

Telecommunications Network Services

16600 Specifications

REQUIRED APPLICATIONS CHECK LIST

(To Be Completed By The Design Consultant)

MMC Project Name: _____

MMC Project Number: _____

The individual section(s) of specification 16600 that have been checked below shall be included as part of the project. Those section(s) that have **not** been checked, even though included in the specifications, shall **not** be part of the project.

- COMPLETE SPECIFICATION REVIEW**
- VOICE / DATA CABLING**
- RISER CABLING**
- FIBER OPTIC CABLING**
- VIDEO / COAX CABLING**
- PUBLIC ADDRESS SYSTEM**
- MASTER TIME SYSTEM**
- VISUAL / VOICE NURSE PATIENT CALL SYSTEM**
- VISUAL ONLY NURSE CALL SYSTEM**

List Of Significant Changes To The MMC 16600 Specifications

- References to the use of Category 3 cabling for voice has been replaced with the wording "network cable".
- Category 6 cabling is described as the default for all network installations.
- Category 5e cabling will be used for legacy voice installations.
- Category 3 cabling will still be used for overhead paging applications.
- Added language to require that all cabling for overhead paging applications be run in separate pathways in accordance with **NEC 725.56 "F"**.
- Added language to describe labeling requirements for fiber and multi pair copper to be labeled at each penetration point.
- Added language for deficit requirements.
- Added language to describe requirements for proper Cat 6 service loops.
- Added language to define the relationship between the MMC 16600 Specifications and the Scopes Of Work developed for each project.
- Added language for Firestopping requirements in the Installation section.
- Added language for the Infection Control Risk Assessment (ICRA) process.
- Updated part numbers and information in all Appendices and added several new Appendices(J-K-L).
 - Grounding & Bonding - Appendix J
 - Primary Protection - Appendix K
 - Firestopping - Appendix L

DIVISION 16600**Telecommunications Network Services Specifications** (Revised July, 2008)**PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. Definition:** Telecommunications includes cabling systems for voice, data and video systems. Additional system specifications included in this document reference public address systems, intercom systems, master time systems and nurse call (visual only, and visual and voice) systems. Specifications for equipment rooms, telecommunication rooms, power, grounding and environmental specifications, video systems, PBX systems, data networking systems, and non-standard cabling requirements shall be detailed within the Scope Of Work document provided on a project by project basis.
- B.** Maine Medical Center (MMC) uses the Ortronics Open Systems Architecture and the Siecor Fiber Optic Universal Transport Systems (UTS). The required system shall be specified within the Scope Of Work document on a per project basis.
- C.** All voice/data, CATV and fiber-optic cabling shall be installed by a MMC approved cable installation firm. A list of acceptable contractors can be referenced in Appendix B of this document.

1.3 SUBMITTALS

- A. No substitution of material or equipment for that specified on the electrical or telecommunications drawings or in the specifications shall be allowed without prior approval from MMC. All change proposals shall be submitted in writing with signed approval obtained from an authorized MMC agent.**
- B. No shop drawings shall be submitted unless required by other sections of the Project Specifications.**
- C. The submittal procedure shall be as follows:**
 - 1. The Contractor shall provide submittals in .PDF formats to the primary contact for the project.
 - 2. The submittals shall contain reference to specified manufacturers' catalog numbers which shall be qualified in writing if required to meet the product performance or characteristics described in the Project's drawings or specifications.
 - 3. All submittals shall contain a list of all equipment and materials to be supplied by the contractor or sub-contractor for completion of the Project. Only materials and equipment referenced in the MMC Telecommunications Section 16600 shall be accepted. In the event that a new part number is introduced since the preparation of the Project's drawings and specifications has superceded any specified manufacturer's part number, the new part number shall be provided with the old catalog number noted as a reference on the submittal.
 - 4. All equipment and material submittals shall have a notation included with the submittal that lists the delivery lead-time requirements for each item in the submittal. The delivery lead-time is the number of CALENDAR days between the time the order is for an item is placed with the distributor and the time can be delivered to the work site. No proposed item shall be reviewed without its delivery lead time indicated.

5. All contractors shall submit a detailed description for methods and procedures for testing of all voice, data and facilities and the testing equipment to be used. The description shall also contain methods and procedures for labeling and documentation of all terminations in accordance with the 16600 Specifications outlined later in this document. A Telecommunications Specification review meeting will be held prior to any work commencing on any MMC project.

1.4 **PRODUCT HANDLING**

Delivery and storage: Storage space at MMC is at a premium at all times. Contractors should take note of this and make arrangements for delivery of project materials per the project time lines. Job materials shall be kept clean, dry and protected at all times. Protect all materials against exposure to wet weather and contact with damp or wet surfaces.

PART 2 - VOICE / DATA / VIDEO NETWORK INSTALLATIONS (Master Spec 16715)

2.1 ASSUMPTIONS For Standard Installations

- A. The contractor shall perform all terminations at the Origination (TR) and Station ends. The contractor shall supply all cable and termination equipment. All cables shall be labeled with a unique ID for each cable with corresponding labels at the Origination (TR) and Station ends. All cables shall be bundled neatly, Velcro wrapped, and dressed into the termination panels. Origination and Station locations shall be identified by MMC on the Master Floor Plans for the project and detailed within the Scope Of Work document.
- B. Installation of cables shall be accomplished according to the project's Master Floor/Site Plan. MMC's cabling termination standard is 568A. One Berktek 4-pair Category 6 Green Plenum UTP cable shall be installed at each location noted on the Master Floor Plan. Service loops for Cat 6 cabling shall be kept to a minimum (no more than 5 ft) and within industry specifications. All cabling shall be placed along established cable pathways without weaving between pipes, conduit, etc. All direction changes shall be at ninety (90) degree angular turns. Consult the BICSI Telecommunications Design Manual (TDM) for clarification of these requirements. **Plenum rated cable shall be required for ALL cabling installations** and shall be indicated in the Scope Of Work document supplied as part of the project as well as in Appendix A of this document.
- C. For legacy voice installations (station end), the voice cable shall be terminated on the top two RJ25C jacks with the 4 pair cable split between the two jacks. The white/orange-white/blue pairs shall be terminated on jack "A" and the white/brown-white/green pairs terminated on jack "B". The data cable shall be terminated normally on the bottom left most RJ45 jack. **The right jack is left unused for Future use.**
- D. For all Video Conference installations, there shall be one Berktek 4-pair Category 6 Green Plenum UTP network cable installed for each video conference unit. These cables shall be terminated on the standard data connections listed in the Appendix A section of this Specification Document. Service loops for Cat 6 cabling shall be kept to a minimum (no more than 5 ft) and within industry specifications. All cable shall be placed along established cable pathways without weaving between pipes, conduit, etc. All direction changes shall be at ninety (90) degree angular turns. Consult the BICSI Telecommunications Design Manual (TDM) for clarification of these requirements. Plenum rated cable shall be used where required and shall be indicated in the Scope Of Work document supplied as part of the project as well as in Appendix A of this document.
- E. The cable shall be dressed and Velcro wrapped following the existing cable path. At the closet (TR), when using the existing path, any and all old cable ties shall be cut and removed. The new cable shall be added to the bundle and redressed utilizing Velcro straps. Service loops in the TR shall be dressed onto the ladder tray in a manner that no coils or loops are present.

- F. All multi pair and fiber cabling shall be identified by mechanically printed labels on both ends of the cable as well as at each side of any penetration point and the identification numbers shall be retained on the cable sheath after termination. All 4 pair station cables shall be labeled using the defined station number indicated on the master floor plan or as documented in the Scope Of Work for the respective project.
- G. Horizontal lengths shall not exceed 100 meters from the origination (TR) point.
- H. All legacy Voice cabling at the Origination point (TR) shall be terminated by the contractor on contractor-provided and installed BIX style connection blocks. One Berktek 4-pair Category 6 Green Plenum UTP cable shall be used for these applications. All cables shall be terminated into approved Ortronics components at the Station ends. If it is necessary to support analog or digital stations in a transitional environment (i.e. new horizontal/old riser), the following design will be used. Multi-pair Cat 3/Cat 5e cable will be run between the Bix field and the cable racks. The horizontal cabling used to connect legacy analog or digital devices will terminate into 24-port or 48-port Cat 6 Patch panels. For installations requiring up to 14 ports, a 24 port patch panel will be used. For installations requiring 15 or more ports, a 48 port patch panel will be used. Standard horizontal wire management will be used in this design. **NOTE:** All Part Numbers are listed in Appendix A.
- I. All diagrams depicting rack layouts, patch panel locations, room layouts, and backboard plans shall be followed exactly as outlined. No deviations to these plans shall be acceptable without the written consent of MMC personnel.
- J. All riser cabling shall be run in a designated pathway/conduit. This pathway/conduit shall be sized to allow free movement of the riser cable depending on pair counts and O.D. of cable. Riser cable shall be pulled and terminated according to EIA/TIA specifications and labeled as outlined in the Scope Of Work for that project with the corresponding cable number and origination point (from-to) at each end as well as at all penetration points.
NOTE: All Part Numbers are listed in Appendix A.
- K. All Grounding installations shall be in accordance with all State and Federal regulations and shall follow any and all NEC,EIA/TIA, and BICSI Standards.
NOTE: See Appendix J for more detail and specific requirements for Bonding & Grounding.
- L. All cabling for overhead paging applications shall be run in separate pathways in accordance with **NEC 725.56**.
- M. All network cabling terminated above ceilings shall be terminated in a standard single-gang surface mount work box. All work boxes shall be properly affixed to walls or other solid building structures.
- N. **PAR X** All Par X connections shall be installed at the height of **18"**from the ceiling unless otherwise specified and shall follow the standard data jack numbering scheme noted in the Scope of work for that project. This cable installed shall be a standard Berktek 4-pair Category 6 Green Plenum UTP cable. All Par X locations shall be noted on the print.

2.2 FIBER OPTIC CABLING

- A. The contractor shall perform all terminations, at the origination and station end. Fiber cable and termination equipment shall be supplied by the contractor. All fiber cables shall be labeled with a unique ID for each cable with corresponding labels at the originating TR and ending TR and each side of all penetration points. All fiber cables shall be bundled neatly, Velcro wrapped, and dressed into the fiber termination bulkhead panels. Origination (TR) and termination (station) shall be identified by MMC on the project prints and detailed within the Scope Of Work document.
- B. Corning fiber optic cabling and shall be installed as specified on the Master Project Plan and within the Scope of Work for that project. For standard installations, 6 strand, 12 strand, or 24 strand Corning cable with armored, Plenum jacket is normally specified and is required for any runs through the main campus. All fiber shall be labeled with the corresponding cable number and origination point (from-to) at each end as well as all penetration points. Armored fiber cable shall be properly grounded at the origination and end points.

- C. All fiber installed for risers shall be rated for that application. Fiber shall be installed within riser conduit or specified as armored fiber cable. All fiber riser shall be labeled "Fiber Optic Cable" with the corresponding cable number and Origination point (from-to) at each end as well as all penetration points.

- D. All fiber shall be terminated with the Corning SC connectors using the required tools and consumables. Corning patch panels and connector centers shall be provided and installed by the contractor. There may be substitutions to the standard fiber enclosures for a project. In these instances, the specific enclosures to be used and respective part numbers will be included in the Scope Of Work for that project.

NOTE: All Part Numbers are listed in Appendix A.

2.3 INSTALLATION

A. FACILITY REQUIREMENTS

1. All activities associated with MMC Telecommunications Rooms (TRs) shall be in strict adherence to MMC's 16600 Specifications document and to the Scope Of Work for that project.
2. All cabling shall be provided, installed, supported and fastened according to NFPA-70, state, local and the ANSI/EIA/TIA 568A Commercial Building Telecommunications Cabling Standards and the ANSI/EIA/TIA 569 specification. For all major renovations and new construction, contractor shall provide and install a cable tray support system in all major corridors and passages. The Cablofil EZ Tray and Caddy CableCat systems are the preferred cable support systems at Maine Medical Center. Four inch sleeved penetrations shall be provided in all firewalls adjacent to cable trays and passages.
3. MMC has specific procedures and requirements for firestopping within its facilities. No contractors will be permitted to install firestopping for any reason without attending MMC's mandatory Contractor Orientation training. The 3M firestop system product line is MMC's required firestopping system. The 3M Quick-Pass fire stop system (P/N 98-0400-5515-8) is the preferred method for all penetrations. Firestopping of any firewall penetration is the responsibility of the contractor and shall be completed prior to leaving the premises each working day.

NOTE: Refer to Appendix L for all MMC Firestopping system procedures, requirements and part numbers.

4. All Infection Control Methods and Procedures shall be followed during any Telecommunications related work that shall be done in any Maine Medical Center facility. The Infection Control Risk Assessment (ICRA) survey process must be completed for all MMC facilities prior to any commencement of work. A copy of the Infection Control Procedures shall be provided to the contractor prior to any work being done. Detailed instructions on this process are part of the Contractor Orientation training.

B. VOICE AND DATA CABLE TESTING

1. All network cabling must be tested as part of the final stage of the cabling project. Cable testing shall be performed with an industry standard test device such as the Fluke DTX or Agilent Framescope 350 and specific to the type of cable being installed (i.e. Cat 5e, Cat 6). When these tests are performed all results must be documented. Any cables not passing the above tests shall not be accepted and shall be remedied at the contractor's expense.

C. FIBER-OPTIC CABLE TESTING

1. All fiber optic strands must be tested in the following manner: All testing must be done using a fiber optic test meter such as Agilent FrameScope 350 or Fluke OTDR. All Multimode fiber strands must be tested at the 850nm and 1300nm wavelengths and in both directions. All Singlemode fiber strands must be tested at the 1310nm and 1550nm wavelengths and in both directions. OTDR testing may be requested in one direction, from the equipment main location to the IDF location. All fiber strands shall be certified with no more than 4 dB of loss or within industry standard limits for runs exceeding one kilometer. All dB losses must be stated at both the 850 and 1300nm windows for the multimode and 1310nm and 1550nm wavelengths for the singlemode. All fiber facilities shall be tested

in accordance with industry procedures. Link certification forms for each strand showing dB losses in both directions must be provided prior to acceptance. Any strands not passing the required tests shall not be accepted and shall be remedied at the contractor's expense.

D. CABLE DEFIT REQUIREMENTS

1. All cabling that is being replaced as part of a project and is considered abandoned or obsolete shall be removed, or defit. The details and requirements for the defit for the respective project will be contained in the Scope Of Work for that project. Cabling that cannot be identified for defit must be labeled in accordance with State and local codes.

E. DOCUMENTATION

1. All fiber optic cables must be labeled with fiber optic warning tags within 18" of entering any light interface unit. All tags must show the fiber type, size, construction, and its source and destination locations. This information must also be included on each Fiber Optic Enclosure and on all link certification forms showing dB losses. All strands must be terminated in order of color code and properly labeled.
2. All fiber test sheets and certification forms showing each strand tested from the MDF or main equipment location towards the IDF or secondary equipment location must be provided.
3. Manufacturer's material, equipment, and part numbers must be provided for all fiber optic materials. This includes light interface units, ST & SC connectors, fiber optic cable, color code, and construction of the cable.
4. Whenever strands are not terminated for any reason, those strands must be noted in the documentation with the location and future termination instructions included. All strands that are not terminated must be labeled anyway by marking the buffer to the main cable or each individual strand. These labels must coincide with the normal labeling scheme and must be noted in the documentation as unterminated strands. This documentation shall be included in the as-built documentation for that project.
5. Full and complete network cable test results shall be provided to MMC's Project Manager or Telecommunications contact upon job completion, and prior to acceptance. Test results shall include a summary report of all cables and fiber strands tested and certified, and a report of each cable identifying all performance characteristics of each cable. The complete set of test results shall be provided to MMC's Project Manager or Telecommunications contact in .PDF format with the job name/location clearly noted.
6. The contractor shall provide a complete set of as-built drawings to MMC and prior to acceptance. As-builts shall indicate all types and sizes of facility pathways, junctions, termination points. All as-builts shall be in .DWG format and shall be provided to MMC's Project Manager or Telecommunications contact. The as-built documentation provided shall include **(2) full-sized** hard copy prints and a .PDF file with all facility pathways, junctions, termination points and overall layout of the completed job in the standardized MMC IS telecommunication layers. The as-builts provided shall be in three layers, **(1) Voice /Data** including pathways and sleeves, **(2) Paging/ Coax** including Tap locations, **(3) Nursecall** to include all cabling paths and locations.

NOTE: Upon substantial completion of the project or when Time Sensitive projects which include Moves, Adds, and Changes are involved, an accurate copy of the field documentation for all cabling shall be submitted immediately to MMC's Project Manager or Telecommunications contact for review up to four (4) weeks prior to the project's schedule completion date. Contactors should take note of this as working field prints need to be kept in a legible state at all times. As-builts shall be furnished to MMC Telecommunications per the project completion schedule.

2.5 VIDEO APPLICATIONS (Master Spec 16850)

A. DESCRIPTION

Network cabling and equipment for CATV, CCTV or ITV systems and other related equipment. The contractor shall perform all terminations, at the Origination (TR) and Station ends. Cable and termination equipment shall be supplied by the contractor. All CATV / ITV cabling will be home run with out exception. Splitting and tapping of drops outside the TR is prohibited unless special circumstances exist (i.e. contaminated spaces) and prior approval is given by MMC. Quad shielded coax shall be used for all applications. Both the RG6 and RG11 are available. All coax connectors shall be compression type. Hex crimps are NOT permitted.

All cables shall be labeled with a unique ID for each cable with corresponding labels at the Origination and Station ends and on each side of any penetration point. This Numbering sequence shall be the (To/From locations and Individual Room #'s that are being fed). All cables shall be bundled neatly, tie wrapped, and dressed into the termination panels. Origination (TR) and Station points shall be identified by MMC on the Master Floor Plan for that project and detailed within the Scope Of Work document. Final connection to the live system shall be performed by MMC unless requested within the Scope Of Work for that project.

1. All Coax locations that shall be used to provide the **ITV** signaling shall be installed at the height specified in the Scope of Work or Master Floor Plan for that project. Adequate blocking for TV support is mandatory and shall be noted on the as-built documentation.
2. The contractor is responsible for the mounting, install, and configuration of each ITV and standard MMC TV in the locations noted on the Master Floor Plan for that project. The contractor shall install all components as requested through the Scope of Work for the specific project.

B. REQUIREMENTS

1. Cabling:

75-ohm coaxial cables are available in a variety of RG styles. White plenum-rated RG-11 coaxial cable shall be used for Riser applications and white plenum-rated RG-6 coaxial cable shall be used for Station locations. Plenum rated coax is required in all areas and shall be noted in the Scope of Work for the specific project.

Note: Refer to Appendix B for a listing of additional Part Numbers and product descriptions.

2. Terminations:

Numerous connectors and adapters are available for each individual application. All outlets shall have a 2-1/2", 2" x 4" duplex box or a 2-1/2", 4" x 4" quad box as part of the standard installation. Specific inserts and connectors shall be detailed on the print for each location.

Note: Refer to Appendix B for a listing of additional Part Numbers and product descriptions.

3. Documentation:

As-Built documentation of any additions to the existing CATV/CCTV/ITV plant shall be the responsibility of the contractor. All testing of the cabling plant shall be the responsibility of the contractor. Testing results shall be submitted to MMC's Project Manager or Telecommunications contact and approved by MMC prior to acceptance of any cabling work. As-Built drawings as well as floor by floor information are available for reference use by contacting the Engineering department.

2.06 PUBLIC ADDRESS SYSTEM 25/70 volt system (Master Spec 16726)

A. DESCRIPTION

Bogen 100 watt paging amplifiers are used at Maine Medical Center. Volume control attenuators (as indicated on project prints) and speakers shall be arranged in a daisy-chain fashion. Each individual speaker is to be set at 2.0 watts. The contractor shall perform all terminations at the origination and speaker end. Cable and termination equipment is to be supplied by the contractor. All cables shall be labeled with a unique ID at the origination point and at all termination points. All cables will be bundled neatly; tie wrapped and dressed into the termination panels. Origination points will be identified by MMC on the project prints. MMC will perform the final connections to the network.

B. REQUIREMENTS

1. Cabling

Shielded West Penn (plenum) 16 gauge single twisted pair double jacketed cable or equivalent shall be used. All cabling for overhead paging applications shall be run in separate pathways in accordance with **NEC Article 725.56 "F"**.

2. Terminations

Each speaker shall have its transformer set for 25 volts or 70 volts to match the paging amplifier. Each speaker shall be set at 2.0 watts, with volume control set @ 50% and this shall be done by the contractor as appropriate for the space. MMC shall provide the termination locations for the speakers, amps, and busbars. The contractor shall provide all materials for the completion of this work. MMC shall make the final connections the system unless otherwise noted in the Scope Of Work for that project.

3. Components

For new installations, speakers shall be spaced according to the Reflective Ceiling Grid for adequate coverage. For existing installations, speakers shall be spaced at a distance of twice the ceiling height. Speakers are to be tapped at 2.0 watts. For amplifier selection, take number of speakers and multiply by 2 watts to determine amplifier size. There shall be no more than 45 speakers per Amplifier. For installations requiring multiple amplifiers that are tied together from a common paging input, an audio distribution amplifier shall be used to control impedance and stabilize out put levels. The Radio Design Labs (RDL) RU-DA4D ADA will be used for these installations.

Product Number

Description

BOGTPU100B
S810T725PG8WVK
RU-DA4D

Bogen 100 Watt Paging Amplifier
Bogen Speaker/Grille/Transformer
RDL Audio Distribution Amplifier

4. Testing

Each speaker run installed shall be tested to determine the load on the system. This shall be determined by utilizing an impedance meter and this information shall be noted on the as-built documentation for the project.

2.07 PUBLIC ADDRESS SYSTEM Valcom (Master Spec 16726) cont.

A. DESCRIPTION

As an alternate, the public address system will be comprised of Valcom products. The contractor shall perform all terminations at the Origination (TR) and speaker locations and as noted in the Scope Of Work for the project. Cable and termination equipment shall be supplied by the contractor. All cables shall be labeled with a unique ID at the origination point and at all termination points. All cables shall be bundled neatly; tie wrapped and dressed into the termination panels. Origination (TR) and termination (speaker) points shall be identified by MMC on the Master Floor Plan and detailed within the Scope of Work document. MMC shall make the final connections the system unless otherwise noted in the Scope Of Work for that project.

B. REQUIREMENTS

1. Cabling

All cabling shall be terminated by the contractor on contractor-provided and installed BIX style connection blocks as noted in Section 2.01A-E. Use one Plenum 4-pair Category 5e yellow UTP cable for this application. All cabling for overhead paging applications shall be run in separate pathways in accordance with **NEC Article 725.56 "F"**.

2. Terminations

Each speaker cable shall be home run back to the telecom closet (TR) on the corresponding floor. All speakers will be marked on the outside grill with the matching cable identification. The cable will be terminated in the telecom closet on a separated BIX style connection block clearly marked "Overhead Paging".

<u>Nordex/CDT Number</u>	<u>Description</u>
A0270164	QMBIX10A 250 pair distribution frame
A0340836	QMBIX12E 300-pair distribution frame
A0393146	QMBIX1A4 25-pair termination field marked every 4
A0270169	QMBIX20A Data plate
A0270168	QMBIX19A Distribution ring
P0748008	QCBIX184 Labels (purple)

3. Components

All Valcom products provide or consume power and are assigned Valcom power units. The amount of power required for a paging system is based on the quantity and type of Page control and speakers/ Horns selected. All speakers will be installed with back boxes and bridges.

Part Number	Discription	Power Units
V-1020C	8" ceiling speaker	-1
V- 1030C-GY	5 Watt Horn	-6
V- 1036C-GY	15 Watt Horn	-18
V-9914M-5	Bridges	
V-9915M-5	Backboxes	
VP-1124	Power Supply	+20
VP-2124	Power Supply	+40
VP-4124	Power Supply	+80
VP-6124	Power Supply	+120
VP-12124	Power Supply	+240

4. Testing

Each speaker run installed shall be tested to determine the load on the system. This shall be determined by utilizing an impedance meter and this information shall be noted on the as-built documentation for the project.

2.8 MASTER TIME SYSTEM

A. DESCRIPTION

Maine Medical Center shall require any clock system proposed for installation in any of the Maine Medical Center campuses to be the Primex brand GPS/wireless clock system. This type of system shall be used in all applications requiring a synchronized master clock system. Elapsed Timer clocks made by Primex are 120v systems and are for specific applications (i.e. OR, ED Trauma Rooms). Installation of Elapsed Timer clocks will be coordinated by MMC Facilities and Engineering departments.

B. REQUIREMENTS

Installation:

The low voltage contractor may be requested to mount the clock units as part of the project. Pricing for installation of the clocks should include labor for unpacking clocks, inserting batteries, removal of old clock mounts or retro fit of existing mounting hardware for the new clock and a check to ensure each unit is functioning properly. Defective clocks "out of the box" will be noted and a replaced as part of the process. Details for installation and location of clocks will be contained in the bid package for the respective project. When necessary, dust control will be achieved through the use of a HEPA vacuum and all packaging material will be removed as the final step.

2.9 VISUAL/VOICE NURSE PATIENT CALL SYSTEM (Master Spec 16725)

A. DESCRIPTION

- 1. The Rauland-Borg Responder IV nurse/patient call system** shall be installed where a visual/voice nurse/patient call system is required. This system provides two-way communication from a patient room to the nurse station, as well as visual and/or audible annunciation at a variety of other devices such as corridor lamps and duty stations.

B. INSTALLATION

1. Installation and programming shall be accomplished by factory certified personnel according to all current manufacturer standards and recommendations unless otherwise specified by MMC. Furthermore, installation of all nurse call systems shall be performed by technicians holding a current State Of Maine Low Voltage license or working with a Helper's License under the supervision of a master electrician. All Responder IV systems installed in the hospital shall be connected to hospital emergency power. Design of the system shall be performed only by certified Rauland personnel and that design shall be reviewed and approved by MMC technical personnel prior to installation.
2. All installations of Rauland nurse call systems will be performed in strict accordance with the Rauland specifications for the respective systems unless otherwise specified by MMC. Particular attention will be paid to power calculations and GCM interconnects.
3. All installations of nurse call station components (i.e. call stations, dome lights, duty/staff stations) must be installed in strict accordance with the ADA specifications for the area.
4. For integrated Pillow Speaker installations, the cabling shall consist of stranded, 3 wire cable. The black, red, white cable shall be terminated on a standard faceplate on the headwall by the cabling contractor. The faceplate will contain coax and ¼" jack and will be supplied by the contractor. Final connections to the nurse call system will be performed by the nurse call system installer.
5. For non-integrated Pillow Speaker installations, the cabling shall consist of stranded, 3 wire cable. The black, red, white cable shall be terminated on a standard faceplate on the headwall by the cabling contractor. The faceplate will contain the standard ¼" jack. Final connections to the nurse call system will be performed by the nurse call system installer.

C. CABLING

1. Contractor shall terminate all cabling with manufacturer approved connectors. Only factory certified and specified parts and components shall be used. No substitutions will be allowed.
2. All cabling shall be free from shorts and faults. Wiring shall be UL listed, and installed according to NFPA 70 standards.
3. Cabling for nurse call systems shall be coordinated through MMC. Only those cabling contractors listed on MMC's approved contractor list can be used in this process.
4. The contractor shall perform all terminations and labeling for cabling and devices installed, which shall include X-Bus, J-Bus, J-Drops, Sub-Station, Power, and Ground wire.

5. All Cable and termination equipment to be supplied by the contractor.
6. All cables shall be bundled neatly, Velcro wrapped, and dressed into the cabinets. Origination (cabinet) and termination (station) points shall be identified by MMC on the project prints and detailed within the Scope Of Work document.
7. All cables shall be mechanically labeled with a unique ID for each cable with corresponding labels at the cabinet (origination) and termination (station) ends.
8. The Labeling sequence that shall be utilized shall be provided by MMC or approved by MMC resources assigned to the project if this information is provided by the contractor.
9. Installation of cables shall be accomplished according to the Master Floor/Site Plan. All cable shall be placed along established cable pathways without weaving between pipes, conduit, etc. All direction changes shall be at ninety (90) degree angular turns. Cabling shall not be run in the same conduit with other systems (i.e. Class 1 AC power distribution, fire alarm entertainment systems, lighting controls, etc.). Consult the BICSI Telecommunications Design Manual (TDM) for clarification of these requirements. Plenum rated cable shall be used for all nurse call installs and shall be indicated in the Scope Of Work document supplied as part of the project. For installations in showers or wet locations, installations shall be completed in accordance with NFPA 70 Article 314.15 (a).
10. All cabling shall be tested for continuity for all runs. Test results shall be provided to MMC's Project Manager or Telecommunications contact upon job completion, and prior to acceptance. Test results shall include a summary report of all cables tested indicating test results.
11. Upon job completion, the contractor shall provide a "field copy" of the prints identifying all cable ID's, locations, routing and diagrams of all nurse call components for use until such time that the final as-builts are received for the project.
12. The contractor shall provide a complete set of as-built drawings to MMC on completion of this project and prior to acceptance. As-builts shall indicate all types and sizes of facility pathways, junctions, termination points. All as-builts shall be in .DWG format and shall be provided to MMC's Project Manager or Telecommunications contact. The as-built documentation provided shall include (2) **full-sized** hard copy prints and a .PDF file with all facility pathways, junctions, termination points and overall layout of the completed job in the standardized MMC IS telecommunication layers. The as-builts provided shall be in three layers, (1) Voice /Data including pathways and sleeves, (2) Paging/ Coax including Tap locations, (3) Nursecall to include all cabling paths and locations.

D. PROGRAMMING

1. Under no circumstances will any programming to the nurse call systems at MMC be performed without prior review and approval from the TNS department at MMC. All programming performed on the Rauland systems at MMC must be accompanied by an MMC work order describing the type of programming needed. For major changes to the system, all programming must also be documented using the process described below in section 2.
2. For project related installations or new installations performed by a contractor, initial programming must be reviewed and approved by MMC personnel prior to actual work being performed. All major programming to nurse call systems at MMC by outside contractors must be reviewed and approved by MMC prior to being performed. Any programming performed by Contractors, **MUST** be accompanied by the factory programming forms. These forms shall be completed in as much detail as possible indicating work performed, date, requestor, etc. These forms are contained in Appendix A of the Rauland Responder IV Applications Manual, Section KI1970A.
3. For contracted installations, all information related to the installations shall be reviewed and approved by MMC personnel prior to commencement of work. This includes detailed floor plans, power calculations, power runs, programming sheets and any other necessary information requested by the MMC technician.

E. IN-SERVICE TRAINING

1. Unless otherwise specified, the contractor shall provide thorough training of all nursing staff assigned to those nursing units. Nursing and support staff respective to the floor shall receive training that will enable them to fully understand the operation of the system in order to provide adequate patient support respective to the processes used on their floors. A separate training room shall be set up that allows this type of individualized training utilizing an in-service training unit, prior to cut over of the new system.

F. COMPONENTS

1. All accurate part numbers for components and/or hardware required for the Responder IV Nurse call system installation shall be identified by utilizing the Responder IV Nurse call system installation manual.

Note: Refer to Appendix C for a listing of all Rauland Part Numbers.

2.10 NURSE CALL VISUAL ONLY SYSTEM SPECIFICATION (Master Spec 16725)

A. DESCRIPTION

The Rauland-Borg Responder 4000 nurse/patient call system shall be installed where a visual only nurse/patient call system is required. Installation shall be accomplished by factory certified installers according to all current manufacturer standards and recommendations. The system shall be connected to hospital emergency power, and include battery back up.

B. INSTALLATION

1. Installation and programming shall be accomplished by factory certified personnel according to all current manufacturer standards and recommendations unless otherwise specified by MMC. Furthermore, installation of all nurse call systems shall be performed by technicians holding a current State Of Maine Low Voltage license or working with a Helper's License under the supervision of a master electrician. All Responder IV systems installed in the hospital shall be connected to hospital emergency power. Design of the system shall be performed only by certified Rauland personnel and that design shall be reviewed and approved by MMC technical personnel prior to installation.
2. All installations of Rauland nurse call systems will be performed in strict accordance with the Rauland specifications for the respective systems unless otherwise specified by MMC. Particular attention will be paid to power calculations and GCM interconnects.
3. All installations of nurse call station components (i.e. call stations, dome lights, duty/staff stations) must be installed in strict accordance with the ADA specifications for the area.
4. For integrated Pillow Speaker installations, the cabling shall consist of stranded, 3 wire cable. The black, red, white cable shall be terminated on a standard faceplate on the headwall by the cabling contractor. The faceplate will contain coax and ¼" jack and will be supplied by the contractor. Final connections to the nurse call system will be performed by the nurse call system installer.
Note: Refer to Appendix C for a listing of all Rauland Part Numbers.
5. For non-integrated Pillow Speaker installations, the cabling shall consist of stranded, 3 wire cable. The black, red, white cable shall be terminated on a standard faceplate on the headwall by the cabling contractor. The faceplate will contain the standard ¼" jack. Final connections to the nurse call system will be performed by the nurse call system installer.
Note: Refer to Appendix C for a listing of all Rauland Part Numbers.

A. CABLING

All installations of nurse call station components (i.e. call stations, dome lights, duty/staff stations) must be installed in strict accordance with the ADA specifications for the area. (**Black-Category 5E 4-pair Plenum cable shall be required for the Responder 4000 Nurse call System**).

1. Installation of cables shall be accomplished according to the Master Floor/Site Plan. All cable shall be placed along established cable pathways without weaving between pipes, conduit, etc. All direction changes shall be at ninety (90) degree angular turns. Cabling shall not be run in the same conduit with other systems (i.e. Class 1 AC power distribution, fire alarm entertainment systems, lighting controls, etc.). Consult the BICSI Telecommunications Design Manual (TDM) for clarification of these requirements. Plenum rated cable shall be used where required and shall be indicated in the Scope Of Work document supplied as part of the project. Plenum cables shall be used whenever necessary and shall be detailed as part of the Scope Of Work for the project.
2. All cabling shall be free from shorts and faults. Wiring shall be UL listed, and installed according to NFPA 70 standards.
3. All cables shall be bundled neatly, tie wrapped, and dressed into the cabinets. Origination (cabinet) and termination (station) points shall be identified by MMC on the project prints and detailed within the Scope Of Work document.
4. All cables shall be mechanically labeled with a unique ID for each cable with corresponding labels at the cabinet (origination) and termination station ends. The Labeling sequence that shall be utilized shall be provided by MMC in the Scope Of Work.
5. All cabling shall be tested for continuity for all runs. Test results shall be provided to MMC's IS Project Manager or Telecommunications primary contact upon job completion, and prior to acceptance. Test results shall include a summary report of all cables tested indicating a PASS/FAIL condition.

B. IN-SERVICE TRAINING

Unless otherwise specified, the contractor shall provide thorough training of all nursing staff assigned to those nursing units. Nursing and support staff respective to the floor shall receive training that will enable them to fully understand the operation of the system in order to provide adequate patient support respective to the processes used on their floors. A separate training room shall be set up that allows this type of individualized training utilizing an in-service training unit, prior to cut over of the new system.

C. COMPONENTS

All accurate part numbers for components and/or hardware required for the Responder 4000 Nurse call system installation shall be identified by utilizing the Responder 4000 Nurse call system installation manual.

Note: Refer to Appendix C for a listing of all Rauland Part Numbers.

2.11 APPENDIX INDEX

Appendix A - Telecommunications Products and General Description

Appendix B - Video Systems Products and General Description

Appendix C - Nurse Call Systems Products and General Description

Appendix D - Telecommunications Preferred Contractor List

Appendix E - MMC Preferred Vendor List (Miscellaneous)

Appendix F - Telecommunications Closet Layout

All new Telecommunications Closets shall follow the specifications put forth in the “Typical Communications Room Design” diagram. Closets that cannot meet the square footage and size requirements shall be built in such a way that follows the specifications as closely as possible. If necessary, existing closets shall be renovated as part of the project to meet the specifications as closely as possible.

Appendix G - Office Terminations for Voice and Data

Voice and data terminations shall follow the guidelines shown on this faceplate diagram. More detail on termination practices can be found in Section 2.01.

Appendix H - Telecommunications Legend (Master Floor Plan)

Appendix I - Telecommunications Room Terminations

Appendix J - Grounding and Bonding for Communications Systems

Appendix K - Primary Protection For Communications Systems

Appendix L - MMC/Telecommunications Firestopping Requirements

Appendix A

Product List & General Description

Voice & Data

<u>Product Number</u>	<u>Description</u>
40604-001	Chatsworth rack install kit (concrete)
40607-001	Chatsworth rack installation kit (wood)
55053-503	Chatsworth 19" Universal Rack (Clear)
55053-703	Chatsworth 19" Universal Rack (Black)
12096-503	Chatsworth Vertical Section (Clear)
12096-703	Chatsworth Vertical Section (Black)
10250-009	9" Universal Cable Runway (Gray)
10250-709	9" Universal Cable Runway (Black)
10250-012	12" Universal Cable Runway (Gray)
10250-712	12" Universal Cable Runway (Black)
OR-PHD66U24	Ortronics 568A 24 port UTP patch panel
OR-PHD66U48	Ortronics 568A 48 port UTP patch panel
OR-808044916	Ortronics wire management panel
OR-60400426	Ortronics wire management panel (Primary)
OR-60400199	Ortronics Strain Relief Bar
OR- S22600	Cat 6 568A dual RJ45 Jacks (DATA)
OR-60900015	Dual RJ11 Jacks (VOICE)
OR-40300158	Single gang face plates
OR-40300159	Dual gang face plates
OR-40300196	1.59 cm medium bezel for cubicles
CABLOFIL	CABLOFIL Cable Tray System
LD3IW6-A	Panduit Raceway
LD5IW6-A	Panduit Raceway

BIX

<u>Northern Telecom Number</u>	<u>Description</u>
A0270164	QMBIX10A 250 pair distribution frame
A0340836	QMBIX12E 300-pair distribution frame
A0266828	QMBIX1A5 25-pair distribution connector (5pr)
A0393146	QMBIX1A4 25-pair distribution connector (4pr)
A0270169	QMBIX20A Data plate
A0270168	QMBIX19A Distribution ring
P0748006	QCBIX1A4 Label, Blue
P0588406	QCBIX1A Label, White
P0748019	QCBIX1A Label, Grey

Appendix A (Cont.)

Voice & Data

Station Cable

Product Number

6P4P24-GR-P-BER-AP
5EXHP4P24-YL-P-BER-AP

Description

Berktek 4 Pair Category 6 Data (PLENUM)
Berktek 4 Pair Category 5E Voice (PLENUM)

Riser Cable

The following manufacturers provide an acceptable Multipair Riser cable product for use throughout the Maine Medical Center campus. Each manufacturer noted below may provide any of the multipair cables noted in the description field below. Prior to any installations, All vendors shall provide Maine Medical Center's Telecommunications Department with the complete Manufacturers specifications for the intended product.

Manufacturer

Ortronics
Berk-Tek
General
Superior
Mohawk
Essex

Description

25 Pair
50 Pair
100 Pair
200 Pair
300 Pair
400 Pair

FIBER OPTIC CABLE

Siecor Number

#CCH-01U
#CCH-02U
#CCH-03U
#WCH-02P
#WCH-04P
#CCH-CP06-15T
#CCH-CP06-19T
#CCH-CP12-91
#CCH-CP12-59
#95-000-41
#95-200-41
#95-000-51
#95-200-51
#CCH-BLNK

Description

24 port Closet Connector Housing
48 port Closet Connector Housing
72 port Closet Connector Housing
24 port Closet Connector Housing
48 port Closet Connector Housing
ST Multimode Connector Panel
ST Singlemode Connector Panel
SC Multimode Connector Panel
SC Singlemode Connector Panel
SC Multimode Connector
SC Singlemode Connector
ST Multimode Connector
ST Singlemode Connector
Blank Connector Panel

Corning FREEDM Cable or Equivalent (**Corning Glass**)

Corning MIC Cable or Equivalent (**Corning Glass**)

Appendix B

Product List and General Description

Video Systems

- Coax cable used in MMC locations shall be Commscope, Times Fiber or Belden brand and shall be white in color, plenum rated and quad shield.
- All jumpers will be plenum-rated RG-6 or RG-11 with compression fitting made by any manufacturer or onsite.
- All connectors shall be compression type, that specifically match the cable being used.
- Faceplates and RF-related inserts shall be Ortronics brand.

<u>MFG.</u>	<u>Part #</u>	<u>Description</u>
BT	CRT-(*)	One Port Tap/Directional Coupler
BT	SXRS-2 or SCVS-2	2 Way Splitter
BT	SXRS-4 or SCVS-4	4 Way Splitter
BT	SXRS-8 or SCVS-8	8 Way Splitter
BT	F81	F-F Splice Female/Female Barrel
BT	F-59T	75 Ohm Terminator
BT	FAM-(*)	Assorted Attenuator
BT	BITA 550-50	Distribution Amp
BT	BITA-RF	Return Filter
BT	BITA-RA	Return Amp
BT	BITA-CE-4	Cable Equalizer
BT	BITA-FA-(*)	Amplifier Attenuator
Pico	SC-3	Channel 3 VCP/VCR Inserter
HA	MCO1/4-F	TV Outlet w/Control Cable Jack (No cover Plate)
HA	JK1/4-PLT	Pillow Speaker Jack w/Single Gang St. Steel Plate
HA	WP-81SS	Stainless Steel Face Plate With "F" Barrel
HA	WP-81IV	Ivory Pace Plate w/"F" Barrel

BT= Blonder Tongue, Pico=Pico Macon, HA=Howlands Associates

Note: All above mentioned components available from Howland Associates.

Appendix C

Product List and General Description

Nurse Call Systems

All parts and descriptions for Rauland Nurse Call systems will be supplied by Signet at the design phases of the project.

Appendix D

Maine Medical Center Preferred Telecommunications Cabling Contractors

E.S. Boulos Co.

45 Bradley Drive
Westbrook, ME 04092
Contact: Dan Broy
207-464-3706
207-464-1833 Fax

Connectivity Point

P.O. Box 1268
Auburn, ME 04211-1268
782-0200
595-0058 (cell)
753-0200 Fax
Contact: Tim Hooper

MTS Services

13 Delta Drive, Suite 7
Londonderry, NH 03053
603-845-1100
603-845-1119 Fax
Contact: Roy Chamberlain

Milestone Communications, LLC

126 Western Ave., PMB #172
Augusta, ME 04330
207-622-3375
Fax: 207-622-3372
Contact: Amy LeGasse

Appendix E
Maine Medical Center
Preferred Vendor List (Miscellaneous)

CCTV/ITV SYSTEMS

Howlands Associates
49 River Street
Plymouth, MA 02360
(508) 747-8332 (Office)
(800) 225-0256 PIN #147169 (Pager)
Contact: Ken Reardon

CATV/ITV SYSTEMS

Healthcare Television of New Eng., Inc.
26 Phillips Drive
Westford, MA 01886
(978) 692-7728 (Tech Support)
Contact: Jack Ryan
(413) 665-2844
Contact: Nancy Wilson (Sales)

MASTER TIME SYSTEMS

Primex Wireless, Inc.
N3211 County Road H
Lake Geneva, WI 53147
800-537-0464 (office)
262-745-7251 (cell)
262-248-0061 (Fax)
Contact: Tim Ashe

NURSE-PATIENT CALL SYSTEMS (VISUAL or VOICE)

Signet Electronic Systems, Inc.
153 U.S. Route 1
Scarborough, ME 04074
781-871-5888 x2105
2-7-415-9797 (cell)
207-874-0600 (fax)
Contact: Dale Moreau, Sr. Sales Engineer

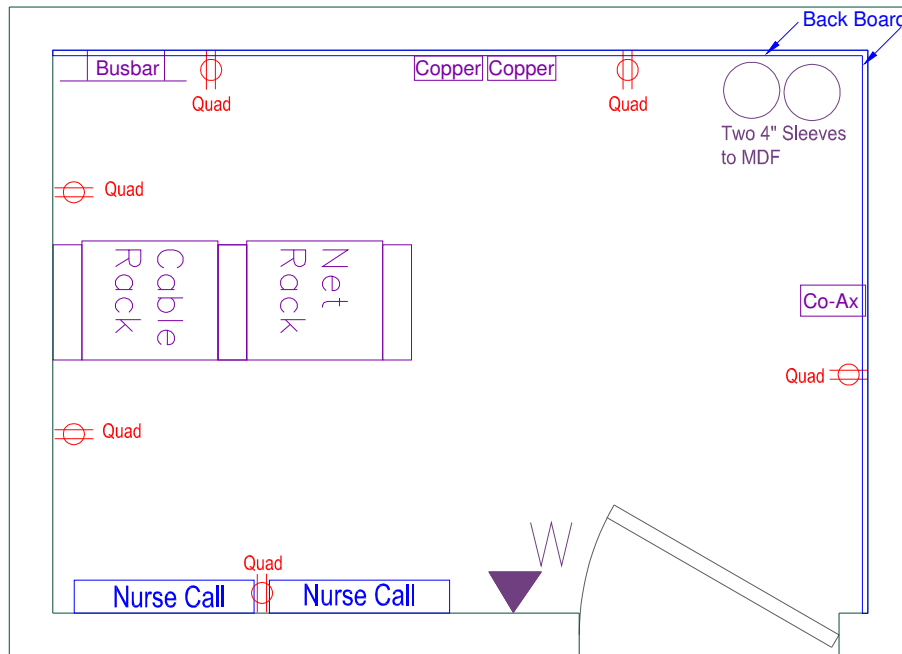
Appendix F

Maine Medical Center

Typical Telecommunications Room Design Plans

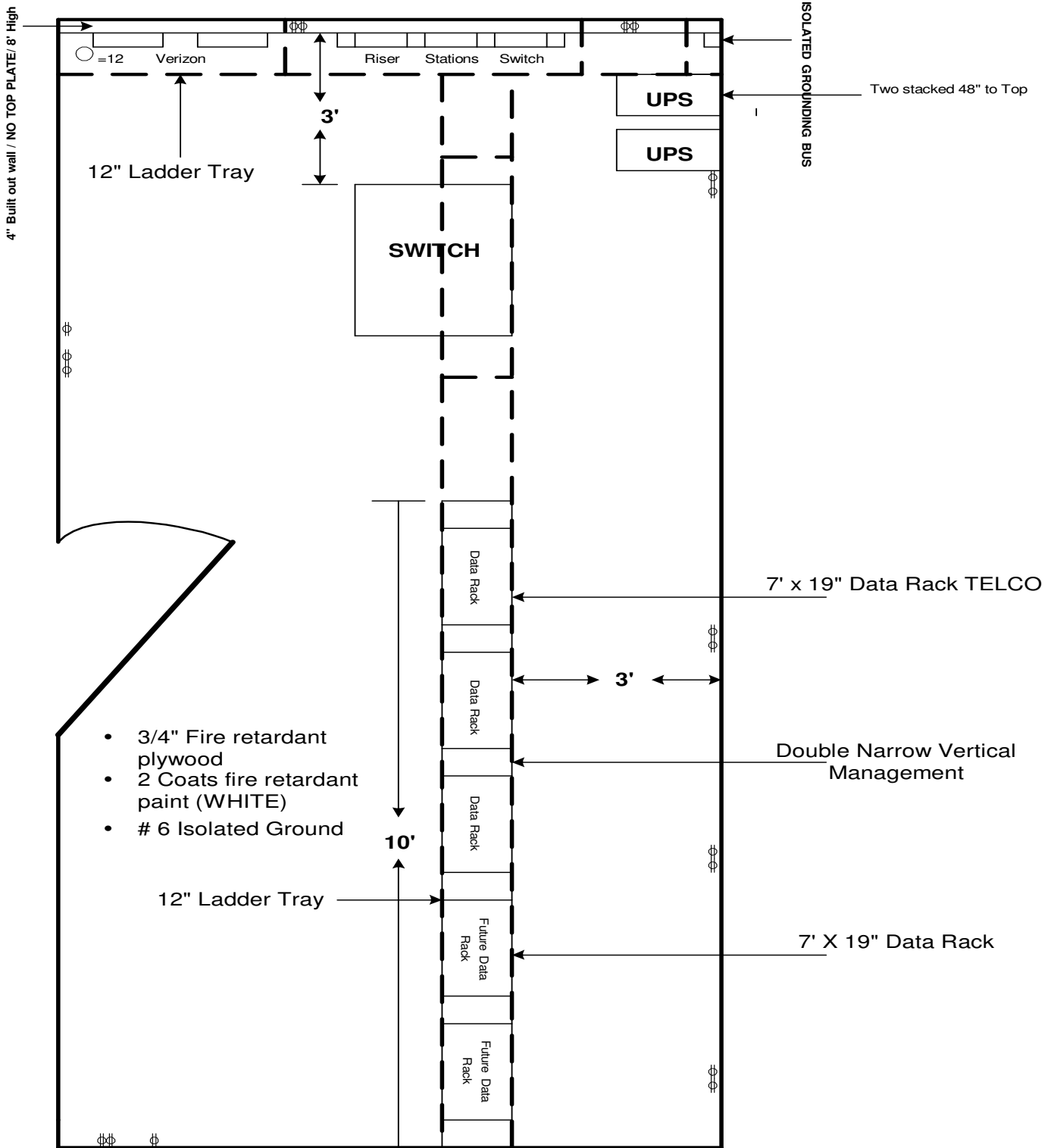
All Telecommunications Rooms (TRs) shall require at least one wall to be built-out with plywood material for use as a backboard in attaching systems enclosures such as nurse call, paging amplifiers, etc. Additional backboard walls may be requested as part of a project and detailed within the Scope Of Work for the project. Backboard walls shall be constructed with exterior sheathing and shall be 3/4" or 1" A/C grade. Standard plywood sheathing shall be painted with 2 coats of White Fire-retardant paint. Fire-retardant plywood may also be used and installed with the finish side out. The backboard shall be mounted flush on the drywall or concrete wall. When applicable, all cabling shall be surface mounted on the backboard using 4" or 6" D-Rings for management.

Any power or voice/data outlets installed on this wall shall be at the 18" A.F.F. height. The racks shall be mounted to the floor 36" from the wall, when applicable.



Appendix F (Cont.)

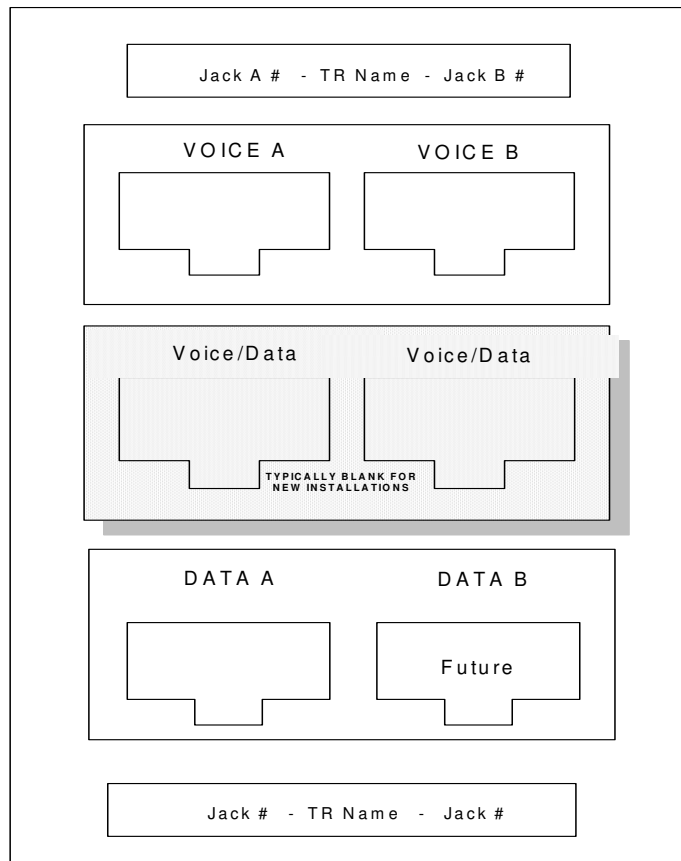
Typical Telecommunications Room Design Plans



Appendix G

Office Terminations for Voice and Data

Maine Medical Center Standard Faceplate Layout



- * One Category 6 cable split into 2 voice jacks (for legacy voice applications)
- * Voice Jacks On Top Of Faceplate, when applicable
- * One Category 6 Per Drop
- * Data Always Terminated on Left side with the right side Open for future use







APPENDIX H

Maine Medical Center











Telecommunications Legend Standards

(For Use On Master Floor Plans)








Network Cabling Legend

-  Standard MMC CAT 6 drop
-  Multi-cable location. X = # of cables to install
-  Data only for wireless access point.
-  Wallphone
-  CO-AX
-  Correct numbering for as-built
0123

Nurse Call Legend

-  Dual Bed Patient Station
-  Single Bed Patient Station
-  Emergency Station with Pull
-  Duty Station
-  Staff Station
-  Master Station
-  Corridor Lamp
-  Zone Lamp
-  Dual 1/4" FAM Device
-  Dual Push Button Station

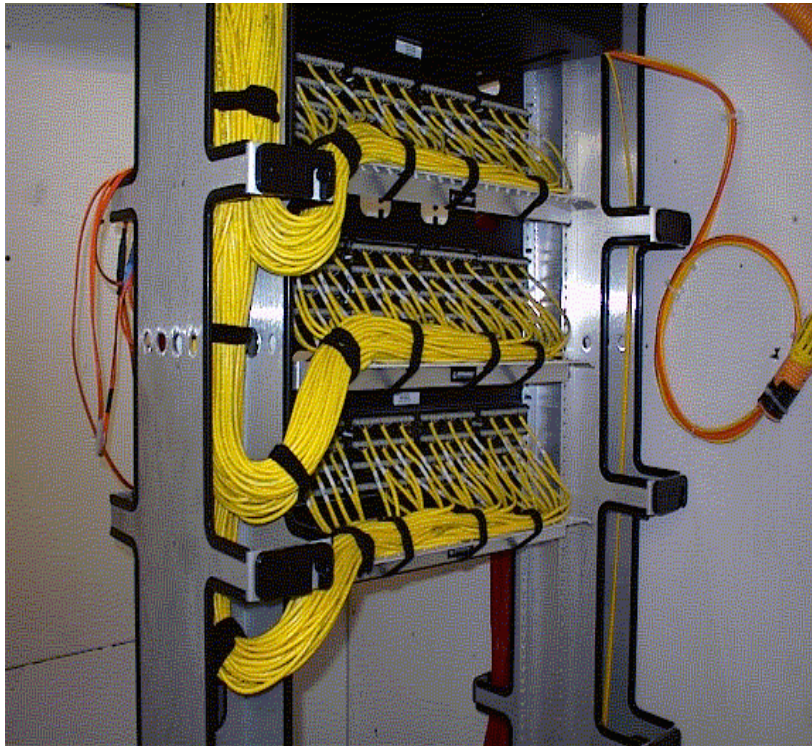
Rough-In and Ceiling Legend

-  Horizontal Sleeve, diameter noted.
-  Vertical Sleeve, diameter and floor level penetration noted.
-  Cable Tray, size noted on key.
-  Grounding Bus Bar
-  19" rack with 4" cable management
-  Ceiling speaker, grid mounted
-  Wall mounted Volume Controller

Appendix I

Telecommunications Room Terminations

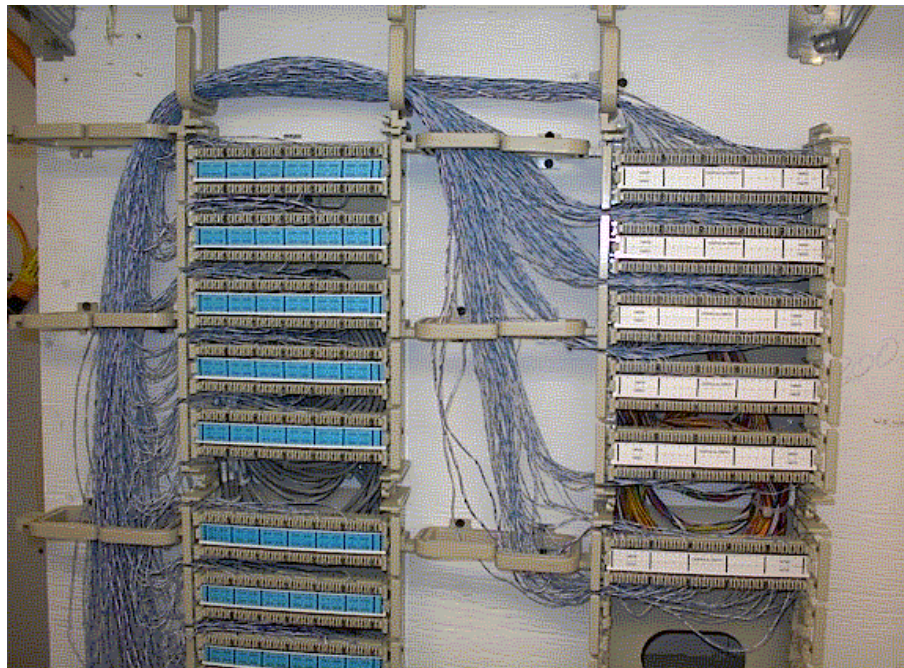
All Cat-6 terminations shall be installed as shown below. Each data drop shall be installed in a uniform manner, which shall include a cable identification number on each cable, and velcro strips shall be used for the finished install. **The Labeling for the Data frame shall be as follows:** (On the Face of the Patch Panel) Starting from the top left and working to the top right and continuing in ascending numerical order from left to right through the remaining frame, the labeling shall be **001** through **999**. This numbering sequence shall be adhered to throughout the Maine Medical Center campus unless specifically noted in the Scope Of Work for that project.



Appendix I (Cont.)

Telecommunications Room Terminations

The Voice Frames in each MMC closet shall be installed utilizing NORDX/CDT (BIX) equipment. Typically, the Station cables shall be installed on the left side and labeled with Blue DESI labels. Typically, the Riser cables shall be installed on the right side and labeled with White DESI labels. BIX management rings shall be installed for cross-wire installs from left to right. No BIX rings shall be required on the extreme right side. **Voice Frame labeling shall be as follows:** Starting at the top left of the frame and working to the top right of the frame and continuing through to the end of the Station cable count the labeling shall be **001A** then two spaces and then **001B** in ascending numerical order to the end of the Station cables. The Riser cables shall be labeled with the next pair count from the Main Distribution Frame (MDF) and each 25 pair ID strip shall have the beginning and end pair labeled on the top and bottom of each ID strip until the complete cable has been identified. The Closet Identification number shall be included in the top and bottom center of each ID strip and shall include the cable origination point and the cable destination point and the pair count. An example of this is **0GPA3 to 0BPA1- 100pr**. This Frame Layout and numbering sequence shall be adhered to throughout the Maine Medical Center campus unless specifically noted in the Scope Of Work for that project.



Appendix J

Grounding and Bonding for Communications Systems

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, and labeling of grounding and bonding infrastructure as described on the Drawings and/or required by these specifications.
- B. Listed manufacturers and products are preferred. UNM approved equal products are also acceptable.

PART 2: PRODUCTS

2.01 GROUNDING BUSBARS

A. Telecommunications Main Grounding Bus bar (TMGB)

- 1. Predrilled, copper, non-anodized. Chatsworth #10622-012 ground bus bar with Chatsworth #10622-000 bus bar insulators.

B. Telecommunications Grounding Bus bar (TGB)

- 1. Predrilled, copper, non-anodized. Chatsworth #10622-012 ground bus bar with Chatsworth #10622-000 bus bar insulators.

2.02 GROUNDING JOINTS AND SPLICES

- A. Grounding conductor joints/splices shall be mechanical type, copper alloy, with a minimum of two bolts and a separate section for each conductor.
- B. Grounding conductor terminations (lugs) shall be single barrel, mechanical screw type, copper alloy with machined contact surfaces.

2.03 BONDING CONDUCTORS

A. Cable Tray Bonding Conductor

- 1. Green #6 AWG insulated bonding jumper (12" max) with appropriate lugs or manufactured braided copper grounding jumper equal to B-Line #CAM-GJ, T&B #BD12, OZ/Gedney type "FB" or Mono-Systems.

B. Bonding Conductor (BC)

- 1. Green insulated copper bonding conductor, size as required by NEC. The BC shall be, as a minimum, the same size as the TBB.

C. Telecommunications Bonding Backbone (TBB)

- 1. Green insulated copper conductor, minimum size of No. 6 AWG. The TBB shall be sized at 2 kcmil per linear foot of conductor length up to a maximum size of 3/0 AWG. Insulation shall meet fire ratings of its pathway.

Appendix J (cont.)

Grounding and Bonding for Communications Systems

PART 3: EXECUTION

3.01 TELECOMMUNICATIONS INSTALLATION

A. Bonding and Grounding

1. Bond and ground all conduits, cable trays, racks and other infrastructure as per the NEC and TIA 607A to the main building ground.
2. Clean Surfaces. Nonconductive coatings (such as paint, lacquer, and enamel) on equipment to be grounded shall be removed from threads and other contact surfaces to ensure good electrical continuity or be connected by means of fittings designed so as to make such removal unnecessary.

B. Installation of the TMGB

1. Install the TMGB at the bottom of plywood backboard near the outside plant entrance conduits in the "BDF". TMGB shall be installed so that the BC for telecommunications is as short and straight as possible. Green insulated conductor shall be installed exposed. Connection at TMGB from main electrical service ground shall be thermo-weld type. Ground resistance shall not exceed 2 ohms, unless approved by UNM. Bus bar shall be predrilled for future connections. Provide label - "Do Not Disconnect" on connection to main electrical service ground.

C. Installation of the TGB

1. Install the TGB at the bottom of plywood backboard near the copper riser terminations in each "IDF". TGB shall be installed so that the TBB for telecommunications is as short and straight as possible. Green insulated conductors shall be installed exposed. Bus bar shall be predrilled for future connections.

D. Installation of the TBB

1. Install Green insulated copper grounding conductor (refer to 2.03.D for conductor size) from the TMGB to each TGB. Conductors shall be installed in continuous 3/4" PVC conduit. Paint all conduit fittings, junction boxes and covers "GREEN".

E. Installation of Grounding Conductor Joints/Splices

1. Install mechanical type, copper alloy, with a minimum of two bolts and a separate section for each conductor or copper compression type with two (2) indents. Install manufactured insulating cover or heavy tape insulation over joints/splices.

F. Grounding of Cable Tray

1. Install Green #6 AWG bonding jumper (12" max) with appropriate lugs at each cable tray joint or install manufactured braided copper grounding jumper. In lieu of bonding jumpers, approved grounding type connectors to connect sections of cable tray will be permitted. Install Green #6 AWG grounding conductor with appropriate lugs from side of cable tray down to TMGB or TGB. Drill and tap side of cable tray (for appropriate size bolt, 1/4" x 20 min.), making sure that bolt does not extend into wire management part of tray.

G. Grounding of Telecommunications Duct bank

1. Provide a continuous #4/0 bare stranded drawn copper conductor within the concrete at the bottom of all duct banks. Terminate to bonding ribbon in telecommunications manholes.

Appendix J (cont.)

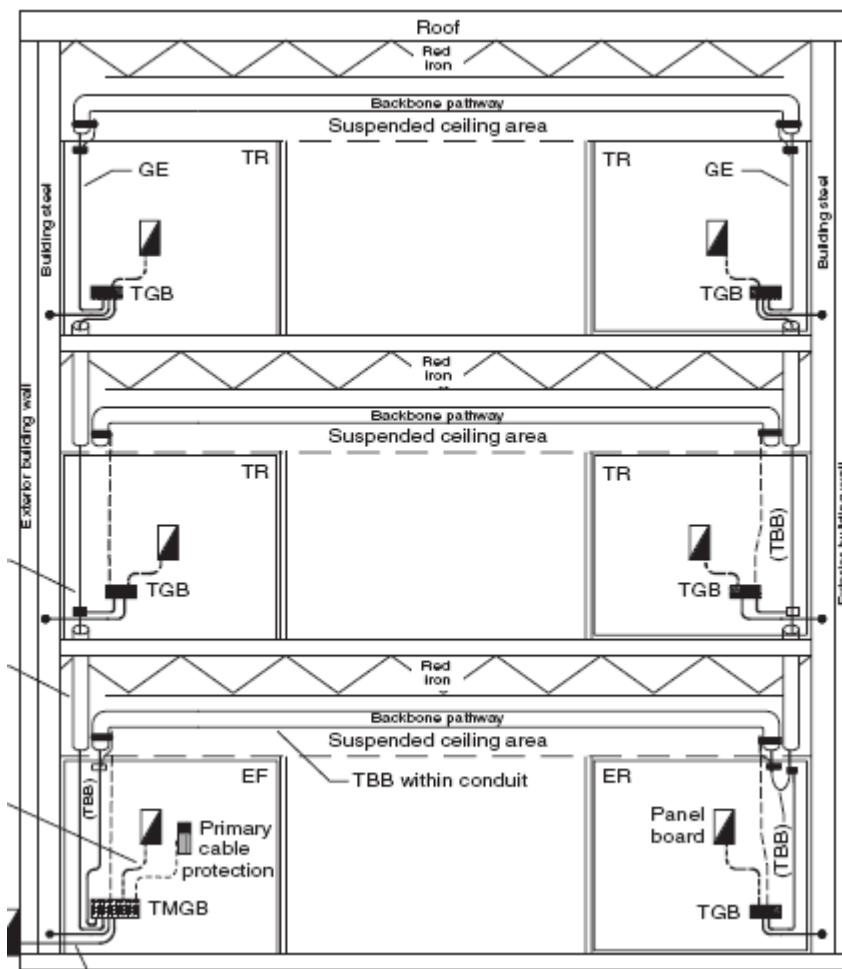
Grounding and Bonding for Communications Systems

H. Grounding of Telecommunications Manholes and Hand holes

1. Provide bonding jumper to reinforcing steel in each section. Install a bonding ribbon horizontally around the top of each manhole and attach to all cable racks and metallic hardware within the manhole. Continue installation vertically between bonding clamps so both top and bottom halves are bonded together on each side. (The bonding ribbon will be used to bond and ground all future splice cases and hardware placed within the manhole.) Provide a ground rod near the center of each manhole and hand hole. Bond to the bonding ribbon in manholes.

Note: Precast manholes having reinforcing steel bonded together does not require an additional ground rod.

Image 1 – Typical Hospital Installation



Appendix K

Primary Protection Systems for Communications Systems

Contractors shall furnish the appropriate model and type of lightning protection to provide maximum protection of electronic equipment that is connected to any outside plant cabling.

Maine Medical Center requires prefers to use lightning protection products from Circa. Other manufacturers such as Porta Systems are also acceptable.

All lightning protection shall be installed to manufacturer's specifications and in adherence to all State and local codes.

Appendix L

Firestopping

PART 1 GENERAL

1.01 DEFINITION

- A. Firestopping: Material or combination of materials to retain integrity of fire rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases.
- B. Through-Penetration Firestop Systems: Material or combination of materials which are field-constructed of fill, void, or cavity materials and forming materials, designed to resist fire spread when installed as a complete firestop system.
- C. Through-Penetration Firestop Devices: Factory built products designed to resist fire spread. Complete when delivered to site; ready for installation.

1.03 SUMMARY

A. Provide labor, materials, services, coordination, and equipment necessary for complete installation of firestopping materials.

- 1. Provide through-penetration firestop systems and through-penetration firestop devices, sealants, and related products for floor and wall penetrations (and sealing top of rated walls to deck when required by code officials). Work includes, but is not limited to conduits and low voltage cables.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data indicating product characteristics, performance, and limiting criteria.
- B. Proposed Installation Drawings: Show typical installation details for methods of installation.
- C. Documentation of qualifications as firestopping installer are required.
- D. MSDS sheets, for each product to be used, shall be provided to the individual responsible for site coordination of MSDS information.
- E. Certification is required from manufacturer that Installer has been trained in the handling and installation of their products.

1.05 QUALITY ASSURANCE

A. Conform to applicable governing codes:

- 1. Maine State Building Code

B. Meet requirements of ASTM E814 Through Penetration Fire Test by a nationally recognized testing agency and other ASTM Standards as applicable for the installation.

- 1. ASTM E84 "Test Method for Surface Burning Characteristics of Building Materials."
- 2. ASTM E119 "Test Methods for Fire Tests of Building Construction and Materials."
- 3. ASTM E136 "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C."
- 4. ASTM E162 "Standard Method for Surface Flammability of Materials Using a Radiant Heat Energy Source."
- 5. ASTM E662 "Test Method for Specific Optical Density of Smoke Generated by Solid Materials."
- 6. ASTM E814 "Test Method for Fire Tests of Through-Penetration Firestops."

Appendix L (cont.)

Firestopping

C. Installer shall have successfully completed within the last 3 years at least 2 firestop projects similar in type and size to that of this Project. The installer is required to have been trained by each manufacturer of products he is installing in the proper handling and installation of that product. Additionally, all contractors must complete MMC's Contractor Orientation process prior to performing any firestopping tasks in MMC facilities.

D. Obtain firestop materials from a single manufacturer for each different product required.

E. Application Certification: Upon completion of the Work, the Contractor shall furnish to the Architect certification that materials have been installed in accordance with manufacturer's installation requirements. Certification shall be signed by the installer.

F. Contact the manufacturers of each product intended for use for a list of qualified Firestop Specialty Installers.

1.06 PRODUCT DELIVERY AND STORAGE

A. Deliver materials to project site in manufacturer's original unopened containers with labels indicating brand names. Store and protect accepted materials in accordance with manufacturer's directions and recommendations.

1.07 SEQUENCING

A. Coordinate this Work as required with work of other trades. Coordinate with other Contractors to make or keep penetration areas accessible to firestopping installer.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S PRODUCTS

A. Penetration Sealants

1. 3M Brand "Fire Barrier" Caulk.
2. 3M Brand Moldable Putty "Pads" and Moldable Putty "Stix".

B. Intumescent sealants and firestopping bags for use in openings and sleeves involving plastic pipe, insulated pipe, or flexible cable:

1. 3M Brand "Fire Barrier" Caulk, with FS-195 Wrap Strip and CS-195 Composite Sheet.

C. Penetration Systems

1. 3M Quick Path/Easy Path firestopping systems.

2.02 MATERIALS - GENERAL

A. Provide flame (F) rating minimum one hour, but not less than fire resistance rating of the assembly in which installed, per ASTM E814.

B. Maintain effective barrier against flame, smoke, and hot gasses per ASTM E814 and UL 1479.

C. Suitable for firestopping of penetrations by steel, glass, plastic, and insulated pipe. Also flexible cable, bus duct, and cable tray.

Appendix L (cont.)

Firestopping

PART 3 EXECUTION

3.01 EXAMINATION

- A.** Examine surfaces to receive penetration sealant or foam and report unacceptable conditions to the IS Project Manager before starting firestopping work. Start of work indicates firestopping installers acceptance of sizing of holes and application conditions.
- B.** Verify that penetration holes are approximately 1-1/2 inch larger diameter than the penetrating element to allow space for wrap strip. Each trade must control sizing of their penetration holes made to accommodate their penetrating items.

3.02 PREPARATION

- A.** Clean penetration holes of dirt, loose materials, and foreign matter which may affect bond or installation.
- B.** Remove coatings such as paint, curing compounds, water repellent, and sealers as required.

3.03 APPLICATION

- A.** Installation of Firestopping Materials: Install firestopping materials, including forming, packing, and other accessory materials to fill openings around mechanical and electrical services, penetrating floors and walls to provide firestops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.
- B.** Install firestopping materials systems in strict accordance with manufacturer's installation instructions and code requirements.
- C.** Employ installation techniques which will ensure that firestopping is deposited to fill and seal holes and openings.
 - 1.** Provide flame (F) rating minimum one hour, but not less than fire resistance rating of the assembly in which installed, per ASTM E814. Ensure effective smoke seal. Tool exposed surfaces of applied sealant smooth.

3.04 CLEAN-UP

- A.** Clean surfaces adjacent to sealed joints free of excess sealant and soiling from this Work as work progresses, using solvent or cleaning agent recommended in writing by the sealant manufacturer.
- B.** Leave finished Work in neat, clean condition; remove excess debris and materials.

END OF DOCUMENT