

OPENINGS

This section of the Washington University School of Medicine (WUSM) Design Standards addresses the following requirements for Openings and its application in WUSM projects:

HOLLOW METAL DOORS AND FRAMES
ALUMINUM DOORS AND FRAMES
STAINLESS STEEL DOORS AND FRAMES
WOOD DOORS AND FRAMES
OVERHEAD DOORS
REVOLVING DOORS
FINISH HARDWARE
ACCESS CONTROL HARDWARE

The WUSM Project Manager will coordinate review of security access issues with the architect, engineers, protective services, and vendors in a minimum of two design meetings.

References:

Standards References:

[ACCESSIBILITY / UNIVERSAL DESIGN](#)

[EH&S](#)

HOLLOW METAL DOORS AND FRAMES

DESIGN GUIDELINES

- a. Hollow metal doors and frames shall be used in high abuse areas such as utility rooms, service areas, mechanical rooms, and dock areas.

PRODUCT REQUIREMENTS

1. Fire ratings, where applicable, shall be clearly labeled on hollow metal doors and frames. Labels must be factory installed and bear the testing agency label.
2. Standard frames shall be 16-gauge hollow metal. Frames shall be double rabbet, 2-inch face with 1/2-inch returns. Throat to match partition thickness at interior drywall partitions.
3. Standard door size shall be 36-inches wide by 84-inches high by 1-3/4-inches thick, 16 gauge (14 gauge at exterior doors) hollow metal. Larger openings shall be provided as required by equipment sizes or room usage. Verify size of door required due to equipment sizing and path of travel.
4. Doors and frames at exterior locations shall be metallic-coated (galvanized). Doors at exterior locations shall be insulated.
5. Frames shall be welded. Knock down frames at interior locations shall be by exception only.
6. Doors and frames shall be prepared and reinforced for required hardware.
7. Exterior frames in masonry construction shall be grouted solid. Interior frames shall not to be grouted.
8. Doors in high abuse areas shall receive stainless steel kickplate(s), sized as required, to protect door from impact loads.
9. Doors and frames at cage wash and rack wash areas shall be stainless steel.
10. [Doors and frames at Biosafety Level 3 \(BSL3\) laboratories shall be chemical resistant coated metal steel. Reference criteria from EH&S.](#)
11. Glass lites shall be provided by exception only. However, it is recommended that glass lites be provided with laboratory to corridor doors whenever possible to promote safety when entering and exiting laboratories.
 - a. The design professional shall investigate and discuss with WUSM Project Manager glass lite locations in doors required for safety purposes.
 - b. Fire rated glass shall be by exception only.

INSTALLATION

1. Interior frames shall be secured to stud wall construction with a minimum of three anchors per jamb, in line with the hinge locations.
2. Exterior frames shall be secured to adjacent construction with bolts or masonry anchorage devices at a minimum of three anchors per jamb, in line with the hinge locations.

ALUMINUM DOORS AND FRAMES

DESIGN GUIDELINES

1. Aluminum frames shall be used in low abuse areas such as offices, conference room, break rooms, and laboratories, and where they match an existing building standard. Review all locations with WUSM Project Manager.
2. Aluminum frames shall be used for sidelights, transoms, and borrowed lights. Standard width for sidelites is 12".
3. Aluminum frames shall be used with wood doors.
4. Aluminum doors with full glass light shall be used by exception only.
5. Aluminum doors and frames shall not be used in high abuse or wet areas.

PRODUCT REQUIREMENTS

1. Frames shall be double rabbet design with minimum 1/4-inch returns (manufacturer's standard frame width and wall return). Trim shall be 1-1/2-inch rectilinear with corners mitered. Throat shall match partition thickness.
2. Acceptable manufacturers shall include:
 - a. Frameworks Manufacturing Company, Inc.
 - b. Modulex, Inc.
 - c. Raco Interior Products, Inc.
 - d. Versatrac
 - e. Wilson Partitions, Inc.
3. Door stile may be narrow, medium, or wide. Stile of door shall be coordinated with hardware. Bottom rail shall be 10-inches high to comply with ADA.
4. Doors shall be prepared and reinforced for required hardware.
5. Frames shall be prepared for hardware with concealed reinforcement plates, drilled and tapped as required and fastened within frame with concealed screws.
6. Finish shall be clear anodized aluminum.

INSTALLATION

1. Treated wood blocking shall be provided within the metal stud cavity and securely attached to the framing to allow positive anchorage of the aluminum framing system to wall substrate. Frames shall be continuously secured to the stud wall construction as required by the manufacturer.

STAINLESS STEEL DOORS AND FRAMES

DESIGN GUIDELINES

1. Stainless steel doors and frames shall be used by exception only. Possible areas of use would include infectious control, environmental rooms, cage wash areas, and rack wash areas.

OPENINGS

PRODUCT REQUIREMENTS

1. Fire ratings, where applicable, shall be clearly labeled on stainless steel doors and frames. Labels must be factory installed and bear the testing agency label.
2. Frames shall be welded.
3. Doors and frames shall be prepared and reinforced for required hardware.
4. Glass lites shall be provided by exception only. However, it is recommended that glass lites be provided with laboratory to corridor doors whenever possible to promote safety when entering and exiting laboratories.
 - a. The design professional shall investigate and discuss with WUSM Project Manager glass lite locations in doors required for safety purposes.
 - b. Fire rated glass shall be by exception only.

INSTALLATION

1. Frames shall be secured to stud wall construction with a minimum of three anchors per jamb, in line with the hinge locations.

WOOD DOORS AND FRAMES

DESIGN GUIDELINES

1. Typical doors shall be solid core flush wood door in selected frame.
2. Bi-folding doors shall not be allowed. Pocket doors shall be allowed by exception only.
3. Wood frames shall be used by exception only. Where approved, the frames shall wrap the face of the adjacent wall construction. Frames with reveals that match the adjacent wall thickness shall not be used.

PRODUCT REQUIREMENTS

1. Fire ratings, where applicable, shall be clearly labeled on doors. Labels shall be factory installed and bear the testing agency label.
2. Standard door sizing shall be 36-inches wide by 84-inches high by 1-3/4-inches thick. Double leaf doors and pairs of doors shall be allowed by exception, as required by room usage or equipment sizing.
3. Wood veneer shall be plain sliced with clear or stained finish. Pairs of doors shall have matched veneers. Edge banding on doors shall match the face veneer. Veneers such as white maple, walnut, cherry, and red oak shall be acceptable when appropriate to the building and approved by the WUSM Project Manager. Other veneer species shall be allowed by exception only.
4. Wood veneer and grain shall match existing at department renovation projects as approved by the WUSM Project Manager.
5. Cut-in glass lites shall be provided by exception only. However, it is recommended that glass lites be provided with laboratory to corridor doors whenever possible to promote safety when entering or exiting laboratories. Glass lite frames shall be wood with trim overlapping the door thickness.

Metal shall be used by exception only. Where approved, the wood frame shall be wider than the door and wrap the exposed edge of the door.

- a. The design professional shall investigate and discuss with WUSM Project Manager glass lite locations in doors required for safety purposes.
 - b. Fire rated glass shall be allowed by exception only.
6. Doors shall be factory finished. Shop and field finished doors shall be allowed by exception only.
 7. Doors shall be factory machined for specified hardware that is not surfaced applied.

INSTALLATION

1. Wood frames shall be installed level, plumb, true, and straight. Shim as required with concealed shims.
2. Wood frames shall be scribed and cut to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts
3. Wood frames shall be anchored to blocking built in or directly attached to substrates. Secure with countersunk concealed fasteners and blind nailing. Use fine finish nails for exposed fastening, countersunk and filled flush with woodwork.

OVERHEAD DOORS

DESIGN GUIDELINES

1. Overhead doors shall be used at service areas where receiving and loading are required.
2. Overhead counter doors shall be used at over the counter dispensing and transaction areas.
3. Overhead grilles shall be used at open areas requiring security.

PRODUCT REQUIREMENTS

1. Door shall be overhead coiling type formed with curtain of interlocking slats.
2. Door shall be furnished with jamb guides, hoods, hardware, and counter balance mechanisms.
3. Door finish shall be baked-enamel or powder-coat. Other door finishes shall be as approved by WUSM Project Manager.
4. Door operation shall be power operated, with flush mounted, constant contact key switch control.
5. Door shall be provided with automatic reversing control by means of electrically activated bottom bar on door.
6. Door shall be provided with safety features of bell alarm, visual alarm, and electric eye stop.
7. Security and access control shall be provided by point-to-point telephone or intercom at exterior overhead doors. Telephone system with more than one contact is preferred.

INSTALLATION

1. Overhead coiling doors and operating equipment including necessary hardware, anchors, inserts, hangers, and equipment supports shall be installed according to manufacturer's written instructions.

REVOLVING DOORS

DESIGN STANDARDS

1. Revolving doors shall be used at building entrances by exception only.
2. Vestibule/air lock would be preferred at building entrances. Air curtain may be required based on depth of vestibule.

PRODUCT REQUIREMENTS

INSTALLATION

FINISH HARDWARE

DESIGN GUIDELINES

1. Finish hardware shall be provided at hollow metal doors, wood doors, and aluminum entrances. Cylinders shall be provided at overhead coiling doors and grilles.
2. Locking and security functions shall be coordinated with WUSM Capital Projects and Protective Services.

PRODUCT REQUIREMENTS

1. Latch sets and locksets shall be cylindrical or bored at all door locations. Mortised locksets shall be by exception only.
2. Cylindrical locksets shall be Best 9K Series, heavy duty commercial with lever handle.
3. Mortised locksets shall be Best 40H Series, heavy duty commercial with lever handle.
4. Cylinders shall be Best 7-pin heavy duty.
5. Grand master keying system shall be provided. Cores and keys shall be provided by Contractor. Contractor shall verify and coordinate keying requirements with WUSM Capital Projects.
6. Hinges shall be Hager ball bearing. 1-1/2 pair butts shall be provided for door up to 7-feet and 2 pair butts for doors over 7-feet in height.
7. Exit doors, restroom and toilet room doors, and doors opening onto a public corridor shall be self-closing.
8. Office doors shall not have closers, unless required by code.
9. Closers shall be LCN 4040 Series. Concealed closers shall be provided by exception only. Janitor closets shall have 180-degree hold-open.
10. Door stops shall be wall mounted. If used, floor stops shall not impede traffic. Where wall or floor stops are not appropriate, overhead stops shall be used.
11. [Magnetic holders shall be Sentronic SEM 7800 Series.](#)
12. [Exit devices shall be Von Duprin 99 Series.](#)
13. Push/Pulls shall be large diameter "D" pulls, 12-inch length.

14. Accessible entrances shall have power assist buttons as required. Animal facilities where large carts and cages are being maneuvered shall have power assist buttons. Pairs of doors at animal facilities to have push and go and push-button openers. High mounted door sensors shall be considered for these locations.
15. Power assist buttons shall be ADA compliant push button. Touchless Activation Sensors may be appropriate in some locations as reviewed and approved by WUSM Project Manager.
16. Kick Plates shall be used at exit doors, restrooms and animal facilities. Restroom and exit door kick plates shall be 18-inches high, full width of door less 2-inches, and stainless steel. Animal facilities kick plates shall be wainscot height and stainless steel, fiberglass, or Acrovyn.
17. Finish on hardware shall satin chrome or satin stainless steel.
18. All pairs of doors with security requirements shall have astragals. Pairs of doors without security requirements shall be reviewed on a case-by-case basis.
19. [Security related hardware may be found in the ACCESS CONTROL HARDWARE section.](#)

INSTALLATION

1. Each item of door hardware shall be installed to comply with manufacturer's written instructions.

ACCESS CONTROL HARDWARE

GENERAL

1. Tech Electronics is the primary vendor for all security related systems at the Medical Campus. The Director of WUSM Protective Services, in conjunction with Tech Electronics, is responsible for design review of all security related systems. The WUSM Project Manager will coordinate review of security access issues with the Architect, Engineers, WUSM Protective Services, and Tech Electronics in a minimum of two design meetings.
2. Exterior Doors:
 - a. The following methods of securing exterior doors:
 - i. Mechanical Key (ex: exterior mechanical doors and similar) or
 - ii. Standard at entry doors (on bollard where required by ADA):
 - Access Control
 - Intercom / Emergency Phones
 - Cameras / CCTV
 - b. All perimeter doors shall be wired to the central system.
 - c. Owner prefers touch sensor bars over motion sensors for door release.
 - d. WUSM Protective Services determines where cameras will be located. End users may request CCTV through the Protective Services Director. Location of cameras to be reviewed during Design Development phase. Adequate lighting for cameras must be provided; see [Lighting Standards](#) for more information.

- e. Intrusion / Panic Alarms may be requested by Department through WUSM Protective Services. Preferred configuration is connection to access control system and voice dialer which are both monitored by Protective Services Communications Center. Where connection to access control is not feasible, dual voice dialers are preferred – one to WUSM Protective Services Communications Center and one to Tech Electronics (Lenel System).
3. Interior Doors:
 - a. Use the following methods of securing interior doors:
 - i. Card reader in all elevator cabs to control individual floor access
 - ii. Card reader to each floor from inside of stairs
 - iii. Card reader to move from lobby areas to office lab area per floor
 - iv. Locks for individual doors are end user defined as:
 - Mechanical key or
 - Card Access – three levels: Stand alone, wireless, and hardwired
 - b. All electro-mechanical locks will be keyed to Best and through Facilities Engineering for coring.
 - c. Architect, Owner, and End User to determine locations of Card Access.
 4. Skidata is the primary vendor for parking garage security systems.

PRODUCT REQUIREMENTS

1. Access Controls

Sole Source: This system is provided by Tech Electronics (Lenel System).

- a. Notes for all locking hardware:
 - i. Fail safe operation where allowed by code. Exceptions include animal facilities and pharmacies. Confirm type of operation on all projects with WUSM Protective Services.
 - ii. 24V / DC continuous duty ratings on locking hardware.
 - iii. Door closers required on access-controlled doors.
 - iv. Latch guards required on all exterior doors with electric strikes; may be required on some interior doors.
 - v. Maglock doors must be interfaced with the building's Fire Alarm System. Typically, only one connection is required at the Main Access Control Panel location.

2. Intercom / Emergency Phones

Sole Source: This system is provided by Pass Security System (Avigilon).

3. Cameras / CCTV

- a. Sole Source: This system is provided by PASS Security.

- b. PASS Security is the vendor for all CCTV related systems at the Medical Campus. The Manager of Critical Systems & Field Investigations, in conjunction with PASS, is responsible for design review of the CCTV system. The WUSM Project Manager will coordinate review of CCTV System issues with the Architect, Engineers, WUSM Protective Services, and PASS in a minimum of two design meetings.

EXECUTION

A. Installation - Access Control

- a. Provide a minimum of 48" of horizontal wall space for the installation of the headend equipment. Locate in one of the following locations, in order of preference: Communications Room, Electrical Room, or Mechanical Room).
- b. Typically, one dedicated 20A, 120V / AC circuit is required for the headend equipment. An emergency circuit is strongly recommended. Typically, no 120V / AC power is required in field, except where electrified panics and door operators are provided.
- c. Complete conduit systems are not required. Rough-in boxes and device stubs for new construction/remodel projects are preferred.
- d. One campus network connection required for each of the following: for every five Access Control Panels, for each NVR, for each Intercom Cabinet, for each standalone Intercom not wired to a cabinet, for each PTZ.

4. Installation - Intercom / Emergency Phones

- a. Provide a minimum of 36" of horizontal wall space for mounting all security equipment. In multiple floor buildings, provide space on each floor in each stacked Communications or Electrical Room. Provide horizontal space directly above and below to facilitate wiring where possible.
- b. All intercoms require low-voltage drop. Coordinate with Washington University I.T. for I.P. Address.
- c. Provide one 120 V / AC, 20-amp emergency circuit to the control panel location. Where emergency power is not available, standard power is acceptable.
- d. Fire Alarm Interface: Provide one set of normally closed Fire Alarm General Alarm contacts from the buildings Fire Alarm Control Panel.

5. Installation - Cameras/ CCTV

- a. Provide a minimum of 48" of horizontal wall space for the installation of the headend equipment. Locate in one of the following locations, in order of preference: Communications Room, Electrical Room, or Mechanical Room).
- b. Typically, one dedicated 20A, 120V / AC circuit is required for the headend equipment. An emergency circuit is strongly recommended.
- c. Communications: Provide one network connection (and IP address) for the Digital Video Recorder (DVR). Network communications must be possible with the server at 128.252.223.161.
- d. Provide at least 6 RU in the 19" Telco/Data rack for mounting the DVR. Provide at least 36" of horizontal space for mounting all security equipment. In multiple floor buildings,

provide space on each floor in each stacked Communications or Electrical Room.
Provide horizontal space directly above and below to facilitate wiring where possible.

6. Continuity testing is required on all projects before Washington University I.T. begins work.