



**RHODE ISLAND SCHOOL OF DESIGN**  
**Facilities Management**  
*Office of Planning, Design & Construction*  
**2 College Street Providence, RI 02903 / Office 173 Benefit Street**

RISD STANDARDS for MATERIALS AND SYSTEMS

April 2022

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**CAD SPECIFICATIONS**

1. BASIS OF SPECIFICATIONS:



The purpose of this specification is to obtain a consistency of CAD files used and maintained by the RISD Office of Planning, Design & Construction.

2. ELECTRONIC FILES:

- a. Electronic CAD files shared with the RISD shall be able to be opened and read using a recent version of AutoDesk's AutoCAD software.
- b. All layer names should follow the most recent version of the AIA CAD Layer Guidelines.
- c. Example: A-WALL\_PLAN\_01
- d. Drawings must be formatted such that RISD may plot at a 1:1 scale.

3. DRAWING SHEET SIZE, SCALE, FORMAT, AND TITLE BORDER:

- a. The preferred drawing size is ARCH D 24" x 36" format. However, the Architect/Engineer may use ARCH E 30" x 42" format with a properly modified title block.
- b. An acceptable and appropriate color dependent style table file (.ctb) must be used.
- c. All drawings must use the RISD Title Border as provided by the RISD Office of Planning, Design & Construction.

	 RHODE ISLAND SCHOOL OF DESIGN 1 COLLEGE AVENUE PROVIDENCE, RI 02903
	VENDOR INFORMATION
	RESERVED FOR STAMP
	PROJECT TITLE BUILDING NAME ADDRESS PLAT # LOT #
	SHEET CONTENTS: PLAN SECTION NOTES POWER LINES  DATE & FOR: _____ REVISION # DATE BY/APP: _____ DATE
 <b>A-1.1</b> SHEET 1 OF 1	



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### DOORS AND HARDWARE SPECIFICATIONS

1. WOODEN DOOR SPECIFICATIONS:
  - a. All doors shall be 5-ply construction with lifetime warranty for re-hanging and re-finishing.
  - b. Door styles shall be hardwood to match face veneer.
  - c. Doors shall be 1.75-inch thick beveled 3 degrees both hinge.
  - d. Warranty shall be furnished to owner upon completion of contract.
  - e. VENEER: Shall be as specified. Rotary cut natural birch, plain sliced red oak, rotary cut natural oak, etc.
  - f. GLAZING : For wooden doors, glazing shall be ¼" safety laminated glass. Glazing bead shall be flush. Louvers shall be 18 ga. steel. Fire rating shall be as specified. Core shall be mineral or particle for proper fire rating.
  - g. FINISH : Finish on doors shall be two(2) coats of clear polyurethane. Doors shall be sanded in-between coats. Stain to match as required.
  
2. HM SPECIFICATIONS:
  - a. EXTERIOR DOORS: Shall be 16 ga. galvanized baked on primer seamless edge and face. Doors shall be reinforced for all hardware, including panic devices, door closers, push & pull. Doors shall be insulated and close flush at top.
  - b. INTERIOR DOORS : Shall be 18 ga. seamless, honeycomb, core reinforced as ext. doors.
  - c. MACHINING: Doors shall be furnished with all holes drilled for mortise locksets, cylindrical locksets and panic devices where called for on plans.
  - d. HM FRAMES: Exterior shall be 14 ga. welded construction. Interior shall be 16 ga. KD or welded as per plans.
  - e. FASTENERS: All wood screws, shields, and masonry anchors shall be furnished with frame. Proper UL fire ratings shall also be ascertained for door and frame openings.
  - f. All HM shall meet Steel Door Institute specifications and reinforced for all hardware.
  - g. Exterior frames shall have high frequency hinge reinforcement.
  - h. It is the intent of RISD to maintain a standard of quality on all doors, doorframes, hardware, and related accessories. Doors, doorframes, hardware, and related accessories shall not be furnished and or installed without the submittals being approved in writing by RISD. A meeting to review and approve the keying application will be required. RISD shall be notified in writing and approve of any proposed changes to the doors, doorframes, hardware, and related accessories or installation thereof subsequent to the approval of the related submittal.
  
3. HARDWARE:
  - a. Panic Devices
    - i. Sargent 80 Series
    - ii. Sargent 12-80 Series
    - iii. Trim Lever EBT
  - b. Door Closers
    - i. Exterior: LCN4111  
Sargent 281
    - ii. Interior: Sargent 281  
Sargent 1431
  - c. Hinges
    - i. Exterior: Solid brass or stainless exterior HW 4.5 x 4.5 NRP  
Continuous: Roton 780-226HD  
Electrified hinges manufacturers: Pemko, ABH, Assa Abloy
    - ii. Interior: Steel ball bearing interior 4.5 x 4.5 NRP  
Electrified hinges manufacturers: Pemko, ABH, Assa Abloy
  - d. Lockset Mortis
    - i. Sargent 8200 LW1B  
8200
    - ii. Sargent 8271 24 volt – According to the application for Card Access Reader  
MTK-15 Black Schlage

All Lock functions to be determined



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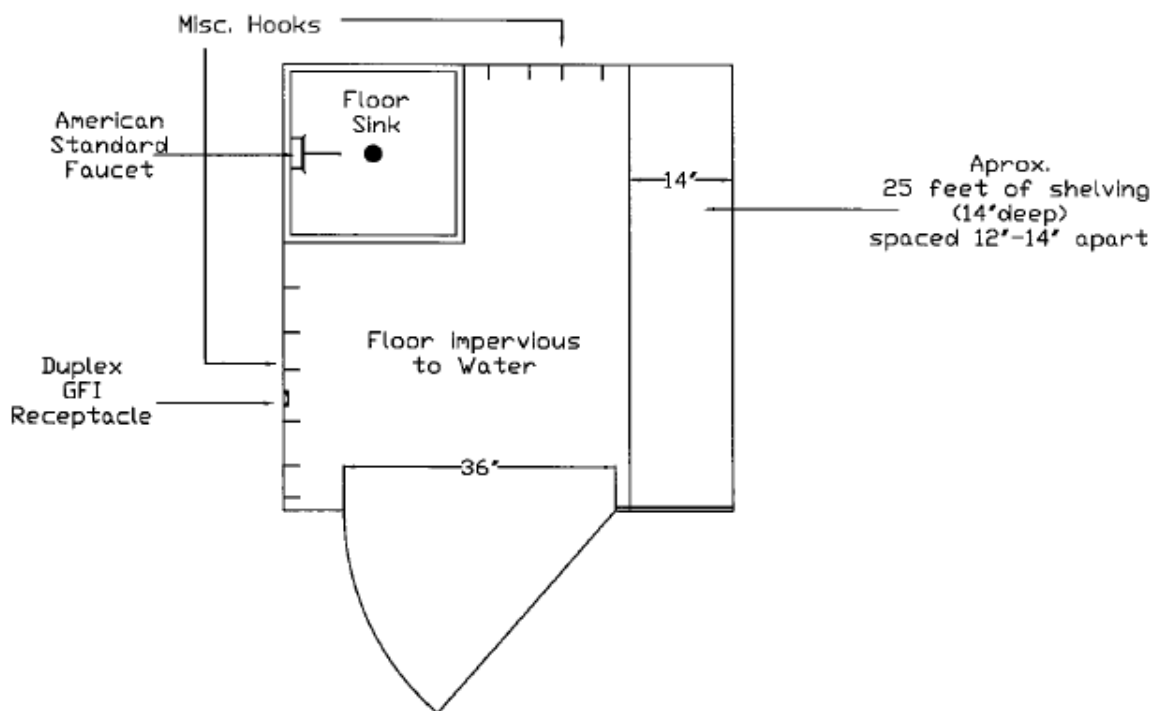
- e. Weather Stripping
    - i. Pemko 306 AV
  - f. Threshold
    - i. As required Aluminum (exterior)
    - ii. Door Bottom Pemko 315 CN (exterior)
  - g. Push and Pulls
    - i. Rockwood Manufacturing Company
  - h. Cylinders
    - i. Keso Cylinders are to be provided at Academic Buildings.
    - ii. Sargent – Removable core at schedule
    - iii. Sargent – Restricted factory system at Academic Building
    - 1. Provide proper keyway. Cylinders to be pinned, keyed and installed by contractor, unless prior arrangements are made with RISD project manager.
  - i. Key Management
    - i. All keys to be provided grouped and tagged with a room/door designation as approved by RISD.
    - ii. Provide a key cabinet sized as required for the project keys and as approved by RISD.
  - j. Finishes
    - i. Finish of all hardware shall be US10, US10B, US26B, US32D; depending on location.
    - ii. Finish on door closers shall be painted to match.
  - k. Fasteners
    - i. Hardware shall be drilled and tapped to door and frame.
    - ii. TEK screws shall not be used.
4. ALUMINUM DOOR SPECIFICATIONS:
- a. WIDE STYLE FOR EXTERIOR: 5-inch stiles, 6-inch top rail, 6-inch bottom rail.
  - b. MEDIUM STYLE FOR INTERIOR: Use 3.5 stiles and rail, 4-inch bottom rail. Aluminum doors shall be 1.75-inch thick (6063-tr) with all exposed surfaces given a 204R1 clear anodized finish or #313 dark bronze anodized finished as specified.
    - a. Wall thickness shall be 1/8-inch. Glazing beads shall have neoprene inserts for clean putty less, snap in glazing.
    - b. Exterior glazing bead shall be non-removable.
  - c. HINGES: Exterior doors shall have continuous Roton or Pemko hinges.
    - a. Interior Doors shall have three(3) per door leaf for 7'-0" and under; four(4) per door up to 8'-0" NRP. Hinges shall be US 26d finish or as specified.
    - b. Frames shall be constructed of seamless extruded aluminum tubes of 6063-t5 with anodized surface. Frames for butt hinge doors shall be furnished with .25 aluminum hinge reinforcement plates and weather-stripped doorstops.
  - d. GLAZING: .25 safety glass, .25 tempered, or as specified.
  - e. HARDWARE: Closers-LCN aluminum or bronze painted finish installed by contractor as specified.
  - f. PANIC DEVICES: Sargent 80 Series to match finish of aluminum. Single doors surface rim. Doubled door surfaced mounted with ETB trim.
  - g. THRESHOLD: To meet ADA requirements.
  - h. CYLINDERS: Provide proper keyway. Cylinders to be keyed and installed by the contractor (unless prior arrangements are made with RISD).
5. CARD ACCESS HARDWARE REQUIREMENTS
- a. Mortise Electric Lock: Sargent 8271, Trim LNL, 26D to all card access opening when applicable
  - b. Electric strikes: if required, Hess 9600, 9400 or 1006
  - c. REX devices: Risko I REX Plus
  - d. Readers: Schlage MTKB15
  - e. Door contacts: Nascom
  - f. Power transfer: Von Duprin EPT10



TYPICAL CUSTODIAL CLOSET

# Typical Custodial Closet RISD

Aprox. 25 sq. ft.



- Faucet - American Standard # 8344.112.002
- Floor Sink - 24" X 24" X 8"D (Flat or Equal) with 18" backsplash
- Light Fixture - Fluorescent, GE T8 Ultra lamp and ballast
- 1 GFI receptacle
- Aprox. 10 hooks for mops, brooms Etc.
- Shelving



**VOICE AND DATA STANDARDS**

1. GENERAL:

- a. The installer under this section shall provide all required labor and additional material to install, terminate, test and certify the passive cabling infrastructure systems to comply with Industry Standards. All work under this contract / purchase order shall comply with the attached RISD Standard Terms and Conditions.
- b. Provide all additional materials, and the necessary labor and services required to ensure a complete system, installed in accordance with the intent of the Contract Documents. Furnishing and installing all incidental items not actually shown or specified, but which are required by good practice to provide complete functional systems.
- c. Coordinate all activities with the owner, the General Contractor and overall construction schedule.
- d. Develop a bill of materials, perform material management and efficient use of the materials whether they are issued by Owner or purchased by the Installer. Ensure materials in excess of those required to complete the project are kept in their original condition and packaging for restocking.
- e. Information Transport Systems drawings show only general locations of equipment, devices, raceways, cable trays, boxes, etc., unless specifically dimensioned. The Installer shall be responsible for the proper placement and routing of equipment, cable, raceways, cable runway, and related components; according to the Contract Documents and subject to prior review by Owner. If found, refer any conflicts within the Contract Documents to Owner for resolution.
- f. Installer shall obtain all permits and arrange all inspections required by codes applicable to this Division and shall submit written evidence to the Owner that the required permits, inspections, and code requirements have been secured. Coordinate site permits with the Owner and obtain Owner approval before contacting local governmental agencies.
- g. Review, observation, assistance, and actions by the Owner shall not be construed as undertaking supervisory control of the work or of methods and means employed by the Installer. The Owner review and observation activities shall not relieve the Installer from the responsibilities of these Contract Documents.
- h. The fact that the Owner does not make early discovery of faulty or omitted work shall not bar the Owner from subsequently rejecting this work and withholding payment until the Installer makes the necessary corrections.
- i. Regardless of when discovery and rejection are made, and regardless of when the Installer is ordered to correct such work, the Installer shall have no claim against the Owner for an increase in the Subcontract price, or for any payment on account of increased cost, damage, or loss.

2. REFERENCES:

- a. All national codes, Building Code of the State of Rhode Island (Latest Adopted Code), Electrical code of the State of Rhode Island (Latest Adopted Code). All other local and State Codes (Latest Adopted Codes). TIA/EIA 568-B Series (Latest Revision), TIA/EIA 569-B Series (Latest Revision), TIA/EIA 598-C Series (Latest Revision), TIA/EIA 606-A Series (Latest Revision), J-STD 607-A (Latest Revision), TIA/EIA 758-A Series (Latest Revision), ANSI/IEEE 802.3 (including sub-sections), and all other Standards related to or referenced by the Standards listed herein.

3. DESIGN CRITERIA:

- a. Compliance by the Installer with the provisions of this Specification does not relieve him or her from the responsibilities of providing materials and equipment of proper design, mechanically and electrically suited to meet operating requirements at the specified service conditions. The intent of the Drawings is to restrict the maximum horizontal subsystem cabling length to 295 feet defined as the link between the Main Distribution Frame (MDF) or Intermediate Distribution Frame (IDF) in the METR and each served IT work area outlet.
- b. As buildings on campus are renovated and advances made to technology, it is the responsibility of the contractors to verify with the Owner the type of cable to be used in each project.

4. SCOPE OF WORK:

- a. Furnish, install, terminate, label and test a complete operating cabling system, as shown on the contract drawings



- b. Provide Fiber Optic cable terminated (no less than 24 Count) via Fusion Spliced pigtails installed in a 2U FSU. See Appendix A for details.
  - c. Provide horizontal cabling from the patch panels to their respective Telecommunication Outlet as shown on the Drawings.
  - d. Provide adequate cable service loop in order to relocate and re-terminate cables from patch panel to furthest located free standing cabinet within the MTER.
  - e. Provide approved rated J-hooks hanger systems from all Telecommunication Outlet to their respective IDFs as required for a complete system.
  - f. Provide fire/smoke proof sealing systems at all penetrations.
    - i. Provide all fire/smoke seals at all penetrations meeting code for the installation of equipment or systems.
    - ii. Properly replace all existing structural fireproofing materials disturbed or removed during the installation of equipment or systems. Coordinate with the General contractor and Construction Manager.
    - iii. The Installer shall be held responsible to replace fireproofing materials in order to meet code and meet the original fire-proofing installation methods. Fire-proofing materials that have been replaced by the Installer that do not comply shall again be removed and replaced by a fire proofing contractor designated by the Owner at the Installers expense.
  - g. The Installer shall be responsible for providing and installing access panels as required to facilitate the work. The size and location of all access panels is subject to written approval from the Owner. All access panels shall meet or exceed the fire rating of the assembly that they are installed in.
  - h. 8. The contractor is responsible for all cutting and patching of all surfaces and assemblies associated with the installation in this scope. All materials used to patch will be similar to the adjacent material subject to fireproofing requirements.
5. WORK SPECIFICALLY EXCLUDED FROM PROJECT:
- a. Incoming common carrier services.
  - b. Private Branch Exchange Systems.
  - c. Wide Area Network Systems.
  - d. Local Area Network Systems.
  - e. Data processing equipment.
    - i. Final connections (cross connects and patching)
    - ii. Painting of any new work including patching will be by Owner.
6. PRODUCT WARRANTY AND APPLICATION ASSURANCE:
- a. A twenty-five (25) year Molex Category 6 extended product warranty and application assurance for this wiring system shall be provided for all new back-bone and horizontal UTP cabling as follows:
    - i. 25 year extended product warranty:
      1. The 25 year extended product warranty shall include providing replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s) for a twenty-five (25) year period.
    - ii. 25 year application assurance:
      1. The 25 year application assurance shall cover the failure of the wiring system to support the application which it was designed to support, as well as additional application(s) introduced in the future for a twenty-five (25) year period.
    - iii. System certification:
      1. Upon successful completion of the installation and subsequent inspection, the Owner shall be provided with a numbered certificate, from the manufacturer(s), registering the installation.
7. QUALIFICATIONS:
- a. The Installer shall be a telecommunications cabling Installer that possess all licenses and industry certifications required to install information transport system's (IT) cabling at this specific project location. The Installer and all of the Installer's individual personnel on this project shall be trained and certified by the manufacturer whose products have been approved by RISD Information Technology Services (ITS) on all projects.

8. REGULATORY REQUIREMENTS:



- a. Conformance to the latest national, state, and local codes and other legal requirements are the responsibility of the Installer. Installer shall obtain all permits at Installers expense and arrange all inspections required by codes applicable and shall submit written evidence to the Owner that the required permits, inspections, and code requirements have been secured. Coordinate site permits with The Owner and obtain Owner approval before contacting local governmental agencies.
9. SUBMITTALS:
- a. Submit (3) copies of complete product cut-sheet submittal package for approval by Owner prior to providing said products. Submittals shall be complete and sent via electronic mail to the Owner. Allow adequate time for Owner review. Materials cannot be used before results have been submitted to and approved by the Owner or its representative.
10. DEFINITION OF ACCEPTANCE:
- a. System acceptance shall be defined as that point in time when the following requirements have been fulfilled:
    - i. All submittals and documentation have been submitted, reviewed, and approved.
    - ii. The complete system has successfully completed all testing requirements.
    - iii. All punch list items have been corrected and accepted.
11. PROJECT RECORD DOCUMENTS:
- a. Provide detailed project record documentation within 30 days after completion of the work. The owner reserves the right to request clarification, edits or additional information following review. Provide a list of twisted-pair cable tests equipment with calibration certification. Submit cabling Systems Test reports in the following manner: One copy via email or on compact disk in Microsoft Excel format to Owner for specification conformance. Provide complete “as built” drawings.
12. WORKMANSHIP:
- a. Manufactured products, materials, equipment, and components shall be provided, conditioned, applied, installed, connected, and tested in accordance with the manufacturer’s specifications and printed instructions. The installation of all system components shall be carried out under the direction of qualified personnel. Appearance shall be considered as important as mechanical and electrical efficiency. Workmanship shall meet or exceed Industry standards.
13. CABLE TERMINATION AND TEST PLANS:
- a. Provide proof of testing technician(s) certification for operation of the specific units of test equipment which is proposed for use. The Installer shall obtain Owner approval for each termination and test plan prior to execution of the work. Provide complete comprehensive test and testing reports for the Horizontal Cabling System as defined by TIA/EIA standards.
  - b. Unshielded Twisted-Pair Cable System Testing Permanent Link Test shall be performed using level IV test instruments capable of the following swept/stepped frequency voltage measurements in accordance with the performance parameters required by the latest EIA/TIA 568 series Standards. Perform metered tests on each multi-pair twisted-pair and/or four pair UTP cable through the patch panel and at each end of the cable section and/or IT outlet. The permanent link test shall be undertaken as described in latest ANSI/TIA/EIA-568 series Standards
  - c. Any cable links which fail to meet performance test criteria shall be reterminated, reconnected, or replaced by the Installer free of charge (at the discretion of the Owner). Submit final field test documentation in list form, including CM’s signature for Owner’s approval.
  - d. Test Reports: Include field test results for each cable including cable link length in accordance with latest EIA/TIA 568 series Standards. All test parameters shall appear on each test document including graphics and indicating each test parameter result. The individual test data shall include the automated print out produced by the cable scanning equipment.





14. PRODUCTS:

- a. Materials and Equipment shall be new and labeled and/or listed as acceptable to the authority having jurisdiction as suitable for the use intended. Coordinate with Architect and owner to select finish color(s), except where specific color is indicated.

15. IT CABLING SYSTEMS:

- a. Acceptable Manufacturers are Hubbel, Molex or approved equivalent, unless otherwise noted. Horizontal Cables: Plenum rated and clearly factory-labeled at intervals not greater than 1 foot to easily differentiate Category type.
- b. Horizontal Cabling - Approved type UTP Cat 6-CMP: Category 6, -CMP (Plenum Rated as required) 4-pair horizontal UTP cable unshielded 100-ohm inside twisted-pair cable for use in the horizontal distribution subsystem shall exceed the requirements of EIA/TIA 568 series Standard. Minimally compliant cable is prohibited. Data cable shall be with a Blue outer jacket and Communication (telcom) shall be with a White outer jacket.
- c. Twisted-Pair Premises Connectors – Molex Category 6, 8-position/8-conductor modular plug without key for use with oval or round four-pair stranded UTP. Provide Molex 6 series connectors. Minimally compliant connectors are not permitted.
- d. Outlet Face Plates – All approved faceplates shall be available in simplex, duplex, triplex, quadplex, or sixplex arrangement in a single gang configuration. Surface mounted outlets shall be available in duplex, triplex, quadplex, or sixplex configuration. Outlets color shall be approved by the Owner. Outlet Face Plates shall be provided with blank module inserts for all unused module locations.
- e. Work Area Outlets – shall consist of single gang utility outlet boxes with plates equipped.
- f. Wireless Outlets- shall consist of double gang utility outlet boxes, with a flush mount reducer plate or approved equivalent.
- g. Category 6 jacks – All category 6 outlets shall exceed Category 6 transmission requirements for connecting hardware, as specified in ANSI/TIA/EIA 568-B commercial building telecommunications cabling standard, horizontal cable section. Minimally compliant connectors are not permitted. Category 6 jacks shall be terminated using TIA/EIA-T568B pin-pair configuration through-out the project.
- h. UTP Patch Panels –Category 6, 48 port, modular patch panel with 2 RU mounting height, color coded individual UTP jacks and label strips. Each patch panel must also be accompanied by a 2U horizontal cable manager approved by RISD ITS.
- i. Patch Cables – The owner shall provide patch cables.
- j. General Cable Management - Provide IT Systems Cable Management Accessories Open and Closed Cable Cable Distribution Rings (J-Hooks, C-Rings, and D-Rings): metallic or plastic (UL Listed for environment in which they are being used). Provide cable hook and loop (Velcro) ties. Provide plenum rated where required.

16. NAMEPLATES AND LABELS:

- a. Utilize Owner approved labeling scheme for all horizontal cables distributed directly from a patch panel or wiring block. Label horizontal cables twice using a laminated preprinted adhesive label attached to the sheath. Place one label inside the IT work area outlet, and the other at the wiring block or patch panel end. Provide adhesive-backed labels suitable for printing and bonding to cables. Handwritten labels are unacceptable.
  - b. Patch Panel Labels - Use a label-making machine to construct label tabs from plastic or paper strips installed behind label windows on face of patch panel. Handwritten labels and adhesive labels are not permitted. Prior to labeling, the installer will work with the Owner to determine the labeling convention to be used.
- FIRE / SMOKE STOPPING:

17. FIRE / SMOKE STOPPING

- a. Provide approved fire / smoke barrier penetration sealing where required by code.



18. UNSPECIFIED EQUIPMENT AND MATERIAL:

- a. Provide any item of equipment or material addresses on the drawings or in this document or required to provide a complete and functioning cable plant installation shall be provided in a level of quality consistent with other specified items.

19. IT WORK AREA OUTLETS:

- a. The installer shall provide all horizontal cabling systems as shown on Drawings. Coordinate outlet types and their locations with Owner.

20. GENERAL COMMUNICATION CABLING:

- a. Install cable after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed. Before installing cabling, ensure all cable pathways are completely and thoroughly cleaned. Inspect conduit, wireway, cable runways, and innerduct. Swab any additional enclosed raceway and innerduct systems furnished.
- b. Provide Pulltape (muletape) with preprinted foot markers is usually provided when conduit and innerduct are installed; if not, provide pulltape in each empty communications conduit containing a bend or over 10 feet in length.
- c. Install communications cable in accordance with manufacturer's instructions so as not to exceed the manufacturer's specified pulling tension.
- d. Provide service loops and pigtails of adequate length for neat, trained, and bundled connections.
- e. Provide service pigtails of no less than twelve inches at all work area outlets.
- f. Provide protection for exposed cables where subject to damage. Provide abrasion protection for any cable or wire bundles which pass through holes or across edges of sheet metal.
- g. When installing cable, insure that any lengths of cable dressed along the floor are protected from traffic.
- h. Cable Management Mountings, Hangers, and Attachments: Hold communications cable firmly in place using independent support. Design and install straps, mountings, hangers, J-hooks, support wires, and other similar fittings adequate to support loads with ample safety factors and so as not to damage, bind, or deflect cable. Do not use plumbers' perforated straps or similar non-compliant supports as a means of support. Do not fasten communications cable supports to steam, water, or other piping, ductwork, mechanical equipment, electrical equipment, electrical raceways, or wires used to support ceiling grid. Do not allow communications cables to make contact with ceiling tiles, ceiling grid support wires, or lighting fixtures.
- i. Communications Cable Hook and Loop Ties: Cable ties and other cable management clamps shall be no more than hand tightened and shall fit snugly, but not compress, crimp, or otherwise change the physical characteristics of the cable jacket or distort the placement of twisted-pair components. Replace any cable exhibiting stresses due to over tightening of cable management devices. Use the following types of cable ties:
- j. Plenum Building Areas: Where cable passes through open return air space, use plenum rated color-coded and Velcro cable ties. Non-plenum Building Areas: Use conventional flame-retardant color coded Velcro ties.
- k. Exterior and Underground Locations: Use black Velcro cable ties.
- l. Cabling: Utilize continuous unspliced lengths of copper conductors between splice enclosures and/or termination points. Arrange cable and install neatly, cut to proper length, and remove surplus wire or strand. Provide suitable cable slack in boxes, outlets, and at turns to ensure that there is no kinking or binding of the sheath. Where possible, route cables in overhead cable trays and inside wire management systems attached to the equipment cabinets and racks. Use Velcro ties or ducts to restrain cabling installed outside of wire management systems on racks or in cabinets. The number of twisted-pairs specified for each cable shall be terminated and operational.
- m. Separation from Power Lines: provide the following minimum separation distances between pathways for copper communications cables and power wiring of 480 volts or less:
- n. Open or Nonmetal Communications Pathways: 12 inches from electric motors, fluorescent light fixtures, and unshielded power lines carrying up to 3 kVA. 36 inches from electrical equipment and unshielded power lines carrying more than 5 kVA. 48 inches from large electrical motors or transformers.
- o. Grounded Metal Conduit Communications Pathways: 2 1/2 inches from electrical equipment and unshielded power lines carrying up to 2 kVA. 6 inches from electrical equipment and unshielded power lines carrying from 2 kVA to 5 kVA. 12 inches from electrical equipment and unshielded power lines carrying more than 5 kVA. 3 inches from power lines enclosed in a grounded metal conduit (or equivalent shielding) carrying from



2 kVA to 5 kVA. 6 inches from power lines enclosed in a grounded metal conduit (or equivalent shielding) carrying more than 5 kVA.

- p. Review cable routing within communications rooms (MTER, IDF, etc) with the owner prior to installing any cable

21. UNSHIELDED TWISTED-PAIR INSTALLATION:

- a. Place unshielded twisted-pair (UTP) cable so as to maintain the minimum cable bend radius limits specified by the manufacturer or the following, whichever is larger:
- b. Horizontal Four-Pair Unshielded Twisted-Pair Cables: Termination Points: eight times the cable diameter. Other Locations: four times the cable diameter.
- c. Multipair Unshielded Twisted-Pair Cables: Maintain a minimum bend radius of ten times the cable diameter.
- d. To avoid stretching four-pair horizontal cable conductors during installation, do not exceed a 25-pound force pulling tension (tensile loading).
- e. Place copper cables transitioning between the cable trays and cabinets or racks in a neat and orderly manner per NEC 318.11(b) requirements. Velcro wraps transitioning bundles.
- f. Directly terminate twisted-pair cable on wiring blocks, patch panels, and Telecommunications Outlet in standard WECO color code order.
- g. Use wiring block and/or connector manufacturer's recommended tools with the proper-sized anvils for all copper punch down, wire wrap, and crimp terminations. Stuffer caps are not permitted.
- h. Unshielded twisted-pair connecting hardware and material including wiring blocks, patch panels, connectors, Telecommunications Outlet, cross-connect jumper wire or cables, patch cords, and other components used to connect unshielded 100-ohm twisted-pair cable shall meet or exceed the requirements of EIA/TIA 568-B series Standard specifications for Unshielded Twisted-Pair Connecting Hardware, for the category of use specified in the Contract Documents.
- i. Cable Jackets: To reduce untwisting of pairs, maintain the twisted pair cable jacket as close as possible to the point of termination.
- j. Multipair Cable: Strip back only as much cable jacket as is minimally required to terminate on connecting hardware.
- k. Horizontal Cable: Strip back no more than 1 inch of cable sheathing.
- l. Pair Twist: Observe the EIA/TIA-568-B series Standard recommended practice of preserving wire pair twists as closely as possible to the point of mechanical termination. The amount of untwisting in a pair as a result of termination to connecting hardware shall be no greater than 1 inch for multi-pair and Category 3 cables, and no greater than 1/2 inch for Category 6 cables. This practice maintains the maximum number of twists in the wire, to minimize signal impairment and reduce potential problems with high-speed transmission.
- m. Analog Phone –Field Terminations
  - i. Copper cabling shall terminate in 110-type block fields. Field layouts, from left to right when facing the backboard, shall be: Riser – Voice. Note that this order depends on room layout and must be verified with OIT before installation. Riser, and voice fields shall have room for growth within each field. All cables shall feed into top of 110 towers. All 110 blocks shall be mounted on towers with vertical wire management between towers and at the left and right outsides of each field type. Horizontal cable management devices shall be placed between 100 pair groupings of 110-type blocks and across the tops of the 110 towers to provide for management of patch cords and cross connects.
  - ii. Additionally, all buildings must have two courtesy/emergency wall phones on each floor, with locations verified by OIT prior to installation.
- n. Wireless LAN (WLAN)
  - i. All buildings on RISD's campus will have access throughout the building to RISD's WLAN. A RF survey must be done prior to design and installation of renovated buildings to ensure radio-frequency
- o. Cabling for Wireless:
  - i. Horizontal cables shall not directly terminate to equipment.
- p. Suspended / False Ceilings
  - i. Access points located in areas with a suspended or false ceiling will have the outlet terminated in a double gang work area outlet.

22. PENETRATIONS:



- a. Cutting and Patching, the contractor is responsible for all cutting and patching of all surfaces and assemblies associated with the installation in this scope.
- b. Seal all raceways entering structures, including conduit and innerduct with cable installed, at the first box or outlet to prevent the entrance of gases, liquids, or rodents into the structure.
- c. Inspect entrance seal installation by others between building structure and/or innerduct and conduit to verify integrity of installation.
- d. Empty Conduits: Install removable screw-tight duct plugs.
- e. Conduit with Innerduct Installed: suitable duct water seal between conduit and innerduct.
- f. After Cable Installed: suitable duct water seal between conduit and cable or between innerduct and cable.
- g. Seal penetrations in fire-rated walls and floors. The following requirements shall apply to the communications contractor:
- h. Inspect fire stopping installation by others between building structure and/or innerduct and conduit, sleeves, wireway, and cable tray to verify integrity of installation.
- i. Sleeves and Fire Barrier Sealing Systems: Before Cable Installation: Unless provided by others, install conduit sleeves with insulating throat bushings or STI EZ Path or equal fire barrier sealing systems in all openings where open cable passes through fire-rated walls and floors. After Cable Installation: Install intumescent fire barrier penetration sealing materials between cables and sleeves or install fire barrier sealing systems.
- j. Raceways: After cable installation, install intumescent fire barrier penetration sealing materials between cables and conduit, innerduct, or wireway at all exposed penetration locations.
- k. Cable Trays: During Cable Installation: Protect fire stopping materials throughout the construction period in a clean and properly protected condition to maintain each assembly without any indication of damage.
- l. After Cable Installation: Restore fire barrier penetration sealing materials to provide required protection.
- m. Provide each conduit passing from a nonhazardous or noncorrosive area to a hazardous area and each conduit entering an enclosure within a hazardous area with a sealing fitting which meets applicable NEC Article 500 requirements. The sealing fitting shall be UL-listed and shall be filled with approved sealing compound of the same manufacture.
- n. Protect adjacent surfaces from damage during seal or fire stop installation. Repair any damage.

#### **TELECOMMUNICATIONS CLOSET SPECIFICATIONS**

##### 1. OVERVIEW:

- a. The telecommunications walk-in closet must provide a safe, environmentally-suitable connection point for backbone cable and horizontal cable. The closet will service equipment, cable terminations, terminal and cross-connect fields.

##### 2. GENERAL REQUIREMENTS:

- a. Telecommunications closets should be aligned vertically in multi-story buildings, whenever possible, and located as close as possible to the center of the area that it is intended to serve, keeping average horizontal cable runs to 150 feet (46 meters) or less, with a maximum of 295 feet (90 meters). Closet will vary in size depending on the floor area they serve. For buildings where the floor space to be served is less than 5,000 ft<sup>2</sup>, closets must be at least 4.5 ft by 4.5 ft. For floor space above 5,000 ft<sup>2</sup>, closets must be at least 6 ft by 9 ft. Minimum ceiling height is 8 ft – 6 in. When a ceiling distribution is used, the closet must have adequate conduit or openings through beams and other obstructions into the accessible ceiling space. False ceilings are not permitted.
- b. The closet must have a fully-opening, lockable door which is at least 36 inches wide and 80 inches tall. The closet lighting must have a minimum equivalent of 450 lux (50 footcandles) measured 3 feet above the finished floor level.
- c. Each closet must have a minimum of three 4" conduit joined by a suitable wall mounted pull box with a hinged or removable door for backbone wiring. There must be at least two 4" conduits, or equivalent, for horizontal cable distribution. Locate all slot/sleeve systems in places where pulling and termination will be easy. Sleeves and slots must not be left open after cable installation. Firestop all sleeves and slots in accordance with all applicable building codes.

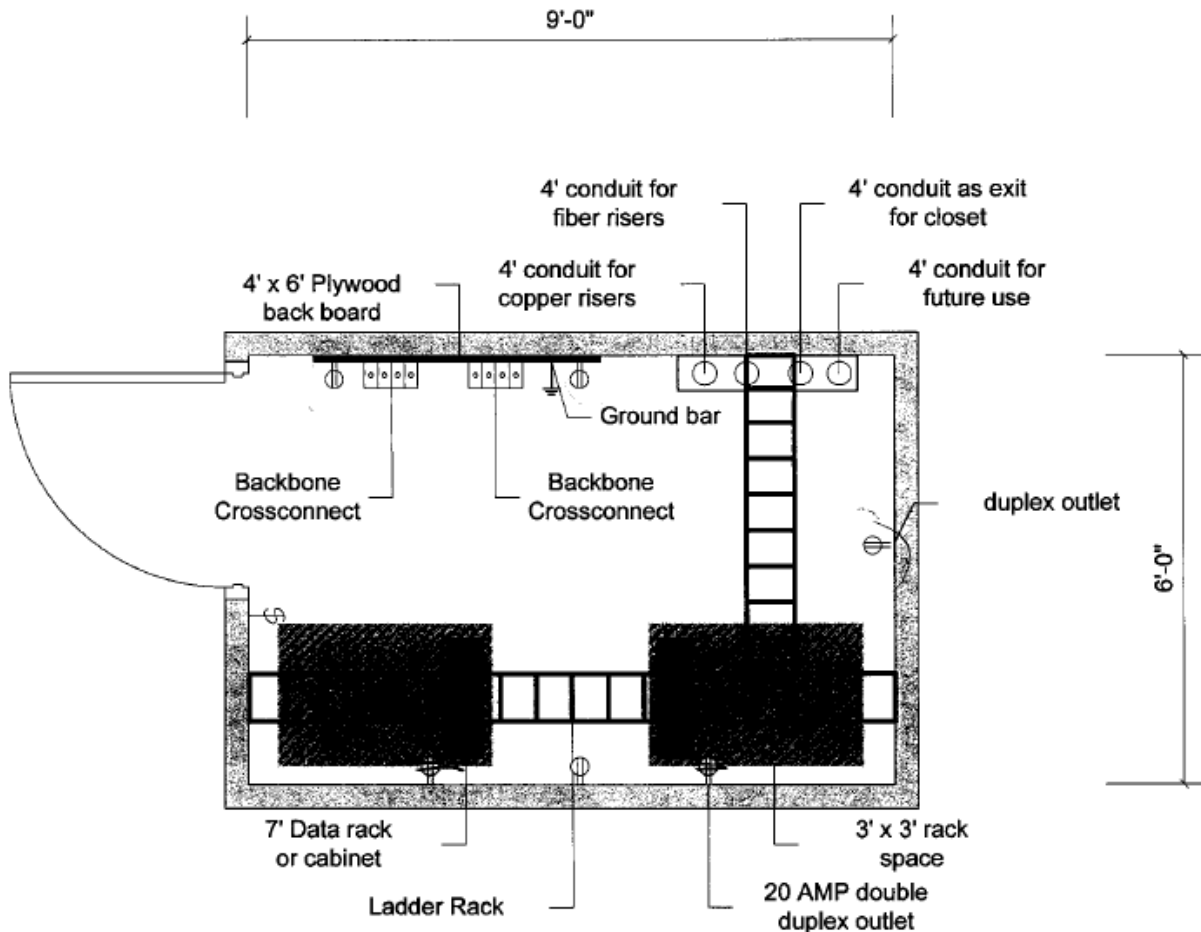
##### 3. ER/TR HVAC



- a. Today's network equipment consumes more power and generates more heat than yesterday's equipment. It is safe to say tomorrow's equipment will also increase power and heat from today's equipment. It is important to design for future growth of added equipment and network equipment upgrades. Design for a minimum of 5,000 BTU's from equipment, for up to 144 data outlets, add 1,000 BTU's for every 48 additional outlets served. HVAC shall be provided on a 24 hours-per-day, 365 days-per year basis. A stand-alone unit should be considered. When building is being backed up by generated power, it is required that the ER/TR's HVAC be tied into the backup power, to keep the life safety network and telephones working during a power outage.
- b. The temperature and humidity shall be controlled to provide continuous operating ranges of 68° F to 77° F with 40% to 55% relative humidity.
- c. The ambient temperature and humidity shall be measured at a distance of 5 ft. above floor level, after equipment is in operation, at any point along an equipment aisle centerline.
- d. When a UPS system is installed in the ER, the engineer will need to factor in the units BTU's
- e. The ER/TR shall have positive air pressure with at least one air change per hour.
- f. When split systems are specified for the ER/TR, those systems shall be provided with a manufacturer-specified auto restart function to ensure the unit comes back on fully functional automatically after a power failure. Manual restart after a power interruption is not acceptable
- g. 2.2c ER/TR Power Requirements
  - i. It is highly recommended that the electrical feed to the ER/TR be backed up by a generator, including all convenience outlets.
  - ii. When generator power is provided to the building: All power, including power to all mechanical systems, in the ER/TR shall be installed to the buildings generator. All electrical outlets hooked to the generator must be red in color with red faceplates. Circuit ID to be labeled on faceplate.
  - iii. Outlets and faceplates with a generator feed shall be red.
  - iv. A separate supply circuit serving the ER/TR shall be provided and terminated in its own electrical panel inside the ER/TR.
  - v. A minimum of two dedicated nonswitched 3-wire, NEMA 20 amp, 120Vac duplex electrical receptacle for equipment power, each on separate branch circuits. These outlets shall be mounted to the equipment rack vertical wire manager at 3'6' AFF. (Not the cabling rack).
  - vi. Separate quad 120Vac convenience outlets for tools, test equipment etc., placed at maximum of 6' (wall space) intervals around perimeter of room and below the plywood.
  - vii. Grounding and bonding shall be in accordance with ANSI/TIA-607-B standard.
  - viii. Follow manufactures recommendations for power needs of a UPS system.



**TYPICAL TELECOMMUNICATIONS CLOSET**



**4. FIBER CABLE SPECIFICATIONS**

- a. Multimode Fiber Cable Specifications - Installed fiber must meet or exceed the following specifications.
  - i. Installed cable shall be 62.5/125micron core/cladding, enhanced grade, multimode, and graded index glass fiber. All materials in the cable shall be dielectric.
  - ii. Performance -Installed fiber must meet or exceed the following performance specifications.

Wavelength (nm)	Max. Attn.(dB/Km)	Min. Bandwidth (Mhz*Km)
850	3.0	200
1,300	0.9	500

- iii. Cable Construction -Installed cable must be manufactured to meet or exceed the following specifications:
  - 1. Plenum Cable (Inside Cable) -Plenum rated cable shall be used for all interior installations. Installed cable shall meet or exceed the following specifications:



- 2. Tight buffered 900 um, mechanical strippable Teflon (for plenum applications).
  - 3. EIA/TIA -598 color coding for fiber optic cable.
  - 4. Aramid yarn strength member, capable of supporting a short-term tensile load of 400 lb. without stretching.
  - 5. Capable of bend radii as small as 20 x outside cable diameter (under installation load) and 10 x outside cable diameter (long term load).
  - 6. Capable of a minimum crush resistance of 850 lb./in.
- iv. Outside Plant Cable - Outside plant cable shall be used for all applications where cable is to be run in underground conduits. Outside plant cable may not be used for interior applications and shall meet the following specifications:
- 1. Gel filled buffer tube, 250 um, acrylate.
  - 2. EIA/TIA-598 color coding for fiber optic cable.
  - 3. Flooded core
  - 4. Capable of bend radii as small as 20 x outside cable diameter (under installation load) and 10 x outside cable diameter (long term load).
  - 5. Capable of a minimum crush resistance of 850 lb./in.
- v. Recommended Suppliers - Corning and Berk-Tech fiber are currently recommended for installation on campus. Cable from other manufacturers will be considered. All cable installed must be cleared by RISD OIT prior to installation.
- a. Single-mode Fiber - Installed fiber must meet or exceed the following specifications
- i. Installed cable shall be 8.3/125micron core/cladding, single-mode, and graded index glass fiber. All materials in the cable are to be dielectric.
  - ii. Performance - Installed fiber must meet or exceed the following performance specifications.

Fiber cable types	Wavelength (nm)	Max. Attn. (dB/Km)
Single-mode, Inside plant	1,310	1.0
	1,550	1.0
Single-mode, Outside plant	1,310	0.35
	1,550	0.2

- iii. Cable Construction - Riser or plenum rated cable shall be used for all interior installations. Installed cable shall meet or exceed the following specifications:
- 1. Riser or Plenum (Inside Cable) - Riser cable shall be used for all interior installations and shall meet the following specifications: Tight buffered 900 um, mechanical strippable Teflon.
    - a. EIA/TIA -598 color coding for fiber optic cable.
    - b. Aramid yarn strength member, capable of supporting a short-term tensile load of 400 lb. without stretching.
    - c. Capable of bend radii as small as 20 x outside cable diameter (under installation load) and 10 x outside cable diameter (long term load).
    - d. Capable of a minimum crush resistance of 850 lb./in.
- iv. Outside Plant Cable - Outside plant cable shall be used for all applications where cable is to be run in underground conduits. Outside plant cable may not be used for interior applications and shall meet the following specifications:
- 1. Gel filled buffer tube, 250 um, acrylate.
  - 2. EIA/TIA -598 color coding for fiber optic cable.
  - 3. Flooded core
  - 4. Capable of bend radii as small as 20 x outside cable diameter (under installation load) and 10 x outside cable diameter (long term load).
  - 5. Capable of a minimum crush resistance of 850 lb./in.



v. Recommended Suppliers

Corning and Berk-Tech fiber are currently recommended for installation on campus. Cable from other manufacturers will be considered. All cable installed must be cleared by RISD prior to installation.

5. TERMINATION STANDARDS

- a. Terminal ends of all fibers cable strands shall be fusion spliced pigtails. The connectors shall be mounted on bulkheads and installed in enclosures called Fiber Integration Centers (FIC). It is RISD's practice to terminate Multi-mode fiber cable with fusion spliced pre-polished pigtails with ST connectors, and Single-mode fiber cable with fusion spliced pre-polished pigtails with SC connectors. Corning FIC's are preferred, 2U minimum size.

6. MISCELLANEOUS

- a. At each end of the cable, sufficient slack (15 - 30') shall be left to facilitate reasonable future relocation of the FIC. Slack shall be mounted on walls or upper ladder racks.
- b. A minimum of 24 Strands of Single Mode (SM) Fiber Optic cable shall be installed. RISD's standard is Single Mode as the primary transport means. Multi Mode, will be specified on a per use bases and a minimum of 24 Strands installed when needed. Any variation requires RISD approval.

7. TESTING

- a. Before Installation -It is suggested that each individual fiber in a cable be tested with an OTDR for length and transmission anomalies while on the reel before installation.
- b. After Installation and termination -
  - i. All single mode and multi-mode fiber strands shall be tested end-to-end for bi-directional attenuation, 850 nm/1300 nm for multimode and 1310 nm/1550 nm for single-mode fibers. Tests should be conducted in compliance with EIA/TIA-526-14 or OFSTP 14, Method B, according to the manufacturer's instructions for the test set being utilized.
  - ii. Tests must ensure that the measured link loss for each strand does not exceed the "worst case" allowable loss defined as the sum of the connector loss (based on the number of mated connector pairs at the EIA/TIA-568 B maximum allowable loss of 0.75 dB per mated pair) and the optical loss (based on the performance standard above, 1.1.1 and 1.2.1).
- c. After the cable is in place it shall be tested in the following manner:
  - i. After termination, each fiber shall be tested with an ODTR for length, transmission anomalies, and end-to-end attenuation. Results are to be recorded and supplied to RISD in the form of hard-copy printouts or photographs of screen traces.
  - ii. After termination and bulkhead mounting, each terminated fiber is to be tested for end-to-end loss with a power meter/light source. As above, results are to be recorded and supplied to RISD.
  - iii. The maximum allowable attenuation for any splice or termination is 0.3 dB.





**PLUMBING FIXTURES AND SPECIALTIES**

**FIXTURES**

1. FLUSH VALVE WATER CLOSETS (ACADEMIC/OFFICE PROJECTS):
  - a. Water Closet
    - i. Floor Mount (Kohler preferred, American Standard alternate)
      1. Kohler Model K-4406 (elongated bowl top spud); American Standard Model 2234.001
      2. Kohler Model K-4405 (ADA elongated bowl top spud); American Standard Model 3043.001
    - ii. Wall Hung (Kohler preferred, American Standard alternate)
      1. American Standard Model 2257.103; Kohler Model K-4325 (ADA elongated bowl top spud)
    - iii. All installed water closets to include:
      1. Bolt covers
      2. Gaskets
  - b. Flush Valves
    - i. Sloan Royal Manual Flushometer – chrome – specifications to match toilet
    - ii. No battery operated Flush Valves to be installed on Campus
  - c. Seat(Kohler preferred, American Standard alternate)
    - i. Kohler Model K-4731-C; American Standard Model 5901.100 (Solid Plastic Elongated)
  - d. Accessories
    - i. Carrier for wall hung water closet
      1. Josam
2. TANK TYPE WATER CLOSETS (RESIDENTIAL PROJECTS):
  - a. Water Closet
    - i. Kohler Wellworth K-3575
    - ii. Kohler Highline K-3658 (meets ADA)
  - b. Seats
    - i. American Standard Rise and Shine Elongated Toilet Seat Model 5324.019 (Solid Plastic), Kohler 4774-0
3. WALL HUNG URINALS:
  - a. Urinals
    - i. Academic/Office Projects: Kohler Dexter K-5452-ET-0 washout wall-mount 0.125 gpf urinal with top spud
  - b. Flush Valve
    - i. Sloan Royal Manual Flushometer – chrome – specifications to match toilet
    - ii. No battery operated Flush Valves to be installed on Campus
  - c. Accessories
    - i. Stainless steel strainer
    - ii. Josam carrier
4. LAVATORIES:
  - a. Vitreous China Wall Hung Basin (Residential, Academic, and Office Projects)
    - i. American Standard Model 03550.12 (4" center set)
  - b. Vitreous China Counter Top Basin (Residential, Academic, and Office Projects)
    - i. American Standard Model 0476.028
  - c. Supply Faucet Manufacturers
    - i. Academic and Office Projects
      1. Symmons SCOT / Metering Faucet Model SLC-6000
      2. No battery operated faucets
    - ii. Residential Projects
      1. Kohler Triton K-7401-K-CP; Handles: 16010-Y-CP
    - iii. Privacy/Lacation Rooms
      1. Symmons SCOT / Metering Faucet Model SLC-6000



2. No battery operated faucets
- d. Accessories
  - i. Carrier for wall hung lavatory
    1. JOSAM
5. KITCHENETTE SINKS:
  - a. Single Compartment Bowl (Residential, Academic, and Office Projects)
    - i. Elkay single bowl Model PSR2522
  - b. Double Compartment Bowl (Residential, Academic, and Office Projects)
    - i. Elkay double bowl Model PSR3322
  - c. Sink Faucets (Residential, Academic, and Office Projects)
    - i. Chicago Model 201-GN8A-E3-317
    - ii. Approved manufacturers: Chicago, Delta, Kohler
  - d. Drains
    - i. Elkay Model LK-35L strainer w/ offset outlet
    - ii. Plain brass continuous waste
    - iii. 2" P-trap with cleanout
    - iv. Stop valves
6. SERVICE SINKS:
  - a. Basins
    - i. Academic Studios: Elkay Model WNSF8124 [R or L, if included on drawings]
    - ii. Custodial:
      1. Floor Mounted: Fiat Model FL1
      2. Mop Basin: Fiat Model MSB 3624
  - b. Faucet
    - i. Chicago 897-CCP
  - c. Drain
    - i. Elkay Model LK24RT
  - d. Accessories
    - i. Zurn Model Z1180-ZSS
    - ii. Endura Interceptor (for grease and solids)
7. BATHTUBS AND SHOWERS:
  - a. Bathtub/Shower (Residential)
    - i. Lasco, Fiberglass Tub/Shower Model 2603SGL
  - b. Bath and Shower Trim (Residential)
    - i. Symmons Tub and Shower Valve Model S-96-2-X
8. SHOWERS:
  - a. Cabinet (Residential)
    - i. Lasco Fiberglass Shower 32" x 34" Model 1323C, White
    - ii. Lasco Fiberglass Shower 36" x 37" Model 1363C, White
    - iii. Lasco Fiberglass Handicapped Shower with Seat and Bars Model 3636BFS, White
  - b. Trim (Residential)
    - i. Symmons Shower Valve Model S-96-1-X
    - ii. Symmons ADA Shower Valve Model 96-500-B30-L-L-X
9. DRINKING FOUNTAINS:
  - a. Manufacturers
    - i. Elkay Model LZS8WSLK (EZH2O® Bottle Filling Station w/ Single ADA Cooler)
    - ii. Elkay Model LZSTL8WSLK (EZH2O® Bottle Filling Station w/ Versatile Bi-Level ADA Cooler)
    - iii. Elkay Model LZO8 (Single ADA Cooler, no bottle filling)
  - b. Installation Requirements
    - i. Fully and securely supported to wall



- ii. 1-1/2" P-Trap with cleanout
- iii. Stop valve

10. WASH FOUNTAINS:

- a. Manufacturers
  - i. Bradley Corporation Model 2605A-SH-FCV-LSD: 36" circular wash fountain

11. EMERGENCY EYE AND FACE WASH:

- a. Manufacturers
  - i. Haws Corporation Model 7760BT

12. EMERGENCY SHOWERS:

- a. Manufacturers
  - i. Haws - Axion MSR Model 7360B-7460B (uncovered)
  - ii. Guardian Model G1750BC (covered)

**SPECIALTIES**

1. DRAINS:

- a. Roof Drains
  - i. Josam Roof Drains Model 21000
- b. Parapet Drains
  - ii. Josam Parapet/Scupper Drains Model 24700

2. HYDRANTS:

- a. Manufacturers
  - i. Josam Wall Hydrants Frost-Free Model 71050

3. WATER HEATERS:

- a. Leak Detection w/ Automatic Shut-Off
  - i. FloodMaster FM-094
- b. Water heater pan with drain

4. TRAP SEALS:

- a. Trap Guard Brand trap seals

5. DOMESTIC WATER PIPE: COPPER, TYPE L:

- a. Sweat or pro-press fittings
- b. PEX piping **will not** be allowed for use in any RISD projects

6. WASTE PIPING:

- a. Cast iron SV Bell and Spigot piping with neoprene gaskets.
- b. Cast iron no hub with 4 band couplings
- c. PVC solid core pipe with solvent weld fittings



**ELECTRICAL WIRING, DEVICES, AND SPECIALTIES**

1. ARC FLASH ASSESSMENT REQUIREMENTS:
  - a. NFPA 70E section 130.5 (arc flash risk assessment) shall be followed whenever a major modification or renovation of the electrical equipment takes place. Equipment labels shall be installed and meet the requirements of 130.5 (3)(D).
2. SWITCHGEAR:
  - a. Manufacturers
    - i. Square D
    - ii. Siemens
    - iii. (Or other as required for the project and approved by RISD Project Manager)
3. BUILDING WIRE AND CABLE:
  - a. Wiring Requirements
    - i. Wet or Damp Interior Locations: Use only building wire, building wire with Type THWN ART 310-8 insulation in raceway, direct burial cable, armored cable with jacket, or metal clad cable.
    - ii. Use conductor not smaller than 12 AWG for power and lighting circuits.
    - iii. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet (25 m).
    - iv. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (160 m).
  - b. Non-Metallic Sheathed Cable
    - i. Description: NFPA 70, type NMC
  - c. Armored Cable
    - i. Type AC armored cable **will not** be allowed for use in any RISD projects.
  - d. Metal Clad Cable
    - i. Description: NFPA 70, Type MC
    - ii. Conductor: Copper
    - iii. For sizes smaller than 4 AWG: Copper
    - iv. For sizes 4 AWG and larger: Copper
4. CONDUIT:
  - a. Conduit Requirements
    - i. Conduit Size: Comply with NFPA 70
      - Minimum Size: ½ inch (13 mm) unless otherwise specified.
  - b. Underground Installations
    - i. More than 5 feet (1.5 meters) from Foundation Wall: Use rigid steel conduit, intermediate metal conduit, plastic coated conduit, thickwall non-metallic conduit, or thinwall non-metallic conduit.
    - ii. Within 5 feet (1.5 meters) from Foundation Wall: Use rigid steep conduit, intermediate metal conduit, plastic coated conduit, thickwall non-metallic conduit, or thinwall non-metallic conduit
    - iii. In or Under Slab on Grade: Use rigid steel conduit, intermediate metal conduit, plastic coated conduit, thickwall non-metallic conduit, or thinwall non-metallic conduit
    - iv. Minimum Size: ¾ inch (19 mm)
  - c. Outdoor Locations Above Grade: Use rigid steel conduit, rigid aluminum conduit, intermediate metal conduit, or electrical metallic tubing.
  - d. In Slab Above Grade
    - i. Use rigid steel conduit, intermediate metal conduit, electrical metallic tubing, or thickwall non-metallic conduit
    - ii. Maximum Size Conduit in Slab: ¾ inch (19 mm); ½ inch (13 mm) for conduits crossing each other
  - e. Wet and Damp Locations: Use rigid steel conduit, rigid aluminum conduit, intermediate metal conduit, electrical metallic tubing, thickwall non-metallic conduit, non-metallic tubing.
  - f. Dry Locations
    - i. Concealed: Use rigid steel conduit, rigid aluminum conduit, intermediate metal conduit, electrical metallic tubing, thickwall non-metallic conduit, or non-metallic tubing.
    - ii. Exposed: Use rigid steel conduit, rigid aluminum conduit, intermediate metal conduit, electrical metallic tubing, or thickwall non-metallic conduit.
    - iii. All set screw type box connectors and couplings for thinwall (EMT) conduit shall be of the steel type. **No** cast connector and couplings shall be allowed.



5. SURFACE RACEWAYS:
  - a. Manufacturers
    - i. Panduit
  
6. BOXES:
  - a. Outlet Boxes
    - i. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
      1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include ½ inch (13 mm) male fixture studs where required.
      2. Concrete Ceiling Boxes: Concrete type
    - ii. Non-Metallic Outlet Boxes: NEMA OS 2
    - iii. Cast Boxes: NEMA FB 1, Type FD aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs
    - iv. Wall Plates for Finished Areas: As specified in Section 16140
  
7. FLOOR BOXES:
  - a. Floor Boxes: NEMA OS 1, fully adjustable, 1-1/2 inches (38 mm) deep
  - b. Material: Cast Metal
  - c. Shape: Round
  - d. Service Fittings: As specified in Section 16140
  
8. PULL AND JUNCTION BOXES:
  - a. Sheet Metal Boxes: NEMSA OS 1, galvanized steel
  - b. Hinged Enclosures: as specified in Section 16139
  - c. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box
    - i. Material: Galvanized cast iron
    - ii. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws
  - d. In-Ground Cast Metal Box: NEMA 250, Type 6, outside flanged, recessed cover box for flush mounting
    - i. Material: Galvanized cast iron
    - ii. Cover: Smooth cover with neoprene gasket and stainless steel cover screws
    - iii. Cover Legend: "ELECTRIC"
  - e. Fiberglass Handholes: Die molded glass fiber hand holes
    - i. Cable Entrance: Pre-cut 6 x 6 inch (150 x 150 mm) cable entrance at center bottom of each side.
    - ii. Cover: glass fiber weatherproof cover with nonskid finish.
  
9. CABINETS AND ENCLOSURES:
  - a. Hinged Cover Enclosures
    - i. Construction: NEMA 250, Type 1 steel enclosure
    - ii. Covers: Continuous hinge, held closed by flush latch operable by screwdriver
    - iii. Provide interior plywood panel for mounting terminal blocks and electrical components
    - iv. Enclosure Finish; Manufacturer's standard enamel
  
10. WIRING DEVICES:
  - a. Wall Switches
    - i. Wall Switches: NEMA WD 1, Heavy Duty, AC only general-use snap switch
    - ii. Body and Handle: Ivory plastic with toggle handle
    - iii. Indicator Light: Lighted handle type switch; red handle
    - iv. Locater Light: Lighted handle type switch; red color handle
    - v. Ratings:
      - vi. Voltage: 120 volts, AC
      - vii. Current: 20 amperes, minimum
      - viii. Ratings: Match branch circuit and load characteristics
      - ix. Switch Types: Single pole, double pole, and 3-way
  
  - b. Wall Dimmers



- i. Wall Dimmers: NEMA WD 1; Semiconductor dimmer for LED lamps, Type as indicated on drawings.
  - ii. Body and Handle: Ivory plastic with linear slide
  - iii. Voltage: 120 volts
  - iv. Power Rating: 600 watts
  - v. Power Rating: Match load shown on drawings; 600 watts minimum.
  - vi. Power Rating: As indicated in schedule.
  - vii. Accessory Wall Switches: Match dimmer in appearance
- c. Occupancy Sensors
- i. Wall Switch: Wattstopper WS-301 Automatic Wall Switch
  - ii. Ceiling Mounted: Wattstopper W-500A
- d. Receptacles
- i. Receptacles: NEMA WD 1, Heavy Duty. Minimum 20 amperes
  - ii. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. Minimum 20 amperes

11. GROUNDING AND BONDING:

- a. Electrodes
- i. Active Electrodes: Metallic solid steel copper-coated electrode
  - ii. Shape: Straight
  - iii. Length: 8 feet (2400 mm)
  - iv. Connector: U-bolt pressure plate
- b. Connectors and Accessories
- i. Wire: Stranded copper
  - ii. Grounding Electrode Conductor: Size to meet NFPA 70 requirements

12. HANGERS AND SUPPORTS:

- a. Materials
- i. Hangers, Supports, Anchors, and Fasteners – General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit
- b. Supports
- i. Fabricated of structural steel or formed steel members; galvanized
- c. Anchors and Fasteners
- i. Do not use powder-actuated anchors, spring clips, or beam clamps.
  - ii. Obtain permission from Architect before using powder-actuated anchors.
  - iii. Concrete Structural Elements: Use precast inserts, expansion anchors, powder-actuated anchors, or present inserts.
  - iv. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
  - v. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
  - vi. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
  - vii. Solid Masonry Walls: Use expansion anchors or preset inserts.
  - viii. Sheet Metal: Use sheet metal screws.
  - ix. Wood Elements: Use wood screws.
  - x.  $\frac{3}{4}$ " plywood will be installed where applicable behind the panelboard up to ceiling height so that MC cable, conduit, etc. can be properly fastened in a neat and uniform manner.

13. ELECTRICAL IDENTIFICATION:

- a. Nameplates and Labels
- i. Nameplates
    - 1. Engraved three-layer laminated plastic, black letters on white background
  - ii. Locations
    - 1. Each electrical distribution and control equipment enclosure
    - 2. Communication cabinets
  - iii. Letter Size
    - 1. Use 1/8 inch (3 mm) letters for identifying individual equipment and loads.
    - 2. Use 1/4 inch (6 mm) letters for identifying grouped equipment and loads.
  - iv. Labels
    - 1. Embossed adhesive tape, with 3/16 inch (5 mm) white letters on black background.



2. Use only for identification of individual wall switches and receptacles, control device stations, and similar.
- b. Wire Markers
  - i. Description
    1. Cloth type wire markers
  - ii. Locations
    1. Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection
  - iii. Legend
    1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings
    2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings

### **STANDARD LIGHTING**

#### **1. STANDARD LIGHTING**

- a. Interior Lighting - All interior fixtures and lamps to be DLC listed, indicating the product is rated, or approved to perform under high levels of energy efficiency. (The term DLC stands for DesignLights Consortium)
  - i. Kelvin rating for lamps shall be as follows:
    1. Academic Spaces – 3000 (track lighting) or 4000 (general overhead lighting); depending on function of the space
    2. Woods Gerry – 3000 (track & general overhead lighting)
    3. Fleet Library – 3000 (track lighting) or 4000 (general overhead lighting); depending on function of the space
- b. Screw-In A-shape Bulbs (LED):
  - i. GE LED10DA19/830
- c. Fixtures
  - i. LED Ceiling Downlight: Lithonia Model No. 6BPMW (6" LED Module, 620 lumens, 3000K)
  - ii. Dorm Houses: [Home Depot] Commercial Electric 2-Light Brushed Nickel Flushmount [for A-shape LED bulbs]
- d. Track Lighting
  - i. Track: Lightolier Lytespan
  - ii. Track Heads: Lightolier 9021MW
  - iii. Track Head Lamp: GE LED 12DP3LRW83040
- e. Switches/Sensors: (see section Electrical Wiring, Devices, & Specialties, page 20)
- f. Note: Pin Lamps are not accepted and shall not be specified or installed on any project, unless specifically authorized in writing by the RISD Project Manager.
- g. Exterior Lighting
  - i. Any and all exterior lighting shall be project specific and shall approved, prior to design (architects) or ordering (contractors), by the RISD Office of Construction Planning & Management.

### **STANDARD FIRE LIFE SAFETY EQUIPMENT & SYSTEMS**

#### **1. FIRE ALARM SYSTEMS:**

- a. Manufacturers
  - i. FCI
- b. Design Specifications
  - i. The fire alarm system shall be designed per code for the specific, individual project
  - ii. All RISD fire alarm systems are to include a voice evacuation system
  - iii. All RISD fire alarm systems must tie into RISD's existing card access system and shall monitor fire alarms, trouble signals, and supervisory signals.
  - iv. All RISD fire alarm systems shall include all necessary hardware and network connections to connect to RISD's FCI Focal Point system
  - v. Circuit Capacity: circuits (both initiating and notification) cannot be loaded above 75% of the total capacity
  - vi. The contractor to hire RISD approved vendors for final connections and programming to card access and Focal Point systems
  - vii. A fire alarm document box mounted near the main fire panel is required. Use the existing document box if applicable. Install a new f/a document box if none exist. The document box should have an integral flash drive for storing the most up to date fire alarm panel program.
    1. Documentation required by NFPA72 Section 7.2 must be placed in the document box.
    2. Document box: Manufacturer: Space Age Electronics – model SSU00685



- viii. Spare Devices: contractor provide an additional 5% each of smoke detectors, manual pull stations, and notification appliances as spares
- c. Programming Requirements
  - i. The following disable functions shall be made available via pre-programmed buttons:
    - 1. City Box
    - 2. AV's
    - 3. Elevator
    - 4. Door Holder Release
    - 5. HVAC Systems
    - 6. Sprinkler Zone(s) bypass
  - ii. The fire alarm system shall allow for the existing program to be extracted from the system to allow for future updates. This function shall be free of any access limitations (i.e. passwords shall be provided to RISD, if necessary).
- d. Project Close-Out Requirements
  - i. Provide training for RISD electricians in the panel operation, educate them on the system design and devices.
  - ii. The fire alarm installer, in conjunction with fire alarm programmer, shall hand over to RISD the fire alarm system program. The fire alarm system program shall be provided on a USB drive and shall come without any access limitations (passwords shall be provided to RISD, if necessary).
  - iii. Following the completion of the installation, the fire alarm installer shall submit as-built drawings in .pdf and AutoCAD format. The as-built drawings shall include, at minimum:
    - 1. The exact locations and installation details of all equipment
    - 2. A device list with their address and location description (addressable systems)
    - 3. A zone map (non-addressable systems)
  - iv. The fire alarm installer shall successfully obtain and provide to RISD a signed record of completion form from the local fire alarm inspector.

#### **FIRE ALARM & FIRE PROTECTION SHUTDOWN PROCEDURE**

- 1. RISD FACILITIES MANAGEMENT DEPARTMENT REQUIREMENTS:
  - a. RISD's lead electrician or fire sprinkler fitter will notify Facilities Management, Public Safety and the Providence Fire Department upon shutting down any building's life safety system (unless an outside contractor has been granted authority to perform the shutdown – see below).
  - b. An email will be sent by the Facilities Management main office staff indicating that a shutdown has taken place. The email will include the building name/address/ID box and will be sent to all Facilities supervisors and Public Safety. Pertinent details will be provided if available.
  - c. A second email will be sent notifying the group that the system is restored once service has been completed.
  - d. When placing fire protection (i.e. sprinklers) out of service, the Facilities Management main office shall be notified.
  - e. Public Safety will be notified by Facilities or PDC prior to any off-hour shut-downs.
- 2. CONTRACTOR REQUIREMENTS:
  - a. All contractors performing any dust producing activities (such as demolition, floor sanding, wall standing, etc.) shall coordinate a fire alarm shut down(s) for the job site with the RISD personnel overseeing the contractor. The RISD personnel will arrange for an in-house fire alarm technician to disarm (and later re-enable) the fire alarm system at agreed-upon times OR grant the contractor permission to perform their own shut-down/re-enable at agreed-upon times.
  - b. If contractor is granted permission to perform a fire alarm shut down:
    - i. Fire Alarms are to be shut down only by licensed fire alarm technicians.
    - ii. The fire alarm technician shutting down the system will notify (via phone call) the RISD Facilities Management Department Main Office, RISD Public Safety, and the Providence Fire Department immediately upon shutting down any fire alarm system, indicating that the fire alarm system has been turned off.
    - iii. All smoke detectors located within the job site shall be covered to prevent dust and debris from infiltrating the device, the covers shall be removed at the end of the work shift.
    - iv. All fire alarm systems shall be turned back on and returned to normal operation at the conclusion of the work shift. The fire alarm technician shall notify (via phone call) the RISD Facilities Management Department Main Office, RISD Public Safety, and the Providence Fire Department, informing them that the system has been fully re-enabled. **No fire alarm systems shall be left disarmed in an unattended work site.**
    - v. All fire alarm panels shall remain *locked* at all times.
    - vi. Smoke detectors shall remain *uncovered* in an unattended job site.





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- c. Fire protection (i.e. sprinklers) shutdowns by a contractor shall be coordinated with the RISD personnel overseeing the contractor.

**RISD Facilities Management Main Office: (401) 454-6484**

**RISD Public Safety: (401) 454-6376**

**Providence Fire Department: (401) 274-3348**

- d. False Alarms – Fire Department fees imposed upon RISD due to contractor’s error shall be reimbursed to RISD in full, details to be provided by Facilities. In the case of non-payment by the contractor, the full amount will be subtracted from the next Contractor payment requisition.

### 3. EXIT SIGNS AND EMERGENCY LIGHTING:

- a. Manufacturers
  - i. Mule Lighting
- b. Design Specifications
  - i. Emergency lighting and signage devices shall match nearby devices.
  - ii. All emergency signage and lighting shall be connected to dedicated emergency light/exit sign branch circuits. The quantity of branch circuits shall be designed and based on actual load.

### 4. AUTOMATED EXTERNAL DEFIBRILLATOR (AED):

- a. Powerheart AED G3 Plus Model 9390A-1001
- b. AED Surface Mount Wall Cabinet w/ Alarm: Part No. 50-00392-30
- c. 3D Wall Sign: Part No. 168-6002-001



**SIGNAGE STANDARDS**

1. INTERIOR SIGNAGE at: 15 West, (Roger Mandle Living and Learning Center) – For signage at the Fleet Library, the first floor and mezzanine please request access to 15 West Signage Standards\_Lobby & Mezzanine

2. INTERIOR SIGNAGE (excluding stairway and elevator fire exit signage)

a. Informational Signage

- i. Size: 4" x 10"
- ii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iii. Copy and Pictograph Color: White
- iv. Braille: None
- v. Material: Rowmark ADA Alternative (or similar)
- vi. Font: Frutiger



b. Men's and Women's Room Non-Accessible Signs

- i. Size: 7" x 8"
- ii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iii. Copy and Pictograph Color: White
- iv. Braille: Type 2 Dome, Clear
- v. Material: Rowmark ADA Alternative (or similar)
- vi. Text: "MEN" or "WOMEN"
- vii. Font: Frutiger



c. Men's and Women's Room ADA Signs

- i. Size: 7" x 8"
- ii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iii. Copy and Pictograph Color: White
- iv. Braille: Type 2 Dome, Clear
- v. Material: Rowmark ADA Alternative (or similar)
- vi. The universal symbol appear to the right of the human silhouette.
- vii. Text: "MEN" or "WOMEN"
- viii. Font: Frutiger



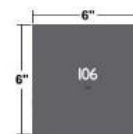
d. Gender Inclusive Restrooms (lockable doors, single)

- i. Size: 8" x 8"
- ii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iii. Copy and Pictograph Color: White
- iv. Braille: Type 2 Dome, Clear
- v. Material: Rowmark ADA Alternative (or similar)
- vi. If restroom is handicapped accessible, the universal symbol must appear to the right of the human silhouette.
- vii. Text: "RESTROOM"
- viii. Font: Frutiger



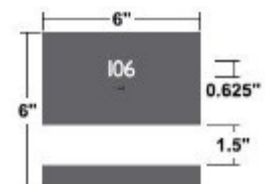
e. Room Numbers

- i. Size: 6" x 6"
- ii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iii. Copy Color: White
- iv. Braille: Type 2 Dome, Clear
- v. Material: Rowmark ADA Alternative (or similar)
- vi. Font: Frutiger
- vii. Install on latch side of door between 54"-66" above finished floor.



f. Room Numbers with Changeable Occupant Window

- i. Size: 6" x 6"
- ii. Window Size: 1.5"
- iii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iv. Copy Color: White
- v. Braille: Type 2 Dome, Clear
- vi. Material: Rowmark ADA Alternative (or similar)
- vii. Font: Frutiger
- viii. Install on latch side of door between 54"-66" above finished floor.





3. STAIRWAY AND ELEVATOR FIRE EXIT SIGNAGE:

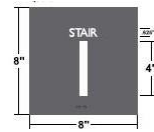
a. Inside Stairwell

- i. Sign shall be mounted within the stair enclosure at approximately 60" above the floor landing and shall be visible when the door is in the open or closed position.
- ii. Size: 10" x 15"
- iii. Body Color: to match Benjamin Moore # AF-530 Lucerne
- iv. Copy Text and Arrow Color: White
- v. Braille: Type 2 Dome, Clear
- vi. Material: Rowmark ADA Alternative (or similar)
- vii. Font: DIN 145 Standard Engshrift (Condensed)



b. Outside Stairwell

- i. Size: 8" x 8"
- ii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iii. Copy and Pictograph Color: White
- iv. Braille: Type 2 Dome, Clear
- v. Material: Rowmark ADA Alternative (or similar)
- vi. Font: Frutiger
- vii. Install on latch side of door between 54"-66" above finished floor.



c. Elevator

- i. Size: 8" x 8"
- ii. Body Color: Cinder (PMS Pantone Matching System Equivalent #411)
- iii. Copy and Pictograph Color: White
- iv. Braille: Type 2 Dome, Clear
- v. Material: Rowmark ADA Alternative (or similar)
- vi. Font: Frutiger
- vii. Install on latch side of door between 54"-66" above finished floor.



4. EXTERIOR SIGNAGE:

- a. The following exterior building signs shall be **blue and white**:
  - i. Directional Signs (signs directing individuals to an accessible entrance)
  - ii. Informational Signs (sign offering information or assistance to handicapped individuals)
  - iii. Accessible Symbol (the universal symbol (wheelchair) designating an accessible entrance (excluding restrooms). All arrows directing individuals to the accessible entrance.
- b. Generally, all exterior signs are not required to have braille or raised characters.
- c. All other exterior signs will be approved per project.



### HEATING BOILERS

1. GENERAL
  - a. SUMMARY
    - i. This section includes design and performance requirements for condensing boilers, and other boilers, for space heating and/or Process use.
    - ii. The section does not apply to boilers greater than 5 MMBTU No. 2 fuel oil input, 10 MMBTU natural gas input, or boilers requiring additional permitting by virtue of their emissions or alternative fuel input.
  - b. WARRANTY:
    - i. Boiler pressure vessels containing water or steam, as well as boiler heat exchangers, shall be provided with a minimum 5-year extended warranty, parts and labor.
  - c. SUBMITTALS:
    - i. Product Data: Submit product literature detailing ratings, dimensions, materials of construction, mounting and installation details, applicable wiring diagrams and accessories.
  - d. GENERAL REQUIREMENTS:
    - i. For natural gas burners, confirm operating gas pressure requirements of the boiler with the available minimum gas pressure available from the local utility.
    - ii. Boilers shall be rated at less than, or equal to, 30 boiler horsepower (BHP) and 1 MMBTU input, each. For locations where boilers need to be of larger capacity, additional Building Automation System (BAS) monitoring shall be provided to meet the City of Providence Ordinance requirements.
    - iii. Burners shall be selected to achieve modulation over the full firing range with a minimum natural gas input pressure of 5 inches water gage.
    - iv. Fuel oil burners shall not be used, unless natural gas is unavailable. Oil and gas trains shall, as a minimum, meet the safety criteria of the University's insurance underwriter, FM Global. Additionally comply with all applicable local, state, and national Code requirements.
    - v. Unless specified otherwise in the Basis of Design, analyze all options for boiler types to determine the option with the lowest life cycle cost. Options include condensing vs. near-condensing vs. campus Central Heating systems.
    - vi. Show Manufacturer's recommended service clearances and pull clearances as shaded areas on mechanical plans.
  - e. CONDENSING BOILERS:
    - i. Condensing boilers shall be direct-vent, sealed combustion type.
    - ii. Minimum firing turndown ratio shall be 5:1.
2. OTHER BOILERS:
  - a. Use of cast iron, fire-tube or water-tube boilers on campus is restricted to steam-only or large-capacity applications.
3. BOILER TRIM AND ACCESSORIES:
  - a. Provide means of isolating boiler trim components to facilitate service and maintenance thereon, using unions, flanges, and isolation valves.
  - b. Provide petcocks for all pressure gauges and sight level gauges.
  - c. Use thermowells in place of in-situ thermometers.
  - d. Provide condensate neutralization tanks with replaceable elements (condensing boilers only).
  - e. For water boilers:
    - i. Extend safety relief valve drain to within 6 inches of existing floor drains with full-size ASTM B88 copper or ASTM A53 iron pipe.
    - ii. Support piping every 6 feet maximum, with wall or floor anchors.
    - iii. For boilers over 1 MMBTH: Low water cut-off, or loss-of-flow sensor, and alarm contacts.
  - f. For steam boilers:
    - i. Provide drip elbows for safety relief valves and extend drain to within 6 inches of existing floor drains with ASTM A53 iron pipe.
    - ii. Provide surface blowdown and pipe to drain.
    - iii. Support piping every 6 feet maximum, with wall or floor anchors.
    - iv. Terminate safety relief vent outside in accordance with local Code requirements.
    - v. For Boilers over 1MMBTH: low and high water level switches and alarm contacts
4. BOILER FEED AND MAKEUP WATER:
  - a. Provide backflow prevention on all feed and makeup water lines and branches to boilers in addition to existing backflow prevention which may exist and remain on existing headers from which makeup is drawn.
  - b. In addition to separate feedwater systems (steam boilers) or regulated city water pressure (water boilers) provide auxiliary 5/8" hose connections on feedwater piping at the main feedwater connection to the boiler(s).
  - c. Provide water softeners or utilize a Reverse Osmosis/De-Ionized (RO/DI) water system on incoming water supply for all steam boilers.



5. CONTROLS:
  - a. All boilers shall, at a minimum, each have an on/off status contact output and a common alarm contact output to the BAS for monitoring, and a remote enable contact to allow for unit operation.
  - b. The following control points shall be monitored by the BAS for all steam boilers over 30HP (1 MMBTU):
    - i. On/Off Status
    - ii. Low Water Level Alarm (Low Water cut-off switch)
    - iii. High Water Level Alarm (High Water cut-off switch)
    - iv. High Steam Pressure Alarm
    - v. Common Boiler Alarm (if provided)
    - vi. Steam Pressure (analog input - may be common for multiple-boiler installations).
  - c. The following control points shall be monitored by the BAS for all hot water boilers over 30HP (1 MMBTU):
    - i. 1. On/Off Status
    - ii. 2. Low Water Level Alarm (Low Water cut-off switch) Alarm
    - iii. 3. Loss of Water Flow Alarm
    - iv. 4. Common Boiler Alarm (if provided)
    - v. 5. Hot Water Temperature (analog input - may be common for multiple-boiler installations).
2. PRODUCTS:
  - a. All equipment and components shall be new and the manufacturer's current model.
  - b. Acceptable Manufacturers:
    - i. Condensing Boilers: KN, Lochinvar (Knight or SYNC Series), Harsco (MACH Series), or HTP (Modcon Series).
    - ii. Other boilers: Weil-McLain, Cleaver-Brooks, Bryan and Burham.
3. EXECUTION:
  - a. GENERAL:
    - i. Install boilers with either a structural steel base or a concrete housekeeping pad, minimum 4" thick.
    - ii. Provide adequate clearance around boiler to comply with manufacturers' recommendations for service and maintenance. Provide 3 foot minimum clearances between boiler jacket and adjacent fixtures.
    - iii. Provide thermal cutouts for all boiler types. Thermal cutouts shall be hard-wired to burners and power sources and upon activation, shall shutoff or disconnect fuel or power to the boiler.
    - iv. Steam boilers shall be repeatedly skimmed when first placed into service to remove mill scale, rust, and oils until no residue appears in the sight glass.
  - b. STARTUP AND TRAINING:
    - i. Prior to project completion, manufacturer's factory trained representative shall program, start up, thoroughly test and calibrate boiler system and controls, and verify that system is in compliance with the project Design criteria.
    - ii. Furnish written report certifying that work has been accomplished with intended results.
    - iii. Coordinate with project BAS vendor to ensure and test that all boiler system monitored points and alarms are properly reporting into the BAS and that all system interlocks are functional.
    - iv. Provide training for University staff in the operation, use and maintenance of the boiler system.

#### AIR HANDLERS

1. GENERAL
  - a. SUBMITTALS:
    - i. As-built drawings shall show total unit configuration in direction of airflow, unit dimensions, and field duct connection details.
    - ii. Product Data:
      - 1 Manufacturer, model, type, finishes of materials, dimensions & weights;
      - 2 Unit air flow and arrangement data;
      - 3 Filter data;
      - 4 Airflow capacity, external static pressure, total static pressure;
      - 5 Motor HP & electrical characteristics;
      - 6 Heating coil data;
      - 7 Cooling coil data;
      - 8 Water flow data; filter media, filter sizes, and filter quantities.
  - b. AIR HANDLERS – GENERAL REQUIREMENTS:
    - i. All air handlers, including energy recovery units, pool units, etc. shall have Building Automation System (BAS) control devices which match the BAS vendor for the project. If there is no vendor for the project, then controls shall



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- be DDC-based by Johnson Controls Facility Explorer only. No proprietary or manufacturer-furnished BACNET or Modbus interfaced controls will be permitted.
- ii. Show Manufacturer's recommended service clearances and pull clearances as shaded areas on mechanical plans.
  - iii. Provide safety platform if air handling unit is installed greater than or equal to 3 feet from the finished roof or floor level per OSHA requirements.
  - iv. Provide concrete housekeeping pad or structural steel bases for base-mounted air handlers.
- c. AIR HANDLERS – DETAILED REQUIREMENTS:
- i. CASING:
    1. Combined height of pad and casing floor shall permit required drain trap depth.
    2. Access Doors: Access doors shall be provided between each air handler component to ensure access and cleanability of the air handler. Each door shall have a minimum of two securing latches, which also operate from inside the unit. Casings shall be double-wall construction, with manufacturer's standard insulation between interior and exterior walls.
    3. Provide drain pans, pitched toward the side of the unit for all steam humidification coils and cooling coils to allow for proper trapping of lines.
  - d. FANS:
    - i. Direct-drive fans are preferred.
    - ii. Fan motor: Totally-enclosed, premium efficiency, inverter-duty rated.
    - iii. Fans shall be statically and dynamically tested as an assembly at the required RPM to meet design specifications.
    - iv. Provide self-aligning, grease lubricated heavy duty sealed or pillow-block bearings. For pillow-block type bearings extend grease lubrication fittings to drive side of unit.
  - e. ECONOMIZER:
    - i. Provide return, outside air, and exhaust dampers and controls for a fully functional 100% outside air economizer cycle when design conditions permit.
  - f. COILS:
    - i. Freeze Protection: Cooling coils shall have non-trapping circuits to facilitate seasonal drainage.
  - g. FILTERS:
    - i. Prefilter: 2-inch 30% eff. Pleated (MERV /8)
      1. Manufacturer: Camfil-Farr 30/30, or equal
    - ii. Final Filter: 12-inch 85% eff. (MERV 13)
      1. Manufacturer: Camfil-Farr "Durafill", or equal
    - iii. Provide Magnehelic Differential Pressure gage across each filter bank, scale 0-5" water column or as required; for units rated over 4,000 CFM, also provide a differential pressure transducer connected to the BAS.
  - h. DAMPERS:
    - i. Outside air, return air and exhaust dampers, and Face and Bypass dampers shall be internally-mounted, low leakage type. Provide as opposable blade type, mounted on stainless steel shafts and stainless steel bearings.
  - j. ACCESSORIES:
    - i. Provide air blender to provide mixing of air to prevent stratification (if mixing box is not configured to prevent OA/RA stratification). Air Flow Measurement Station: When required, provide electronic type air measurement station.
    - ii. Variable Frequency Drives: When required, provide Variable Frequency Drives
    - iii. (VFD's) on fan motors.
2. PRODUCTS
- a. PREFERRED MANUFACTURERS
    - i. All equipment and components shall be new, and the manufacturer's current model.
    - ii. Acceptable Manufacturers:
      1. Custom Units: Cambridgeport, Haakon, Ventrol
      2. Factory Packaged Units: Aon, Carrier, McQuay, Trane, York



3. EXECUTION

a. INSTALLATION:

- i. Install per Manufacturer's requirements, shop drawings and Contract documents.
- ii. Insulate coil headers located outside airflow.
- iii. Provide flexible connection to separate unit from connecting ductwork.
- iv. Installation of water coils:
  1. Make all connections from supply lines to coils with unions or flanges to facilitate coil removal.
  2. Connect water supply to leaving airside of coil (counter flow arrangement).
  3. Locate water supply at bottom of supply header and return water connection at top.
  4. Install water coils to allow draining and install drain connection at low points.
- v. Test the operation of all unit safety and control devices.
- vi. Clearly label and identify all piping supply, return and drain connections.

**HVAC CONTROL STANDARDS**

1. AUTOMATIC TEMPERATURE CONTROLS:

a. Basic Components and Systems

- i. General: Provide control products in sizes and capacities indicated, consisting of dampers, thermostats, clocks, sensors, controllers, and other components as required for completion of installation. Except as otherwise indicated, provide manufacturer's standard materials and components as published in their product information, designed and constructed as recommended by manufacturer and as required for application indicated. All equipment and systems shall be installed by factory trained contractors with the following functional and construction features.
- ii. Electrical Wiring
  1. All electrical wiring and wiring connections, either line voltage or low voltage, from the main electric panels to the ATC panels, and from the ATC related panels to the individual control devices (i.e. VAV boxes, valves, dampers, etc.) required for the installation of the control system, as herein specified shall be provided by the control contractor unless specifically shown on the electrical drawings or called for in the electrical specifications. The wiring installation shall be in accordance with National and Local Codes and with the electrical portion of these specifications. All wiring shall be run in raceways. Raceways shall be Wiremold 200 series with all elbows, raceways, covers, mounting stops, box extensions, and wiring for a complete and neat installation. All wiring located in mechanical spaces, boiler rooms, fan rooms, etc. shall be installed in metal conduit.
  2. All wiring above ceilings, in boiler rooms, and all mechanical spaces shall follow routing of piping and where not possible shall be in conduit. All exposed wire shall be bundled and wire tied and shall be supported to adjacent piping. Draped and free-floating wire will not be allowed.
  3. All terminations of wire at control devices shall be looped and supported adequately.
  4. All wiring shall comply with the requirements of the electrical section of the specification.

- b. The building ATC/BMS system shall be an open protocol (BACNet), web accessible and addressable direct digital control system. The building automation system shall be based on the Tridium Niagara AX platform. Tridium provides an open automation infrastructure that integrates diverse systems and devices (regardless of manufacturer, communication standard or software) into a unified platform that can be easily managed in real time using a standard Web browser. Systems not developed on the Tridium Niagara AX platform are unacceptable. Acceptable manufacturers subject to compliance with specifications include American Automating or approved equal.
- c. Any workstation with a web browser shall have remote access to the system, and must provide the same view of the graphics as that provided by the central workstation. Systems that require purchase of additional software or licenses at each new workstation shall not be permitted.

2. ATC CONTRACTOR QUALIFICATIONS:

- a. The ATC contractor shall be fully licensed at the time of bid to do business in the job site area.
- b. Wholesalers, dealers, or any firm whose principal business is not that of installing DDC controls will not be acceptable.



### **STANDARD BATHROOM DESIGN**

1. The following materials, fixtures, equipment and construction details shall be incorporated into all new and Renovated RISD bathroom projects. Any deviation or exception to these details must be approved in writing by the RISD PDC office.
  - a. All plumbing fixtures and accessories must be RISD standard (see RISD standard plumbing fixtures).
  - b. All lighting fixtures must comply with the RISD standard performance specifications and must be submitted to the PDC office for review.
  - c. All lighting and electrical power accessories must comply with RISD standard electrical specifications.
  - d. All bathrooms will have dedicated exhaust ducted to the exterior. Final design must be submitted to the PDC office for review.
  - e. All bathrooms will have a floor drain.
  - f. All bathroom floors will have a waterproofing system that is integral to the floor drain.
  - g. All bathrooms will have ceramic or porcelain tile floors with epoxy grout and sanitary cove base.
  - h. All bathrooms will have at a minimum half height ceramic tile “wet walls”.
  - i. All ceramic and porcelain tiling with grout shall receive one coat of grout sealer.
  - j. All bathrooms will have RISD supplied and contractor installed toilet paper, paper towel and soap dispensers. The number and location of dispensers to be determined by the designer / contractor. Mounting templates for RISD supplied bath accessories will be supplied by RISD upon request.
  - k. All other required bathroom accessories to be supplied and installed by the contractor.
  - l. All bathrooms to have a hose bib.
  - m. All bathrooms to meet ADA requirements unless specifically waived by RISD.
  
2. RISD STANDARD BATHROOM ACCESSORIES:
  - a. Toilet Paper Dispenser
    - i. Georgia-Pacific Compact Quad Vertical 4-Roll Tissue Dispenser
      1. MFG part #56744 (different color options allowed)
  - b. Paper Tower Dispenser
    - i. Georgia-Pacific enMotion® Splash Blue Wall Mount Automated Touchless Towel Dispenser,
      1. MFG part #59460 (different color options allowed)
  - c. Soap Dispenser
    - i. Spartan Chemical Company Lite n’ Foamy Soap Dispenser
  - d. Standard bathroom accessories will be provided by RISD and installed by the contractor, unless specifically agreed to otherwise.

### **GENERAL CONSTRUCTION DETAILS**

1. Building Code Requirements
  - a. Maintain egress door hardware in good working order
  - b. Maintain all fire rating labels visible on doors and frames

### **ROOFING STANDARDS**

1. Roofing Material to be Welded PVC Sheet Roofing; Sarnafil or Approved Equal:
  - a. Thickness: 60 mils
  - b. Manufacturer: Sika-Sarnafil, G410 bareback membrane
  - c. Exposed Face Color: White
  - d. 20 year warranty
2. A fall arrest system, including anchor points, must comply with OSHA 29 CFR 1926
  - a. RISD will determine if fall protection is required
  - b. Once a determination is made; the roofing contractor’s proposal shall include the services of a Structural Engineer for the purpose of determining anchor point locations and installation details.





- c. Upon award; the Roofing Contractor shall provide RISD with a roof plan with the following:
  - i. Anchor Point locations
  - ii. Details for fastening to the building structure
  - iii. A PE stamp of a Structural Engineer licensed to practice in the State of Rhode Island
- d. The costs for these requirements shall be carried by the Roofing Contractor

#### ACCESS CONTROL AND VIDEO SURVEILLANCE STANDARDS – CAMPUS

1. Access control (ON-LINE): RISD currently utilizes an on-line access control system to manage building / dorm access for students, faculty and staff. Where code compliant RISD access controlled buildings fail “SECURE”. Fail secure ensures reader controlled areas remain secure in the event of power loss or other failure.
  - a. Card technology – RISD utilizes PROX (RFID) cards (AWID or AWID compatible) and mag stripe technology id cards.
  - b. Card readers (on-line) – RISD utilizes *Allegion (Schlage) AptaQ MTK 15 card readers* for building and room access throughout the campus. These readers read RFID technology cards. RISD uses PIN codes for non-community member access. Therefore card readers must have a PIN pad and be AWID compatible.
  - c. Access control equipment (on-line) operates on the RISD network, all network connections must utilize **PURPLE** CAT cables / patch cables. IP addresses acquired through Network Services in the IT department.
  - d. Access control “panels” are typically installed in “network closets”.
  - e. Access control is typically installed on all building entrances.
  - f. A “typical card reader door” will include:
    - i. Card reader (code compliant height)
    - ii. Door contacts
    - iii. Motion detector with sounder
    - iv. Sounder to alarm locally and alert remotely for forced open and hold open situations
    - v. Electrified lock (hand set, crash bar or electrified strike) as determined by campus locksmith on a door by door basis.
  - g. Doors utilized as EXIT ONLY, can be wired as an “exit package” only. A typical “exit package” will include:
    - i. Door contacts
    - ii. Motion detector with sounder
  - h. Doors secured with code compliant magnetic locks that release during a fire alarm may be monitored by a door contact only.
  - i. The access control system is tied to RISD Fire Alarm Control boxes in each building to alarm in the event a FIRE ALARM, AIRE ALARM TROUBLE, of FIRE ALARM SUPERVISORY condition exists. RISD electricians’ co-ordinate with access control integrator to ensure proper connectivity and programming.
2. Access control (WiFi ON-LINE): RISD currently utilizes PERSONA (ASSA ABLOY) Intelligent WiFi Access Control (SARGENT Passport 1000 p2) locks for dormitory room access. These locks read RISD’s Prox Card technology and are connected the campus WiFi network. Persona (server) receives room assignment data via an interface between the campus Room Management System (ex StarRez) and Persona.
3. WiFi lock installations are coordinated with the campus locksmith.
4. Access control (OFF-LINE): RISD currently utilizes PERSONA (ASSA ABLOY) “hotel style” locks for student dorm room access. These readers (locks) read mag stripe technology.
5. Persona (hotel style) lock installations are coordinated with the campus locksmith.
6. Video surveillance: RISD utilizes two platforms of Video Management – DIGITAL (IP based) and ANALOGUE (digital video recorder per building). IP addresses are acquired through Network Services in the IT department.
  - i. DIGITAL cameras are IP based. Video is recorded back to a main server. RISD currently utilizes Milestone as its VMS (Video Management System). PURPLE CAT cables / patch cables must be used.
  - ii. ANALOGUE cameras are hardwired from camera back to a DVR, typically installed in a network closet.
7. Interior cameras are installed to monitor common space areas with an emphasis in entrances accessed via a card reader.
8. Exterior cameras are installed to monitor common areas adjacent RISD buildings and properties.
9. Handicap operators: RISD utilizes code complaint automatic door operators where appropriate. Each installation must tie into the access control system. Ditec is the preferred manufacturer.
10. RISD’s access control system must allow integration / interface with building control systems to monitor environmental conditions, as well as various campus systems. (Pharos, Colleague, Odyssey etc...)

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