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LOGIN: Roy Adam

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30x42

j) Metal clad type MC, armored cable, and fire alarm cable are to use 2-screen malleable iron, zinc plated connectors. Connectors to be provided with insulated throat and be manufactured by Raco, O/Z Gedney or equal.

k) MI cable terminations and slices are to be as manufactured by the cable manufacturer. All splices are to be 2-hour fire rated.

3) Boxes:

- Concealed Interior Outlet boxes: Except as otherwise required by construction, devices or wiring, boxes shall be stamped steel, 4 in. square or octagon for fixtures. Boxes above ceiling shall be 1-1/2 in. deep. Boxes in ceiling or slab shall be 3 in. deep. Boxes in wall for fixtures shall be 2-3/4 in. deep. Boxes in wall for receptacles and switches shall be 1-1/2 in. deep. Furnish with raised covers and fixture studs where required. Without fixture or device: furnish blank cover. Offset back-to-back outlets with minimum 6 in. separation. Devices shall be manufactured by Raco or equal.
- Interior exposed or surface mounted outlet and junction boxes shall be of cast metal with Threaded Hubs, Killark, O/Z Gedney or Crouse Hinds Conduit Type. Covers shall be cast metal.
- Exterior surface mounted outlet and junction boxes shall be of cast metal with threaded Hubs, O/Z Gedney, Crouse-Hinds or equal. Covers shall be cast metal and shall be gasketed rain-tight exterior type.
- Junction and pull boxes: Galvanized sheet steel with crew-on covers, except as noted. Furnish with insulated supports for cables. Locations shall be as noted or required and accessible. Provide barriers in new and renovated boxes between 120/208 volt and 277/480 volt wiring. Devices shall be manufactured by Hoffman or equal.
- Floor boxes shall be suitable for conduit and devices noted. Raised outlets shall be Hubbell #B2414 Series with flush fitting. Flush outlets shall be Hubbell #B2414 Series with flush floor fitting. Increase size to suit as necessary. Provide raceways only as herein specified, except as noted. Raceways shall be run concealed, except as noted.

- Provide raceway support utilizing ceiling trapeze, straphangers, or wall brackets. Provide U-bolts at each floor level of riser raceways and connected to acceptable supports. Provide riser clamps at each floor level of riser raceways resting on slabs. Spacing of supports shall be a minimum of 10 ft on center for metallic raceway and as required for nonmetallic raceway. Spacing shall be 5 ft on center for wireways and per code and as noted for others. Mount supports to structure masonry with toggle bolts on hollow masonry, expansion shields or inserts in concrete and brick, machine screws on metal, beam clamps on framework, wood screws on wood, and pan through straps in metal deck. Nails, roof plugs or wood plugs shall not be permitted. Where required by structure, furnish through bolts and fistplugs.
- Exposed raceways shall be run parallel with or at right angles to walls. Provide clearance with water, steam or other piping (minimum 3 in. separation from steam and hot water pipes, except 1 in. from pipe cover at crossings and 18 in. for parallel runs). For hung ceiling outlets, run in hung ceiling and connect to ceiling support channels. In masonry and poured concrete, run vertically only.
- Maintain grounding continuity of interrupted metallic raceways with ground conductor, and in flexible conduit for feeders and motor terminal connections.
- Empty raceways over 10 ft long: Provide fish or pull wire, galvanized or nylon rope.
- Raceway and Cable Installation: Rigid steel conduit shall be permitted for feeders and branch circuits. Point male threads of field-threaded conduit with graphite-base pipe compound and butt conduit ends. Touch up marred surfaces and field-cut threads, CRC-cold galvanized.

- Raceways concealed in the concrete slab - rigid steel.
- Raceways installed exposed in mechanical and unfinished spaces-rigid steel.
- Raceways installed exposed in finished areas - surface metal raceway.
- Flexible taps from junction boxes above hung ceilings to recessed fluorescent lighting fixtures shall be in flexible metal conduit. Provide minimum 4 ft and maximum 6 ft lengths. For final connection to motor terminal box, transformer and other vibrating equipment: provide with polyvinyl sheathing and ground conductor. Minimum length: 18 in. with slack. Connect ground conductor to enclosure or raceway at each end.
- Branch circuit wiring installed concealed in ceilings, furred or stud walls - EMT or metal clad cable type MC or healthcare cable type HCF-90.
- Feeders in dry locations - rigid steel or EMT.
- Fire alarm system is to be in a rigid conduit system. Type of conduit system to be as required by locations. Cable installed concealed in ceiling in walls is to be type - MC fire alarm cable or plenum rated fire alarm cable.
- Two-hour rated feeders - Mineral insulated Cable

- Expansion fittings shall be installed at right angles with clip joint centered in expansion joint. Provide a length of run in accordance manufacturer's recommendations. Pre-set fittings shall allow for temperature variation. For expansion joint crossings, cross at right angles and anchor ends. For raceway not in slab, provide flexible conduit with external bonding jumper strip. In slab, provide O.Z. Type "AX" or Appletton type "XJ" or "XJF" with ground continuity.
- For through-the-floor systems, utilize an assembly similar to Hubbell or Wiremaid fire rated poke-through-floor box system. For above floor fittings power shall be duplex receptacle or other as noted. Provide separation barrier between power and telephone compartments. Provide junction box on underside of floor. Pack fitting to restore fire rating of floor.
- Erect wall and switch outlets in advance of furring and fireproofing. Outlet boxes shall be set square and true with building finish. Secure to building structure by adjustable strap iron or gROUT with masonry. Verify outlet locations in finished spaces with architectural drawings of interior details and finishes. Provide barriers between switches connected to different phases for voltages exceeding 150 volts to ground.

13. GROUNDING

- An equipment grounding conductor commonly described as a "green wire" shall be provided for all branch circuits protected by overcurrent devices except for lighting branch circuits. Green wire ground shall also be provided for flexible conduit and motor circuits. Metallic raceway continuity shall be maintained with a bare No. 6 wire. Where isolated grounding branch circuits are used, provide a separate and distinctly marked green ground wire. Each grounding conductor shall serve a maximum of three circuits/poles.
- Service and equipment:
 - For separately derived services or service switches, ground the neutral conductor through disconnecting link and ground terminal to water service ground clamp and building steel or driven ground rods in exterior installations.
 - Ground clamps shall be bronze, solderless type with bronze screws, suitable for receiving noted conductors. Mount ground clamp on water service at street side of main service valve. Provide jumper to by-pass water meter.
- Run insulated ground conductors in rigid steel conduit or EMT with conductor connected to conduit, through ground fitting at each end.
- Ground noncurrent carrying metal parts of distribution panels, switchboards, transformer enclosures, raceways, busway enclosures, controller enclosures, motor frames and other electrical equipment.
- Miscellaneous:
 - Ground the following:
 - Telephone system.
 - Fire alarm system.
 - Emergency distribution system.
 - Computer equipment.

14. POWER WIRING

- Provide all power wiring to all motors and equipment furnished under all contracts on the project. Include extensions from controllers to motors and motor connections. Mount and wire all contactors and power devices furnished under all contracts.

15. CONTROL WIRING

- Provide all control wiring for motors and equipment furnished under all contracts and as specified shown on the drawings, except as noted for mechanical/plumbing equipment. Include mounting and wiring of all control devices furnished with equipment.
- Control wiring less than 120 volts for motors, alarms for equipment furnished under mechanical/plumbing will be provided under mechanical/plumbing specifications.

16. DEVICES:

- Provide complete material and accessories as noted by Leviton, Hubbell, or equal.
- Local wall switches shall be specification grade, totally enclosed, toggle, quiet type, noted 20 amp, 120/277 volt, AC. All switches shall be ganged with multi device plates, in areas where dimmers are specified with wall switches; all switches shall match dimmer series and shall be ganged together. Switches shall have screw type terminals and shall be of the white phenolic compound finish, unless otherwise directed by the Architect (coordinate with Architect prior to bid). Toggle switches shall be manufactured as follows:

HUBBELL
1) 20A, 120/277V Single Pole, Hubbell No. HBL 12211
2) 20A, 120/277V Double Pole, Hubbell No. HBL 12221
3) 20A, 120/277V Three Way, Hubbell No. HBL 12231
4) 20A, 120/277V Four Way, Hubbell No. HBL 12241
5) DIMMER SWITCHES: LUTRON NOVA T SERIES

LEVITON
SIMILAR TO:
1) 20A, 120/277V Single Pole, Leviton #1221-2
2) 20A, 120/277V Double Pole, Leviton #1222-2
3) 20A, 120/277V Three Way, Leviton #1223-2
4) 20A, 120/277V Four Way, Leviton #1224-2
5) DIMMER SWITCHES: LEVITON MURAL SERIES

22. FIRE ALARM SYSTEM

- The building is served by a base building addressable fire alarm system. The system will remain and be expanded to accommodate the renovations to the building. During the construction phase the existing system shall be protected from damage.
- Work included:
 - Work under this section includes the installation of components to form a complete and operative fire alarm system, including removal of the existing addressable fire alarm system devices that are not to be retained.
 - Work shall include, but not limited to, the following:
 - Relocation of existing Fire Alarm System components and associated equipment
 - Disconnection, removal and disposal of existing fire alarm equipment and wiring
 - Testing
 - Furnish and install Fire Alarm System components to work in conjunction with the existing base building addressable fire alarm system as described herein and as shown on the plans, to be wired, connected, and left in first-class operating condition. The system shall include manual station (fire alarm boxes), automatic fire detectors, audio/visual devices, strobes, beacon, door holders, electric door strikes, all wiring, conduit, connections to devices, connections to sprinkler flow and tamper switches, zone modules, SNAC panels, outlet boxes, junction boxes and all other necessary material for a complete operating system. The new fire alarm system components will be as manufactured by the base building system manufacturer.
 - The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.
 - The complete installation is to conform to the applicable sections of NFPA-72, Local Code Requirements and Maine Electrical Code.
 - The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.
 - The electrical contractor is to coordinate the installation, final connections and testing with the building manager/owners fire alarm system contractor/service company. All costs associated with the building manager/owners contractors as it relates to this project will be paid by this contractor as part of his base bid.

17. ELECTRICAL TESTING

- Provide all necessary meters, instruments, temporary wiring and labor to test and adjust all equipment and wiring installed and/or connected under this contract including electrical equipment furnished by others, to determine proper polarity, phasing, freedom from grounds and shorts and operation of equipment. All measuring instruments must be properly calibrated.
- Whenever the authorities having jurisdiction require that any work be tested or approved, Contractor shall provide proper facilities for access for inspection.

18. FIRE STOPPING

- Drawings and general provisions of contract, including general and supplementary conditions and division specification sections, apply to work of this section.
- Provide all required fire-stopping. Work includes fire stopping penetrations of fire-resistance rated floors, walls and partitions in new construction, as well as pre-existing penetrations in renovation areas of existing construction.
- Product data: Submit manufacturer's product data for each fire-stopping product used, including instructions for substrate preparation and fire-stopping installation.
- Fire resistant joint sealers: Provide manufacturer's standard fire-stopping sealant with accessory materials, having fire resistance ratings indicated as established by testing identical assemblies per ASTM E814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.
- Materials - Provide the following:
 - One-part fire-stopping sealant: One part latex based intumescent sealant formulated for use in a through-penetration fire-stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors. Acceptable products/manufacturers include the following:
 - Spec Seal LC150 Series
 - HIH FS One

19. DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS


- Submit written certification that electrical systems are complete and operational. Submit certification with Contractor's request for final review.
 - At the time of final review of electrical work, demonstrate the operation of electrical systems. Furnish labor, apparatus and equipment for systems' demonstration. The various tests shall be witnessed by the Owner or his Representative.
- The Contractor shall furnish all test equipment, materials, labor, and temporary power hook-ups to perform start-up and all tests as required obtaining final field acceptance from Owner. All tests shall be conducted in the presence of the Owner or his Representative. All test procedures shall conform to this specification and applicable standards the ANSI, IEEE, NEMA, OSHA, NEPA, etc.
- The Contractor shall be responsible for all tests and test record. Testing shall be performed by and under the immediate supervision of the Contractor. Test record shall be kept for each piece of equipment. Copies shall be furnished to the Engineer for review and/or approval.
- A visual inspection of all electrical equipment, to check for the foreign material, tightness or wiring and connection, proper grounding, matching nameplate charts with specification, etc., shall be made prior to actual testing.
- A complete operational test shall be made on the revised life safety fire alarm system. The Contractor shall consult with the equipment vendors and then submit for approval a step-by-step procedure describing the method of making the tests, the equipment to be utilized and the method to be checked by the test. All interlocks and protective features shall be checked out.


20. SPECIAL ENGINEERING SERVICES

- In the instance of complex or specialized electrical systems such as emergency system, fire alarm or similar miscellaneous systems, the installation, final connections and testing of such systems shall be made under the direct supervision of competent authorized service engineer who shall be in the employ of the respective equipment manufacturer.
- Any and all expenses incurred by these equipment manufacturers' representatives related to this project, shall be borne by the Electrical Contractor.

21. DESIGN MODIFICATIONS

- The drawings show electrical systems that supply, control, and/or monitor systems specified elsewhere. The electrical system shown has been based on specific manufacturers data or information conveyed to the electrical designer. Where any agreement or change is made to supply equipment of larger capacity or different electrical characteristics, the Contractor shall be responsible for providing the electrical system to effect such changes within the intent of these specifications and to inform the Engineer, in writing, of such change. For example, if HVAC compressors and/or motors are allowed to be changed to 230 volts rather than the originally specified 208 volts, boosting or bucking transformers shall be supplied, installed, and wired to accommodate the change at no additional cost.

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PROJECT NORTH: SMRT Architects and Engineers 144 Fore Street Portland, Maine 04104 1.877.700.7678 www.smrtinc.com		
ARCHITECTURE ENGINEERING PLANNING INTERIOR ENERGY SMRT		
MAINE MEDICAL CENTER BRAMHALL CAMPUS MRI #1 REPLACEMENT PORTLAND, MAINE		
ELECTRICAL SPECIFICATIONS		
SHEET TITLE: 		
SCALE: NTS		
PROJECT MANAGER:		PROJECT NO: B160143-004
A/E OF RECORD:		
JOB CAPTAIN:		
DRAWN BY: AJR		
SMRT FILE:		SHEET No. E3.1

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