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5.4.1: MM TELECOMMUNICATION ROOMS

General

This SBA documents all of the specific requirements for telecommunications rooms and like infrastructure for Michigan Medicine (MM) facilities. This document completely supersedes 5.4 in all MM owned and long term leased facilities.

New buildings shall provide telecommunication infrastructure in full accordance with this document. Major renovations in existing buildings shall, when noted in the program statement, upgrade the telecommunications infrastructure also in full accordance with this document.

All voice and data systems services in MM facilities are provided by the Health Information Technology & ServicesMedical Center Information Technology (MCITHITS) Division of MM. Also, in almost all cases, MM projects include AT&T (under MCITHITS separate contract) for wire pulling and similar services.

In some cases, U-M (Campus) Information Technology Services (ITS) also has involvement as well. In these cases, there will be specific notation in the project scope statement noting their involvement and to what degree.

Coordinate through the Design Manager for the specific MCITHITS requirements for each project and provide telecommunications rooms as described below and in accordance with the Program Documents.

When more stringent, BICSI and ANSI/TIA guidelines supersede other guidelines.

Related Sections

Design Guideline Technical Sections:
1.0 – “Codes and Regulatory Agencies”
260500-H – “Supplemental Common Work Results for Electrical”
260526-H – “Supplemental Grounding and Bonding for Electrical”
260533-H – “Supplemental Electrical Materials and Methods”
260543 – “Underground Electrical Services”
260553-H – “Supplemental Electrical Equipment Identification”
272000-H – “Supplemental Voice and Data Communications”
273523-H – “Supplemental Emergency Responder Radio Coverage”
8.4 – “Electrical Preferred Manufacturers List”

References

ANSI/TIA-568-C Commercial Building Standards for Telecommunications Cabling Standards
ANSI/TIA-569-B Commercial Building Standards for Telecommunications Pathways and Spaces
ANSI/TIA-606-A Administration Standard for Telecommunications Infrastructure of Commercial Buildings.
ANSI/TIA-607-A Commercial Building Grounding and Bonding Requirements for Telecommunications
ANSI/TIA-758-A Customer-Owned Outside Plant Telecommunications Cabling Standard
ANSI/TIA-1179 Healthcare Facility Telecommunications Infrastructure Standards
BICSI – TDMM Building Industries Consulting Services International - Telecommunications Distribution Methods Manual.

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ASHRAE HVAC Applications, Chapter 19, 2011 – Data Processing and Telecommunications Facilities

MM Definitions:

BE - Building Entrance
Building Entrance (BE) Room is a space that combines the functionality of two telecommunication industry standard spaces defined 1) Entrance Facility (also known as Main Distribution Frame -MDF) and 2) Equipment Room (also known as Main Telecommunications Room or Building Distribution Frame -BDF).

The BE Room is the telecommunications service entrance to the building and main equipment room. This room is the main demarcation point for interconnecting cables external to the building (OSP cables) with cables internal to the building (ISP cables). It is a central space for telecommunications equipment that serves some or all building occupants. It contains the electronic equipment that transitions between the core data, voice, and video backbones and the building backbone, patch panels, terminations, equipment racks, telephone switches, and other electronic equipment that servers the building.

TR - Telecommunications Rooms
Telecommunications Rooms (TR) are distribution and termination rooms that serve the user stations (work area outlet) in the immediate area of the TR. It is where the connections are made between the horizontal cabling to the outlets is made to the building vertical/backbone cabling occurs. TRs also house voice and data equipment, and auxiliary electrical equipment of other systems such as nurse call, fire alarm, etc.

Backbone (Riser) Cabling
The vertical cabling distribution system that provides connection between telecommunication spaces such as BE and TR.

Horizontal Cabling
The cabling between the TR and the Work Area (work area outlet) that carries voice, data and video signals.

Work Area Outlet
Any point of connectivity for voice/data/CATV and similar services. These typically are at the user end (i.e. work area, desk, etc.).

Telecommunications Pathways
Conduits, cable trays or other supports with the sole purpose of carrying telecommunications cabling. Telecommunications pathways shall not be used by other low-voltage systems, including but not limited to: fire alarm, security systems, and or building automation wiring or air/vacuum tubes.

Outside Plant (OSP) Cabling
Telecommunications cabling and terminations primarily located outside the building footprint; including but not limited to copper and optical cabling, splicing and terminations, lightning and electrical protection, and work related to their construction.

Inside Plant (ISP) Cabling
Telecommunications cabling and terminations primarily located inside the building footprint; including but not limited to copper and optical cabling, splicing and terminations, lightning and electrical protection, and work related to their construction.

Outside Plant (OSP) Pathways
Telecommunications pathways primarily located outside the building footprint; including but not limited to conduits, maintenance holes, hand-holes and work related to their construction.

MCITHITS

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Medical Center InformationHealth Information Technology & Services Technology department provides information technology services to the entire MM campus – Hospitals, on and off campus medical centers and the Medical School.

Auxiliary Electrical Systems
Auxiliary electrical systems include any number of non-power, commonly low voltage, electrically operated systems for functions such as fire alarm, security, building management (BMS), nurse call, intercom, and like systems approved by MM/MCITHITS

MCITHITS Service Level for Telecommunications Rooms
Based on the area the TR serves and equipment installed within, each room is classified according to the below noted expected IT service availability and recoverability criteria. Design guidelines and this SBA will include specific power cooling and infrastructure requirements for each service level. [Note: The response times noted below specifically relate to IT responses to failures. The infrastructure supplied to BE and TR rooms should be configured to allow building and operational personnel the tools and systems to respond in a similar manner.]

Bronze
Standard Class Service – Monday to Friday, 8 am to 5 pm operations.

Silver
Business Class Service – Monday to Saturday, 7 AM to 7 PM operations.

Gold
High Availability Environment – 24/7/365 operations.

Platinum
High Availability & Patient Safety Environment – 24/7/365 operations.

Note: As noted below, BE rooms typically are Platinum

General Requirements:

If not clearly stated in the program statement, ask the Design Manager for the 'Service Level' standard required for the telecommunications infrastructure to be installed. For programing purposes, assume Platinum service level for inpatient & ambulatory surgery occupancy and assume Gold Service Level for outpatient / business occupancies. Building Entrances shall typically be considered Platinum Service Level.

Drawings shall clearly identify areas in each communication room dedicated for the IT services being installed as well as for each auxiliary electrical system being installed . Provide plans and elevations to clearly define location (typically wall space), heights, etc. to ensure maximum available resource (space, etc.) is maintained for future changes.

Consider and show space (in plan views) for, working clearances needed for maintenance and operation, and code mandate clearances for all current and known future equipment planned for the room. Also provide and show the power and cooling infrastructure needed to support the entire room.

In existing buildings where a central UPS is present, and in new buildings where a building-wide UPS is part of the program statement, provide building UPS power for IT loads in communication rooms and emergency power for room cooling, lights and miscellaneous power. When noted in the program statement, provide these also for major renovations. Where building wide UPS is not present, provide power to rack-mounted UPS systems of size and number defined by MCITHITS

BE and TR rooms shall be secured by dedicated keys and card readers, and be dedicated to this purpose with no other building services sharing the space.

If conditions allow the BE may be co-located with one TR room, when approved by MCITHITS. When this is done, provide a room sized for both functions.

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Equipment, including racks, patch panels, cable management, etc. for each room to be specified by MCITHITS for each project. Ask the Design Manager for the MCITHITS specifications for each room.

See 272000-H for detailed specifications to each item below.

Architectural Requirements

1. Locate the BE as close as practicable to the point where the telecommunication (OSP) cables enter the building and relatively close to the TRs. Preferably this is at or near the exterior wall of the facility, and in no case more than 50' cable feet from the point of entering the building. BE room should accessible for deliveries (close to dock), away from potential sources of EMI such as power substations or switchboards), away from machinery that causes vibration such as air compressors), and away from sources of potential water leaks damage (i.e., steam pipes, drains, clean-outs, etc.).

2. For in-patient buildings provide one BE and a hybrid TR/BE on the ground floor at opposite ends of the building. Bring telecommunication utilities to both rooms from separate sources.

3. Office buildings provide one BE on the ground floor.

4. Centrally locate the TRs to allow 'star' distribution of cabling to the user stations (work are outlets). Stack TRs vertically to provide short, direct, vertical paths for riser and network cables. (see Figure 1)

5. For critical in-patient buildings provide one BE plus a hybrid TR/BE on the ground floor, otherwise provide one BE on the ground floor. Ask the Design Manager for the specifications for each building.

6. Provide a minimum of one TR per floor.

7. Provide additional TRs as required to also ensure:
    a. The maximum cable distance from the patch panel to the farthest voice/data outlet does not exceed 90 meters (~295').
    b. One TR for every 1,152 voice/data outlets being served.
    c.
    d. One TR for every 10,000 gross square feet in in-patient buildings.
    e. One TR for every 15,000 gross square feet in office buildings.
        of floor area being served.
    f. One TR for every 300 voice/data outlets being served.
    g. Place the TR centrally, so the cable distance to the farthest voice/data outlet (work area outlet) does not exceed 295' cable feet. This 295-foot requirement shall include an allowance of 24" of slack at work area outlet, and 10-feet of slack at the patch panel rack in the TR.

8. These rooms shall be free of obstructions such as diagonal bracing, stairs, or other utilities. Infrastructure serving TR's & BE's shall be limited to that which directly serves the TER/ BE space. Do not Ideally, if room shares spaces with other networked facility systems (i.e. BMS, fire alarm, etc.), the rear two thirds of the space should be devoted strictly to telecommunications and IT equipment and services. Place cooling and power equipment serving rooms so those equipment's are not directly above the IT racks and like equipment.

9. Coordinate with MCITHITS to obtain the quantity and arrangement of equipment racks in each room. Allow space for a minimum of three (3) racks (each rack is 7' to 9' tall by 39" wide [including wire management troughs] by 30" deep). Show the rack outlines and needed working clearances on the plan drawings.

10. Size the rooms to provide the National Electrical Code minimum working space of 3' in front, 3' in back, and 2' on one side of each rack.
11.

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12. Provide space (including NEC minimum working space) for non-rack equipment including patch panels, terminations, and auxiliary electrical system equipment. Consider needs to co-locate non-MCIT devices (networked facility systems (i.e. BMS, security, etc.).

13. **BE** minimum size is based on the building gross square footage.

Building Gross Sq. Ft.	BE Sq. Ft.
Up to 20,000	130
20,001 to 50,000	140
50,001 to 75,000	200
75,001 to 200,000	240
200,001 to 400,000	340
400,001 to 600,000	390
600,001 to 900,000	430

14. **TR** minimum size for all service areas shall be 130 sq. ft.

15. The minimum short wall length for TR and BE rooms shall be 10', rectangular rooms are preferred.

16. Minimum room height is 9'-6" clear in the entire room.

17. Leave the room ceilings open to the decks above. No ceilings are allowed. Fire-proofing of overhead steel shall be sealed and/or encapsulated behind drywall.

18. Seal all concrete surfaces

19. Paint or seal the walls and cover at least 3 walls from 12" AFF to 9' AFF with 3/4 inch Class B fire retardant plywood backboards (smooth side out). Backboards shall be rigidly installed and painted per 272000-H specifications.

20. Install anti-static vinyl tile on the floors, no carpeting or bare concrete is allowed.

21. Doors shall be 36" wide by 80" high minimum and shall swing outward. Doors should be located near a corner of the room, and shall have storage room function hardware. Doors shall not have door sills, and double doors shall not have center posts. Consult with Security on how to key each door.

22. Provide or prepare the doors for card readers access with and electric hardware sets (preferred), or electric strikes. Consult with Security on how to key each door.

23. Sleeves or dam walls around floor slots and sleeves shall extend 3" AFF. All slots and sleeves shall be fire-stopped.

Electrical Requirements

1. Provide fluorescent lighting per TIA/EIA-569-B Standard; typically, 8.5' high providing 50 vertical foot candles @ 3' AFF. Fluorescent lighting shall not be installed directly above equipment racks. Emergency lighting and power should be provided.

2. Provide manual switches for the lighting. Time controls and occupancy sensors are not allowed.

3. Conduits and/or fFloor sleeves (see Figure 1) shall extend upward 3" AFF, shall be water tight, and shall be fire stopped. Provide spare sleeves and conduits for future use.

4. Extend conduits and cable trays a minimum of 3" into the rooms. Whenever possible eExtend the tray to an area above the proposed location of the relay racks. Also provide a cable tray over the tops of all of the racks.

5. Supply BE & TR rooms, including lighting, with emergency critical power (UPS & generator) when available within the building, unless otherwise specified. Cooling systems for these rooms shall be

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powered from emergency generator sources when generator power is in building, or part of program statement (UPS power not required).

6. If possible, locate the electrical panel serving the BE or TR room within the room (dedicated) or nearby to facilitate future modifications.

7. Provide the following power at the top of each for each room at the equipment racks, unless specifically noted otherwise.[1] For Platinum and Gold Service Level rooms see 'Gold and Platinum Service Level Requirements below.
    a) 1x 30A 208V Critical (generator backed up) L6-30R outlet.
    b) 1x 30A 208V non-critical or on a separate electrical branch L6-30R outlet.
    c)
    d) 1x 20A 120V non-critical quad 5-20R outlet.1x 20A 120V quad receptacle as a service outlet.
    e) If a building-wide UPS is not available, provide 1x rack-mounted 6000V UPSs, with remote monitoring capabilities accessible by Facilities Systems Monitoring. Provide a general alarm point from the local UPS to the BMS.
    f) Note: If generator power is not available in building see, Design Manager

8. Along all walls install 120V/20A/120V general purpose duplex NEMA 5-20R electrical outlets every 6' at 618" AFF. This should be below the plywood backboard and not on emergency power. Auxiliary electrical systems accepted. See appropriate design guideline section for appropriate power for the various auxiliary systems.

9. If generator power is available install on the walls covered with the plywood backboard 20A/120V quads 5-20R at 60" AFF.

    Include a minimum of two dedicated 120V, 20A quad outlets separate branch circuits to the top of equipment racks. When emergency power is available, one of these circuits shall be on emergency power; the other shall be 'normal' power. Also provide 1x 120V 20A horizontal rack-mounted PDU.

10. As required by Design Guideline 260533-H and 260553-H Label every electrical outlet with typed labels indicating the serving power panel and breaker.

11. Provide a 1/4" x 2" x 12" copper ground bus (Panduit GB2B0306TPI-1) in the BE, and each TR room; , and connect it to the building ground system, in the main substation room, using a #6 AWG or larger insulated copper ground wire. Design in accordance with the recommendations from ANSI/TIA-607-A. The resistance to building ground shall be 2 ohm maximum. Bond each rack independently to the noted above noted ground bar in the TR or BE room.; Follow design guideline 260526-HNote: One #6 may be used to serve all of the TR rooms in a vertical stack.

<u>Mechanical Requirements</u>

1. Ductwork, piping, and other mechanical system components (water/gas/fuel/drain/etc.) are not permitted in or through these rooms unless they serve these rooms.

2. Room temperature and humidity shall be designed per ASHRAE Handbook, HVAC Applications 2011, Ch 19; 24 hours a day, 365 days a year, maintained between 65°F- 80°F/ max 55% RH, positive pressure.

3. Cooling capacity for TR rooms shall be based on a minimum MCITHITS equipment heat load of 5,000 watts per 130 sq. ft. room; plus that of all current and planned auxiliary electrical system equipment.
    - Confirm projected heating loads with MOST HITS during the design phase. Load shall include rack mounted UPS units.

[1] If the building has a central UPS top of the rack power can be changed to 2x 20A 208V electrical circuits with at least 1 on central UPS power.

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4. Provide emergency power for the room cooling system if emergency power circuits are provided in the space. The need for 24/7/365, high density, emergency powered cooling typically dictates the use of a packaged dedicated HVAC system (i.e. fan coil unit [FCU] or split DX) for each room. UMH's standard is to utilize a chilled water FCU when an emergency source of chilled water is available (i.e. process chilled water - PCHW).

5. Ideally the FCU shall be mounted outside of the room, typically in an adjacent corridor, and ducted into and out of the space. Provide minimum ventilation air off of the central AHU for each room. If the room is large enough, or if adjacent space is too limited, locate the dedicated FCU within the room, at the door. All piping serving the FCU within these rooms, including chilled water and condensate piping, and the fan coil itself, shall be provided with an auxiliary drain pan. Pan shall not impinge on maintenance of the FCU.

6. All TR/ BE rooms shall be remotely monitored and alarmed through the DDC BMS by MM Systems Monitoring. BMS shall monitor space temperature and alarm when space temperature is <65°F or >80°F. When a possible source of water leak exists in the room (i.e. FCU or water/ drain piping), provide a floor-mounted leak detector, located in the corner of the room out of the path of travel, integrated to alarm thru the BMS.

7. Route sprinkler piping over aisles, not directly over IT equipment. All exposed sprinkler heads shall utilize protective cages.

Bronze and Silver Service Level Requirements

All requirements stated above.

Gold and Platinum Service Level Requirements

1) All requirements stated above.

2) Provide the following power at for each room at the equipment racks in-lieu-of those mentioned in lower service levels.[2]
   a) 2x 30A 208V Critical (generator backed up) L6-30R outlets.
   b) 24x 320A 208V non-critical or on a separate electrical branch L6-320R outlet.
   c) 2x 20A 120V on separate branch circuits, one on generator one on emergency, quad 5-20R outlets.1x 20A 120V quad receptacle as a service outlet.
   d) If a building-wide UPS is not available, provide 1x floor mounted 8-10 KVA UPS or 2x rack-mounted 6000kVA UPSs, with remote monitoring capabilities accessible by Facilities Systems Monitoring. Provide a general alarm point from the local UPS to the BMS.

3) Cooling capacity for TR rooms shall be based on a minimum MCITHITS equipment heat load of 10,000 watts per room.
   a) Confirm projected heating loads with MCIT HITS during design phase. Load shall include rack mounted UPS units and non-MCITHITS devices (CCTV amplifiers, etc.) where appropriate.

4) Cooling capacity for BE rooms shall be based on a minimum MCITHITS equipment heat load of 20,000 watts per room.
   a) Confirm projected heating loads with MCIT HITS during design phase.

[2] If building has a central UPS top of the rack power can be changed to 8x 20A 208V electrical circuits with at least 4 on central UPS power.

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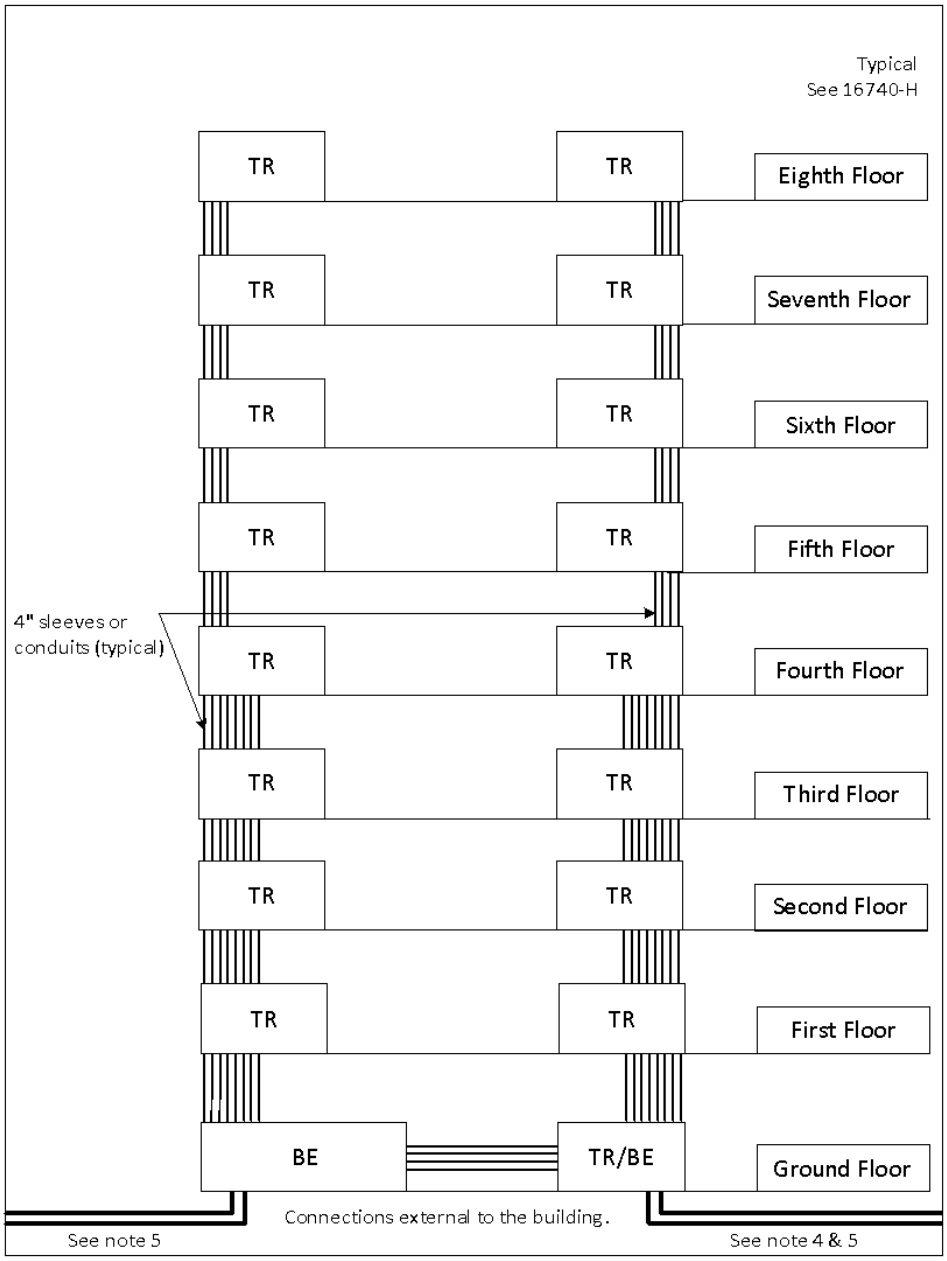
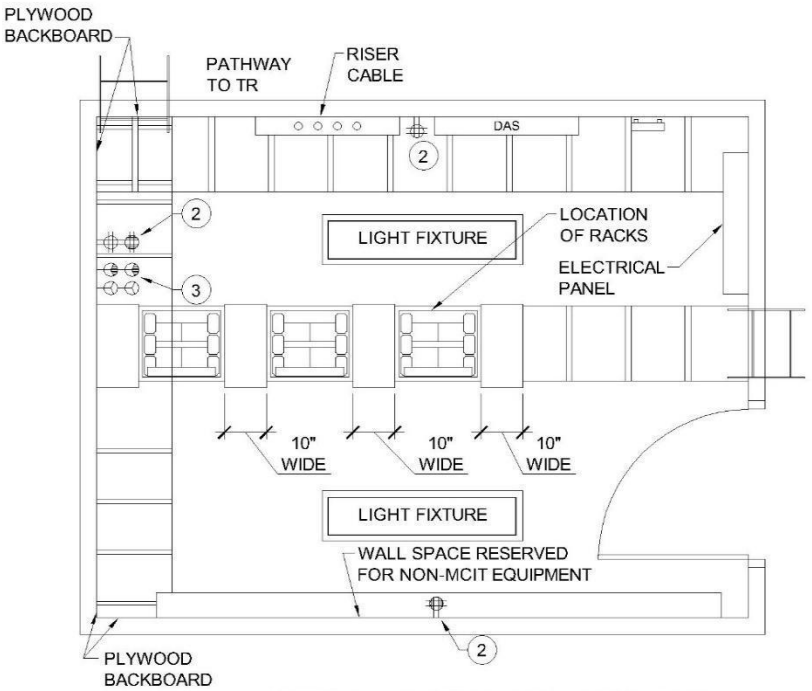


Figure 1 – Typical Building BE/TR Room Riser Diagram
No Scale

Notes:

1. The number of TR rooms per floor shall be noted above in paragraph 4. The above riser assumes a building with a floor area of more than 10,000 square feet, but less than 20,000 square feet.
2. The number of total risers will reflect the total area of the typical floor. I.e. a building with around 30,000 square feet would have three total risers, instead of the two shown above.
3. Each stack of TR rooms will be connected to the BE room as noted above.
4. The second OSP building entrance noted above, going into TR/BE room is required in buildings having Platinum service levels, and is highly desirable in buildings with Gold or Silver service levels. It is never required in buildings having Bronze service levels.
5. Provide 4-4" ducts for the OSP cabling, from the manhole or service point

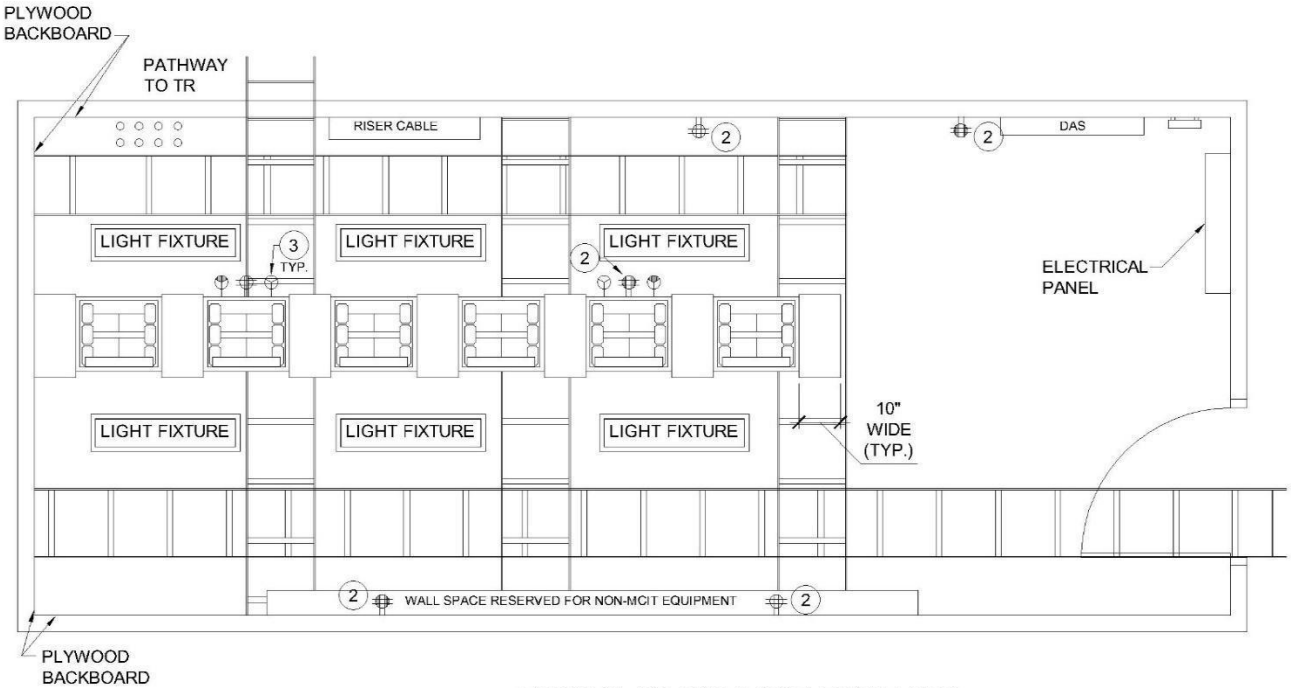
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TYPICAL 10'x13' FLOOR PRINT AND LADDER RACK LAYOUT

0 1' 2' 4'

NOTE:
1. CONVENIENCE OUTLETS EVERY 6'-0" ARE NOT SHOWN.
2. ELECTRICAL QUAD RECEPTACLE 20/120V 5-20R.
3. ELECTRICAL SINGLE RECEPTACLE 30/208V L6-30.



TYPICAL 10'x24' FLOOR PRINT AND LADDER RACK LAYOUT

0 1' 2' 4'

NOTE:
1. CONVENIENCE OUTLETS EVERY 6'-0" ARE NOT SHOWN.
2. ELECTRICAL QUAD RECEPTACLE 20/120V 5-20R.
3. ELECTRICAL SINGLE RECEPTACLE 30/208V L6-30.