2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

087100-H: FINISH HARDWARE

GENERAL

In general, follow the guidelines below when designing and specifying finish hardware. Unless specifically noted otherwise, these guidelines are not intended to restrict or replace professional judgment and all applicable codes.

1. Finish hardware must comply with all current codes and with applicable ANSI/BHMA Standards.
2. In renovation projects, all hardware shall match the existing building standard, hardware manufacturer, model, keying, finish and style within the space. If building standards deviates from guidelines below and current codes, contact the MM Design Manager for direction. For example, typical hardware finishes are Satin Chromium plated, ANSI 626 or US26D. However, the Cancer Center building has original hardware in a polished brass finish. The finish in this building has not worn well, however Satin Chrome looks out of place.
3. No hardware, such as continuous hinges, shall cover the fire rating label on the door or frame. Labels are to be visible.
4. Where removing existing hardware within door assemblies, holes remaining must be covered and/or filled with like material. No fire rated caulk or dissimilar fillers are permissible. Limit use of filling holes with screws, bolts, or plates to four or less, unless directed by the MM Design Manager. Comply with all applicable codes on fire rated doors and frames.
5. Card Reader access: Doors to patient areas with card reader access MUST continue to allow employee ID card access during and after a fire alarm, to allow clinical staff to reach patients quickly. Alternately, for secured areas within the building, the doors MUST unlock and remain unlocked until relocked by Security. Only very secure areas, such as pharmacies, behavioral health units and the like should have the cardreader doors remain locked and a key be required to unlock the doors.

SEQUENCE OF OPERATIONS IN PLAIN ENGLISH FOR ALL CONDITIONS ON CONSTRUCTION DOCUMENTS

Full sequences of operations are to be provided to the clinical and administrative staff, written in “plain English”, for each door (or room type) during design. For electrified hardware, the verbiage of the approved sequence of operations should remain on the construction documents. Generic examples follow:

a. Example 1:
   i. Inserting and turning a key on the outside of the room unlocks the door.
   ii. Depending on which way the key is turned, the door can be kept locked after the key is removed, or the door can be kept unlocked after the key is removed.
   iii. To change the door from locked to unlocked and vice versa, a key needs to be inserted and turned on the outside of the room.
   iv. There is no thumb turn or key on the inside of the room.
   v. It is always possible to exit the room by turning the lever handle.
   vi. The door is opened manually by turning the lever handle and pushing the door
   vii. The door usually closes automatically.
   viii. If the door is pushed fully open, it will remain open until the door is tugged slightly, and then it will close itself.
   ix. In the event of a fire alarm or power failure, the door will close itself.

b. Example 2:
   i. These doors are normally closed, and automatically swing shut to close themselves.
   ii. During normal hours, the card reader will have a green light, the doors will automatically open by “wave to open” in front of a sensor.
   iii. If the card reader is red (after hours), the doors are locked, and can be unlocked by placing an approved employee ID card in front of the cardreader. After the

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

doors unlock, it is then necessary to “wave to open” for the doors to automatically open.
iv. Security can unlock the doors with a key.
v. In the event of a fire alarm or power failure, the doors will unlock and remain unlocked until re-locked by Security.
vi. The doors can be remotely unlocked by Security.

REQUIRED CONTRACTOR SUBMITTALS:

In addition to door, frame and hardware shop drawing submittals, where there is electrified hardware the construction documents must indicate a required submittal of point to point wiring diagrams that must agree with the written detailed sequence of operations.

a. Submit elevation drawing showing relationship of all electrical and pneumatic hardware components to door and frame. Indicate number and gage of wires required. Indicate size of air tubing required. Indicate PSI requirements.
b. Submit wiring drawing showing point to point wire hook up for all components.
c. Smart relays have multiple systems connected and need wiring details. The individualized wiring schematic must be left visible on the component when it is installed.
d. Submit drawing showing point to point hookup of air tubing for all components.
e. Submit system operations descriptions for each type of opening; describe each possible condition.
f. Submit system operation description as part of the original hardware schedule submittal. Failure to include will result in the schedule being returned not reviewed and not approved.
g. Product Data: Manufacturer’s technical data for hardware specified.
h. For all electrified hardware sets, a written detailed sequence of operations which is to be reviewed at the Hardware Design Meeting and included in the project Construction Documents. Note all variations of operations including:
    i. Power failure operation
    ii. Day versus after-hours operation
    iii. Fire alarm operation
    iv. Remote operation
i. For all electrified hardware sets, a detailed elevation drawing will be required showing door, hardware locations, and electrical systems.
j. Electrified hardware specifications shall include the requirement for a wiring diagram fully coordinated with all systems including: Security Access Control, Auto Operation, Fire Alarm System, Intercom Systems and any others.
k. Specify blocking, shims, and anchorage required for installing hardware and concealed within other construction before hardware installation. All blocking shall meet applicable codes.

HARDWARE DESIGN AND COMMISSIONING MEETINGS

1. **Hardware Design Meetings**: A minimum of one Hardware Design Meeting must be held during the Design Phase with the following attendees. On larger projects, or if significant design review comments are made, multiple meetings may be required. Issues to be reviewed at the hardware design meeting(s) include functions desired by Departmental Staff and by Security, functions required by code, existing conditions, door protection options and complete sequence of operations for each door, explained in plain English, covering each possible circumstance (fire alarm, power failure, etc). Departmental Representatives, Security Services and MM Design Manager must agree with the “plain English” sequences of operations for all doors.
    - Departmental Representatives
    - MM Project Design Manager
    - MM Project Design Electrical Engineer (if any electrical hardware is specified)
    - MM Security Services Representative
    - Consulting Hardware Specification Writer
    - Consulting Electrified Hardware/Automatic Doors Specification Writer
    - Consulting Design Architect

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

- Consulting Design Electrical Engineer (if any electrical hardware is specified)
- MM Maintenance Staff

2. **Keying Meeting**: MM Security/Keying Staff will meet with MM Departmental Representatives to develop master keying system and specifications.
3. **Commissioning and Final Adjustment Meeting**: Door hardware commissioning and final adjustment / training meeting(s) are required with the following attendees:
   - Departmental Representatives
   - MM Project Design Manager
   - MM Project Design Electrical Engineer (if any electrical hardware is specified)
   - MM Security Services Representative
   - Consulting Hardware Specification Writer
   - Consulting Electrified Hardware/Automatic Doors Specification Writer
   - Consulting Design Architect
   - Consulting Design Electrical Engineer (if any electrical hardware is specified)
   - MM Maintenance Staff
   - Commissioning Agent

HARDWARE DETAIL

1. **Hinges:** Provide Heavy Weight hinges. Provide Swing Clear hinges at Inpatient Room doors, Telecommunications Rooms and as required by program. (Where MM standard sized wheelchair traffic is anticipated, typically providing wider doors.)
   a. Unless specified otherwise Furnish size 4-1/2" x 4-1/2" for doors 36" or under.
   b. Unless specified otherwise Furnish size 5" x 4-1/2" for doors over 36" wide.
   c. Furnish a minimum of 4 hinges for doors greater than 90" in height and less than or equal to 120" in height or for door widths greater than 42" wide.
   d. Furnish a minimum of 4 hinges, size 5" x 4-1/2" at lead lined doors.
   e. Provide non-ferrous hinges in areas where caustic elements exist: (high humidity areas, exterior installations, pool areas, etc.). Stainless steel base material standard; brass or bronze only where specified.
   f. Prison style hinges are not acceptable.
   g. Provide hospital tips at behavioral health facilities.
2. **Continuous Gear Hinge**: Avoid use at all locations except at aluminum exterior doors and behavioral health facilities. Where required, do not provide pin and barrel hinges. Provide a heavy duty model only.
   a. Interior doors have stainless steel heavy duty continuous hinges with manufacturer's fasteners at 3" on center.
   b. Hinge shall match metal of door, for example aluminum hinge at exterior aluminum door. No dissimilar metals.
   c. .Furnish fire rated hinges "FR" at labeled opening. Coordinate door and frame labels with hinge locations.

3. **Pivot Sets**: Limit use to heavy doors (such as lead lined Radiology doors) and doors requiring bidirectional swing (such as single occupant toilet room doors). Provide heavy gage, load rated hardware.
   a. Provide intermediate pivot(s) as required.
   b. Stainless steel base material standard.
   c. Provide fire rated pivots as required on labeled doors.
   d. Provide appropriate closing device and peripherals as required.
   e. To be surface mounted.
4. **Flush Bolts**: For inactive leafs on storeroom doors, electrical closets, doors which don't require paired egress. Provide without bottom bolt. Provide concealed, positive latch, automatic top flush bolts and auxiliary fire latch, as required by door rating. Do not provide manual bolts.
5. **Locksets and Latch Sets:**
   a. Trim to match building standard, or Best Standard Lever Design #3H or equivalent.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/



b. Provide strikes with extended lips where required to protect trim from being marred by latch bolt. Provide strike lips that do not project more than 1/8" beyond door frame trim at single doors and have 7/8" lip to center at pairs of 1-3/4" doors. Provide wrought box strikes on all locks and latches.
c. At lead lined doors, supply lead wrapped cases.
d. Provide knurled handles on doors in any hazardous areas.
e. **Combination Keypad:** Use should be limited and reviewed with MM Design Manager and Security Management. Keypad application is limited to areas that would normally have no lock required and where there is a minimal security risk of compromise to staff safety or to the area. This is due to the ease of compromise of the codes and limited monitoring and auditing capabilities inherent. Example of use: To separate patient waiting rooms and reception areas from the outpatient treatment corridors.
    i. Should be used as a standalone keyless entry device.
    ii. Should be manually programmable standalone battery powered lockset that allows keyless entry by individual or group codes from 3 to 8 digits.
    iii. Require a MM key override, in addition to the programming and storing of up to 120 codes.
    iv. Programming should also include time functionality features such as auto unlocking and relocking.
    v. Battery replacement is required.
f. **Mortise Type:** All locking functions to be reviewed with MM Design Manager.
    i. Lock case shall be easily handed without chassis disassembly.
    ii. Lock case shall allow change of function without chassis disassembly.
    iii. Lock thumb turns shall meet ADA.
    iv. Lock trim shall be through-bolted to the door to assure correct alignment and proper operation. Thumb turns shall have “EZ” oversized thumb turn equal to IR-Schlage L583-363 at single occupancy toilets, changing rooms and other special needs.
    v. At all cardreader locations, and for communication closets, janitor closets, storage, mechanical and electrical rooms, specify the use of an ‘Apartment Entrance’ or equivalent function lockset. The definition of this function is: Latch-bolt retracted by lever from either side unless the outside lever is locked by the key from inside. When locked, latch-bolt can be retracted by key outside or lever inside.
        1. Security Services will be responsible for managing the distribution of this higher level keying system.
    vi. Integrated card readers with mortise locksets are permissible if hardwired directly to the iSTAR panel and as authorized by MM FPD Design Manager.
g. **Privacy Sets:** At single occupancy restrooms and similar spaces patients might be alone, privacy sets requiring special tools for the outside emergency release will not be accepted.
    i. Single Occupant Toilet Room Locksets

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

1. Inpatient sleeping room toilet room locksets shall be either a passage set or releasable from the outside for emergency access without the use of a key, coin, or tool. Confirm lock function with Design Manager and Nursing Representative.
2. Outpatient clinic single occupancy patient toilet room locksets shall be releasable from the outside for emergency access, without the use of a key, coin, or tool. A privacy indicator shall be provided.
3. Public single occupancy toilet room locksets shall be releasable from the outside by the use of a coin turn. A privacy indicator shall be provided.
4. Staff toilet room locksets shall be releasable from the outside by the use of a key. A privacy indicator shall be provided.



h. **Heavy Duty Cylindrical Type**: Cylindrical locksets are acceptable on small renovation projects within existing buildings which have existing cylindrical locks, on offsite office or outpatient buildings as authorized by MM FPD Design Manager. Typically match building standards.
   i. Provide rigid or Lost Motion trim as specified.
   ii. Trim to match Best Standard Lever Design #3, or match existing; however, knobs are not permitted.
   iii. Provide 2-3/4” backset, unless otherwise indicated.
   iv. Provide strikes with extended lips where required to protect trim from being marred by latch bolts. Provide strike lips that do not project more than 1/8" beyond door frame trim at single doors and have 7/8" lip to center at pairs of 1-3/4" doors. Provide wrought box strikes on all locks and latches.

i. **Electrified Mortise Lock Type:**
   i. Provide electric locking or unlocking for high security and fire safety applications.
   ii. To be UL Listed and rated for both fire and single point locking on labeled doors.
   iii. Always contain "Request to Exit" feature in electrified locks.
   iv. Specify fail safe or fail secure, upon loss of power, per code and application required.
   v. Specify which side of the door is secure. Request to exit (RTE) on egress side only or provide field programmable RTE.

j. **Hospital Latch Mortise Lock Type:** Limit use. Provide only as required by function.
   i. Provide a minimum of 5” backset, unless otherwise specified.
   ii. Typically provide with mortise lock
   iii. Provide electrified as required by function
   iv. At lead lined doors, provide a lead wrapped lock case.

k. **Magnetic Lock Type:** The use of magnetic locks should be minimized and must be approved by the MM Design Manager. Magnetic locks must have bond sensor function and provide a signal when energized.

6. **Rescue Set:** Limit use of rescue sets (double swing door at single occupant patient toilet room or similar) by swinging doors in the direction of egress wherever possible. For privacy where

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

double swing is required due to space constraints, provide a full height removable stop that does not require the use of a tool or a key.

7. **Aluminum Door Dead-latch**: Armor faceplate to suit door edge. Backset shall be 1-1/2" unless door style width requires narrower backset.
8. **Aluminum Door Dead-lock:** Amor faceplate to suit door edge. Backset shall be 1-1/2" unless door style width requires narrower backset. Furnish thumb turn cylinder inside. Furnish with Exit Indicator
9. **Padlock**: Case hardened steel shackle, 1" minimum shackle clearance height. Padlock will be keyed into the building key system.
10. **Electric Strike:** Electric strikes shall provide remote release of latch bolts. Limit use of electric strikes. Electrified Mortise Locksets are preferred.
    a. Provide type as required for use with the type of locks shown at each opening where required.
    b. UL Listed as Burglary Resistant Electric Door Strikes and, where required shall be UL listed as electric strikes for Fire Doors or Frames.
    c. Faceplates shall be stainless steel with finish as specified for each opening. The locking components shall be stainless steel to resist damage and abuse.
    d. Solenoids shall be of the continuous duty type for the voltage specified. Plug connectors will be furnished.
    e. Strikes shall have an adjustable backbox to compensate for misalignment of door and frame.
11. **Electrified Hinges:** This type is to be specified by its electrical function. Specify for interior doors only and typically at all locations requiring access control. Do not specify continuous electrified hinges other than specialized Behavioral Health hardware.
    a. Provide the same class and size as other hinges in the same set.
    b. Coordinate voltage requirements with Electrical Drawings and Specifications.
    c. Provide switch hinges having a minimum of four wires. Coordinate number of wires required and currents to be carried on those wires.
    d. Label that Hinge is electrified.
    e. Do not use at non-retractable latch exit device locations.
    f. Place electrified hinge in middle of door.
12. **Electric Power Transfer:** Use where concealed through wire hinges cannot be used (such as where latch retraction is required), at doors receiving high abuse, high traffic and/ or high security, and at exterior doors.
    a. Used to transfer power from door frame to edge of door.
    b. Provide only UL listed product.
    c. Provide type and size wire as required for application.
13. **Armored Door Cords**: Should be avoided. Only use at renovations where other options are not possible and security and traffic are low.
14. **Electric Power Supply**:
    a. A separate power supply is typically only required at access control doors with electrified retractable latches or where the distance between the electrified door hardware and security panel is long.
    b. Coordinate voltage requirements with MM Security and Electrical staff.
15. **Exit Devices:**
    a. Provide rim mounted exit devices wherever possible.
    b. Provide recessed type exit devices for cross-corridor applications and where cart traffic is present, except where exit devices are electrified.
    c. Exit devices with vertical rods should be specified less bottom rod (LBR) at most locations and should not be concealed type rods except where recessed type devices are used.
    d. Do not specify lever trims at exterior emergency exit doors.
    e. At access control doors, provide less dogging.
    f. Provide Request to Exit in exit device when access control is provided.
    g. Exit devices shall be flat touchpad style, fabricated of brass, bronze, stainless steel, or aluminum, to match the balance of the door hardware.
    h. All exit devices shall incorporate a noise damper.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

i. Touchpad shall extend a minimum of one half of the door width.
j. Only compression springs will be used in devices, latches, and outside trims or controls.
k. Exit devices shall be UL or other testing agency listed panic exit hardware. All exit devices for fire rated openings shall be UL or other testing agency labeled fire exit hardware.
l. Where Lever trim is used it shall be vandal-resistant. Lever design to match lockset design.

16. **Request to Exit**
    a. Requests to exit should be provided in exit device or mortise lock.
17. **Delayed Egress Exit Device**:
    a. Provide less dogging.
    b. Standard Delayed Egress Exit Alarm set to 15 seconds.
    c. Provide filtered regulated power supply terminated to fire alarm.
    d.
18. **Keyswitch**: Only provide where doors require ADA automation, where actuators are to be disabled after business hours.
    i. See 'Division 087113-H, Auto Operated Doors (Including ICU Doors)' for model and additional guideline information.
19. **Keyed Removable Mullion**:
    Avoid the use of keyed removable mullions, use only as function requires and code permits.
20. **Push and Pull Hardware:**
    a. Push Plates: 6" x 16" x .050". If stile widths are less than 8", provide a plate two inches less than stile width.
    b. Push Pull Units: 1" round straight hollow push bar - sized to the width of the door. Pull: 1" round straight hollow pull with 90 degree offset, 12" center to center. Attach top post of pull back to back with end of push bar. Attach bottom post of pull and hinge style & end of push bar with 1" end caps.
    c. Offset Pull: 1" round straight hollow pull with 90 degree offset, 12" center to center.
    d. Straight Pull: 1" round straight hollow pull 12" center to center. Do not use straight pulls with key cylinders.
    e. Pull Plates: 7"ctc 3/4" round x 4" x 16" x .050".
    f. Vandal Resistant Pulls: Stainless steel construction 0.120" thick.
21. **Rod Guard:** Provide stainless steel cover for top exposed rod at paired fire doors. Do not install new bottom rods; use fire pins instead.
22. **Coordinator – Frame Stop Mounted**: Coordinators should be avoided wherever possible. If astragals are required, use two piece astragals rather than overlapping astragals.
    a. Door coordinator shall prevent the active door from closing before the inactive door.
    b. Stop mounted channel 1-5/8" x 5/8" steel tubing x length to suit door opening.
    c. Coordinator shall be UL or other testing agency listed.
    d. Furnish filler bars to fill the gap between the end of the coordinator and the inactive door frame.
    e. Furnish mounting brackets for all stop mounted hardware such as exit device strikes, door closer PA shoes, etc.
    f. Coordinators shall be prepared (cutout) at the factory for surface applied or concealed vertical rod panic devices if required.
    g. Gravity type coordinators will not be permitted.
23. **Closers:** Closers to meet barrier free opening force requirements. Specify only surface mounted door closers. Specify handing and mounting. Concealed closers are not permitted (including aluminum entrance doors). Mount closers on the room side of doors except for behavioral health. Never specify hold open closers on exterior building entrances or vestibules.
    a. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cylinder.
    b. Hydraulic fluid shall be of a type requiring no seasonal closer adjustment.
    c. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. All closers shall have solid forged steel main arms and forged forearms for parallel arm closers.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

d. Where caustic elements exist; provide SRI Sprayed Rust Inhibitor on cast iron / steel parts which may rust.
e. Furnish accessories such as drop plates, panel adapters, spacers and supports as required to correctly install door closers. State degree of the door swing in the hardware schedule.
f. Provide delay action closer or Holder Scanner Activated Hold Open at doors used by patients or with cart traffic.

24. **Overhead Holders and Stops**: Use at openings where equipment, casework, sidelights or adjacent conditions exist that do not permit the use of a wall stop.
    a. Track and arm: High-quality extruded brass or bronze and plated or polished to the finish specified. Stainless steel in caustic areas.
    b. Size appropriately to the width and weight of the door, per manufacturer's requirements. Surface mount type is the design standard.
    c. Provide concealed mount for double acting doors.
    d. Mount on push-side or pull-side of the door as required. Design standard is to mount devices on the room side of the opening where possible.
    e. Provide stop only units at fire rated openings where closers are required
    f. Do not provide at Behavioral Health spaces where patients might be alone.
25. **Fire/Life Safety Closer/Holders:** Use at fire rated openings, where hold-open function is desired and aesthetics or adjacent conditions prevent the use of an electro-magnetic wall mounted hold-open device.
    a. Single Point Electronic Hold-Open (SE) – use at openings where a single hold-open point is needed and is between 90 degrees and 110 degrees.
        i. Surface mount type is the design standard.
        ii. Mount on push-side or pull-side of the door as required. Design standard is to mount closer/holder devices on the room side of the opening.
        iii. Provide thru-bolts when used on fire-rated wood doors
        iv. Electronics are to be within the track, not within the closer
        v. Design standard is to include a wall mounted stop at the hold-open point to prevent overextension of closer/holder arm. Where no adjacent wall exists, an overhead stop may be used.
        vi. Mechanical closer is included with this device.
    b. Multi Point Electronic Hold Open (ME) – use at openings where multiple hold-open points up to 170 degrees are needed.
        i. Surface mount type is the design standard.
        ii. Mount on push-side or pull-side of the door as required. Design standard is to mount closer/holder devices on the room side of the opening.
        iii. Provide thru-bolts when used on fire-rated wood doors
        iv. Electronics are to be within the closer, not within the track.
        v. Design standard is to include a wall mounted stop at the maximum degree of opening to prevent overextension of closer/holder arm. Where no adjacent wall exists, an overhead stop may be used.
        vi. Mechanical closer is included with this device.
    c. Holder Scanner Activated Hold Open (HAS) – use at openings where hold-open is required only while pedestrian traffic is present in the opening.
        i. Surface mount type is the design standard.
        ii. Mount on push-side or pull-side of the door as required. Design standard is to mount closer/holder devices on the room side of the opening.
        iii. Provide thru-bolts when used on fire-rated wood doors, where blocking is not specified.
        iv. Electronics are to be within the closer, not within the track.
        v. Design standard is to include a wall mounted stop at the maximum degree of opening to prevent overextension of closer/holder arm. Where no adjacent wall exists, an overhead stop may be used.
        vi. Mechanical closer is included with this device.
26. **Fire/Life Safety Holders:** Electro-Magnetic Wall Mounted Holders/Electro-Mechanical Overhead Mounted Holders – Is the design standard at fire rated doors where hold-open

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

function is desired unless aesthetics or adjacent conditions prevent use. Interface with fire alarm system.

a. Consider installation on doors located in Control, CT Scan, Imaging, Interventional Radiology Exam, Fluoroscopy, Ultrasound and Nuclear Medicine Rooms.
b. Is the design standard for doors entering into a suite, corridor doors located in smoke barrier walls and on corridor control doors.
c. Provide a wall mounted release button which when pressed, will permit the door to release from the wall mounted magnet, close and latch.
d. A mechanical closer is also required.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

27. **Door Frame Protection**: Subject to functional considerations, provide stainless steel door frame protection floor to top of frame.
    a. Heavy traffic: Provide stainless steel full height frame wrap and/ or door frame roller guard, ex: radiology imaging, logistics rooms, loading docks, janitors closets, etc.
28. **Roller Door Frame Guard:** Used at door requiring protection from wheeled equipment such as gurneys, heavy food carts, hospital beds, etc. instead of or in addition to Heavy Traffic Protection above. Vertical stainless steel roller mounted on the frame to deflect carts by rolling. 42" long typical.
    a. Guards to be mounted 6" from the finish floor.
    b. Guard and guard caps are to be stainless steel.

    Roller guard on stainless steel frame protection below:



29. **Kick & Armor Plates**: Provide stainless steel plates to suit function.
    a. Stainless steel minimum .050" thick. Ease cut ends of armor plates to eliminate sharp edges.
    b. Dimensions: Width: 1-1/2" less than door width to which they are to be applied. Kick plate height: 10". Armor plates: 48", or as dictated by specified hardware.
    c. Armor plates on labeled doors shall comply with NFPA-80 and require to be labeled by UL or other approved agency. .
    d. Install kick plates and armor plates flush to the bottom edge of the door.
    e. Notch armor plates for lock or exit device trim or active case.
    f. When armor plate is used on doors with touch bar type exit devices, determine height of plate by measuring from bottom of door to 1" below bottom of touch bar, and notch for active case.
    g. Where glass or louvers prevent 16" height; supply plate with height equal to height of bottom rail less 2".
    h. Stainless steel kick-plates and Armor plates shall be drilled and countersunk for oval head, countersunk screws. Pan head not acceptable.
30. **Trim Protector Bars:** Provide stainless steel plates to suite function and aesthetics.
31. **Door Edgings**: Provide stainless steel to suit function and aesthetics.
    a. Stainless steel mortise type, .050 inches thick, same height as armor plate, not cut out for hinges. If height interferes with lock or latch front or strikes, cut top of edging at

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

bottom of front or strike. Make cutouts for bottom flush bolts. Provide for both hinge and latch edges.

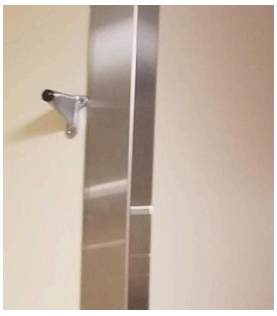
32. **Wall Bumpers**: Typically limited to office and light traffic locations. Always specify concealed blocking within the wall.
    a. BHMA L02101. Wrought, forged, or cast, approximately 2-1/2" diameter, convex rubber center, concealed fasteners.
    b. Products of any BHMA member are acceptable.

Door stops get smashed into the gyp board when there is no blocking:



33. **Wall Stops**: Use at walls with doors in high traffic, patient or cart use areas. Mount at top of door. Always specify concealed blocking within the wall. Mount on a stud if possible.
    a. BHMA L12011 or L12021.
    b. Provide wall stops with threaded studs and expansion shields for masonry wall construction
    c. Length of stop to exceed projection of all other hardware.
    d. Mount sloped side of stop up (below right) at TOP of door

Incorrect at top: correct at top:
Incorrect and a trip hazard:







34. **Floor Stops**: Floor stops should not be used unless there is no other option, and must be authorized by the Design Manager.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

35. **Wall Holders**: The use of wall holders should be minimized.
    a. At heavy non-rated doors, provide a heavy duty holder body and strike with adjustable stop. Mount strike on a stud and/or provide wall blocking. Through-bolt at door.
    b. Furnish strike length to exceed projection of all other hardware.
36. Wall holder must allow door to be held open at designed angle.**Thresholds**:
    a. All exterior threshold shall be ADA Compliant, meeting the standards of the Americans with Disabilities Act and current applicable codes.
    b. Typically 5” wide with corners coped at jambs to extend the width of the face of the frame.
    c. Cope thresholds in front of mullions.
    d. Supply thresholds with Returned Closed Ends (RCE) at all locations where the heading edge of the Threshold extends beyond the face of the flush mounted frame or wall.
    e. All exterior thresholds shall have abrasive surface finish equal to National Guard Products “SIA” nickel/titanium alloy.
    f. Interior thresholds for acoustics in clinical areas shall be resilient reducer strips. .
    g. Interior thresholds at shower and tub rooms with ceramic tile should be solid surface, not marble, ideally installed in conjunction with a trench drain.
    h. Furnish aluminum thresholds with 10-14 Stainless Steel MS/LA fasteners.
37. **Door Sweeps**:
    a. Select a surface mounted door sweep to gasket on the bottom of the door when using the saddle type thresholds.
    b. Install the sweep on the exterior (pull side) of the door.
    c. Finish of the aluminum retainer is to be clear anodized or match the door.
    d. Sweeps used on exterior doors shall have a rain drip as an integral part of the gasket retainer.
    e. Sweeps are to be furnished and install with Stainless Steel fasteners
38. **Weather-Stripping:**
    a. Install the following products on all three sides of the frame opening.
    b. Install the head section first, then the side jamb pieces.
    c. It is important to install this product prior to installing any other door hardware with surface mounting brackets or strikes.
    d. Important note: This product will increase the height of the frame stop, thus affecting the position (template) for installation of surface mounted hardware and mounting brackets (door closers and rim strikes for exit devices).
    e. The aluminum retainer is to be clear anodized finish or match door.
    f. Gasketing is to be furnished and installed with Stainless Steel fasteners
39. **Meeting Stile Weather-Stripping:**
    a. The following item is furnished in sets.
    b. Install gaskets so that the gaskets lightly contact the opposing side.
    c. The parts should allow either door to be opened independently of the other while making firm contact to provide adequate air seals.
40. **Astragals, Overlapping Security:**
    a. Overlapping astragals shall be Stainless Steel.
    b. The metal shall be 3/32” thick with stainless steel fasteners
41. **Astragals, Acoustic:**
    a. Overlapping type. Shall have closed cell sponge neoprene gaskets held in place with a clear anodized aluminum retainer.
42. **Acoustic Gaskets, Perimeter Sound Seals**: Use around doors in patient care areas or where sound reduction is important.
43. **Smoke and Draft Control Gasketing:**
    a. Gaskets must comply with all current codes.
44. **Fire and Smoke Seals:**
    a. Gaskets must comply with all current codes
45. **Door Position Switches:**
    a. Provided by contractor.
    b. Coordinate voltage requirements with Electrical Drawings and Specifications.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

c. Concealed types are preferred.

46. Automatic Door Bottoms:

a. Where a door bottom is required at a fire door, provide UL approved door bottoms. All door bottoms to be surface mounted. Acoustical door bottoms should be used with an appropriate threshold and acoustical gasketing.

47. Fasteners:

a. Furnish fasteners of the proper type, size, quantity and finish. Use machine screws and expansion shields for attaching hardware to concrete or masonry, and wall grip inserts at hollow wall construction. Furnish machine screws for attachment to reinforced hollow metal doors and frames and reinforced aluminum doors and frames. Furnish full thread wood screws for attachment to solid wood doors and frames. "TEK" type screws are not acceptable.

b. Through bolts should not be used on reinforced metal doors or wood doors where blocking is specified.

48. Finishes: For projects in existing buildings, match building standard finish unless directed by the Design Manager. (Note the Cancer Center does not use Dull Chrome finish. Use PVC/PVC free kick plates and armor plates at the Cancer Center).

a. Generally, Dull Chrome, US26D / BHMA 626.
b. Hinges, Non-Ferrous US32D / BHMA 630.
c. Hinges, Steel US26D / BHMA 652.
d. Exit device touch-bars, push/pull bars, pull, push plates, kick plates, overhead holders and stops and wrought bumpers, Dull Stainless Steel, US32D / BHMA 630.
e. Continuous gear hinges, satin aluminum, clear anodized, US28 / BHMA 628.
f. Continuous gear hinges, Paint caps to match color of doors and frames, balance of hinge clear anodized, US28 / BHMA 628.
g. Closers: Powder coated finish, color Aluminum BHMA 689.

49. Cylinders Key Control and Keying:

a. **Master Key System**
   i. The MM master key systems are developed, managed and installed by the Hospital Key Office.
   ii. Technical inquiries should be directed to the Key System Supervisor contact the Key& ID Office at keyidoffice@med.umich.edu or PH. 734-936-6376

b. **Lock Description**
   i. MM requires Small Format Interchangeable Cores aka. SFIC
   ii. The legacy system is being replaced
   iii. The key system is being changed (circa 2017) to Medeco X4, patented keyways registered to MM
   iv. The legacy system is being removed; use is at the discretion of the Hospital Key Office. until it is eliminated acceptable cores are:
      a) Arrow C,D,K & L Keyways
      b) Best C,D,K & L Keyways

c. **Mortise Cylinders**
   i. Mortise or rim cylinder must have lock manufacturers required cam for proper function of lockset.
   ii. Cylinders must be installed in proper orientation with locking screw tightened to prohibit cylinder rotation.
   iii. Solid riveted tail piece, no screw in tail pieces.
   iv. Lock cylinder parts constructed from brass/bronze, stainless steel or nickel silver.
   v. Provide solid machined cylinder rings with tension spring to resist wrenching of cylinder. Length, finish and size as required for correct operation of lockset.

d. **Bored / Cylindrical Locksets**
   i. Correct tail piece for lock core must be delivered to the Hospital Key Office prior to lock core installation.

e. **Specification manuals**
   i. Indicate that all hardware capable of being locked will have the lock core supplied by the Hospital Key Office.

2101 Commonwealth Blvd, Suite B
Ann Arbor, MI 48105-5759
www.med.umich.edu/facilities/plan/

ii. Cylinders required for the project will be supplied by the contractor. The cylinder should be capable of housing the standard MM hospital core.
iii. Cores required for projects will be supplied by MM Hospital Key Office with funds allocated from corresponding projects.
iv. Hospital Key Office will supply or reuse cores for maintenance work at its sole discretion.

f. **Room Signage**
   i. Key cores will be installed only after one of the following is done.
      1. Project Coordinator or Architect provide print reflecting the correct hospital room numbers on large projects.
      2. Project Coordinator or Construction Services has provided print from FPD reflecting relevant changes and room numbers on smaller projects**.**
      3. Room signage is installed

g. **Construction, Remodeling and Maintenance**
   i. Lock cores are the property of MM and must be returned to the Hospital Key Office prior to or at the start of demolition.
   ii. Preferable method is to submit a work order to have Hospital Key Office remove cores prior to start of project and install temporary construction cores if required.
   iii. Cores not returned will be accessed as to security implications and appropriate measures will be pursued.
   iv. Contractors are prohibited to use their own construction cores. Construction cores to be supplied by Hospital Key Office.
   v. Contractor responsible for proper operation of lockset at installation.
   vi. If the lockset is not completely or correctly installed or does not operate within manufacturers or MM specifications, the lock core will not be installed.
   vii. Hospital Key Office will communicate with Project Manager and/or Project Coordinator via email with the specific details to rectify the situation in a timely manner.

h. **Activation**
   i. Hospital Key Office will remove construction cores.
   ii. Install permanent keying per keying scheme developed with customers.
   iii. Customers will need to request keying through Key & ID office prior to move in.

50. Suicide prevention door top alarm system. Provide photoelectric sensors centralized alarm systems within inpatient psychiatric nursing units at patient toilet and bathrooms and patient sleeping rooms, and otherwise as required by clinical function. Shall have continuous hinges, hospital tips, keyswitches, local A/V alarm, centralized station with addressable, recordable, self-monitoring. Reports shall include date and time and location. Alarm shall remain active until manually reset with key switch at doorway location. Clinical and facilities review to select appropriate manufacturers.

51. Anti-ligature lockset: Provide inpatient psychiatric nursing units at patient toilet and bathrooms and patient sleeping rooms, and otherwise as required by clinical function. Crescent handle, mortised. Provide beveled latch at light security locations where ligature is a higher risk, and straight latch where security is a higher risk. Clinical and facilities review to select appropriate manufacturers.