




# U.S. ARMY RESERVE NETWORK ENTERPRISE CENTER INFRASTRUCTURE TECHNICAL CRITERIA

## FOREWORD

This criteria is a living document and will be periodically reviewed and updated. As part of the Army Reserve's responsibilities to provide technical criteria for infrastructure design and construction, this document and all updates will be made available to all users. The proponent for Army Reserve Information Technology is USARC G-6. Development and maintenance of this criteria is the responsibility of USARC G-6, in coordination with ARIM-D, USACE, and ISEC.



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AUTUMN C. AQUINALDO  
Network Enterprise Center Director, USARC Deputy  
Chief of Staff, G-6

## SUMMARY OF CHANGES

The following information summarizes the changes or additions to this version of the Infrastructure Technical Criteria.

### **General**

- Changed release date from February 2017 to February 2018.
- Added signature block for the NEC, USARC G-6.
- Replaced “Information and Communication Technology (ICT)” with “telecommunications” throughout the document.
- Updated the Table of Contents.
- Updated the Glossary.

### **Specific Criteria**

- 1.3.10. – Added telecommunications spaces hard ceiling requirements.
- 2.1.3. – Removed specific requirements for CATV conduit as CATV requirements are outside of the scope of USARC G-6.
- 2.1.3.2. – Added half-size maintenance hole requirements.
- 2.1.3.3. – Added requirements regarding the use of hand holes.
- 2.1.4.6. – Added specific floor box conduit requirements.
- 2.1.5.2.5. – Added requirements where the use of cable tray is not allowed.
- 2.1.5.3.5. – Added requirements where the use of J-hooks is not allowed.
- 2.2.1.2. – Clarified keying requirements for lockable telecommunications cabinets.
- 2.2.1.3.1. – Clarified requirements for standard wall-mount cabinets
- 2.2.1.3.2. – Added requirements for shallow-depth wall-mount cabinets
- 2.3.3 – Added minimum single-mode (SM) backbone fiber strand count.
- 2.3.5 – Added minimum copper backbone cabling pair count.
- 2.3.6 – Added slack backbone cabling requirement.
- 2.4.2 – Added the requirement that all horizontal cabling must be installed in a homerun fashion.
- 2.4.1.12.2. – Clarified horizontal cabling slack storage requirement.
- 2.6.4.3 – Added voice test requirement for backbone copper.
- 2.6.4.4 – Clarified ground to earth resistance test requirements.
- 2.6.4.5. – Added requirements for splice case flash testing.
- 2.6.5 – Added requirements for the delivery of test results to USARC G-6.
- 2.7.1.1. – Removed conduit requirement for IPS container standard telecommunications outlet.
- 2.10.2.1 – Clarified rack electrical receptacle mounting height.
- 2.10.3.2. – Clarified service provider electrical receptacle types.
- 2.11.1.1. – Removed ground bar requirement for SIPR spaces.
- 2.11. – Clarified grounding and bonding connection requirements.
- 2.11.5. – Added requirement for grounding lug inspection window.

## Drawings/Diagrams

- B.02 - Added symbol for WID outlet mounted below ceiling.
- B.02 – Added symbol for floor box outlet.
- B.03, B.04, B.05, B.06, B.09, B.10, B.15, B.16, B.17 – Revised sheets to include in-slab conduits.
- B.03, B.05, B.09 – Revised ladder rack layout.
- B.03, B.05, B.09, B.11, B.15, B.18 – Added plan wall compass.
- B.04, B.06, B.10, B.16, B.17 – Added the backbone cables for in-slab conduits.
- B.06, B.10, B.12, B.16, B.17, B.19, B.20 – Added ceiling/floor sleeves.
- B.06, B.10, B.12, B.16, B.17, B.19, B.20 – Added vertical ladder rack.
- B.07, B.13, B.21 – Revised location of copper backbone BET and 110 block.
- B.15, B.16, B.17, B.18, B.19, B.20 – Revised ladder rack layout.
- B.15, B.18 – Revised TR door orientation.
- B.16, B.17, B.19, B.20 – Added north and west wall elevation diagrams.
- B.23, B.24, B.25 – Added wall mounted cabinet diagrams.
- B.28, B.29 – Added requirements for standard team room telecommunications outlets.
- B.30 – Added UDB diagrams.
- B.39, B.40 – Added in-slab conduit homerun diagrams.
- B.44, B.45 – Added typical WAP outlet placement diagrams.
- B.46 – Added a smaller size conduit to diagram 3, conduit labels.
- B.51 – Added typical cabinet labeling diagram.

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# 1. Chapter 1 – Introduction and General Overview

## 1.1. Purpose and Applicability of this Document

- 1.1.1. The purpose of this document is to define Army Reserve standards and requirements for telecommunications infrastructure, specifically standards and requirements for new sites and existing facilities as well as site and facility modernization. This document defines the requirements needed to ensure consistent and compliant design and construction of telecommunications infrastructure throughout the Army Reserve.
  - 1.1.2. Army Reserve telecommunications strategy will evolve over time and individual facilities may have unique requirements. The USARC G-6 Network Enterprise Center (NEC) reserves the right to issue Infrastructure Criteria Update Bulletins as needed. These bulletins will be used to supplement this document. The USARC G-6 Network Enterprise Center (NEC) has the responsibility for authorizing individual criteria updates, as well as additions to or variations from the criteria contained in this document.
  - 1.1.3. The USARC G-6 NEC is the proponent for all telecommunications infrastructure requirements and shall participate in individual project scope review, pre-design, charrette, and design meetings to review and define the infrastructure requirements for these projects. USARC G-6 NEC is also the proponent for quality control (QC) inspections for all initiatives, projects, efforts, etc. involving telecommunications infrastructure.
  - 1.1.4. This criteria, the Army Installation Information Infrastructure (I3A) criteria, and UFC 3-580-01 1 June 16 (Telecommunications Interior Infrastructure Planning and Design) are required documents and must be included and complied with in the design and specifications for all projects.
    - 1.1.4.1. For clarification on relationship between the I3A, UFC 3-580-01 and this criteria the following is to be adhered to:
      - 1.1.4.1.1. The I3A criteria is the governing document for Outside Plant (OSP) infrastructure design and construction.
      - 1.1.4.1.2. UFC 3-580-01 is the governing document for Inside Plant (ISP) infrastructure design and construction.
      - 1.1.4.1.3. This criteria supplements the I3A and UFC 3-580-01 with requirements unique to the Army Reserve.
      - 1.1.4.1.4. The USARC G-6 NEC Infrastructure Team Lead will address any conflicts between the I3A and this document.
      - 1.1.4.1.5. Refer to I3A and UFC 3-580-01 for all requirements not specifically addressed in this criteria.
  - 1.1.5. This document does not supersede any contract for design or construction of any individual Army Reserve project; if conflicts exist between this document and a contract, the conflict must be brought to the attention of the appropriate project manager for resolution.
- ## 1.2. Strategy for Delivery of Telecommunication Services for Army Reserve Facilities
- 1.2.1. When a Reserve Center is located off of an installation, camp, post, or station (e.g. Standalone USARC), the Army Reserve Command G-6 will provision both voice and data services.
  - 1.2.2. When a Reserve Center is located on an installation, camp, post, or station, the Army Reserve Command G-6 will provision data services to be delivered to the installation demarcation point. The service will then be extended thru the installation distribution backbone.
  - 1.2.3. When a Reserve Center is located on an installation, camp, post, or station, the Army Reserve prefers to obtain voice services from the installation. If the installation cannot provide voice services, USARC G-6 will provide direction on the way ahead with such services.

### 1.3. Information and Communications Technology Service and Distribution Spaces

- 1.3.1. Army Reserve telecommunications spaces are dedicated to housing voice and ARNet data services infrastructure and equipment.
- 1.3.2. Descriptions and requirements for Army Reserve telecommunications spaces are found in UFC 4-171-05 *Army Reserve Facilities Design Guide*. The information for telecommunications spaces listed in this document are in addition to what is specified in UFC 4-171-05.
- 1.3.3. Each site or campus shall have only one Entrance Facility (EF) (a.k.a. DEMARC).
  - 1.3.3.1. The EF is typically located in the main training building. However, the EF location can vary depending on the needs of the site or campus.
  - 1.3.3.2. When a Reserve Center is located on a military installation, camp, post, or station, the site DEMARC shall be determined by the installation host (e.g. Active Army NEC).
  - 1.3.3.3. The voice and data services from the public service provider shall terminate in the EF and be extended from the EF to the Telecommunications Equipment Room (TER).
- 1.3.4. Unless a joint use site, each Army Reserve site or campus shall have only one TER.
  - 1.3.4.1. The TER is typically located in the main training building. However, the TER location can vary depending on the needs of the site or campus.
  - 1.3.4.2. If joint use site, provide a TER for each Service (e.g. Army Reserve, Army National Guard, USMC, etc.) occupying the site.
  - 1.3.4.3. Additional Telecommunications Rooms (TRs) are required for every 10,000 sq. ft. of usable floor space. Note that additional TRs may be required in larger buildings to maintain compliance with TIA/EIA 295 ft. (90 m.) horizontal link distance limit. Provide a TR for each Service (e.g. Army Reserve, Army National Guard, USMC, etc.) occupying a joint-use Reserve Center (AFRC). A TR is not required in buildings with minimal or no telecommunications requirements (e.g. Unheated Storage Building). When calculating the number of TRs required, note that the TER counts as a TR. The following spaces are typically not considered as useable floor space and do NOT need to be considered in the calculation of usable floor space:
    - 1.3.4.3.1. Hallways/Corridors
    - 1.3.4.3.2. Vestibules
    - 1.3.4.3.3. Lobbies
    - 1.3.4.3.4. Storage Rooms
    - 1.3.4.3.5. Kitchens (Except the Kitchen Office)
    - 1.3.4.3.6. Scullery
    - 1.3.4.3.7. Mechanical Rooms
    - 1.3.4.3.8. Electrical Rooms
    - 1.3.4.3.9. Janitors Closets
    - 1.3.4.3.10. Physical Readiness
    - 1.3.4.3.11. Locker Rooms
    - 1.3.4.3.12. Restrooms
    - 1.3.4.3.13. Unit Storage
    - 1.3.4.3.14. Arms Vault
    - 1.3.4.3.15. Elevator
    - 1.3.4.3.16. Elevator Machine Rooms
    - 1.3.4.3.17. Stairwells
    - 1.3.4.3.18. Battery Room
    - 1.3.4.3.19. Fluid Distribution
    - 1.3.4.3.20. Controlled Waste
    - 1.3.4.3.21. Vending Areas

- 1.3.5. The TER and each TR shall be located as close as practical to the center of the area it serves. This will provide for better cabling distribution and will help minimize horizontal cabling lengths.
- 1.3.6. There shall not be any equipment (piping, ductwork, machinery, etc.) that does not serve the EF, TER, TR installed above, below (e.g. in or below slab) or in the EF, TER, TR nor will this equipment pass-through or enter the EF, TER, TR spaces. Add the following note to the applicable Fire Safety, Plumbing, and Mechanical design sheets, design analysis, and specifications: "Equipment (piping, ductwork, machinery, etc.) that does not serve the EF, TER, or TR(s) shall not be installed above, below (e.g. in or under slab) or in these telecommunications spaces nor will this equipment pass through or enter the EF, TER, or TR(s)."
- 1.3.7. All motors, transformers, or other electrical devices greater than 5KVA are required to have a minimum of a 47" buffer from any wall of the EF, TER, TR(s) and telecommunications Cabinet locations. Add the following note to the applicable Electrical and Mechanical design sheets, design analysis, and specifications: "Any motor, transformer, or other electrical device greater than 5KVA will have a minimum of a 47" buffer from any wall of the EF, TER, or TR(s)."
- 1.3.8. Cabling and equipment not directly needed in support of ARNet data and voice services shall not be terminated in, pass-thru, or be located in the TER, TR(s), or TE(s).
- 1.3.8.1. The equipment and cabling for access control and mass notification head-end systems can be located in the TER if needed. If located in the TER, this equipment shall be rack-mount capable or shall be located in a flush wall mount panel. If rack-mounted, it shall be mounted in the rack in empty space as designated by USARC G-6. The access control and mass notification workstation(s) shall not be located in the TER or TR.
- 1.3.8.2. CATV head-end equipment and cabling shall be located in and terminated in the EF.
- 1.3.9. Windows are not allowed on any wall or door, of the EF, TER, or TR(s).
- 1.3.10. Hard (gypsum board) ceilings are allowed in the EF, TER, or TR only when an open to the deck ceiling is not practical due to the height of the deck above (i.e. TRs in open maintenance bay areas). Minimum hard ceiling height is 12 feet AFF.
- 1.3.11. The minimum square footage requirements for telecommunications spaces as listed in UFC 4-171-05 have been superseded by the following:
- 1.3.11.1. EF = 48 square feet (6' x 8')
- 1.3.11.2. TER = 80 square feet (8' x 10')
- 1.3.11.3. Standard TR = 80 square feet (8' x 10')
- 1.3.11.4. Small TR = 48 square feet (6' x 8') – Note that the use of a small Telecommunications Room shall be limited to serving areas of 144 or fewer horizontal cabling terminations.
- 1.3.12. If a joint use facility, shared spaces (e.g. classrooms, assembly hall), will require separate telecommunications outlets for each DOD component (e.g. Army Reserve, Army National Guard). The telecommunications DOR can place the separate outlets in the same faceplate where appropriate.

#### 1.4. Telecommunications Qualifications

- 1.4.1. The certified final design submittal is to be reviewed and approved by an active Building Industry Consulting Services International (BICSI) Registered Communications Distribution Designer (RCDD) and indicated as such with the RCDD's stamp and signature on the design submittal cover page.
- 1.4.2. The on-site foreman assigned to the installation of this system or any of its components shall be an active Building Industry Consulting Services International (BICSI) Registered Cabling Installer, Technician Level with a minimum of 5 years' experience in the installation of low-voltage cabling systems. All other personnel assigned to the installation of this system must have a minimum of 3



years' experience in the installation of low-voltage cabling systems or any of its components. It is preferred that these personnel have a minimum of an active Building Industry Consulting Services International (BICSI) Registered Cabling Installer, Level 1. Documentation of current BICSI certification for each of the key personnel must be provided.

## 2. Chapter 2 – Infrastructure Requirements

### 2.1. Pathways

- 2.1.1. Provide a complete telecommunications pathway system that provides a flexible, re-usable, expandable pathway for premises and outside plant distribution of telecommunication services throughout the facility.
- 2.1.2. The preferred pathway for installing service entrance and campus outside plant (OSP) cables is underground duct bank. Aerial pathways will only be considered where the use of underground pathways is not a viable option. The use of aerial pathways must be explicitly approved by USARC G-6 prior to design and/or implementation.
- 2.1.3. Outside Plant (OSP) Pathways
  - 2.1.3.1. On an installation, camp, post, or station, the OSP pathways criteria will be determined by the installation.
  - 2.1.3.2. On standalone Army Reserve sites, the use of half-size (6 feet x 6 feet x 7 feet) maintenance holes is allowed.
  - 2.1.3.3. The use of hand holes is not allowed on any OSP pathway. The only exception allowed is for the service provider point of connection and then only when specifically required by the local telephone company.
  - 2.1.3.4. Service Provider Point of Connection (SPPOC)
    - 2.1.3.4.1. Provide two 4-inch-conduits from the Entrance Facility (EF) to the local telephone company (a.k.a. Local Exchange Carrier (LEC)) point of connection.
    - 2.1.3.4.2. Designer of Record shall coordinate with the LEC to determine the point of connection location and conduit termination requirements (e.g. maintenance hole, hand hole, pedestal, telephone pole).
  - 2.1.3.5. For all buildings where ARNET and voice services are needed, provide two 4-inch conduits from the TER to other buildings TR or Telecommunications Enclosure (TE).
    - 2.1.3.5.1. Provide one 3 inch-3 cell fabric mesh inner-ducts with tracer wire in one of the two conduits.
  - 2.1.3.6. For all buildings where only voice services are needed, provide one 4-inch conduit from the TER to other buildings TR or TE.
    - 2.1.3.6.1. Provide one 3 inch-3 cell fabric mesh inner-duct with tracer wire in this conduit.
- 2.1.4. Inside Plant (ISP) Pathways
  - 2.1.4.1. Provide a minimum of two 3-inch conduits from the EF to the TER. If the cable tray system extends to the corridor immediately outside the EF and TER, then this conduit may be omitted and backbone cable may be routed thru cable tray.
  - 2.1.4.2. Provide a minimum of two 3-inch conduits from the TER to each non-stacked TR. If the cable tray system extends to the corridor immediately outside the TER and TR, then this conduit may be omitted and backbone cable may be routed thru cable tray.
  - 2.1.4.3. For stacked TRs in multi-story buildings, provide a minimum of 2-4” floor sleeves from each TR to open ceiling below.
  - 2.1.4.4. Floor and Wall Penetrations
    - 2.1.4.4.1. The initial fill capacity of each floor penetration or wall sleeve shall be 80 percent or less. One spare, empty penetration or sleeve shall also be provided.
    - 2.1.4.4.2. All wall penetrations in fire-rated walls shall require the use of self-sealing, re-entenable, mechanical fire-stop assemblies.

- 2.1.4.4.2.1. If unable to determine fire-rating of the wall, then the use of self-sealing, re-entenable, mechanical fire-stop assemblies is required.
- 2.1.4.4.3. All multi-story floor penetrations shall require the use of self-sealing, re-entenable, mechanical fire-stop assemblies.
- 2.1.4.4.4. Fire stopping plugs shall be used on all 2 and 4 inch sleeves and conduits requiring additional fire-stopping.
- 2.1.4.5. Horizontal cabling conduit requirements
  - 2.1.4.5.1. All conduits not in-slab must be sized for an initial fill ratio of 40% or less. This 40% fill ratio must be based on a horizontal cabling outside diameter of .22 inches. The minimum size conduit is one inch.
  - 2.1.4.5.2. Modular furniture system connections (up to 12 Category 6 cables) require a 1.5 inch liquid-tight flexible metal conduit and fittings to connect each floor box or wall box to the acoustic panel raceway.
- 2.1.4.6. In-slab floor box requirements
  - 2.1.4.6.1. Up to two floor boxes can be daisy-chained together. The conduit supporting both floor boxes shall be installed in a homerun fashion and terminated directly in the TER or TR supporting the floor box location.
  - 2.1.4.6.2. Unless daisy-chained together, all conduits supporting in-slab floor boxes shall be installed in a homerun fashion and terminated directly in the TER or TR supporting the floor box location.
  - 2.1.4.6.3. All conduits supporting in-slab floor boxes must be sized for an initial fill ratio of 40% or less. This 40% fill ratio must be based on a horizontal cabling outside diameter of .28 inches. The minimum size conduit is one inch.
- 2.1.5. Cabling Support
  - 2.1.5.1. Where feasible and cost effective, all low-voltage signal cable from all low-voltage systems can share the same corridor pathway (e.g. cable tray, conduit). For all projects located on installations, camps, posts, and stations, NEC approval is required before using this approach.
  - 2.1.5.2. Cable tray
    - 2.1.5.2.1. Cable tray usage is for pathways and horizontal distribution outside of the telecommunications spaces. Cable tray cannot enter the EF, TER, or any TR.
    - 2.1.5.2.2. The cable tray system shall originate in the corridor outside of the TER and TR and shall serve the respective area served by that TER or TR. It shall support a minimum of 90% of the premise cabling.
    - 2.1.5.2.3. Distance from conduit stub out to cable tray shall not exceed 40 feet.
    - 2.1.5.2.4. Cable tray is not allowed in hard ceiling areas. All cabling routed through hard ceilings must be routed in conduit sized IAW the Horizontal cabling conduit section of this criteria.
    - 2.1.5.2.5. Cable tray is not allowed in any below finished ceiling area, work bays, maintenance bays, unit storage areas, or warehouse areas.
    - 2.1.5.2.6. Cable tray shall be sized so the sum of the cross-sectional areas of the low-voltage cabling will not exceed 40 percent of the interior cross-section of the cable tray
    - 2.1.5.2.7. The minimum size cable tray allowed is 6 inches wide x 2 inches deep.
    - 2.1.5.2.8. The maximum depth cable tray allowed is 6 inches
    - 2.1.5.2.9. Provide 12-inch minimum clearance above the top of the cable tray and 3-inch minimum clearance below the cable tray

- 2.1.5.2.10. The use of center hung and cantilever mounting systems for cable tray is not allowed.
- 2.1.5.3. Non-continuous cable support
  - 2.1.5.3.1. J-hooks are the only approved non-continuous cable support method. They shall not replace cable tray, but can be used to provide cable support where the use of cable tray is not feasible.
  - 2.1.5.3.2. J-hooks shall be Category 6 rated and spaced at intervals that shall not exceed 60 inches from the conduit stub up or ceiling entry point to the cable tray.
  - 2.1.5.3.3. Each J-hook shall not exceed 50 percent of the J-hook fill capacity.
  - 2.1.5.3.4. J-hooks shall not be installed over, above, or through hard ceiling areas.
  - 2.1.5.3.5. J-hooks are not allowed in any below finished ceiling area, work bays, maintenance bays, unit storage areas, or warehouse areas.
- 2.1.5.4. Telecommunications spaces
  - 2.1.5.4.1. Ladder rack is the only approved cabling support method allowed in the EF, TER and all TRs. Both horizontal and vertical style ladder rack shall be used. Basket style cable tray shall not enter or pass through the EF, TER, or any TR.
  - 2.1.5.4.2. Ladder rack shall be 1-1/2 inch x 3/8 inch stringers with 1/2 inch x 1 inch welded rungs at 12-inch intervals.
  - 2.1.5.4.3. The minimum width for all horizontal ladder rack is 18 inches.
  - 2.1.5.4.4. The minimum width for all vertical ladder rack is 12 inches.
  - 2.1.5.4.5. Ladder rack shall be secured to the wall and/or ceiling deck above. Use only wall mount or trapeze mounting systems.
  - 2.1.5.4.6. Ladder rack above equipment racks shall be fastened to these racks with 6 inch elevation kits and rack to runway mounting kits.
  - 2.1.5.4.7. Radius dropouts (waterfalls) shall be used in all locations where the premise cabling is routed to the equipment rack below. All radius dropouts for the telecommunications racks shall be attached to the ladder rack and shall be the same width as the ladder rack used.
  - 2.1.5.4.8. Use radius dropouts in all locations where the premise cabling is routed from the wall fire-stop sleeve to the ladder rack below.
  - 2.1.5.4.9. If the distance from the exit point of the conduit/sleeve to the ladder rack below exceeds 5 foot, then the cable must be supported from the exit point of the conduit/sleeve until it meets the ladder rack
  - 2.1.5.4.10. Horizontal category 6 cabling shall be properly supported on the back of the patch panel. Support brackets shall be compatible with the Category 6 patch panels installed.
  - 2.1.5.4.11. The use of plastic tie-wraps on all horizontal category 6 cabling is NOT allowed. 3/4 inch (minimum) size Velcro fasteners must be used.
  - 2.1.5.4.12. Provide vertical and horizontal cable managers in the quantities as shown in Appendix B: Infrastructure Technical Criteria Diagrams and Details. Vertical cable managers shall be:
    - 2.1.5.4.12.1. Minimum 6 inches wide
    - 2.1.5.4.12.2. Double sided
    - 2.1.5.4.12.3. Double hinged
    - 2.1.5.4.12.4. Match the height of the rack
    - 2.1.5.4.12.5. Bolted to telecommunications racks (to both racks if placed in between two racks)

## 2.2. Racks and Cabinets

- 2.2.1.1. Provide two post, heavy-duty racks in quantities sufficient to accommodate the cabling systems and equipment for the project. At a minimum, provide the quantities as shown in Appendix B: Infrastructure Technical Criteria Diagrams and Details. Racks shall be:
  - 2.2.1.1.1. EIA-310-D compliant
  - 2.2.1.1.2. Supports 19 inch wide EIA rack mount equipment
  - 2.2.1.1.3. Equipment static load capacity of 1500 lbs.
  - 2.2.1.1.4. 45 U (7 feet) height
  - 2.2.1.1.5. EIA-310-D compliant, Universal hole pattern
  - 2.2.1.1.6. 5/8"-5/8"-1/2" vertical hole spacing
  - 2.2.1.1.7. Threaded #12-24 equipment mounting holes with included equipment-mounting screws
  - 2.2.1.1.8. Fixed in place
  - 2.2.1.1.9. Pre-marked and numbered rack-mount spaces
  - 2.2.1.1.10. Integrated grounding with a built-in attachment point for a ground (Earthing) connection
- 2.2.1.2. If floor mounted lockable telecommunications cabinets are used in place of telecommunications racks they shall meet the minimum specifications for telecommunications racks and are to be 36" in depth and have adequate internal ventilation (louvers and fan kit). Fan kit shall be mounted to the interior, top of the cabinet. Multiple telecommunications cabinets used on the same site must all be keyed alike. If used to support separation of cabling for multiple components (i.e. AR, ARNG), the cabinets for each component must be keyed alike but shall be different from the keyset for the other component(s).
- 2.2.1.3. The use of wall mounted telecommunications cabinets will only be allowed with USARC G-6 approval.
  - 2.2.1.3.1. Standard wall-mount cabinet requirements
    - 2.2.1.3.1.1. Width of: 24 inches; 19 inches EIA rack-mount
    - 2.2.1.3.1.2. Heights: 24 inches for port densities of 48 ports or less, 48 inches for port densities of 49 ports or more
    - 2.2.1.3.1.3. Depth: 30 inches
    - 2.2.1.3.1.4. Lockable front door with swing-out rear access
    - 2.2.1.3.1.5. Usable interior space:
      - 2.2.1.3.1.5.1. 12 Rack Management Unit (RMU) (24 inch cabinet)
      - 2.2.1.3.1.5.2. 6 RMU (48 inch cabinet)
      - 2.2.1.3.1.5.3. 1 pair L-shaped equipment mounting rails in the main cabinet body (adjustable depth)
      - 2.2.1.3.1.5.4. 19"W, EIA-310-D compliant rails
      - 2.2.1.3.1.5.5. Universal hole pattern, 5/8"-5/8"-1/2" vertical hole spacing
      - 2.2.1.3.1.5.6. Threaded #12-24 equipment mounting holes with included equipment-mounting screws
      - 2.2.1.3.1.5.7. Re-marked and numbered rack-mount spaces
      - 2.2.1.3.1.5.8. Integrated grounding with a built-in attachment point for a ground (Earthing) connection
      - 2.2.1.3.1.5.9. Load capacity: minimum 200 pounds (90.7 kg) of equipment, open or closed
      - 2.2.1.3.1.5.10. Vented, with louvers and fan kit included. Fan kit shall be mounted to the interior, top of the cabinet.
  - 2.2.1.3.2. Shallow depth wall-mount cabinet requirements

2.2.1.3.2.1. Hubbell RE4XB (or approved equivalent) cabinet. Cabinet shall include.

2.2.1.3.2.1.1. Fan kit

2.2.1.3.2.1.2. Sound dampening kit

2.2.1.3.2.1.3. Padlock hasp kit

2.2.1.3.2.1.4. Padlock

2.2.1.3.2.1.5. Patch panel mounting bracket

2.2.1.3.2.1.6. 20A power kit

2.2.1.3.2.1.7. Equipment mounting bracket

2.2.1.3.2.1.8. Any other miscellaneous accessories/parts needed for a complete and operational system

2.2.1.3.3. Multiple standard or shallow depth telecommunications cabinets used on the same site must all be keyed alike. If used to support separation of cabling for multiple components (i.e. AR, ARNG), the cabinets for each component must be keyed alike but shall be different from the keyset for the other component(s).

### 2.3. Backbone cabling

2.3.1. All backbone fiber optic cabling shall be single-mode (SM) OS2 rated as defined in TIA 492CAAB.

2.3.2. All backbone fiber optic cabling shall be terminated using duplex SC style connectors.

2.3.3. A minimum of 12 strands of SM fiber backbone cabling is required from the TER to each TR and TE.

2.3.4. All backbone copper cabling shall be category 5 rated.

2.3.5. A minimum of 25 pair of backbone copper cabling is required from the TER to each TR and TE.

2.3.6. A minimum of 20 feet of slack cable is required in the TER, TR(s), and TE(s) for both SM fiber backbone cabling and copper backbone cabling. Loosely coil all slack cable and attach the slack to the plywood backboard.

2.3.7. A Siamese coaxial cable with RG59 BNC connectors is required from the TER to the EF.

2.3.7.1. These cable shall be long enough so there is enough slack to reach the bottom of Rack 1 in the TER and have 20 ft. of slack in the EF.

2.3.7.2. If the length of the coaxial cable will not exceed 250 feet, then a Siamese 735a coaxial cable is required.

2.3.7.3. If the length of the coaxial cable will exceed 250 feet, then a Siamese 734 coaxial cable is required.

2.3.8. A minimum of 12 category 6 cables are required from the TER to the EF.

2.3.8.1. Terminate these cables on a RJ45 Category 6 patch panels.

2.3.8.2. In the EF, a wall mounted patch panel is required. Locate this patch panel near the SPPOC conduits

2.3.8.3. In the TER, a separate rack mounted patch panel is required. Locate this patch panel in rack 1.

2.3.9. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for further details.

### 2.4. Horizontal cabling

2.4.1. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for the type of telecommunications outlets and jacks required for each type of telecommunications outlet.

2.4.2. The use of multi-user telecommunications outlet assembly (MUTOA) or consolidation points is not allowed. All horizontal cabling must be installed in a homerun fashion from the jack to the appropriate TER, TR, or TE.

2.4.3. For standard, flush wall-mounted telecommunications outlets, the use of low-voltage mounting brackets (e.g., mud ring, plaster ring, square-drawn cover, and box eliminator) is an approved alternative to the use of standard outlet boxes with stub-up conduit (non-fire rated walls only).

2.4.4. All cabling installed in conduit in or below a concrete slab that is in direct contact with the earth

must be rated for use in wet locations.

2.4.5. Consolidation points for transition from wet-rated to plenum-rated cable must be used if the distance from the conduit exit point to the TER/TR exceeds 49 ft. or the cable will pass thru a plenum space. All consolidation points installed must allow for cabling from the wall outlet to the TER or TR to pass all Category 6 permanent link tests as tested from the wall outlet thru the consolidation point to the patch panel port.

2.4.6. Exterior Call Box Requirements

2.4.6.1. Exterior call boxes shall be model CEECO WPP-531-F (analog model) or approved equivalent and are a contractor furnished, contractor installed (CFCI) item. The use of exterior VoIP call boxes is not allowed.

2.4.6.2. Exterior call boxes and all cabling, conduit, and other associated hardware shall be provided in the following areas;

2.4.6.2.1. Main building (i.e. Training Building) front entry door

2.4.6.2.2. Any main building exterior door that provides direct access to a privately owned vehicle (POV) parking lot

2.4.6.2.3. Delivery gate. The call box shall be pole mounted at this location.

2.4.7. Wall Phone Outlets

2.4.7.1. The following guidance concerning wall phone outlet requirements supersedes that found in the current version of UFC 4-171-05

2.4.7.2. Wall phone Outlet Requirements Table

Typical Building Type	Typical Space Name	Outlet Location
Training	Vestibule	Locate just inside main door on side wall
Training	Unit Storage	Locate just inside main interior door
Training	Assembly	Locate just inside main interior door
Training	Physical Readiness	Locate just inside main entry door
Training	Locker Rooms (w/shower facilities)	Locate just inside main entry door
OMS, AMSA, TEMF	Work Bay/ Maintenance Bay	Locate just inside main interior door
Warehouse	Open Warehouse	Locate just inside main interior door

2.4.8. Cable Jacket and Jack Colors

2.4.8.1. When a Reserve Center is located off of an installation, camp, post, or station (e.g. Standalone USARC), the cable jacket and jack color shall be blue.

2.4.8.2. When a Reserve Center is located on a military installation, camp, post, or station, the cable jacket and jack color shall be determined by the installation host (e.g. Active Army NEC).

2.4.8.3. If the facility is joint-use, the cable jacket and jack color will be determined by USARC G-6 during the design process.

2.4.9. Wireless Device Outlets

2.4.9.1. Facilities without an ARNet requirement (i.e. Unheated Storage) are excluded from this requirement.

2.4.9.2. Provide one Wireless Intrusion Detection (WID) outlet (1 jack) for each facility.

2.4.9.2.1. Locate this outlet in the corridor or administrative area immediately adjacent to the main entry door.

2.4.9.3. Provide one Wireless Access Point (WAP) outlet (1 jack) for each 40 by 40-foot square grid of the following areas; administrative, office space, unit common, classroom, team room, assembly, physical readiness, weapons simulator, and break room.

- 2.4.9.3.1. Locate each outlet on the wall as close as practical to the center of each 40 by 40-foot square grid.
- 2.4.9.4. Work Bay and Maintenance Bay Areas
  - 2.4.9.4.1. Provide one WAP outlet every 40 feet on the wall immediately adjacent to the adjoining administrative area.
  - 2.4.9.4.2. Provide one WAP outlet per work or maintenance bay roll-up door. Locate this outlet as close as practical to the work/maintenance bay roll-up door.
  - 2.4.9.4.3. Locate all WAP outlets in an area free from obstructions both below and in front of (i.e. air handling units, pallet storage) the outlet.
  - 2.4.9.4.4. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for typical examples.
- 2.4.9.5. Unit Storage and Open Warehouse Areas
  - 2.4.9.5.1. Provide one WAP outlet for each corridor adjacent to or in between the shelving units. Locate this outlet as close as practical to the center of the wall facing the corridor.
  - 2.4.9.5.2. Locate all WAP outlets in an area free from obstructions both below and in front of (i.e. air handling units) the outlet.
  - 2.4.9.5.3. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for typical examples.
- 2.4.9.6. WAP and WID Outlet Mounting
  - 2.4.9.6.1. 2-lug style (i.e. wall phone) mounting faceplate.
  - 2.4.9.6.2. Minimum of 12 inches of clearance on all sides of the outlet.
  - 2.4.9.6.3. For all standard height (9 ft. or lower) accessible (i.e. drop) ceiling locations, mount the outlet 18 inches above finished ceiling.
  - 2.4.9.6.4. For all standard height (9 ft. or lower) non-accessible (i.e. hard) ceiling locations and high height (9 ft. 1 inch or higher) ceiling locations (e.g. assembly hall, work bay, maintenance bay, unit storage, warehouse area), mount the outlet 8 feet AFF.
- 2.4.10. Admin. Common Spaces Outlets
  - 2.4.10.1. 1 convenience outlet (1 jack) is required for each benching table. This outlet shall be located on a wall in the vicinity of the benching table.
  - 2.4.10.2. 1 outlet (1 jack) per workstation location is required for each desk intended for FTS use. This outlet shall be located directly adjacent to or under the desk.
- 2.4.11. Terminations
  - 2.4.11.1. All horizontal cabling shall be terminated using T568B pin-out configuration.
  - 2.4.11.2. The jack used shall be of the same color as the horizontal cabling jacket.
  - 2.4.11.3. Standard wall phone outlets shall consist of a single-gang box with a single-gang, lug-type faceplate suitable for direct wall mounting of a telephone instrument.
- 2.4.12. Horizontal Cabling Slack
  - 2.4.12.1. 10 feet of cable slack is required for each cable. This slack is to be stored in tear drop fashion on the ladder rack above the telecommunications rack(s) or cabinet(s).
  - 2.4.12.2. 3 feet of horizontal cable slack is required for each outlet location. Cable slack is to be stored within the cable tray in a tear drop fashion or on a J-hook closest to the outlet in a figure 8 fashion.
  - 2.4.12.3. Service loops are not allowed at any time.
- 2.5. Labeling
  - 2.5.1. All labeling shall be IAW the requirements as listed in ANSI/TIA 606 (Class 3 requirements) and the requirements in Appendix B: Infrastructure Technical Criteria Diagrams and Details.
  - 2.5.2. Hand written labels are not acceptable.



2.5.3. All conduit labels must be self-laminating cable tags that are properly secured to the conduit. Self-laminating cable tags shall be installed on all backbone cabling immediately upon the exit of the floor/wall/or ceiling penetration and as close as practicable at the termination point.

2.5.4. If the facility is joint-use, then each outlet shall be labeled with the branch of service as well (e.g. R for Army Reserve, G for Army National Guard). The exact additional labeling details will be determined by USARC G-6 during the design process.

## 2.6. Testing

2.6.1. All testing shall be performed IAW the requirements as listed in I3A, UFC 3-580-01, ANSI/TIA-568 and this criteria.

2.6.2. All testing devices used must have been calibrated/recertified within one year of performing field testing. Proof of calibration/recertification is to be provided with the test plan and test results.

2.6.3. Prior to conducting any testing, the contractor shall submit a test plan to USARC G-6. This test plan shall indicate all test equipment, testing methodology, and plan of delivery of test results to USARC G-6. This test plan must be approved by USARC G-6 prior to conducting any testing.

2.6.4. Final Acceptance Testing is required for:

2.6.4.1. Horizontal cabling

2.6.4.2. Backbone fiber

2.6.4.2.1. In addition to the requirements listed in ANSI/TIA-568, I3A and UFC 3-580-01, each strand of terminated fiber shall also be tested at both ends with an optical time domain reflectometer (OTDR).

2.6.4.3. Backbone copper

2.6.4.3.1. In addition to the requirements listed in ANSI/TIA-568, a voice test shall be conducted for each pair of backbone copper cable installed. This voice test shall be conducted using a tester capable of performing this test (i.e. Fluke DSX-5000).

2.6.4.4. TMGB and TGB

2.6.4.4.1. Each TMGB and TGB installed shall be tested for ground to earth resistance. A passing result is a ground to earth resistance measurement of no more than 10 ohms.

2.6.4.5. Splice case

2.6.4.5.1. Each splice case installed in an underground vault or maintenance hole must be flash tested IAW the manufacturer's instructions. This test must be witnessed and verified by the U.S. Government approving authority.

2.6.4.6. USARC G-6 is the approving authority for all of the above test results.

2.6.5. Test Results Delivery

2.6.5.1. The test results for each project must be delivered as one consolidated PDF document.

2.6.5.2. This document must include the following items in the following format.

2.6.5.2.1. Title Page with low-voltage contractor's RCDD Stamp (only the title page needs this stamp)

2.6.5.2.2. Table of Contents. The Table of Contents must indicate the page number that each chapter starts and should be indexed for ease of use.

2.6.5.2.3. Separate chapters (with header page) for each building. Each chapter must contain the following.

2.6.5.2.3.1. As-Build floor plans indicating the location and jack label(s) for each telecommunications outlet installed. Jack labels must be in computer generated format. Hand-written floor plans are not acceptable. Each jack label on the As-Build floor plans must match the actual label(s) that is on each telecommunications outlet.

2.6.5.2.3.2. Category 6 cabling Test Results for each jack terminated in the EF, TER, TR(s) and TE(s). Both the summary test results and detailed test results must be included.

The cable label for each test result must match the cable label on the As-Build floor plans.

2.6.5.2.3.3. ISP Backbone fiber test results from the main TER/TR to each TR and TE

2.6.5.2.3.3.1. Power meter tests. Both the summary test results and detailed test results must be included.

2.6.5.2.3.3.2. OTDR tests. Both the summary test results and detailed test results must be included.

2.6.5.2.3.4. ISP backbone copper test results from the main TER/TR to each TR

2.6.5.2.3.4.1. Voice test for each pair. Both the summary test results and detailed test results must be included.

2.6.5.2.3.5. Ground to earth resistance test results in tabular format for each TMGB and TGB installed in the EF, TER, TR(s), and TE(s).

2.6.5.2.4. Separate chapter (with header page) for the OSP backbone fiber test results from the site TER to each buildings main TR or TE.

2.6.5.2.4.1. Power meter tests. Both the summary test results and detailed test results must be included.

2.6.5.2.4.2. OTDR tests. Both the summary test results and detailed test results must be included.

2.6.5.2.5. Separate chapter (with header page) for the OSP backbone fiber test results from to each buildings main TR or TE to the site TER.

2.6.5.2.5.1. Power meter tests. Both the summary test results and detailed test results must be included.

2.6.5.2.5.2. OTDR tests. Both the summary test results and detailed test results must be included.

2.6.5.2.6. Separate chapter (with header page) for the OSP backbone copper test results from the site TER to each buildings main TR or TE.

2.6.5.2.6.1. Voice test for each pair. Both the summary test results and detailed test results must be included.

## 2.7. SIPRNet

2.7.1. Encryption within the SIPRNET Room will occur in an Information Process Station (IPS) container. The requirements for this container shall be provided by USARC G-6. This container is a Government Furnished, Contractor Installed (GFCCI) item. Other telecommunications infrastructure requirements are:

2.7.1.1. Provide and install one standard outlet with one CAT6 cable. Cable jacket color and jack color shall be blue. Mount this box at standard outlet height. The location of this outlet shall be immediately adjacent to the IPS container. Cable shall use standard horizontal cabling pathways to the nearest TR/TER and terminated on a category 6 patch panel.

2.7.1.2. If the site has a Dedicated SIPRNet Space, provide and install the following;

2.7.1.2.1. One standard outlet with three CAT6 cables. Cable jacket color and jack color shall be blue. Mount this box at standard outlet height. The location of this outlet shall be immediately beneath the table used for the secure fax machine. Cables shall use standard horizontal cabling pathways to the nearest TR/TER and terminated on a category 6 patch panel.

2.7.1.2.2. One SIPRNet outlet for each SIPRNet workstation location. These outlets shall terminate in the IPS container. Additional requirements are:

2.7.1.2.2.1. Red cable jacket and jacks must be used for all SIPRNet outlets.

2.7.1.2.2.2. Center the SIPRNet outlets on each SIPRNet Workstation.

2.7.1.2.2.3. Mount at 54 inches AFF in a Government approved User Drop Box (UDB).

- 2.7.1.2.2.4. The cabling shall be installed in a Government approved hardened carrier PDS (i.e. Holocom) system.
- 2.7.1.2.2.5. Hardened carrier PDS design shall be reviewed and approved by an individual with an active design engineer certification issued by the PDS manufacturer.
- 2.7.1.2.2.6. Hardened carrier PDS installers shall have active installer certifications issued by the PDS manufacturer
- 2.7.1.2.2.7. Hardened carrier PDS installation shall be certified by an individual with an active quality assurance certification issued by the PDS manufacturer.

2.7.1.2.3. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for further details and requirements.

## 2.8. Intrusion Detection System (IDS)

2.8.1. For each IDS control panel, provide and install two category 6 cables from the IDS panel to the appropriate TER/TR. Install both cables in a single 1 inch EMT conduit. In the TER/TR, terminate these cables on the category 6 patch panels. In the IDS Panel, terminate these cables with an 8P8C jack. Provide 8-12 inches of slack cable in the IDS panel.

2.8.2. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for further details.

## 2.9. HVAC

2.9.1. The EF, TER and all TR(s) shall be properly conditioned to meet the control, availability, temperature, and humidity requirements as listed in UFC 4-171-05, UFC 3-580-01, and ANSI/TIA/EIA-569. Back-up systems are not required, but if an emergency power source is available in the facility, connect the HVAC system that serves each telecommunications space to the emergency power source.

## 2.10. Electrical

2.10.1. The electrical panel that serves the EF, TER, and each TR must be located in and dedicated to the space it serves. This panel must meet the following minimum requirements:

- 2.10.1.1. 120/208 volt, 3-phase or 120/240 volt, 1-phase, 24-(or 20 for 1-phase) space panel with a minimum 100 ampere (A) bus rated capacity.
- 2.10.1.2. Feed all loads within the EF, TER, or TR, except lighting, from this dedicated panel. Loads must include, but are not limited to, convenience receptacles, dedicated rack or cabinet receptacles, and HVAC systems (including exterior units for split systems).
- 2.10.1.3. No other loads shall be fed from this panel.
- 2.10.1.4. Back-up systems are not required, but if an emergency power source is available in the facility, connect the panel that serves the EF, TER, and each TR to the emergency power source.

2.10.2. Provide and install one (1) dedicated 120V/20 circuit with one (1) double duplex NEMA 5-20 receptacle for each telecommunications rack or cabinet in the TER, each TR, and each wall-mounted telecommunications cabinet.

2.10.2.1. Mount the receptacle at 6 inches AFF on the side of the telecommunications rack within the vertical wire manager.

2.10.2.2. Mount the receptacle inside the telecommunications cabinet in the lower, left corner.

2.10.3. In the EF, provide and install the following:

2.10.3.1. One (1) dedicated 120V/20 circuit with one (1) double duplex NEMA 5-15 receptacle.

2.10.3.2. One (1) dedicated 120V/20 circuit with one (1) NEMA L5-15 receptacle.

2.10.3.3. If provided specific power requirements by the local service provider, provide and install electrical receptacles that meet these requirements. Each of these receptacles shall be on a dedicated circuit.

2.10.3.4. Mount all receptacles at 18 inches AFF on the plywood backboard immediately adjacent to the service provider conduits.

- 2.10.4. In each EF, TER, and TR, provide 125V, 20A duplex convenience receptacles at 6 feet intervals on center around perimeter walls.
  - 2.10.5. Provide and install one (1) dedicated 120V/20 circuit with one (1) double duplex NEMA 5-20 receptacle for the IPS container in the SIPRNet Room or Team Room designated for SIPR use. Mount the receptacle immediately adjacent to the IPS container at standard outlet height.
  - 2.10.6. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for further details.
- 2.11. **Grounding and Bonding**
- 2.11.1. The design for grounding and bonding shall meet or exceed all requirements of ANSI/TIA-607-B and NFPA 70 and shall include grounding and bonding for the following:
    - 2.11.1.1. EF, TER, TR(s), TE(s), all metallic telecommunications components.
  - 2.11.2. Telecommunications Main Grounding Busbar (TMGB)/Telecommunications Grounding Busbar (TGB) requirements are as follows:
    - 2.11.2.1. Mounting height of 6 feet 6 inches AFF.
    - 2.11.2.2. Minimum of 24 inches in length.
    - 2.11.2.3. Predrilled with standard 5/16" Holes in a 2 hole configuration.
    - 2.11.2.4. Listed insulators and mounting brackets.
    - 2.11.2.5. A minimum of 50.8 mm separation from the wall is required to allow access to the rear of the bus bar.
    - 2.11.2.6. Copper or a copper alloy with a minimum of 95% conductivity.
    - 2.11.2.7. Electrolytically-Plated (ETP)
  - 2.11.3. Rack grounding Busbar (RGB) requirements are as follows:
    - 2.11.3.1. 1 RGB per telecommunications rack.
    - 2.11.3.2. Locate at the top rear of the rack.
    - 2.11.3.3. Copper or a copper alloy with a minimum of 95% conductivity.
    - 2.11.3.4. Each telecommunications rack shall be bonded to its RGB with a minimum #6 AWG size bonding conductor. This bonding connection shall not impede the installation of other rack-mounted equipment.
  - 2.11.4. All bonding lugs for each TMGB, TGB, and RGB shall be 2 hole, long barrel type lugs with a minimum of (2) crimp points to the bonding conductor.
  - 2.11.5. All bonding lugs shall have inspection windows so that bonding connections may be inspected for full conductor insertion.
  - 2.11.6. Telecommunications grounding connections to the TMGB, TGB, or RGB shall utilize listed compression two-hole lugs.
  - 2.11.7. Telecommunications grounding connections to metallic telecommunications infrastructure (i.e. racks, ladder rack, cable tray) shall utilize listed compression two-hole lugs wherever possible or equivalent one hole non-twisting lugs, or other irreversible compression type connections where the use of two-hole lugs is not possible (i.e. conduit grounding bushings).
  - 2.11.8. Prior to installing any bonding conductors an anti-oxidant compound shall be applied to all grounding and bonding surfaces that are not electrolytically-plated.
  - 2.11.9. Refer to Appendix B: Infrastructure Technical Criteria Diagrams and Details for further details.

## Appendix A – Glossary of Terms and Acronyms

1391 = MILCON Project authorization form  
AFF – Above Finished Floor  
ANSI = American National Standards Institute  
AR = Army Reserve  
ARNET = Army Reserve Network  
AWG = American Wire Gauge  
CATV = Community/Cable Access Television  
EF = Entrance Facility  
HDPE = High Density Polyethylene  
HVAC = Heating, Ventilating and Air Conditioning  
IDS = Intrusion Detection System  
I3A = Technical Criteria for Installation Information Infrastructure Architecture  
IPS= Information Processing Station  
LEC= Local Exchange Carrier (a.k.a. Telephone Company)  
NEC= Network Enterprise Center  
NEMA = National Electrical Manufacturers Association  
OSP = Outside Plant  
OTDR = Optical Time Domain Reflectometer  
PDS = Protected Distribution System  
PVC = Polyvinyl Chloride  
RMU= Rack Management Unit  
SIPRNet = Secret Internet Protocol Router Network  
SM = Single Mode  
TER = Telecommunications Equipment Room  
TGB = Telecommunications Grounding Busbar  
TIA/EIA = Telecommunications Industry Association/Electronics Industries Alliance  
TMGB = Telecommunications Main Grounding Busbar  
TR = Telecommunications Room  
UDB = SIPRNet User Drop Box  
UFC = Unified Facility Criteria  
UHS = Unheated Storage  
UPS = Uninterruptible Power Supply  
USARC = U.S. Army Reserve Command  
VoIP = Voice-Over-Internet-Protocol

## Appendix B - Infrastructure Technical Criteria Diagrams and Details

The diagrams and figures provided in this appendix provide additional requirements and guidance. All Army Reserve infrastructure design and construction shall adhere to the requirements listed in these diagrams and details.



# U.S. ARMY RESERVE NETWORK ENTERPRISE CENTER INFRASTRUCTURE TECHNICAL CRITERIA APPENDIX B DIAGRAMS AND DETAILS



SYMBOL	REVISIONS DESCRIPTION	DATE	APPR.

DESIGNED BY: JOHN BABB	DATE: FEBRUARY 2018
DESIGNED BY: DEREK MITCHELL	APPROVED FOR PUBLIC RELEASE;
REVIEWED BY: ROBERT BABB USARC G-6 RCDD	DISTRIBUTION UNLIMITED

USARC G-6  
NETWORKING AND  
INFRASTRUCTURE  
BRANCH  
INFRASTRUCTURE  
TEAM

U.S. ARMY RESERVE  
NETWORK ENTERPRISE CENTER  
INFRASTRUCTURE  
TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

B.01

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	STANDARD TELECOMMUNICATIONS OUTLET (1 JACK)		DDC/UMP TELECOMMUNICATIONS OUTLET (1 JACK) MOUNT AS CLOSE TO THE CONTROL PANEL AS POSSIBLE
	TELECOMMUNICATIONS OUTLET ("X" DENOTES NUMBER OF JACKS)		WALL PHONE TELECOMMUNICATIONS OUTLET(1 JACK) 2 LUG WALL PHONE FACEPLATE
	WID TELECOMMUNICATIONS OUTLET (1 JACK) ACCESSIBLE CEILING 2 LUG STYLE FACEPLATE		EXTERIOR CALL BOX (1 CAT. 6 CABLE)
	WID TELECOMMUNICATIONS OUTLET (1 JACK) NON-ACCESSIBLE CEILING 2 LUG STYLE FACEPLATE		MULTI-FUNCTIONAL DEVICE TELECOMMUNICATIONS OUTLET (2 JACKS)
	WAP TELECOMMUNICATIONS OUTLET (1 JACK) ACCESSIBLE CEILING 2 LUG STYLE FACEPLATE		TELECOMMUNICATIONS OUTLET (2 JACKS) MOUNT 6 INCHES ABOVE COUNTER TOP
	WAP TELECOMMUNICATIONS OUTLET (1 JACK) NON-ACCESSIBLE CEILING 2 LUG STYLE FACEPLATE		MODULAR FURNITURE TELECOMMUNICATIONS OUTLET (1 JACK)
	IDS PANEL (2 CAT. 6 CABLES)		SIPRNET OUTLET (1 JACK)
	STANDARD TELECOMMUNICATIONS FLOOR BOX (1 JACK)		STANDARD TELECOMMUNICATIONS FLOOR BOX ("X" DENOTES NUMBER OF JACKS)



SYMBOL	REVISIONS DESCRIPTION	DATE	APPR.

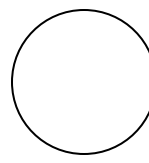
DESIGNED BY: JOHN BABB	DATE: FEBRUARY 2018
DESIGNED BY: DEREK MITCHELL	APPROVED FOR PUBLIC RELEASE: UNLIMITED
REVIEWED BY: ROBERT BABB	DISTRIBUTION: UNLIMITED
USAR C G-6 RCDD	

USAR C G-6  
NETWORKING AND  
INFRASTRUCTURE  
BRANCH  
INFRASTRUCTURE  
TEAM

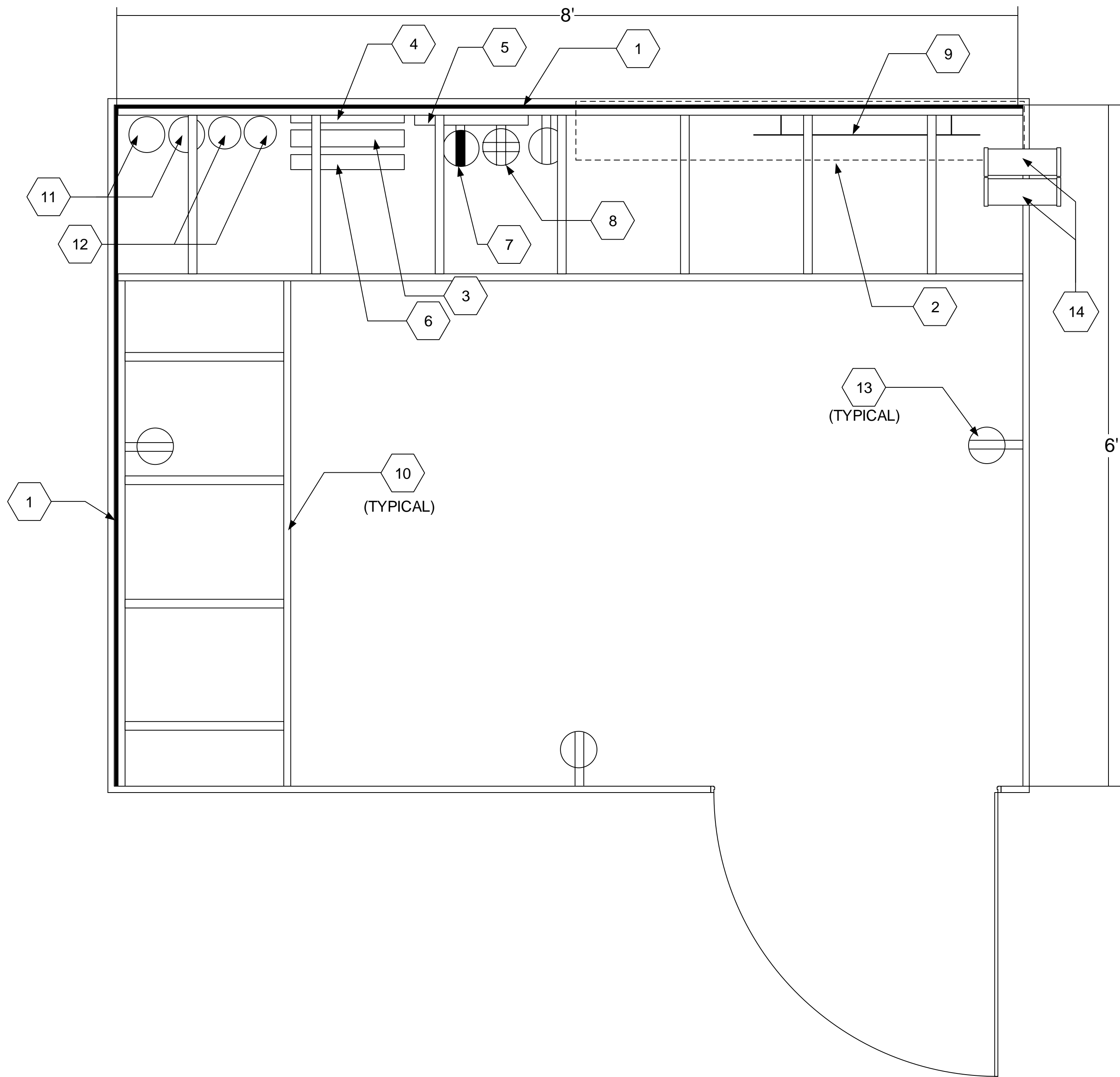
U.S. ARMY RESERVE  
NETWORK ENTERPRISE CENTER  
INFRASTRUCTURE  
TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

B.02

# STANDARD TELECOMMUNICATIONS SYMBOL LEGEND







**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 SPACE RESERVED FOR SERVICE PROVIDER INSTALLED EQUIPMENT
- 3 SERVICE PROVIDER INSTALLED BUILDING ENTRANCE PROTECTOR FOR COPPER BACKBONE CABLE
- 4 SERVICE PROVIDER INSTALLED COPPER TERMINATION BLOCK
- 5 SERVICE PROVIDER INSTALLED WALL MOUNTED FOPP
- 6 12 PORT WALL MOUNTED CAT6 PATCH PANEL
- 7 NEMA L5-15R POWER RECEPTACLE
- 8 DOUBLE DUPLEX NEMA 5-20R POWER RECEPTACLE
- 9 TMGB/TGB
- 10 HORIZONTAL LADDER RACK
- 11 LEC CONDUIT
- 12 CONDUIT TO TER
- 13 NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLE
- 14 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



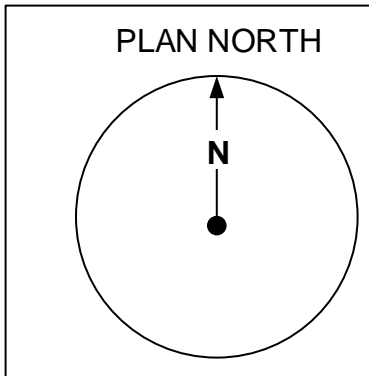
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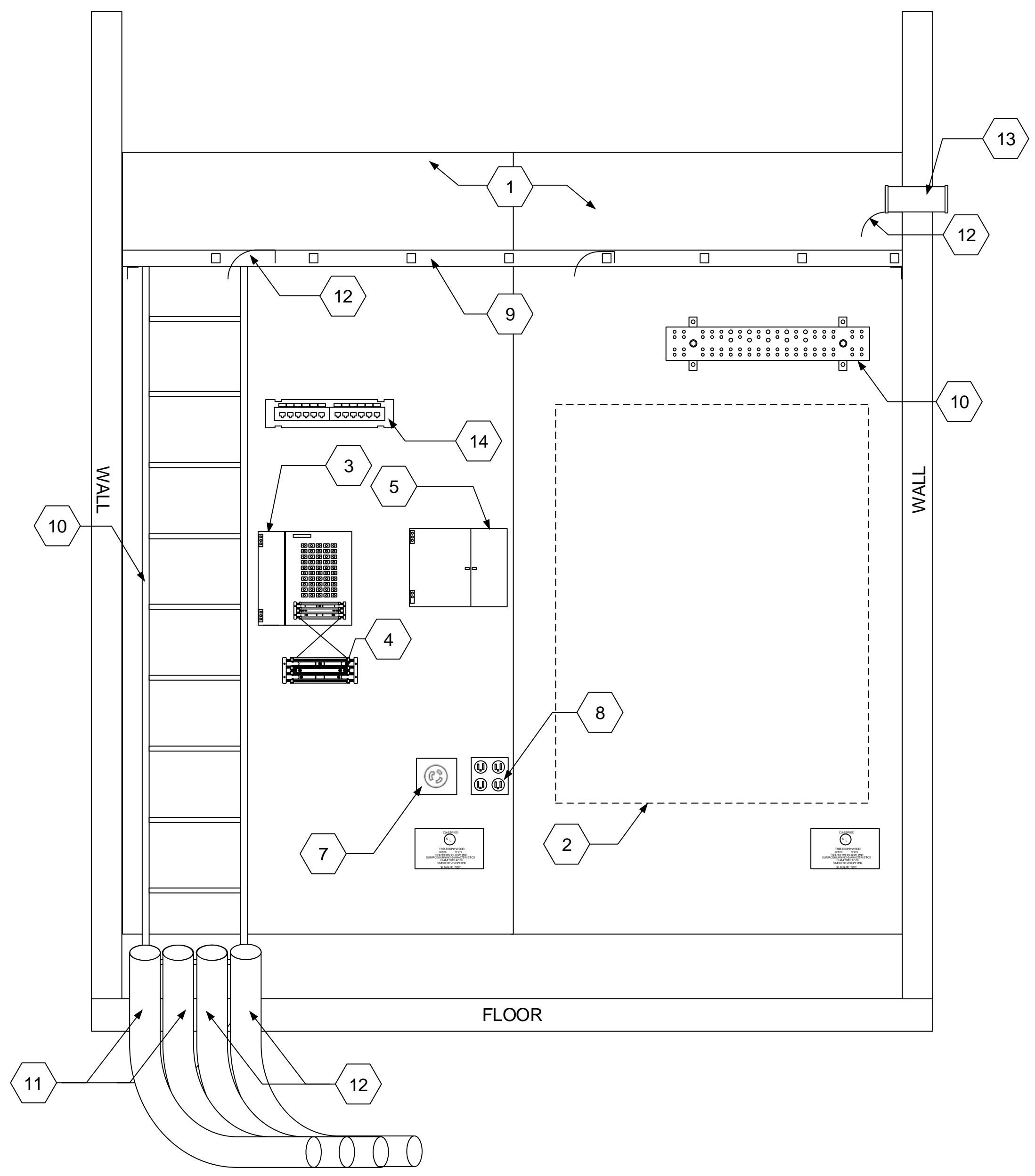
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**B.03**



**TYPICAL EF AERIAL DIAGRAM**



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 SPACE RESERVED\_FOR\_SERVICE\_PROVIDER\_INSTALLED\_EQUIPMENT
- 3 SERVICE\_PROVIDER\_INSTALLED\_BUILDING\_ENTRANCE\_PROTECTOR\_FOR\_COPPER\_BACKBONE\_CABLE
- 4 SERVICE\_PROVIDER\_INSTALLED\_COPPER\_TERMINATION\_BLOCK
- 5 SERVICE\_PROVIDER\_INSTALLED\_WALL\_MOUNTED\_FOPP
- 6 DOUBLE\_DUPLEX\_NEMA\_5-20R\_POWER\_RECEPTACLE
- 7 NEMA\_L5-15R\_POWER\_RECEPTACLE
- 8 TMGB/TGB
- 9 HORIZONTAL\_LADDER\_RACK
- 10 VERTICAL\_LADDER\_RACK
- 10 CABLE\_RADIUS\_DROP\_OUTS\_(WATERFALL\_SUPPORTS)
- 11 LEC\_CONDUIT
- 12 CONDUIT\_TO\_TER
- 13 STANDARD\_WALL/CEILING\_SLEEVES\_OR\_SELF-SEALING,\_RE-ENTERABLE,\_MECHANICAL\_FIRE-STOPPING\_WALL\_SLEEVES\_(AS\_REQUIRED\_PER\_TECHNICAL\_CRITERIA)
- 14 12\_PORT\_WALL\_MOUNTED\_CAT6\_PATCH\_PANEL

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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**B.04**

**TYPICAL EF WALL ELEVATION DIAGRAM**

**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLE
- 3 TMGB/TGB
- 4 HORIZONTAL LADDER RACK
- 5 CONDUITS TO BUILDING XXX TR
- 6 CONDUITS TO EF
- 7 CONDUITS TO TR
- 8 TELECOMMUNICATIONS EQUIPMENT RACK
- 9 VERTICAL WIRE MANAGERS
- 10 EQUIPMENT RACK RECEPTACLE
- 11 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



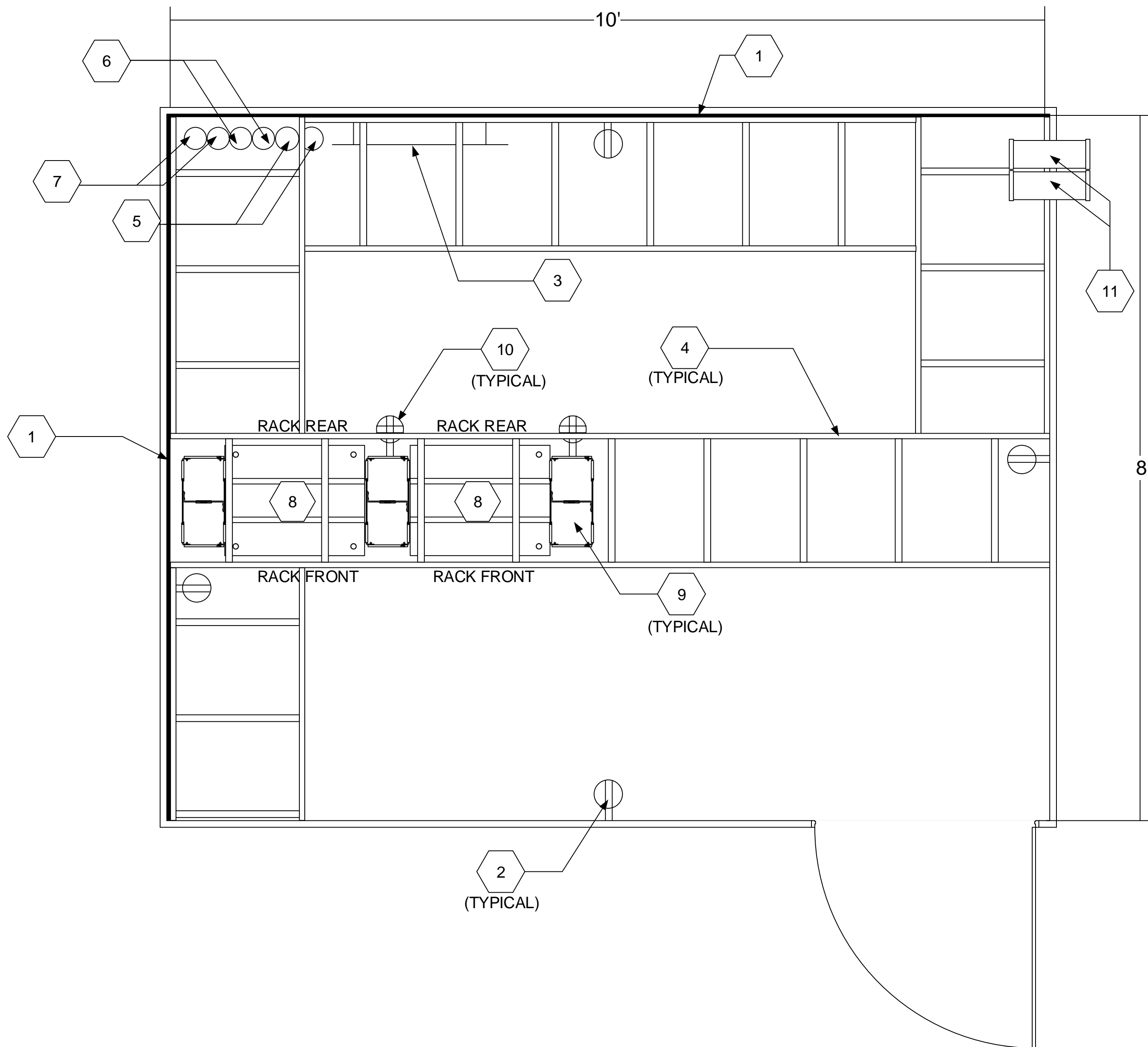
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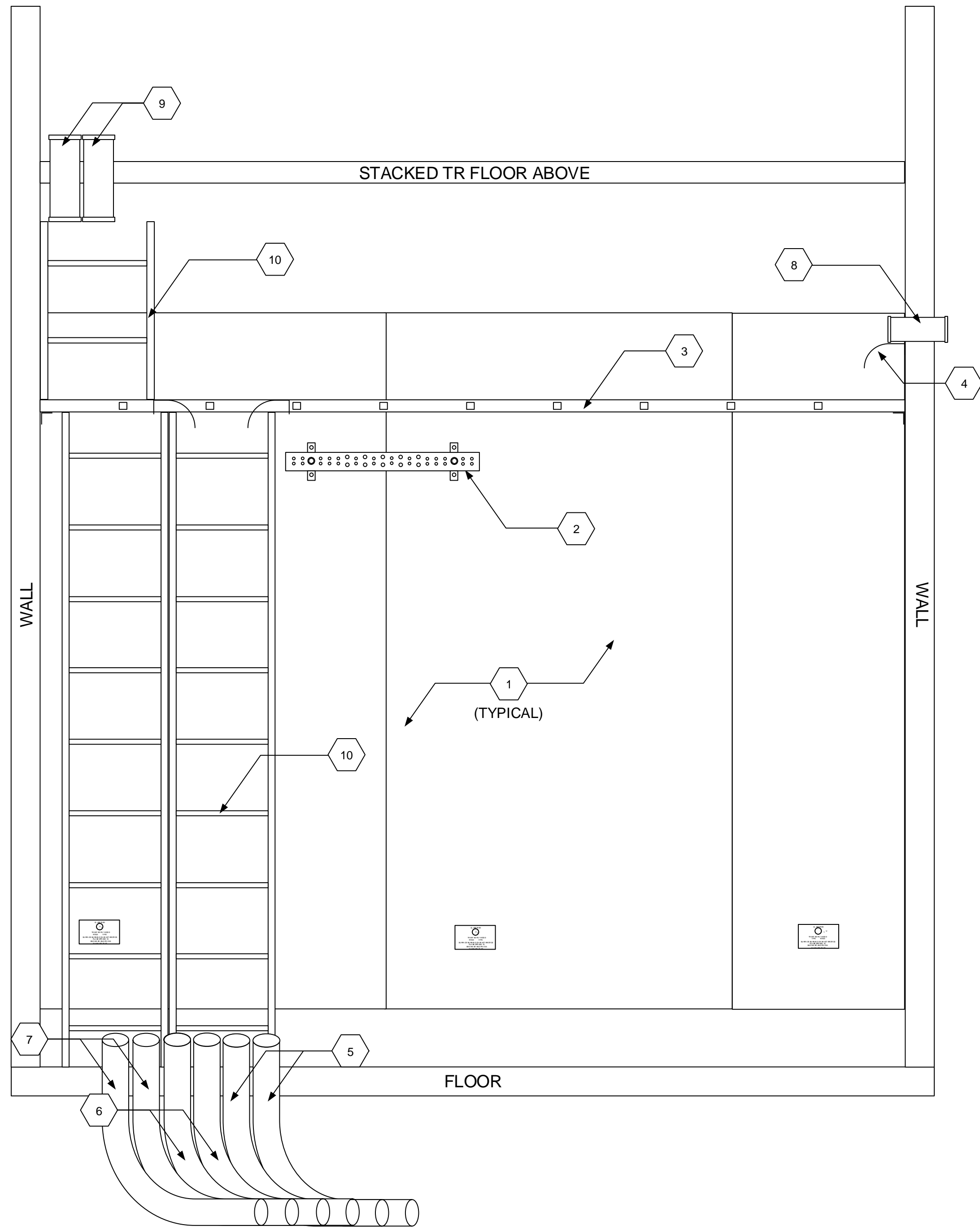
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**B.05**



 TYPICAL TER AERIAL DIAGRAM



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 TMGB/TGB
- 3 HORIZONTAL LADDER RACK
- 4 CABLE RADIUS DROP OUTS (WATERFALL SUPPORTS)
- 5 CONDUITS TO BUILDING XXXX TR
- 6 CONDUITS TO EF
- 7 CONDUITS TO TR
- 8 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- 9 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES
- 10 VERTICAL LADDER RACK

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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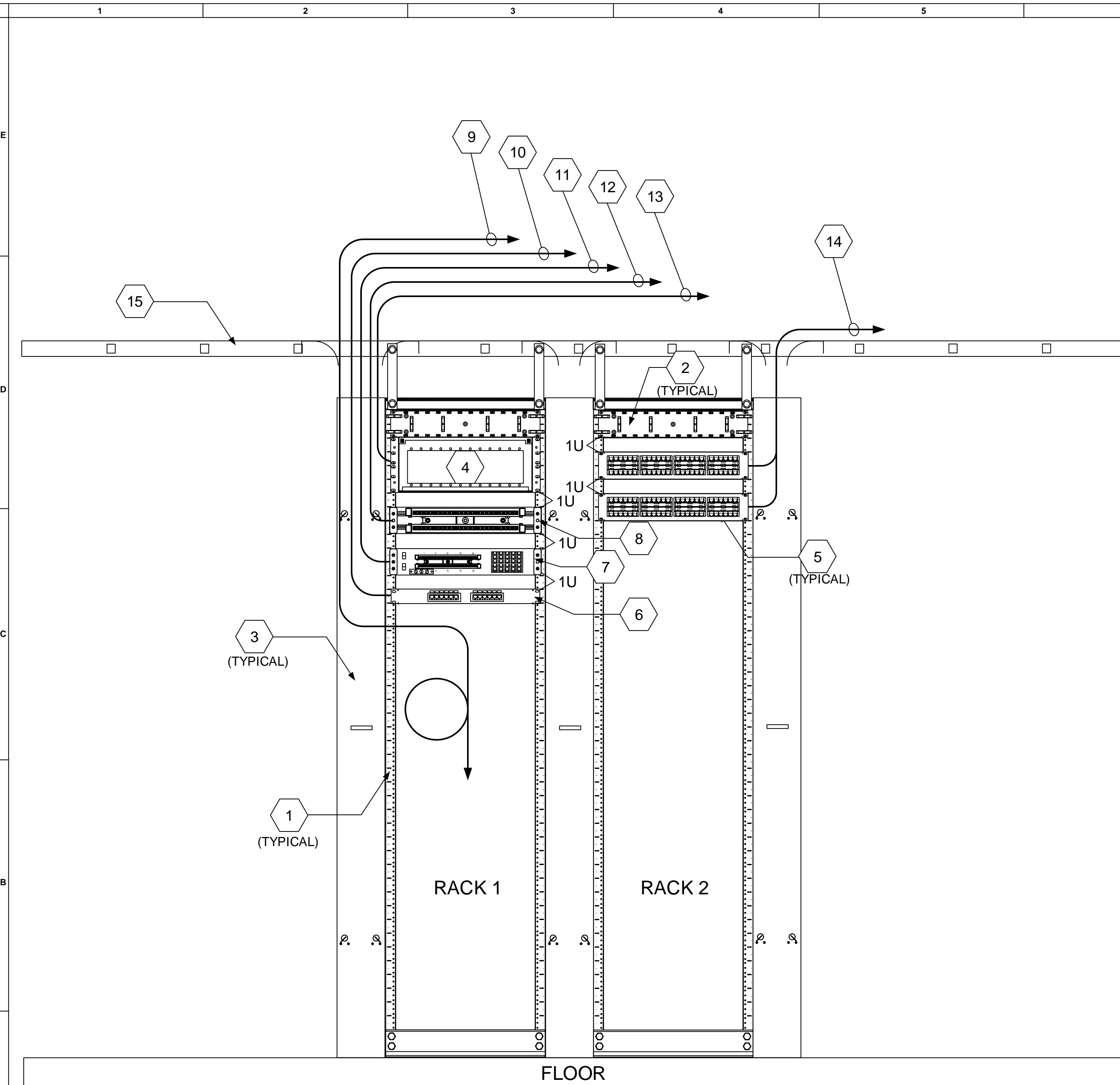
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**B.06**

**TYPICAL TER WALL ELEVATION DIAGRAM**



- ### SHEET KEY NOTES
- 1 2 POST EQUIPMENT RACK
  - 2 2U HORIZONTAL WIRE MANAGER
  - 3 VERTICAL WIRE MANAGER
  - 4 4U FIBER PATCH PANEL
  - 5 48 PORT PATCH PANEL
  - 6 12 PORT PATCH PANEL
  - 7 BET FOR COPPER BACKBONE CABLE TO BUILDING XXX TR XXX
  - 8 110 BLOCK FOR COPPER BACKBONE CABLE TO TR XXX
  - 9 DS3 EXTENSION COAXIAL CABLE
  - 10 (12) CAT 6 CABLES TO EF
  - 11 OSP COPPER BACKBONE CABLE TO BUILDING XXX TR XXX
  - 12 ISP COPPER BACKBONE CABLE TO TR XXX
  - 13 OSP/ISP FOC TO OTHER TR(S)
  - 14 CATEGORY 6 HORIZONTAL CABLE
  - 15 HORIZONTAL LADDER RACK

### SHEET GENERAL NOTES

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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**B.07**

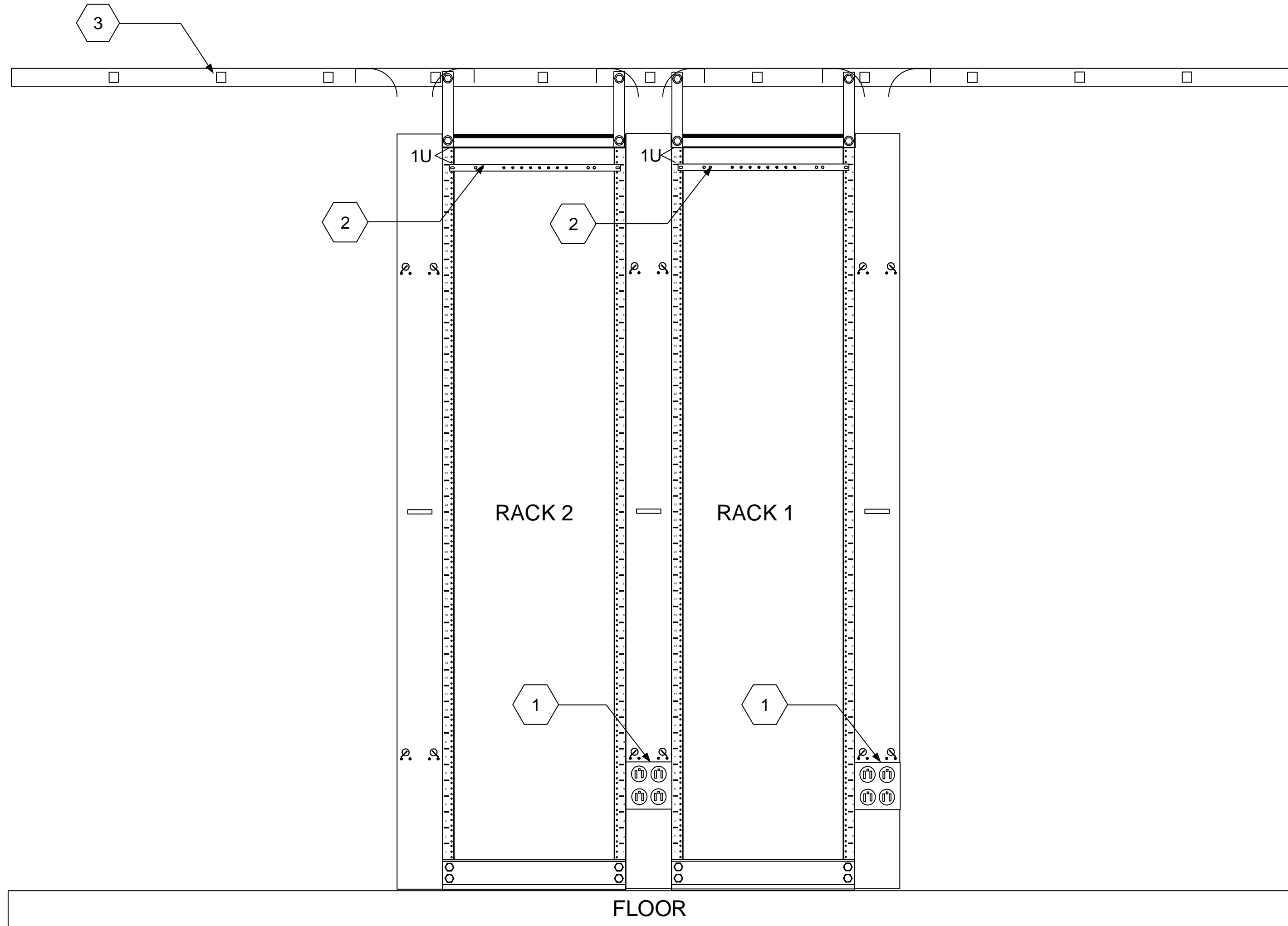
**TYPICAL TER RACK FRONT ELEVATION DIAGRAM**

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.

**SHEET KEY NOTES**

- 1 DOUBLE DUPLEX NEMA 5-20R RECEPTACLE
- 2 RACK MOUNTED BUS-BAR (RGB)
- 3 HORIZONTAL LADDER RACK



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DIAGRAM AND DETAILS

**B.08**

**TYPICAL TER RACK REAR ELEVATION DIAGRAM**

**SHEET KEY NOTES**

- ① PLYWOOD BACKBOARD
- ② NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLE
- ③ EQUIPMENT RACK RECEPTACLE
- ④ TMGB/TGB
- ⑤ HORIZONTAL LADDER RACK
- ⑥ TELECOMMUNICATIONS EQUIPMENT RACK
- ⑦ VERTICAL WIRE MANAGERS
- ⑧ STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- ⑨ CONDUITS TO TER

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



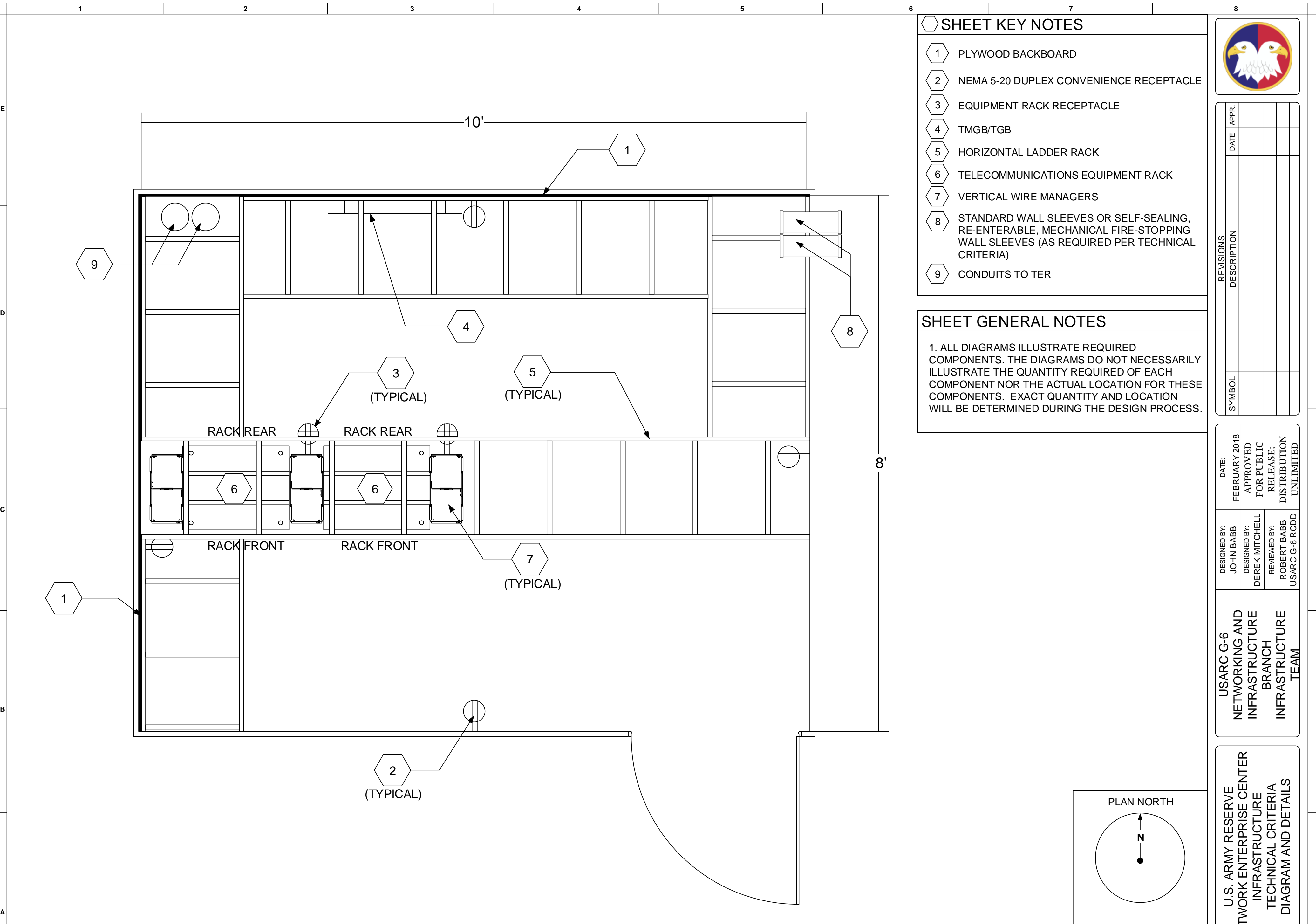
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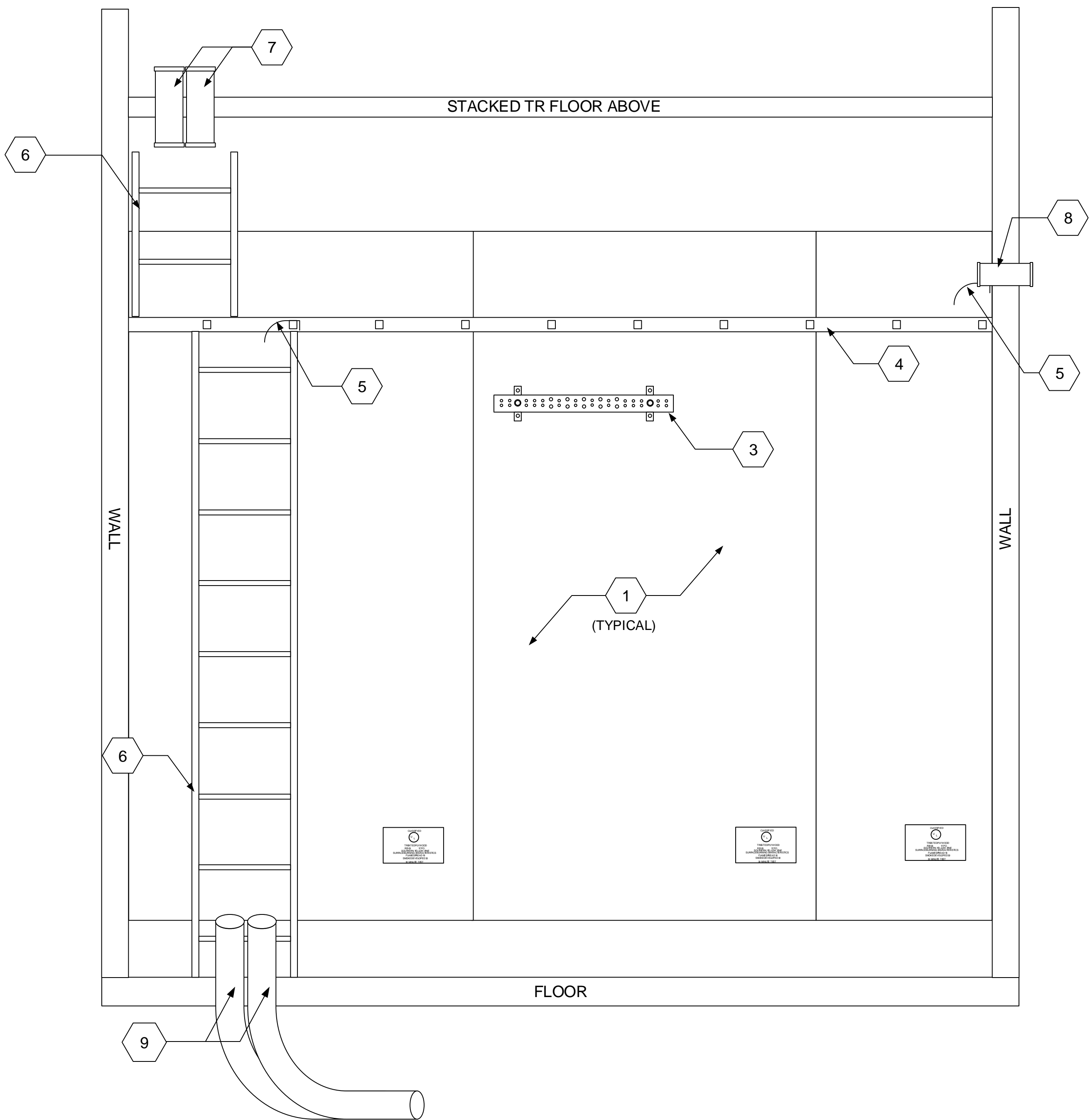
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**B.09**



**TYPICAL FIRST FLOOR STANDARD TR AERIAL DIAGRAM**



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 3 TMGB/TGB
- 4 HORIZONTAL LADDER RACK
- 5 CABLE RADIUS DROP OUTS (WATERFALL SUPPORTS)
- 6 VERTICAL LADDER RACK
- 7 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES
- 8 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- 9 CONDUITS TO TER

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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DIAGRAM AND DETAILS

**B.10**

**TYPICAL FIRST FLOOR STANDARD TR WALL ELEVATION DIAGRAM**



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLE
- 3 EQUIPMENT RACK RECEPTACLE
- 4 TMGB/TGB
- 5 HORIZONTAL LADDER RACK
- 6 TELECOMMUNICATIONS EQUIPMENT RACK
- 7 VERTICAL WIRE MANAGERS
- 8 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- 9 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



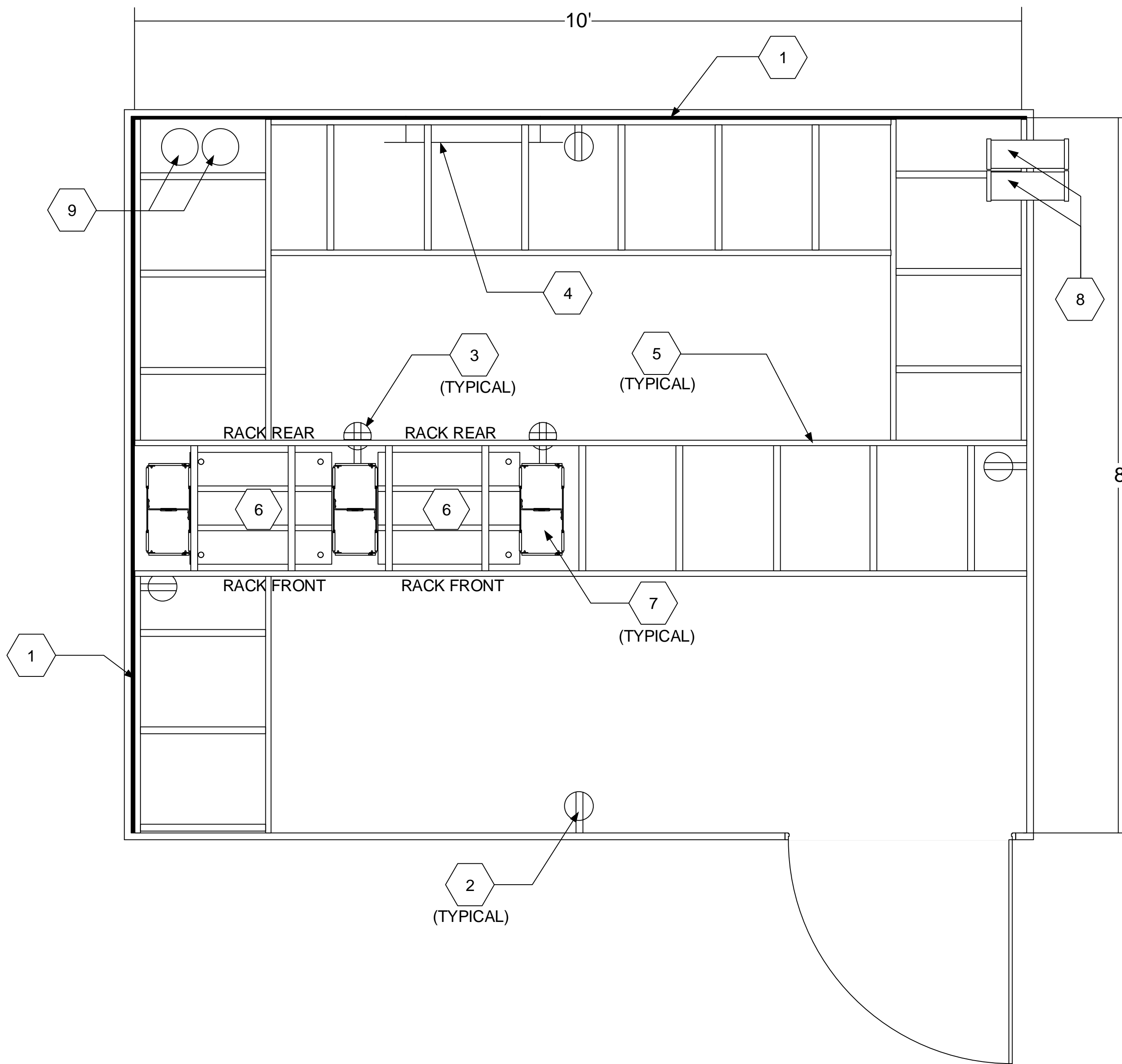
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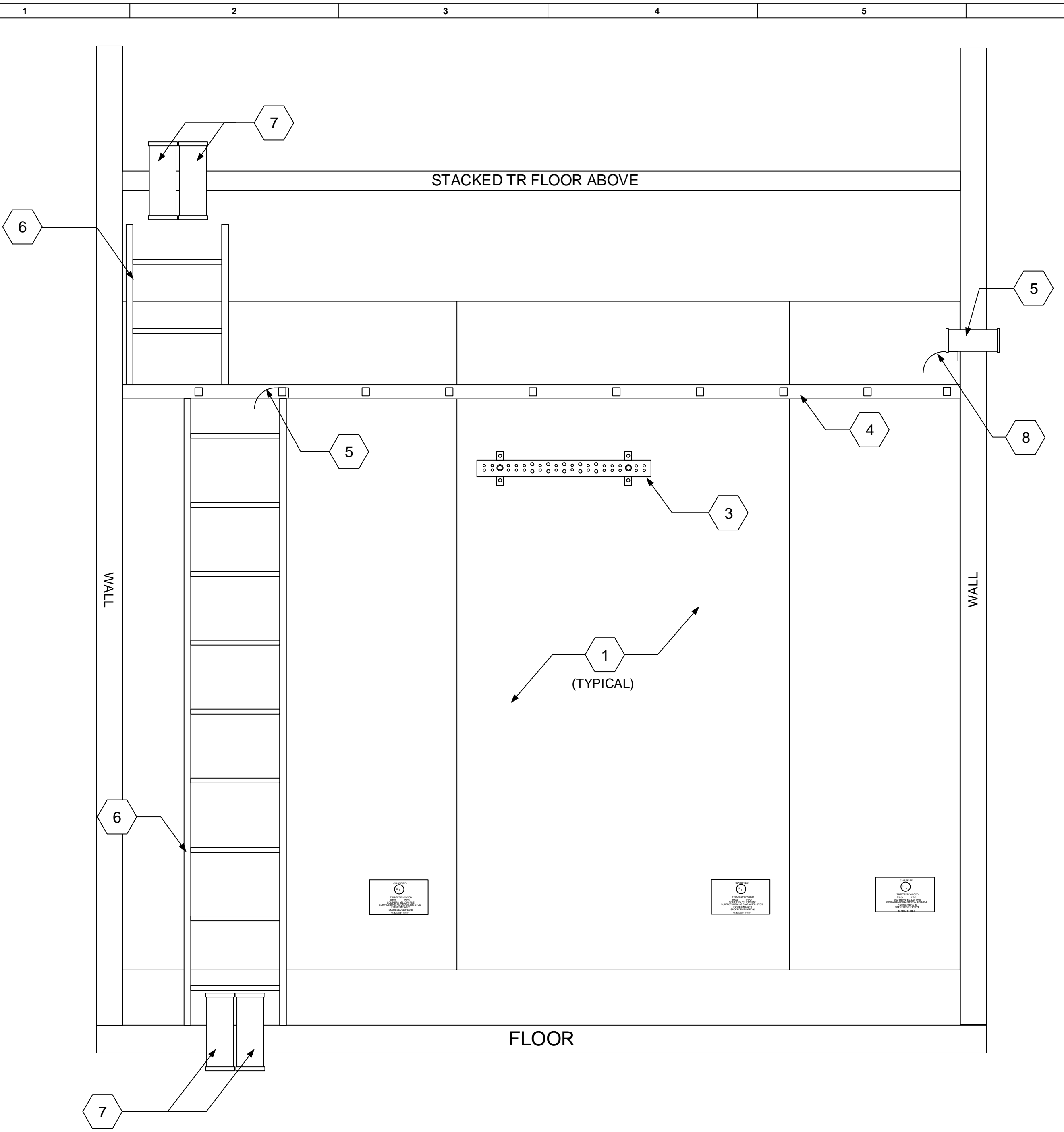
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TEAM

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INFRASTRUCTURE  
TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

**B.11**



**TYPICAL SECOND FLOOR STANDARD TR AERIAL DIAGRAM**



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 3 TMGB/TGB
- 4 HORIZONTAL LADDER RACK
- 5 CABLE RADIUS DROP OUTS (WATERFALL SUPPORTS)
- 6 VERTICAL LADDER RACK
- 7 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES
- 8 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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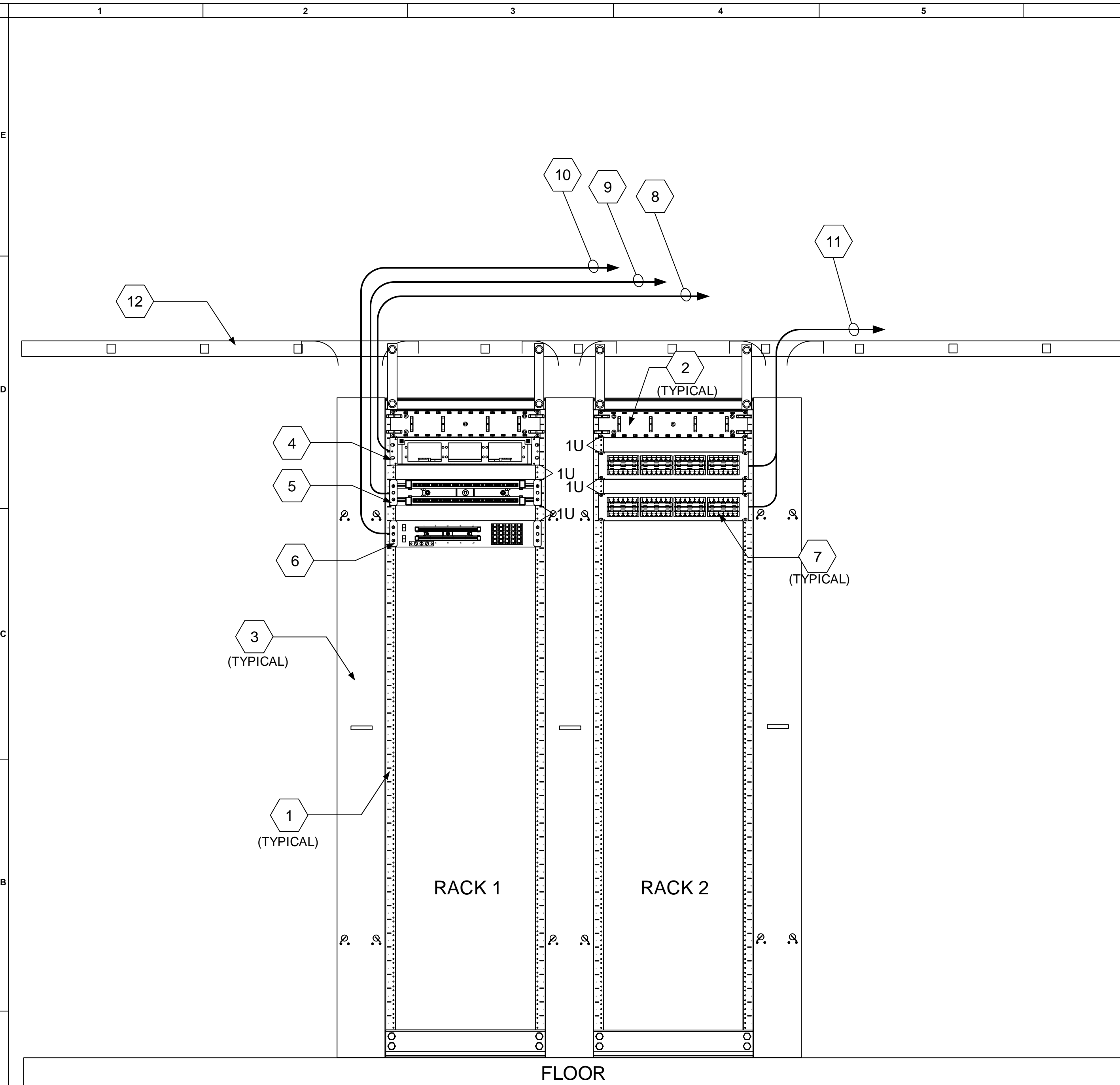
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**B.12**

**TYPICAL SECOND FLOOR STANDARD TR WALL ELEVATION DIAGRAM**



- ### SHEET KEY NOTES
- 1 2 POST EQUIPMENT RACK
  - 2 2U HORIZONTAL WIRE MANAGER
  - 3 VERTICAL WIRE MANAGER
  - 4 2U FIBER PATCH PANEL
  - 5 110 BLOCK FOR COPPER BACKBONE CABLE TO TR XXX
  - 6 BET FOR COPPER BACKBONE CABLE TO BUILDING XXX TR XXX
  - 7 48 PORT PATCH PANEL
  - 8 OSP/ISP FOC TO OTHER TR(S)
  - 9 ISP COPPER BACKBONE CABLE TO TR XXX
  - 10 OSP COPPER BACKBONE CABLE TO BUILDING XXX TR XXX
  - 11 CATEGORY 6 HORIZONTAL CABLE
  - 12 HORIZONTAL LADDER RACK

### SHEET GENERAL NOTES

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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**B.13**

**TYPICAL STANDARD TR RACK FRONT ELEVATION DIAGRAM**

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.

**SHEET KEY NOTES**

- 1 DOUBLE DUPLEX NEMA 5-20R RECEPTACLE
- 2 RACK MOUNTED BUS-BAR (RGB)
- 3 HORIZONTAL LADDER RACK



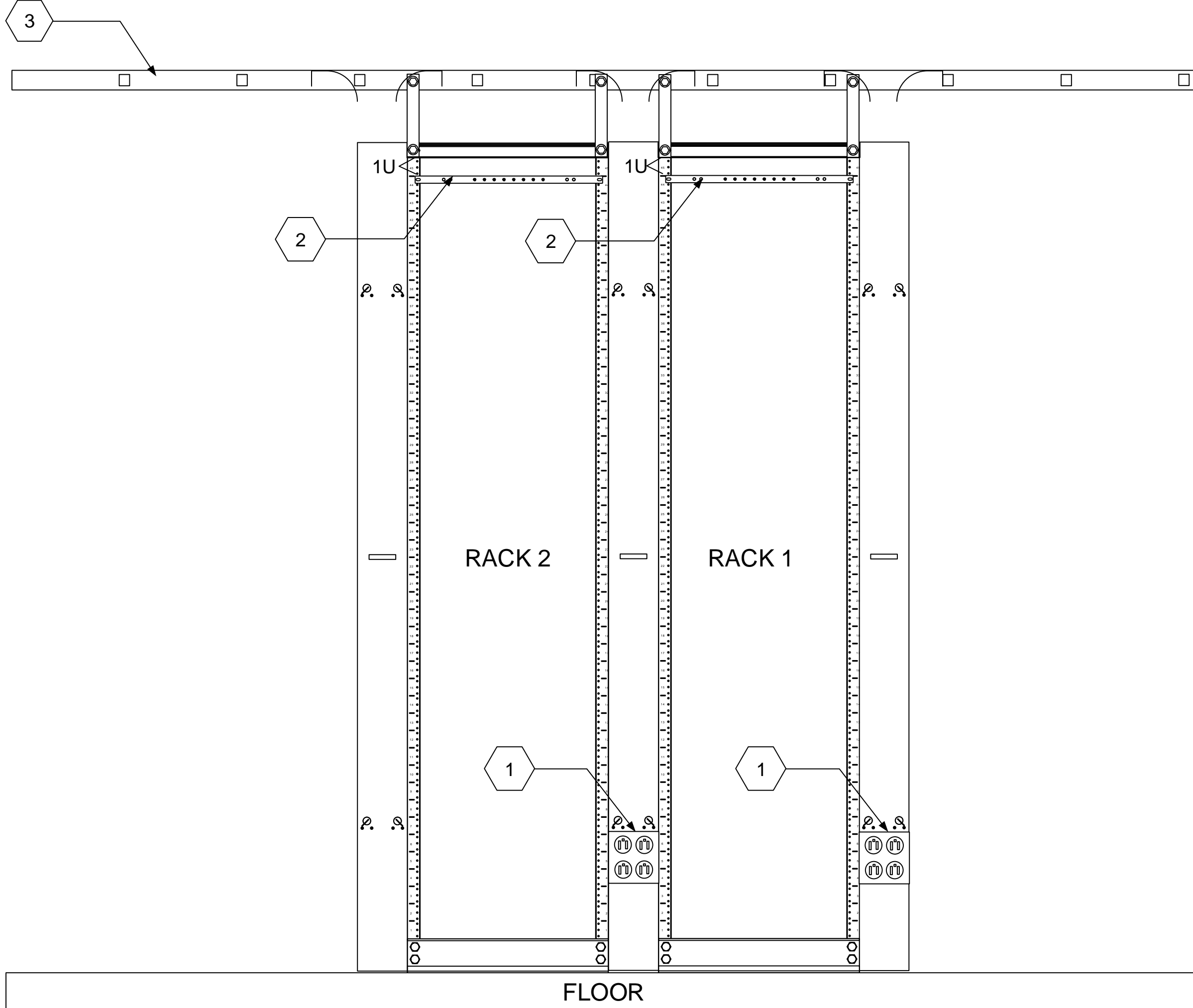
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TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

**B.14**



**TYPICAL STANDARD TR RACK REAR ELEVATION DIAGRAM**

**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLE
- 3 EQUIPMENT RACK RECEPTACLE
- 4 TMGB/TGB
- 5 HORIZONTAL LADDER RACK
- 6 TELECOMMUNICATIONS EQUIPMENT RACK
- 7 VERTICAL WIRE MANAGERS
- 8 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- 9 CONDUITS TO TER

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



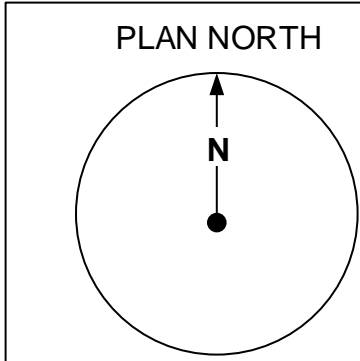
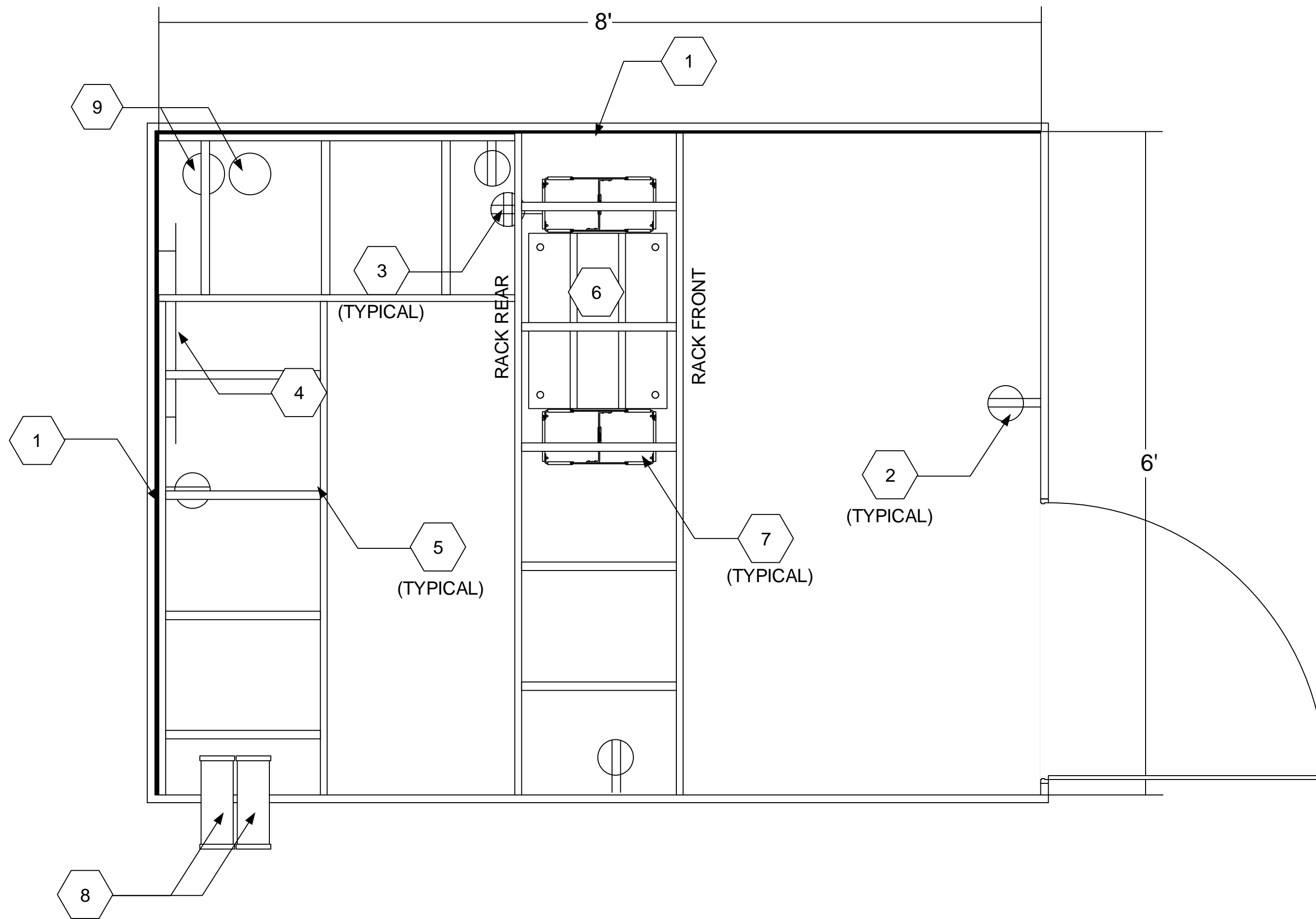
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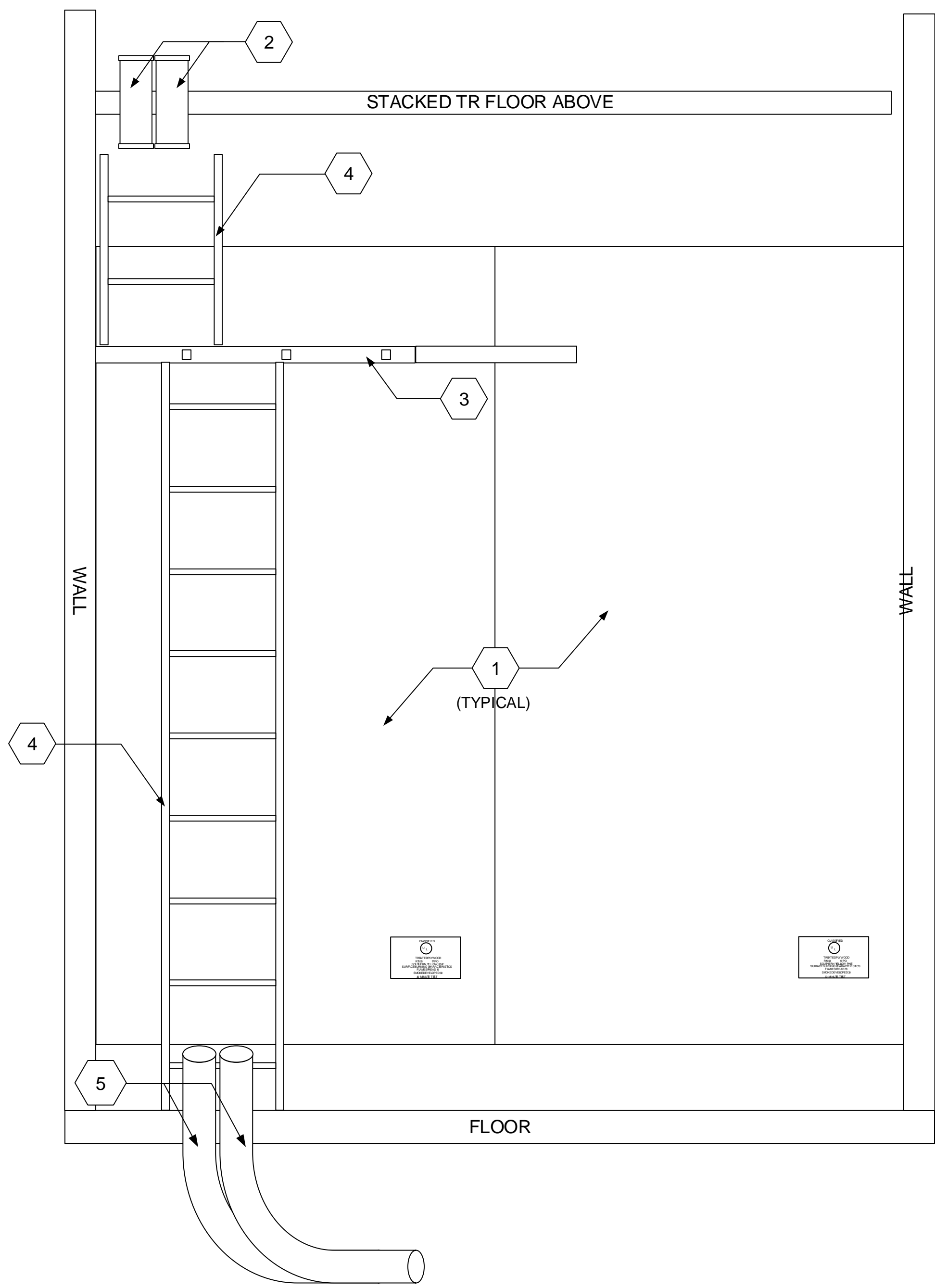
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INFRASTRUCTURE  
TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

**B.15**



**TYPICAL FIRST FLOOR SMALL TR AERIAL DIAGRAM**



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES
- 3 HORIZONTAL LADDER RACK
- 4 VERTICAL LADDER RACK
- 5 CONDUITS TO TER

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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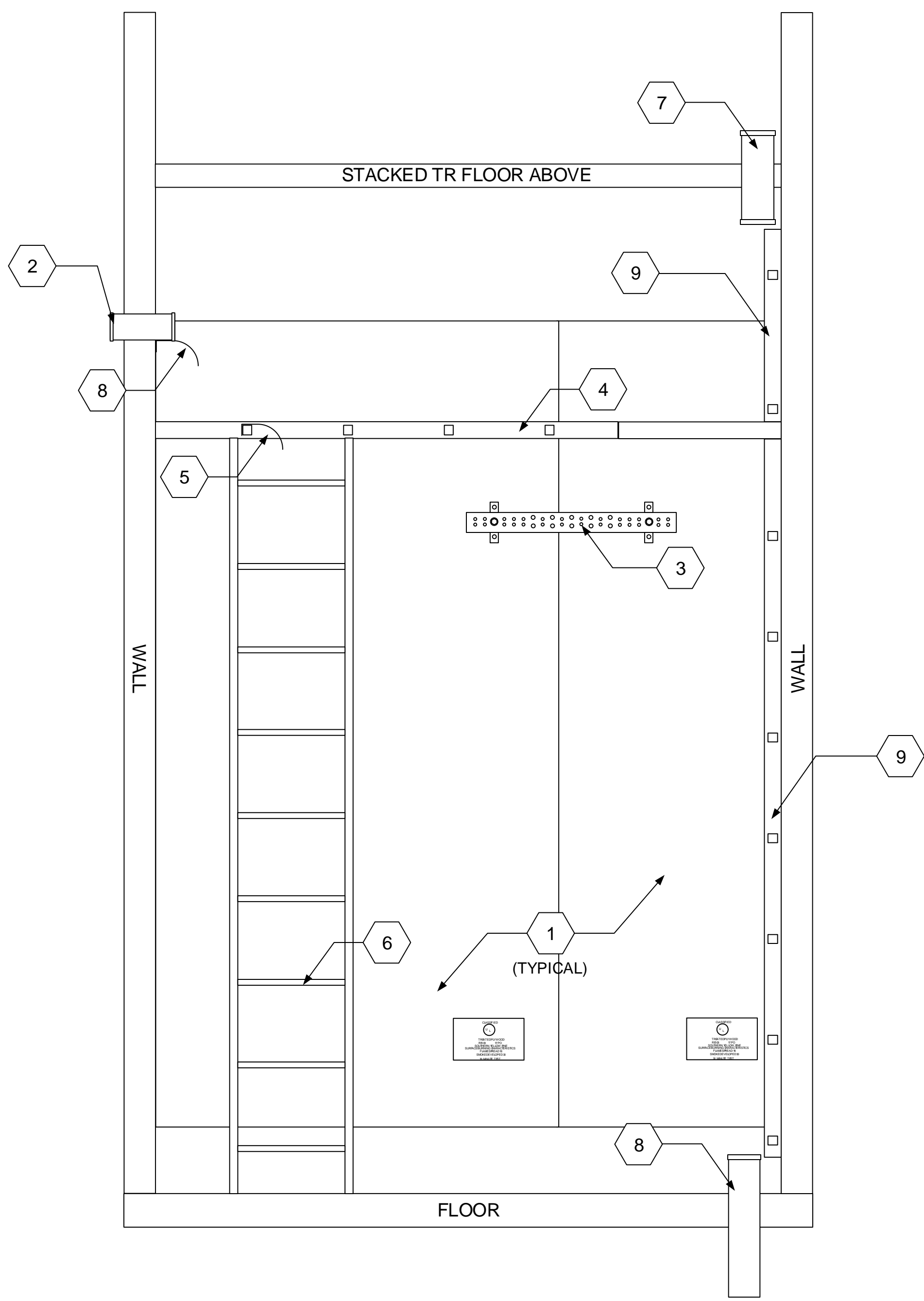
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**B.16**

**TYPICAL FIRST FLOOR SMALL TR PLAN WALL NORTH ELEVATION DIAGRAM**



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- 3 TMGB/TGB
- 4 HORIZONTAL LADDER RACK
- 5 CABLE RADIUS DROP OUTS (WATERFALL SUPPORTS)
- 6 VERTICAL LADDER RACK
- 7 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES
- 8 CONDUITS TO TER

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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**B.17**

**TYPICAL FIRST FLOOR SMALL TR PLAN WALL WEST ELEVATION DIAGRAM**

**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLE
- 3 EQUIPMENT RACK RECEPTACLE
- 4 TMGB/TGB
- 5 HORIZONTAL LADDER RACK
- 6 TELECOMMUNICATIONS EQUIPMENT RACK
- 7 VERTICAL WIRE MANAGERS
- 8 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- 9 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



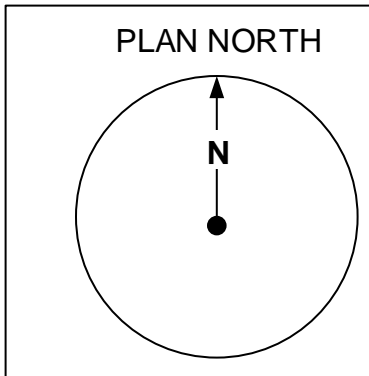
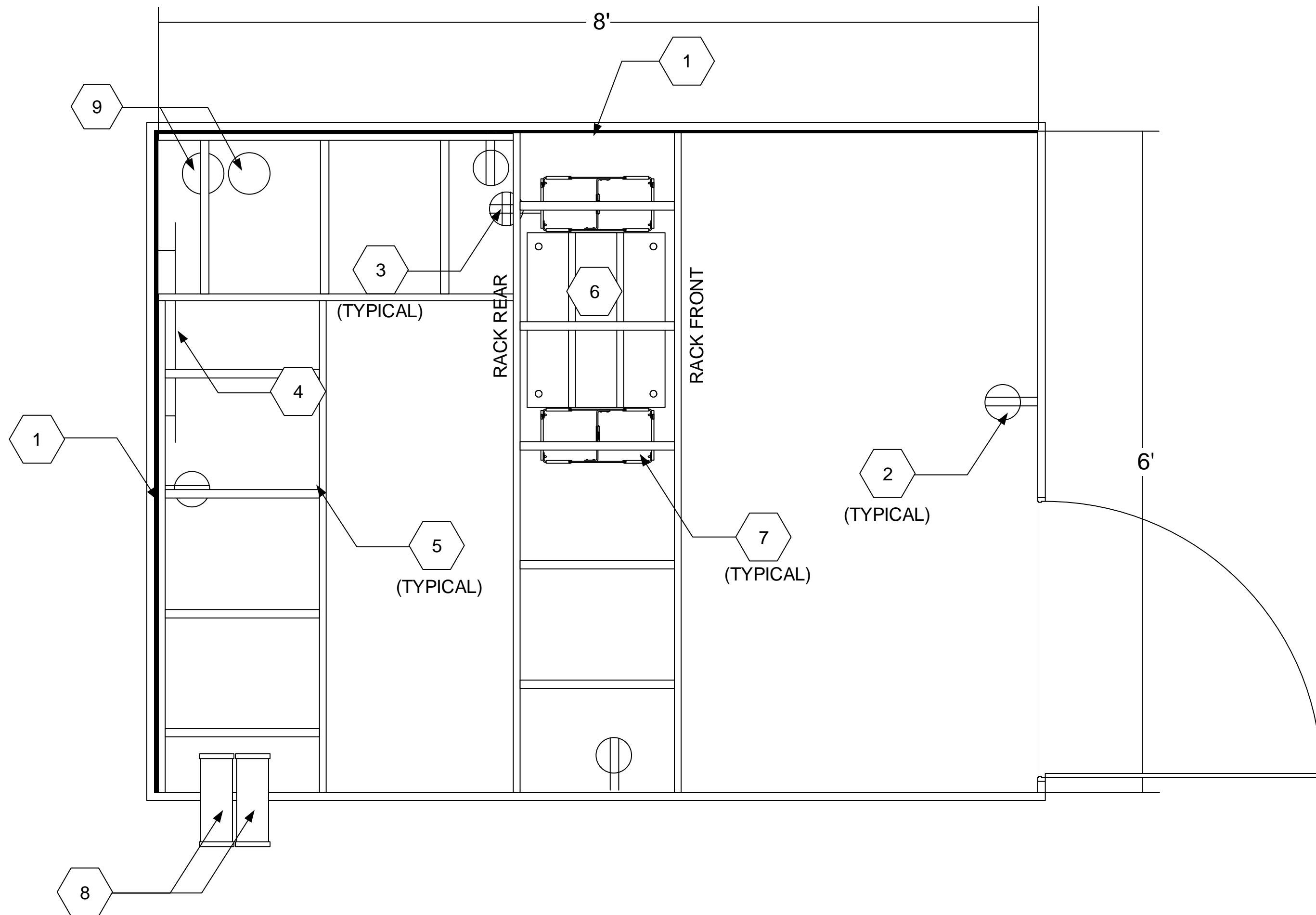
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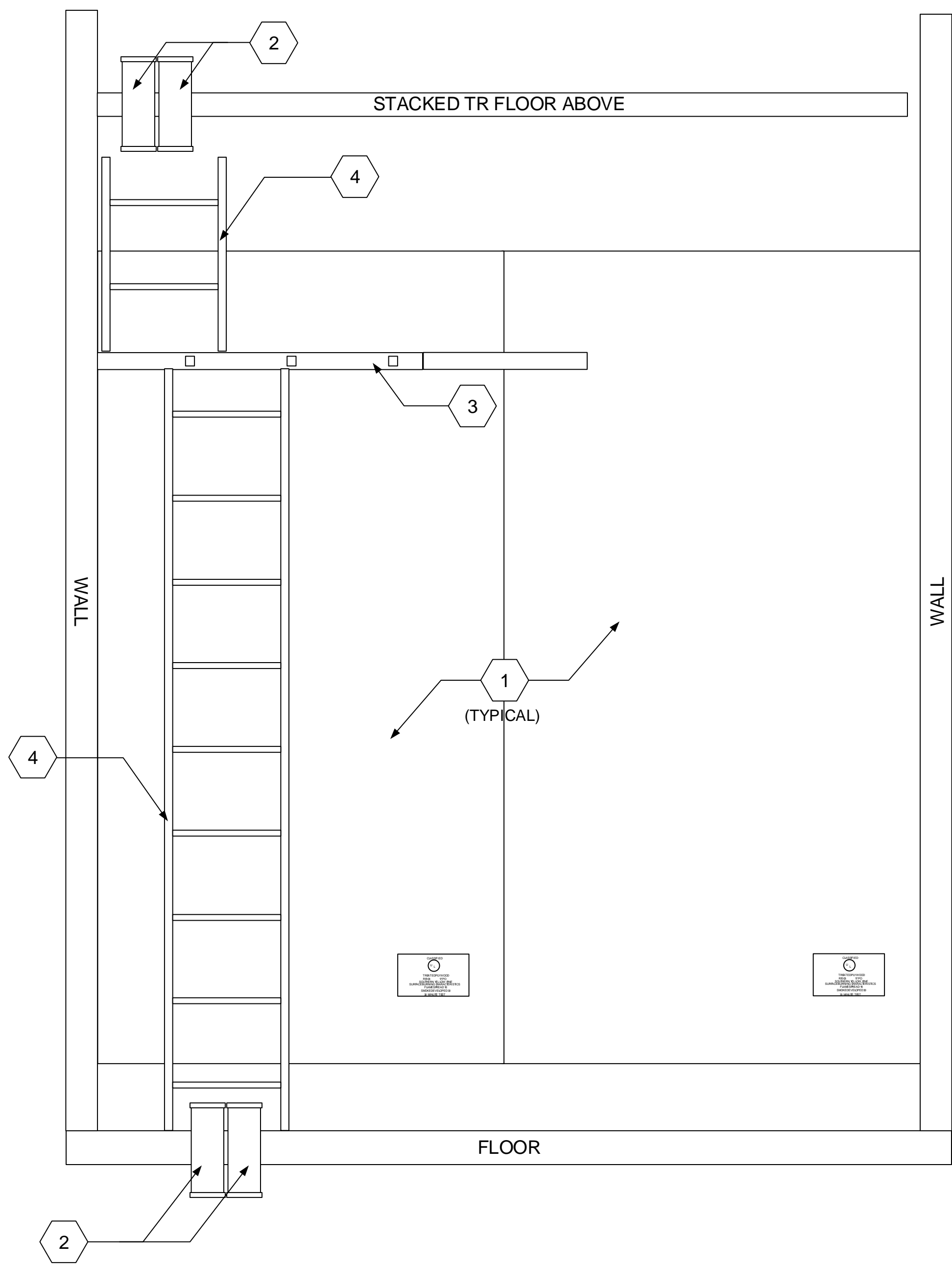
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DIAGRAM AND DETAILS

**B.18**



**TYPICAL SECOND FLOOR SMALL TR AERIAL DIAGRAM**





**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES
- 3 HORIZONTAL LADDER RACK
- 4 VERTICAL LADDER RACK

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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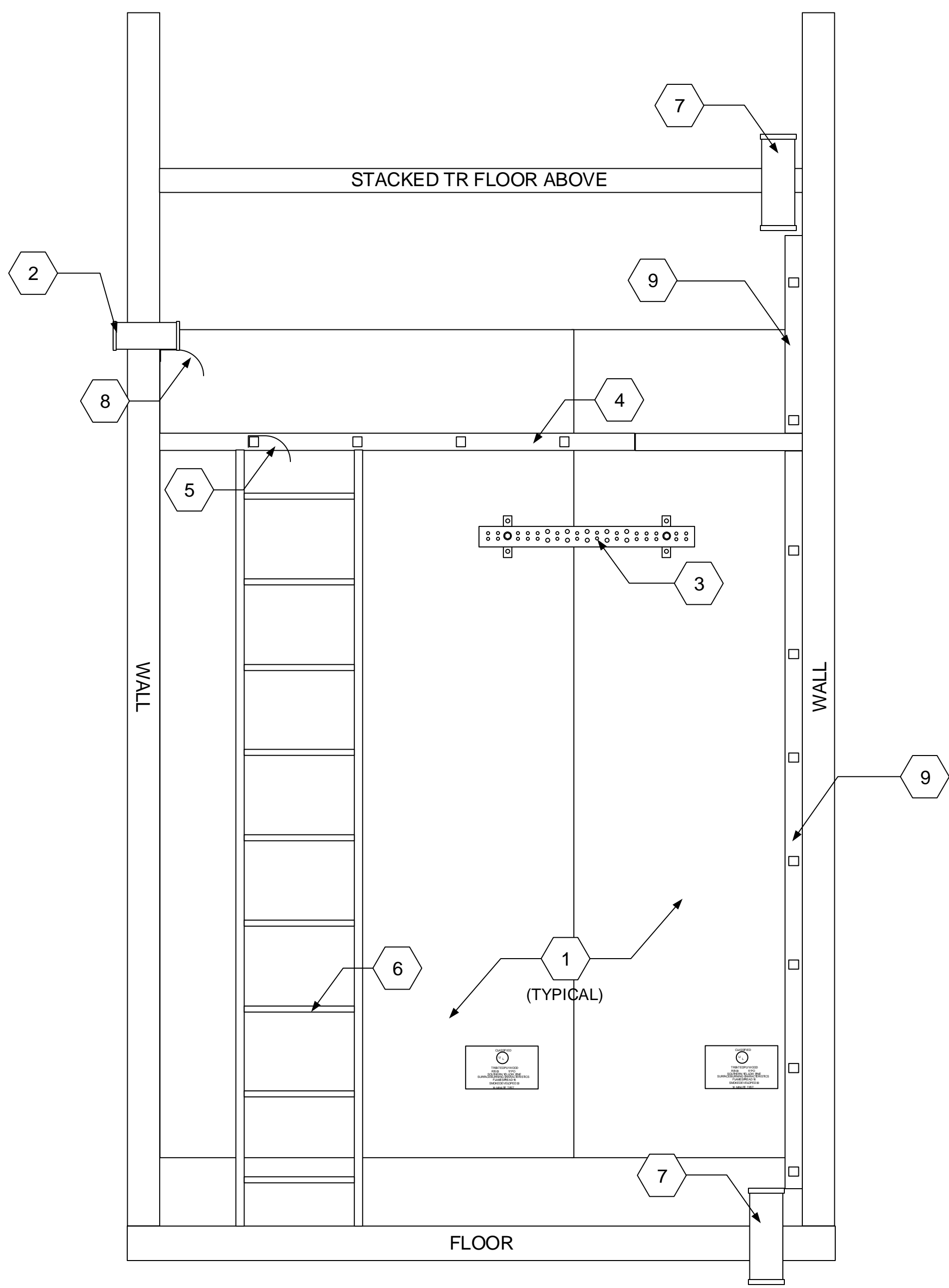
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DIAGRAM AND DETAILS

**B.19**

**TYPICAL SECOND FLOOR SMALL TR PLAN WALL NORTH ELEVATION DIAGRAM**



**SHEET KEY NOTES**

- 1 PLYWOOD BACKBOARD
- 2 STANDARD WALL SLEEVES OR SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING WALL SLEEVES (AS REQUIRED PER TECHNICAL CRITERIA)
- 3 TMGB/TGB
- 4 HORIZONTAL LADDER RACK
- 5 CABLE RADIUS DROP OUTS (WATERFALL SUPPORTS)
- 6 VERTICAL LADDER RACK
- 7 SELF-SEALING, RE-ENTERABLE, MECHANICAL FIRE-STOPPING FLOOR SLEEVES

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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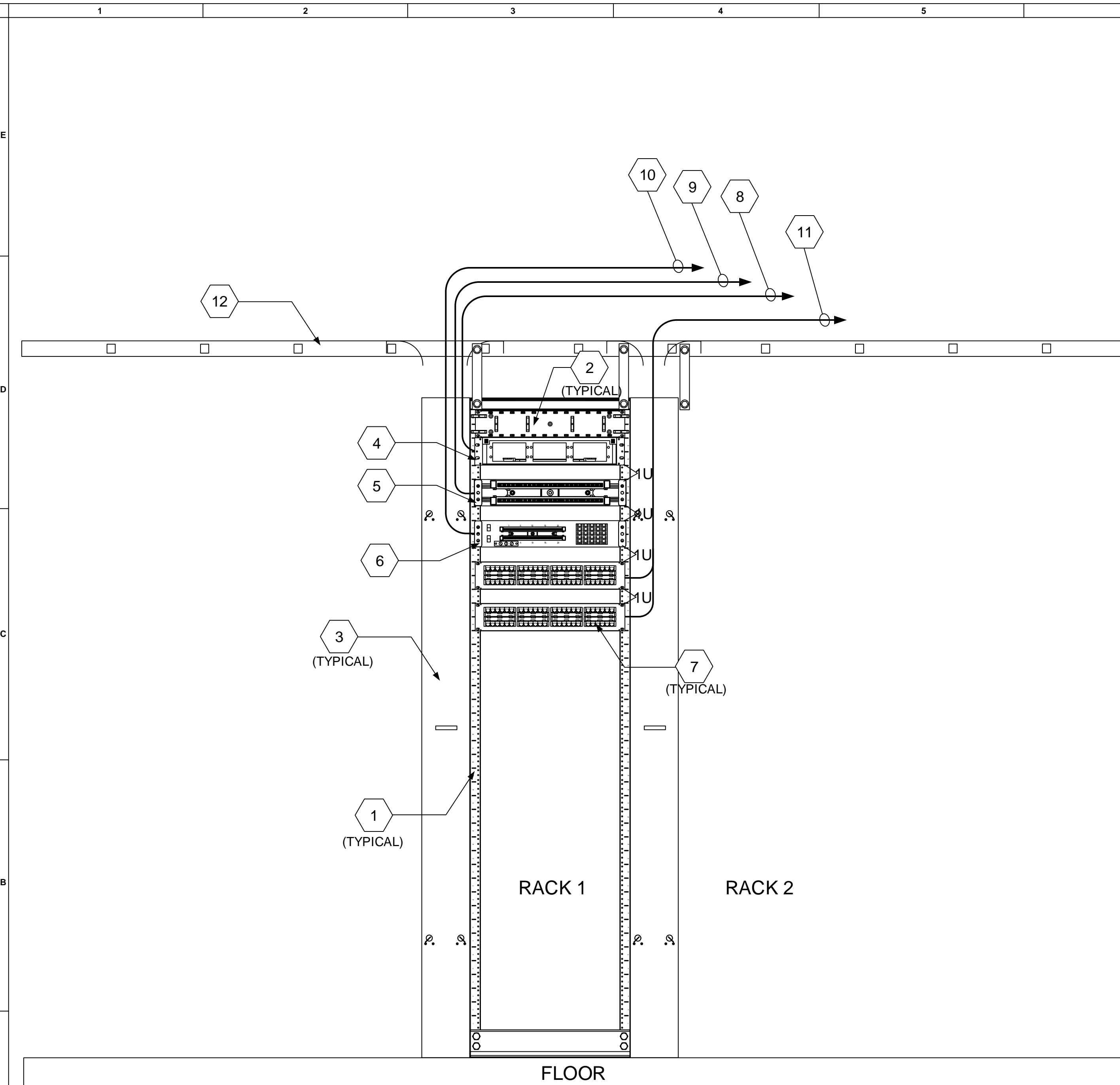
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TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

**B.20**

**TYPICAL SECOND FLOOR SMALL TR PLAN WALL WEST ELEVATION DIAGRAM**



- ### SHEET KEY NOTES
- 1 2 POST EQUIPMENT RACK
  - 2 2U HORIZONTAL WIRE MANAGER
  - 3 VERTICAL WIRE MANAGER
  - 4 2U FIBER PATCH PANEL
  - 5 110 BLOCK FOR COPPER BACKBONE CABLE TO TR XXX
  - 6 BET FOR COPPER BACKBONE CABLE TO BUILDING XXX TR XXX
  - 7 48 PORT PATCH PANEL
  - 8 OSP/ISP FOC TO OTHER TR(S)
  - 9 ISP COPPER BACKBONE CABLE TO TR XXX
  - 10 OSP COPPER BACKBONE CABLE TO BUILDING XXX TR XXX
  - 11 CATEGORY 6 HORIZONTAL CABLE
  - 12 HORIZONTAL LADDER RACK

### SHEET GENERAL NOTES

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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**B.21**

**TYPICAL SMALL TR RACK FRONT ELEVATION DIAGRAM**

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.

**SHEET KEY NOTES**

- 1 DOUBLE DUPLEX NEMA 5-20R RECEPTACLE
- 2 RACK MOUNTED BUS-BAR (RGB)
- 3 HORIZONTAL LADDER RACK



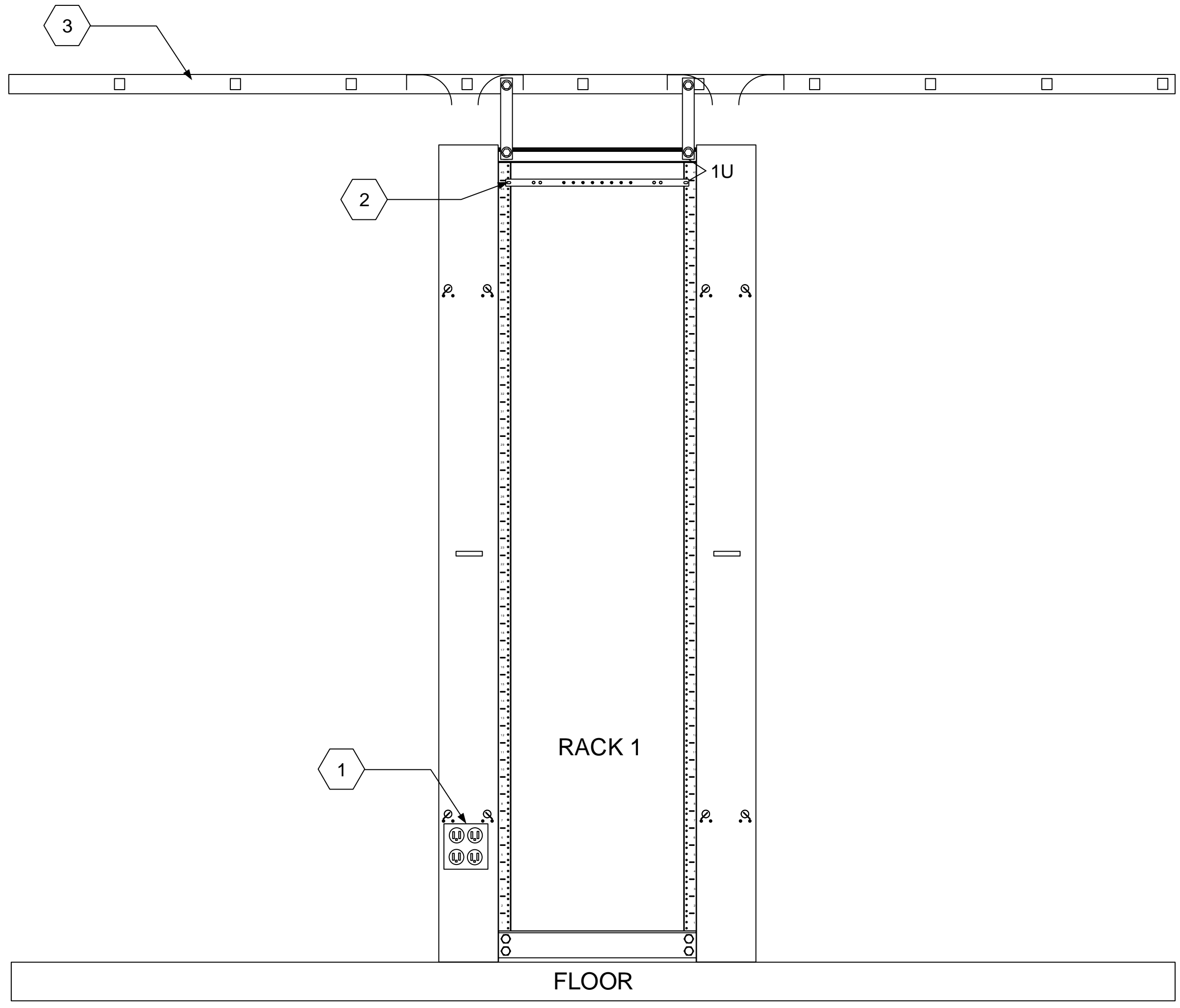
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**B.22**



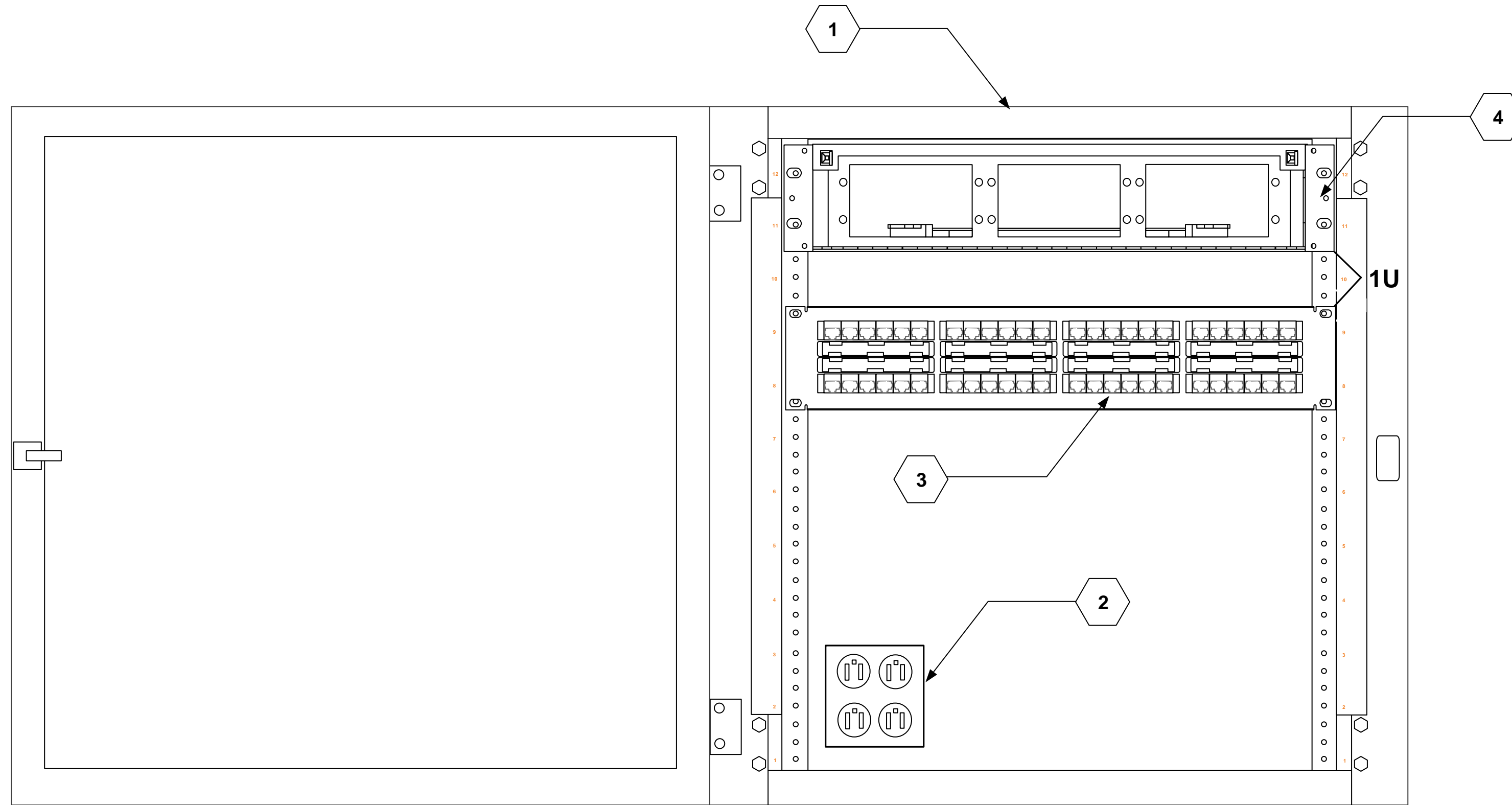
**TYPICAL SMALL TR RACK ELEVATION REAR VIEW DIAGRAM**

**SHEET KEY NOTES**

- 1 WALL MOUNTED TELECOMMUNICATIONS CABINET
- 2 DEDICATED DOUBLE DUPLEX NEMA 5-20R RECEPTACLE
- 3 CATEGORY 6 PATCH PANEL
- 4 2RU FIBER PATCH PANEL

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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**B.23**

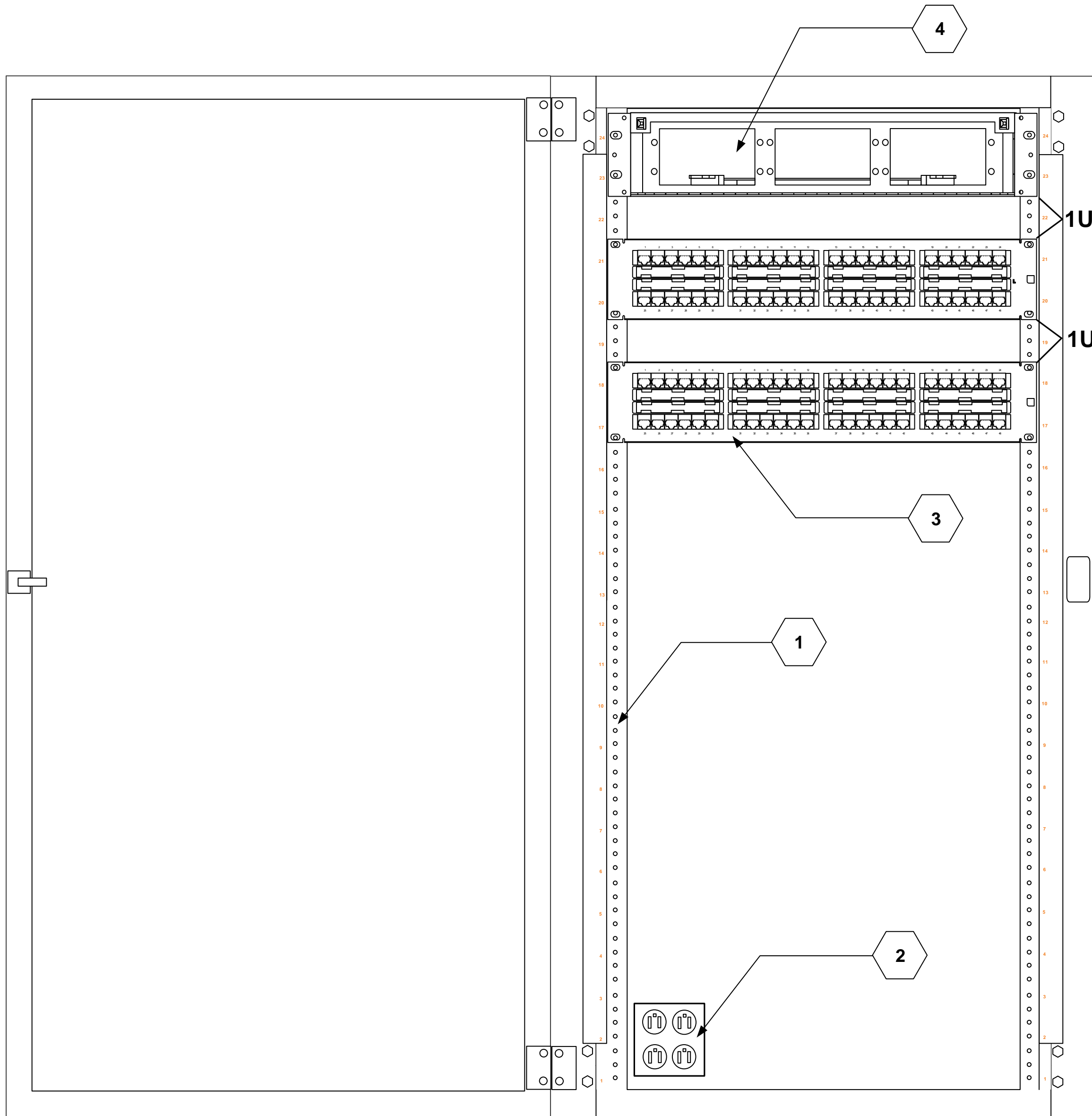
**TYPICAL WALL MOUNTED TELECOMMUNICATIONS CABINET DIAGRAM**

**SHEET KEY NOTES**

- 1 WALL MOUNTED TELECOMMUNICATIONS CABINET
- 2 DEDICATED DOUBLE DUPLEX NEMA 5-20R RECEPTACLE
- 3 CATEGORY 6 PATCH PANEL
- 4 2RU FIBER PATCH PANEL

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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**B.24**

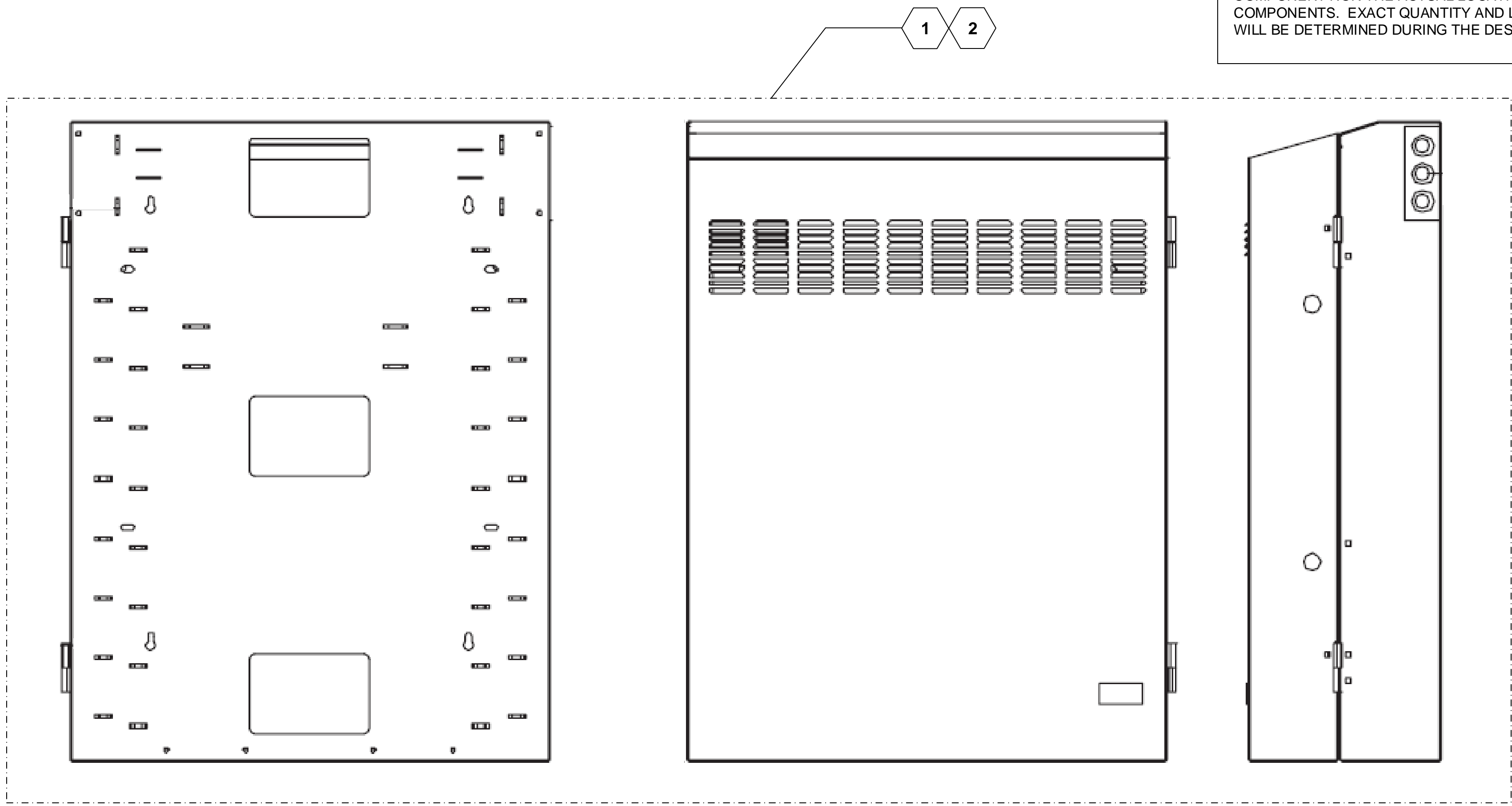
**TYPICAL WALL MOUNTED TELECOMMUNICATIONS CABINET DIAGRAM**

**SHEET KEY NOTES**

- 1 HUBBLE RE4XB OR APPROVED EQUIVALENT WALL MOUNTED TELECOMMUNICATIONS CABINET
- 2 INSTALL A STANDARD 1RU FIBER OPTIC CABLE PATCH PANEL ONTO THE EQUIPMENT MOUNTING BRACKETS WITHIN THE CABINET AS CLOSE TO THE BACK WALL OF THE CABINET AS POSSIBLE TO PROVIDE THE MAXIMUM AMOUNT OF ROOM FOR NETWORK EQUIPMENT

**SHEET GENERAL NOTES**

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**B.25**

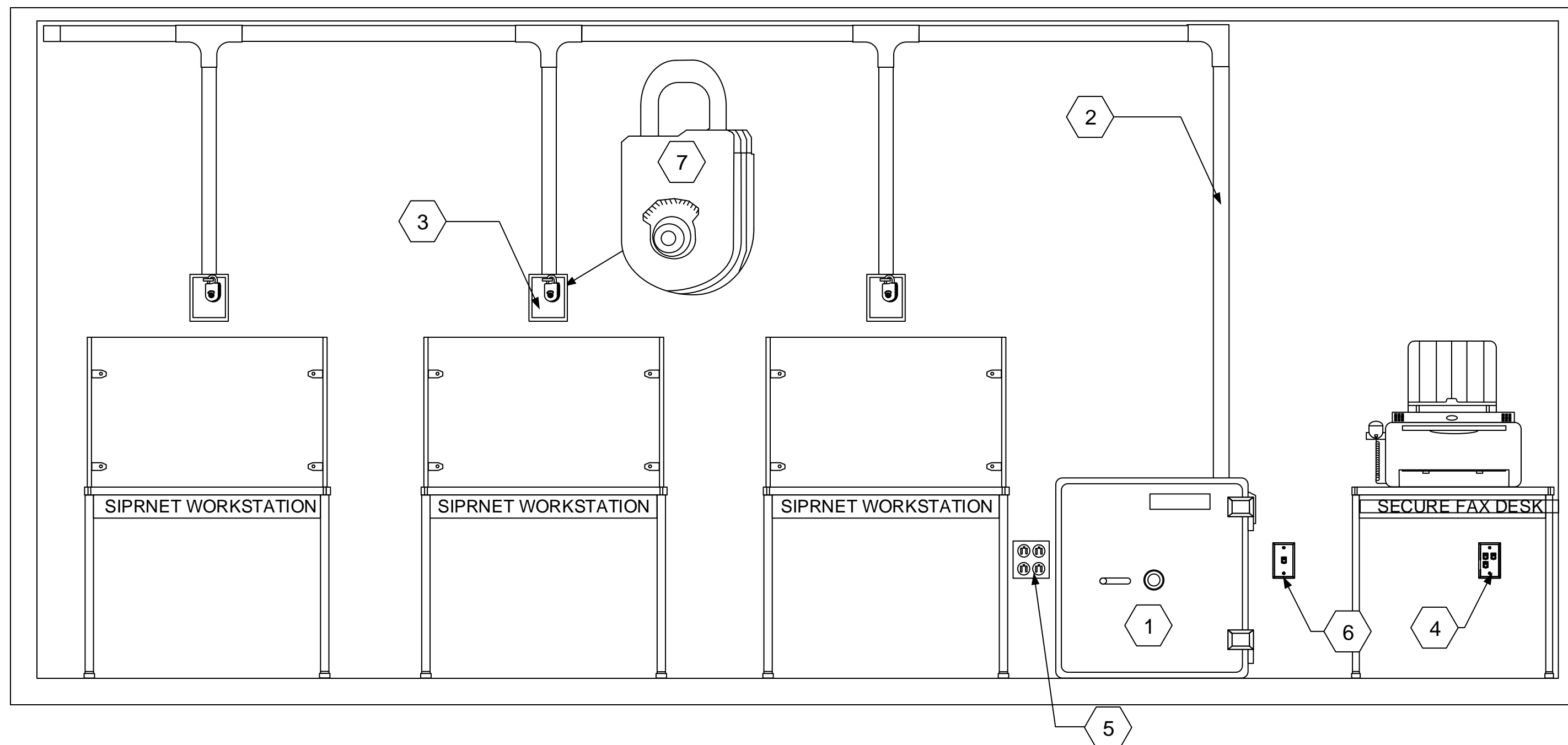
**TYPICAL HUBBLE RE4XB WALL MOUNTED TELECOMMUNICATIONS CABINET DIAGRAM**

### SHEET KEY NOTES

- 1 IPS CONTAINER
- 2 HARDENED CARRIER PDS
- 3 UDB (USER DROP BOX)
- 4 TELECOMMUNICATIONS OUTLET (3 JACKS)
- 5 DEDICATED 20 AMP DOUBLE DUPLEX NEMA 5-20R RECEPTACLE. MOUNT AT STANDARD RECEPTACLE HEIGHT IMMEDIATELY ADJACENT TO THE IPS CONTAINER
- 6 STANDARD TELECOMMUNICATIONS OUTLET. INSTALL IMMEDIATELY ADJACENT TO THE SIPRNET IPS CONTAINER AT STANDARD OUTLET HEIGHT
- 7 GOVERNMENT APPROVED COMBINATION PAD LOCK

### SHEET GENERAL NOTES

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



TYPICAL DEDICATED SIPRNET ROOM WALL ELEVATION DIAGRAM



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**SHEET GENERAL NOTES**

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**SHEET KEY NOTES**

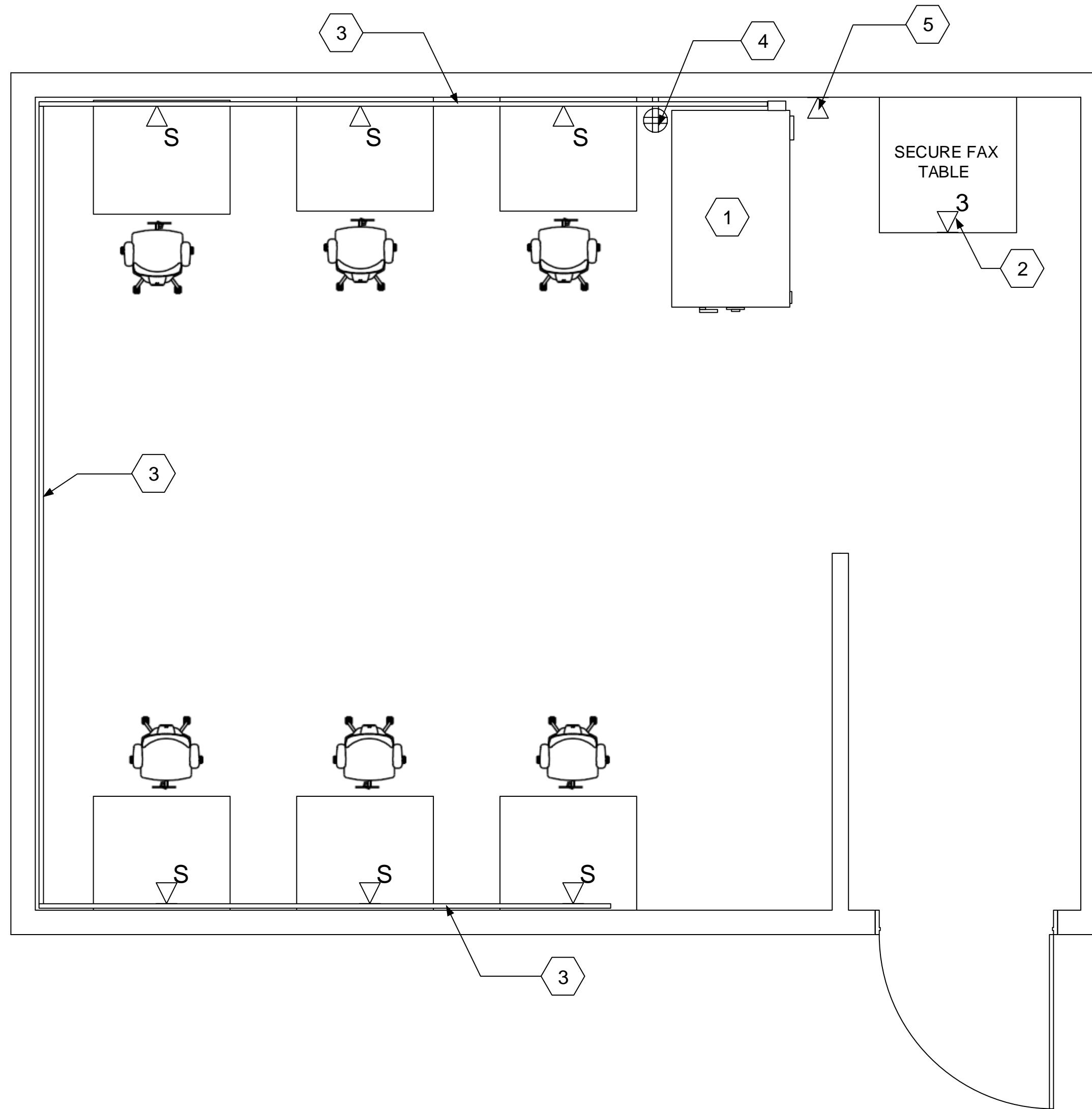
1 IPS CONTAINER

2 TELECOMMUNICATIONS OUTLET (3 JACKS)

3 HARDENED CARRIER PDS

4 DEDICATED 20 AMP DOUBLE DUPLEX NEMA 5-20R RECEPTACLE. MOUNT AT STANDARD RECEPTACLE HEIGHT IMMEDIATELY ADJACENT TO THE IPS CONTAINER

5 STANDARD TELECOMMUNICATIONS OUTLET. INSTALL IMMEDIATELY ADJACENT TO THE SIPRNET IPS CONTAINER AT STANDARD OUTLET HEIGHT



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**B.27**

**TYPICAL DEDICATED SIPRNET ROOM AERIAL DIAGRAM**

**SHEET GENERAL NOTES**

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**SHEET KEY NOTES**

- 1 IPS CONTAINER
- 2 DEDICATED 20 AMP DOUBLE DUPLEX NEMA 5-20R RECEPTACLE. MOUNT AT STANDARD RECEPTACLE HEIGHT IMMEDIATELY ADJACENT TO THE IPS CONTAINER
- 3 STANDARD TELECOMMUNICATIONS OUTLET. INSTALL IMMEDIATELY ADJACENT TO THE SIPRNET IPS CONTAINER AT STANDARD OUTLET HEIGHT
- 4 STANDARD TELECOMMUNICATIONS OUTLET
- 5 TELECOMMUNICATIONS FLOOR BOX (2 JACKS)



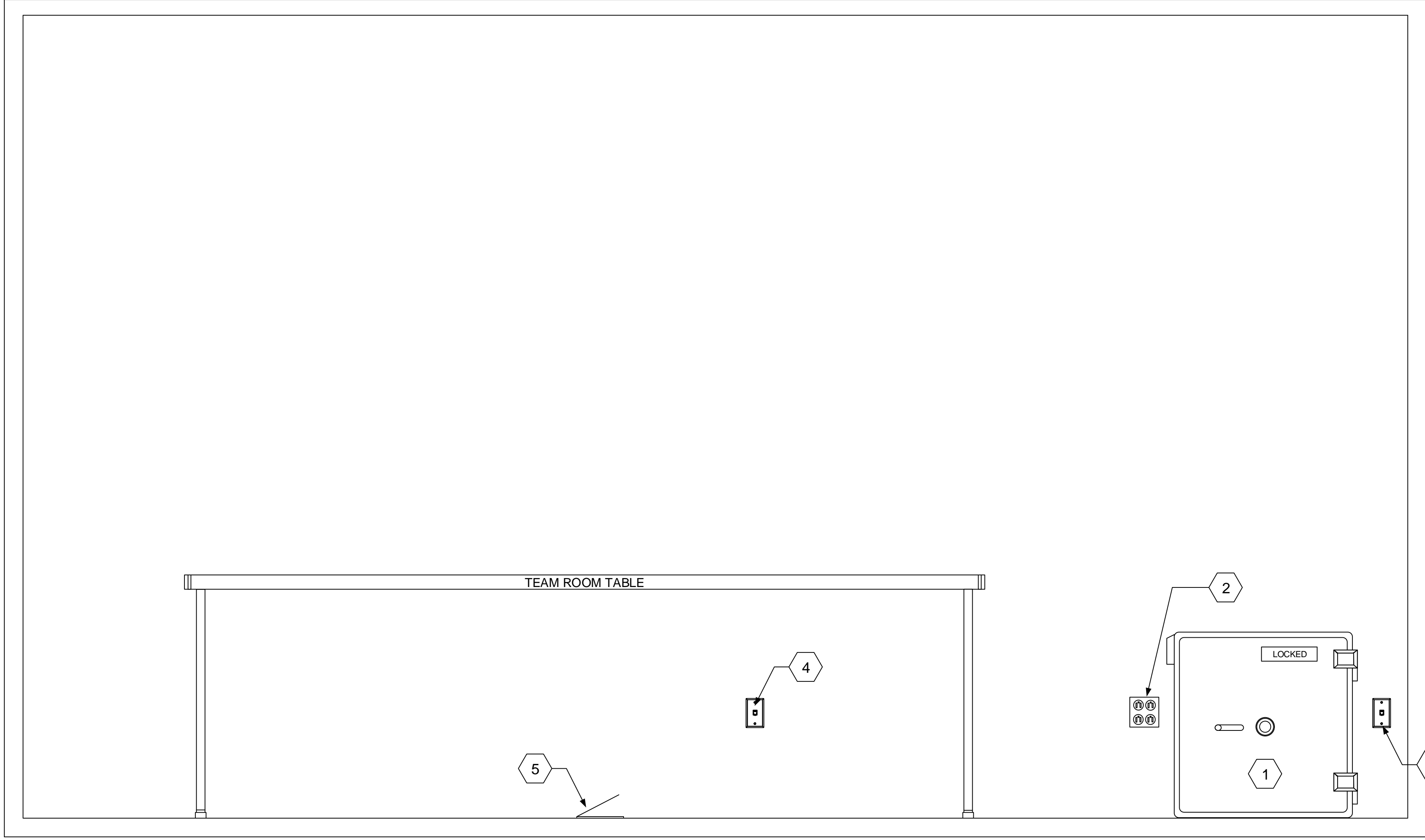
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**B.28**



**TYPICAL STANDARD SIPRNET WALL ELEVATION DIAGRAM**

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.

**SHEET KEY NOTES**

- 1 IPS CONTAINER
- 2 DEDICATED 20 AMP DOUBLE DUPLEX NEMA 5-20R RECEPTACLE. MOUNT AT STANDARD RECEPTACLE HEIGHT IMMEDIATELY ADJACENT TO THE IPS CONTAINER
- 3 STANDARD TELECOMMUNICATIONS OUTLET. INSTALL IMMEDIATELY ADJACENT TO THE SIPRNET IPS CONTAINER AT STANDARD OUTLET HEIGHT
- 4 STANDARD TELECOMMUNICATIONS OUTLET
- 5 TELECOMMUNICATIONS FLOOR BOX (2 JACKS)



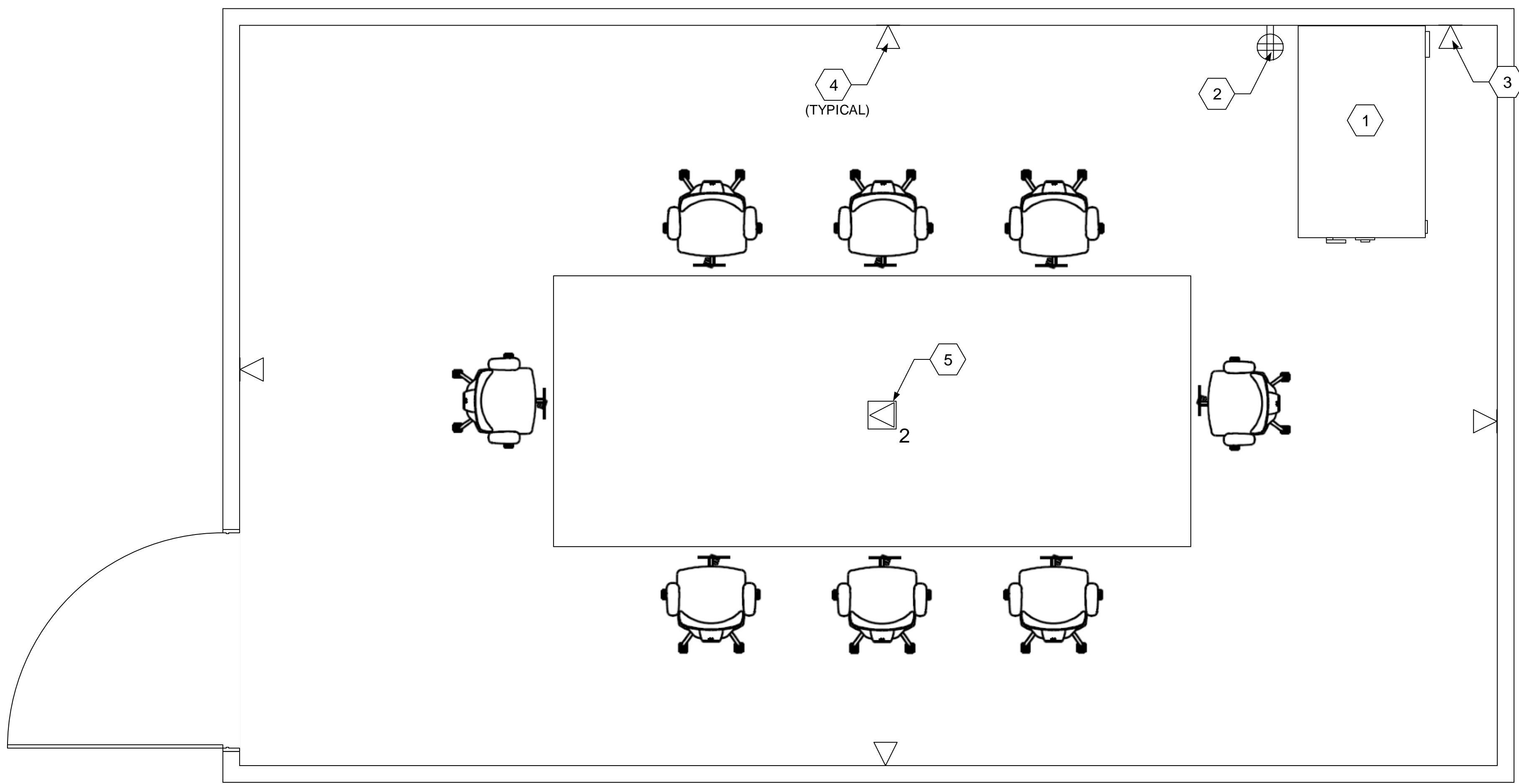
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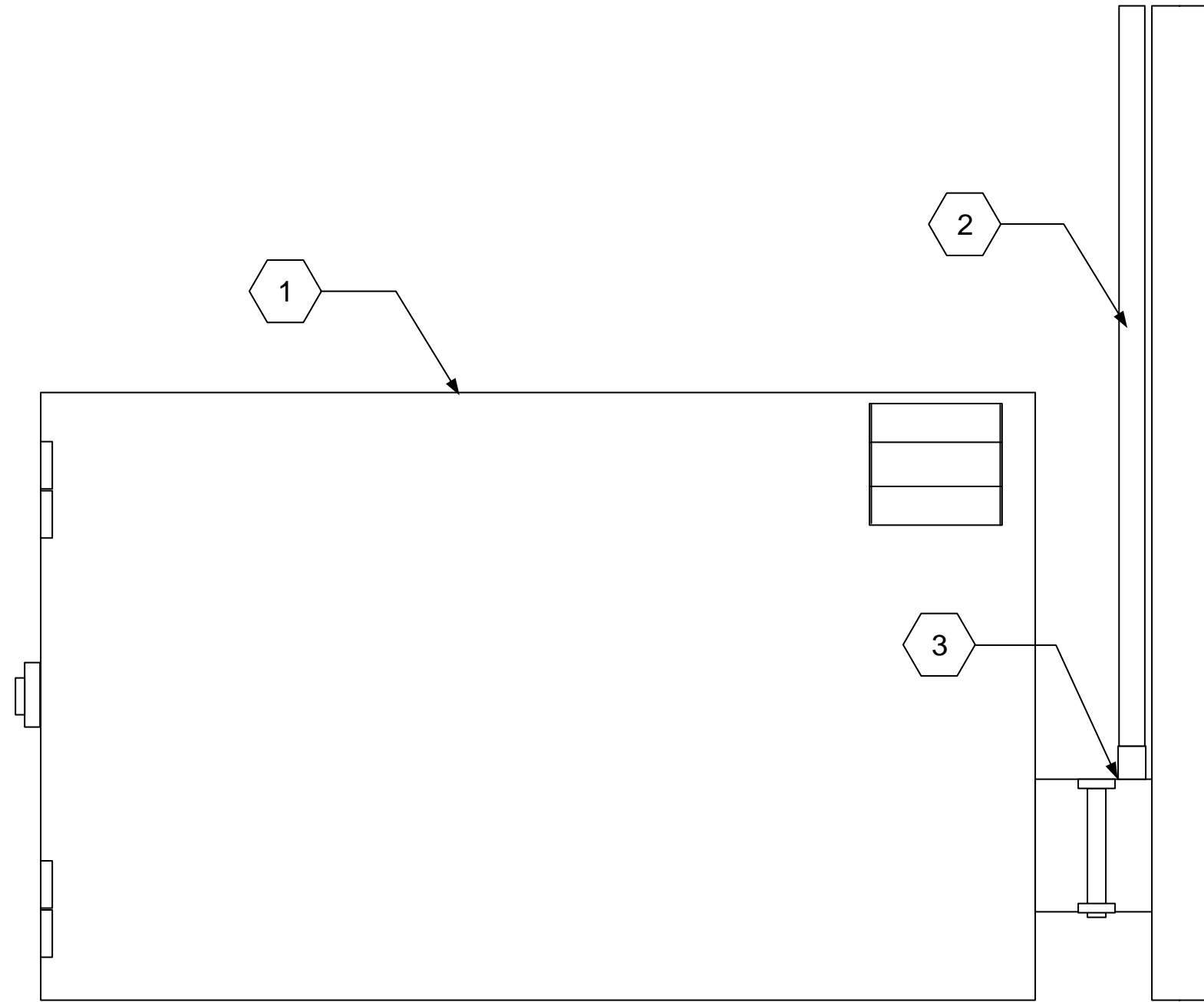
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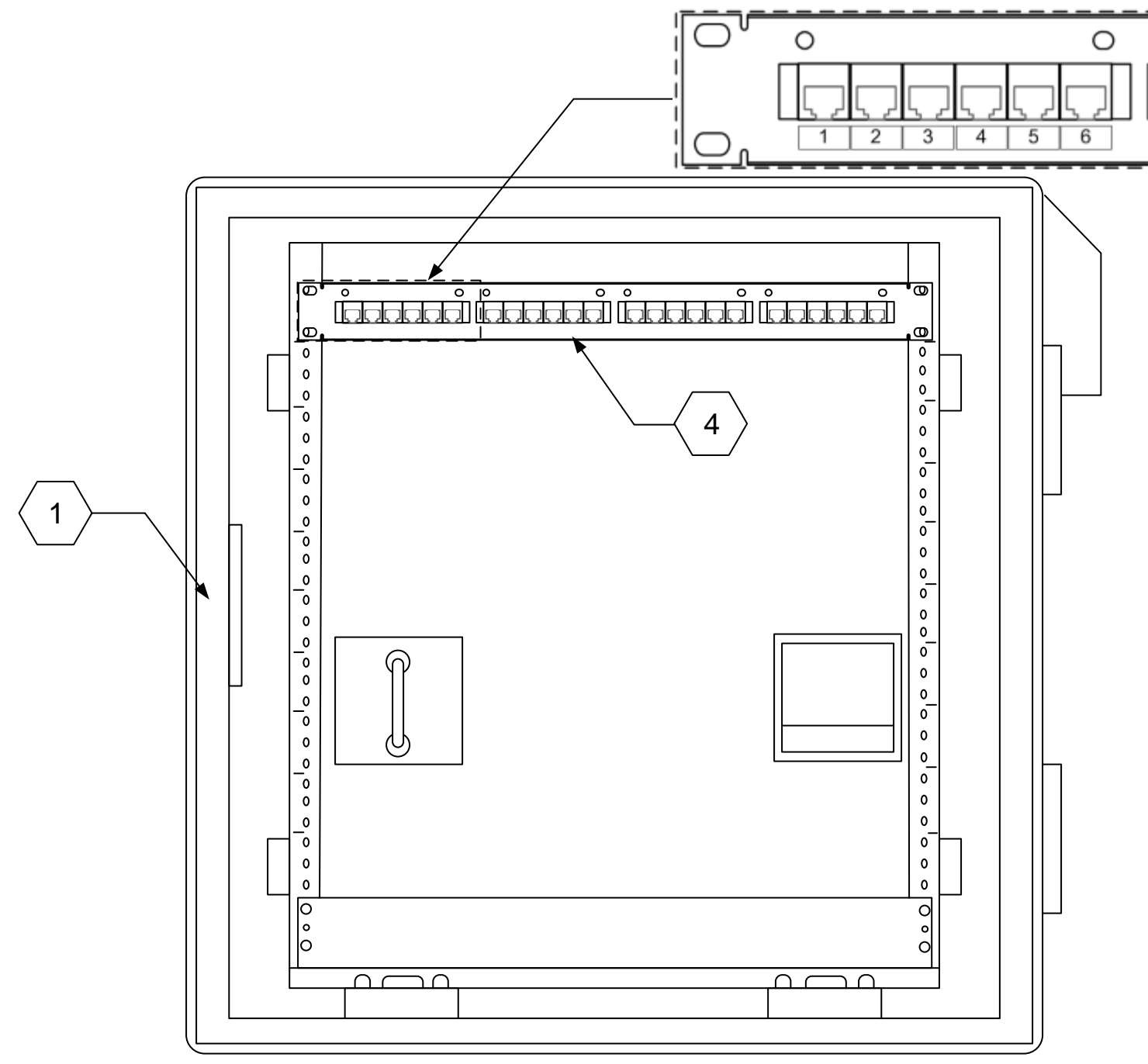
**B.29**



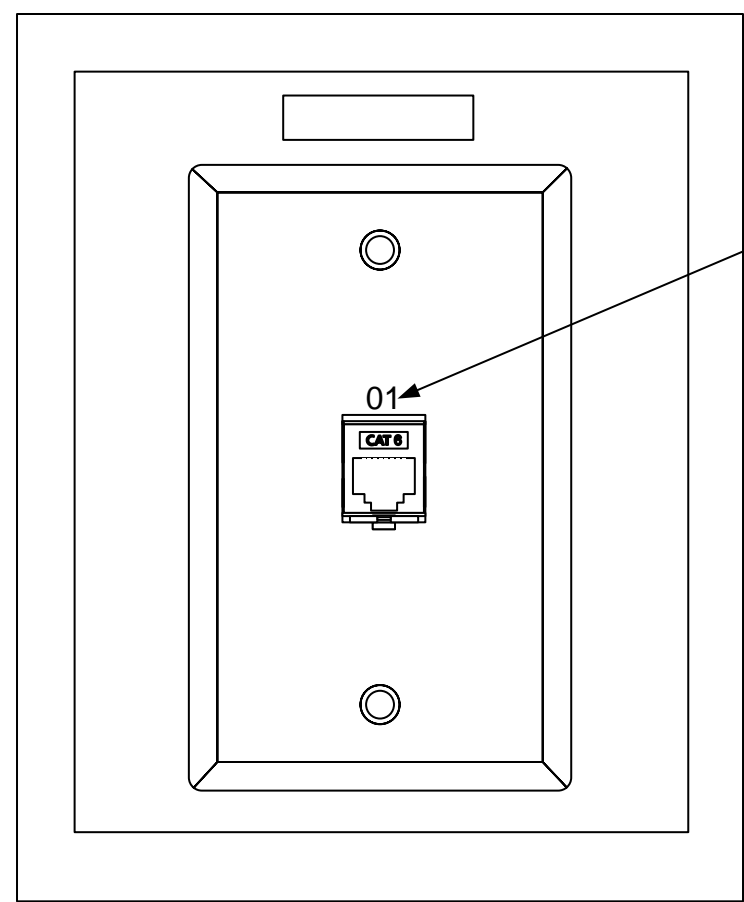
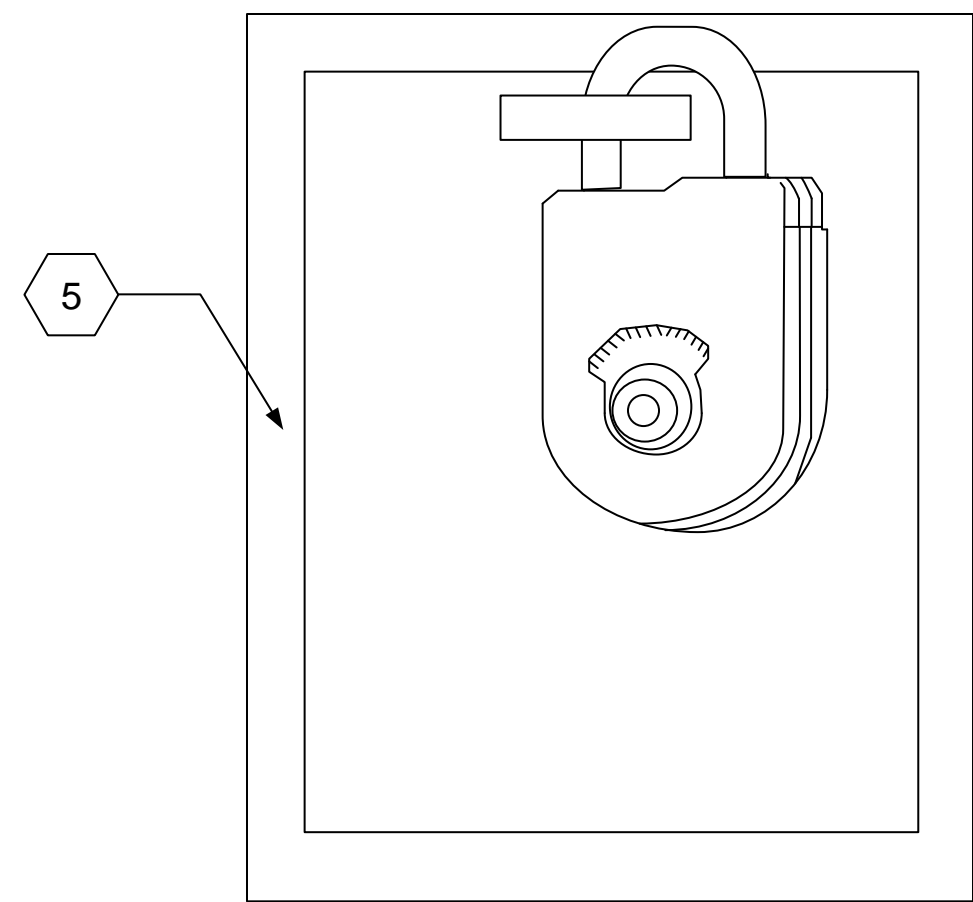
**TYPICAL STANDARD SIPRNET ROOM AERIAL DIAGRAM**



1 IPS CONTAINER SIDE DIAGRAM



2 IPS CONTAINER FRONT DIAGRAM



3 SIPR WORKSTATION UDB (CLOSED/OPEN)

**SHEET KEY NOTES**

- 1 IPS CONTAINER
- 2 HARDENED CARRIER PDS
- 3 HARDENED CARRIER PDS CONNECTION
- 4 CATEGORY 6 PATCH PANEL
- 5 UDB (USER DROP BOX)

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.

**TYPICAL DEDICATED SIPRNET ENLARGED COMPONENTS DIAGRAMS**



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DIAGRAM AND DETAILS

**B.30**

**SHEET KEY NOTES**

- 1 IPS CONTAINER
- 2 HARDENED CARRIER PDS
- 3 UDB (USER DROP BOX)
- 4 GOVERNMENT APPROVED COMBINATION PAD LOCK

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



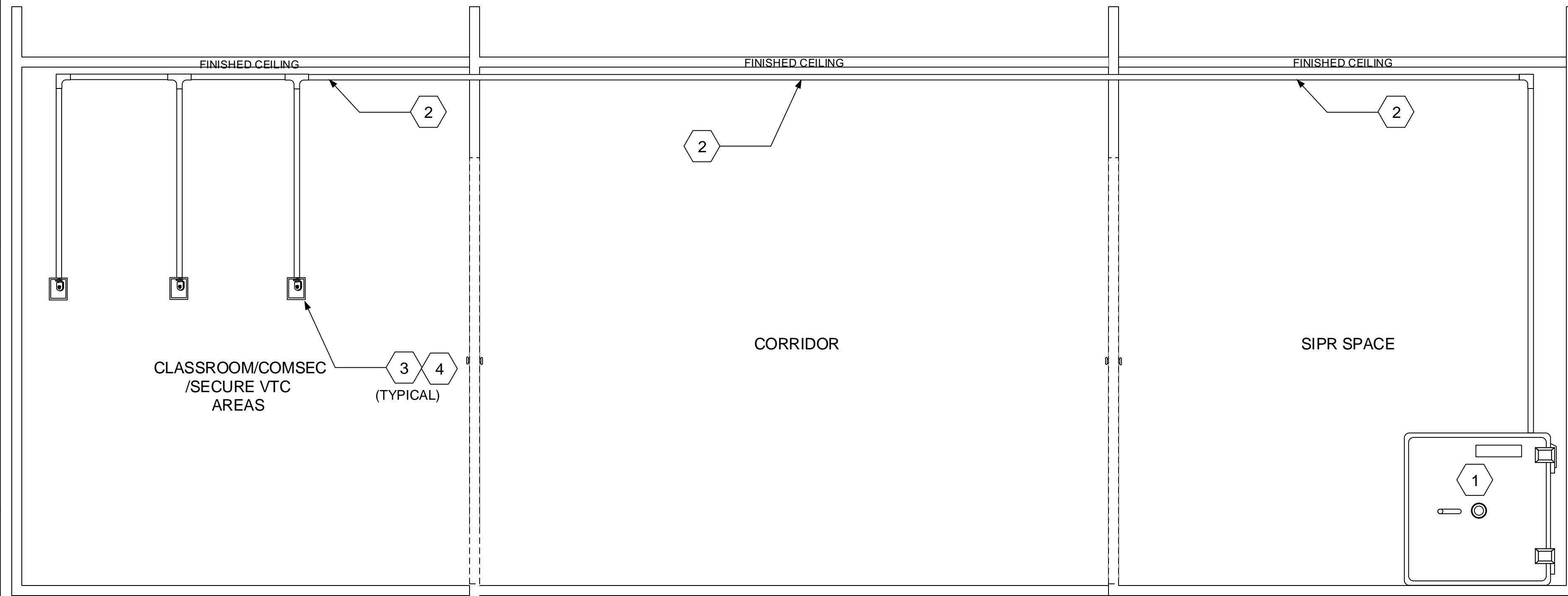
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DIAGRAM AND DETAILS

**B.31**



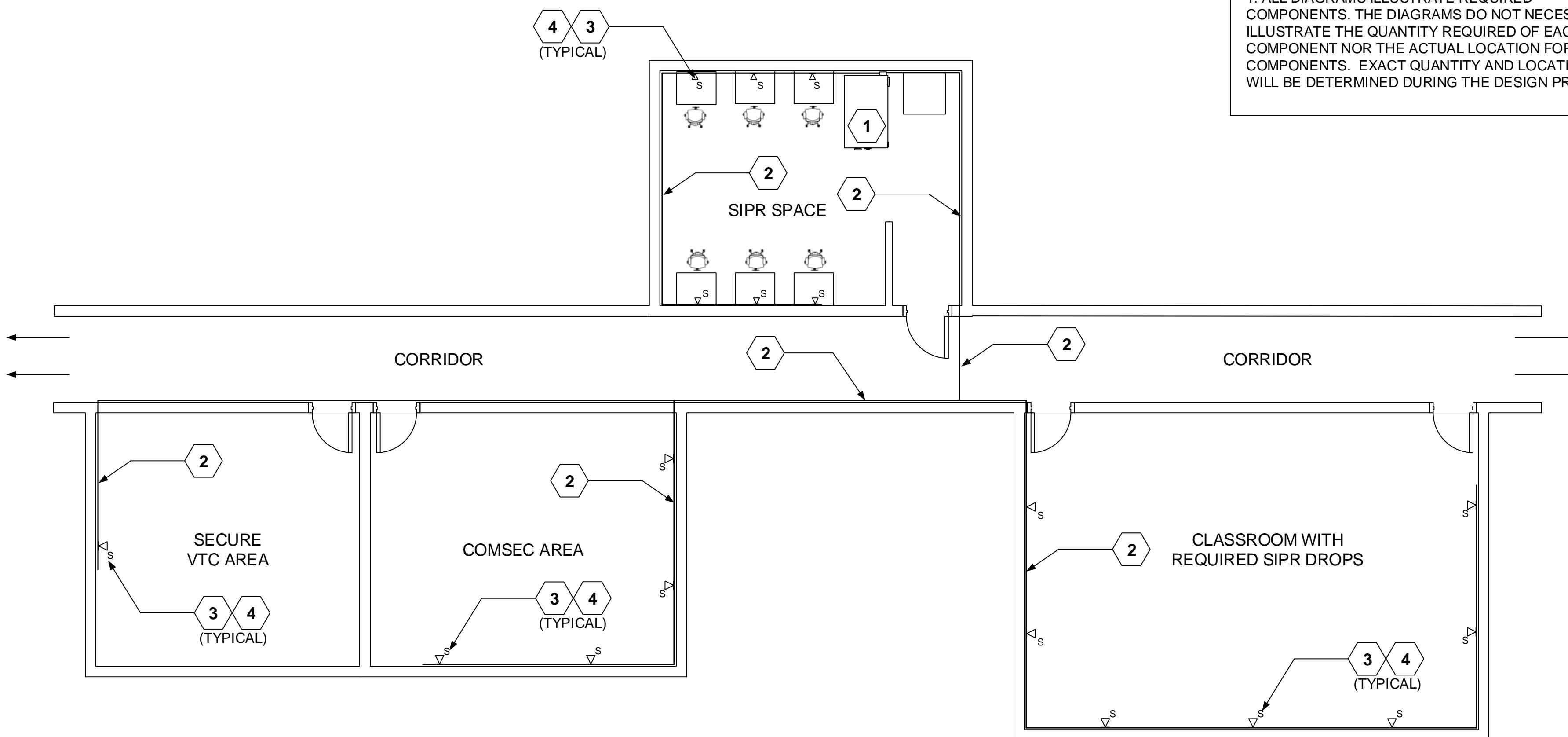
**TYPICAL ADDITIONAL DEDICATED SIPRNET DROPS ELEVATION DIAGRAM**

**SHEET KEY NOTES**

- ① IPS CONTAINER
- ② HARDENED CARRIER
- ③ UDB (USER DROP BOX)
- ④ GOVERNMENT APPROVED COMBINATION PAD LOCK

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



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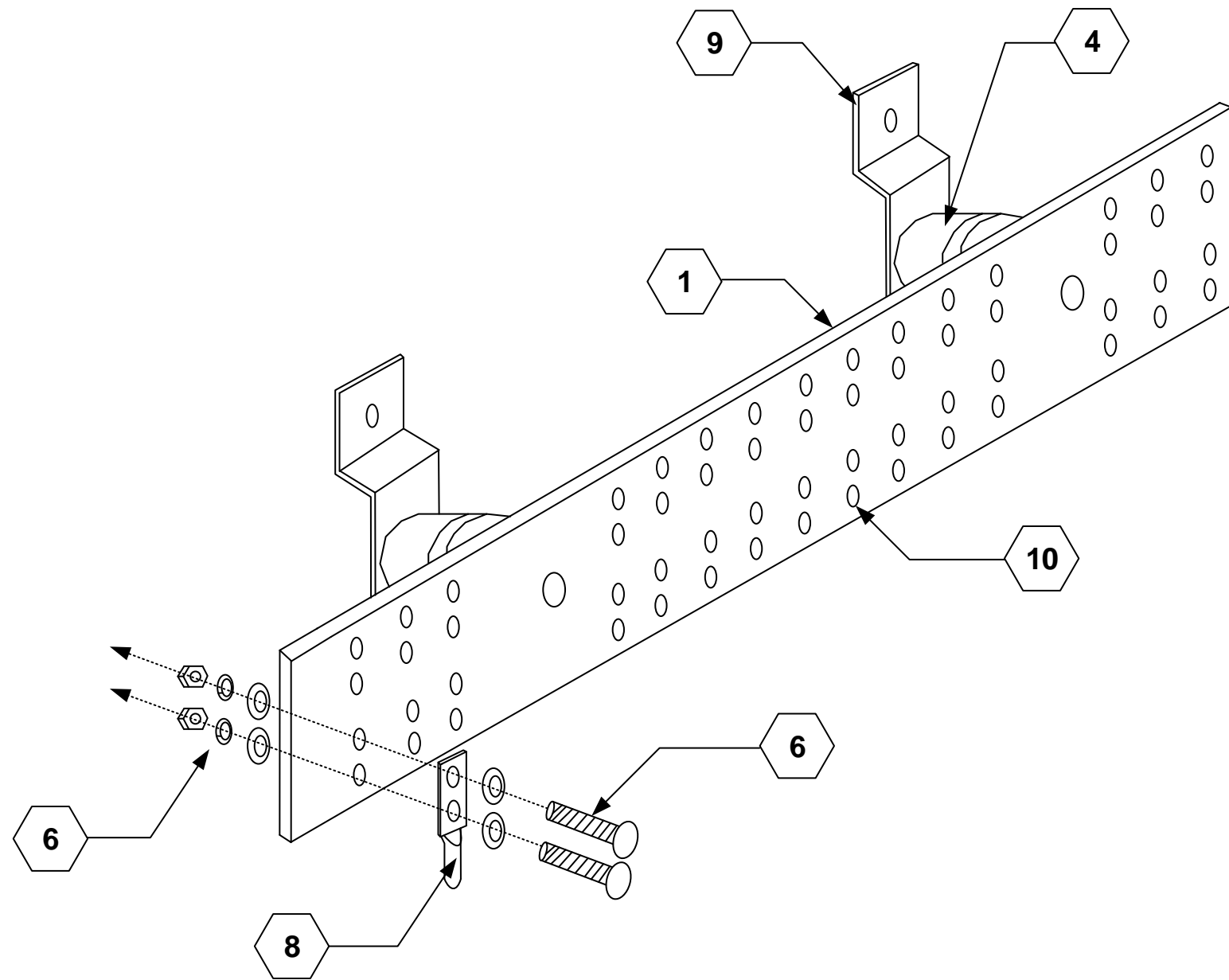
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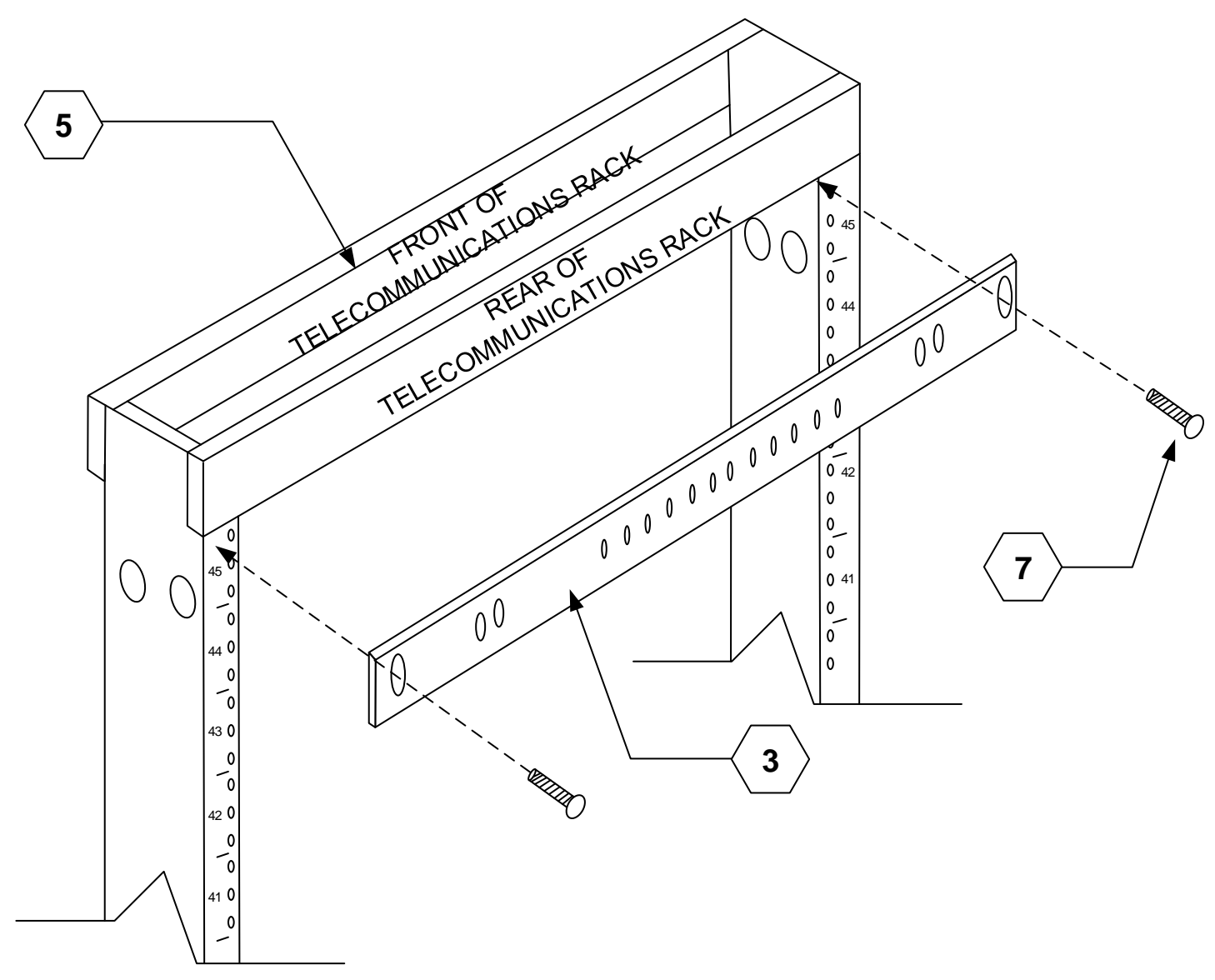
**B.32**

**TYPICAL ADDITIONAL DEDICATED SIPRNET DROPS AERIAL DIAGRAM**

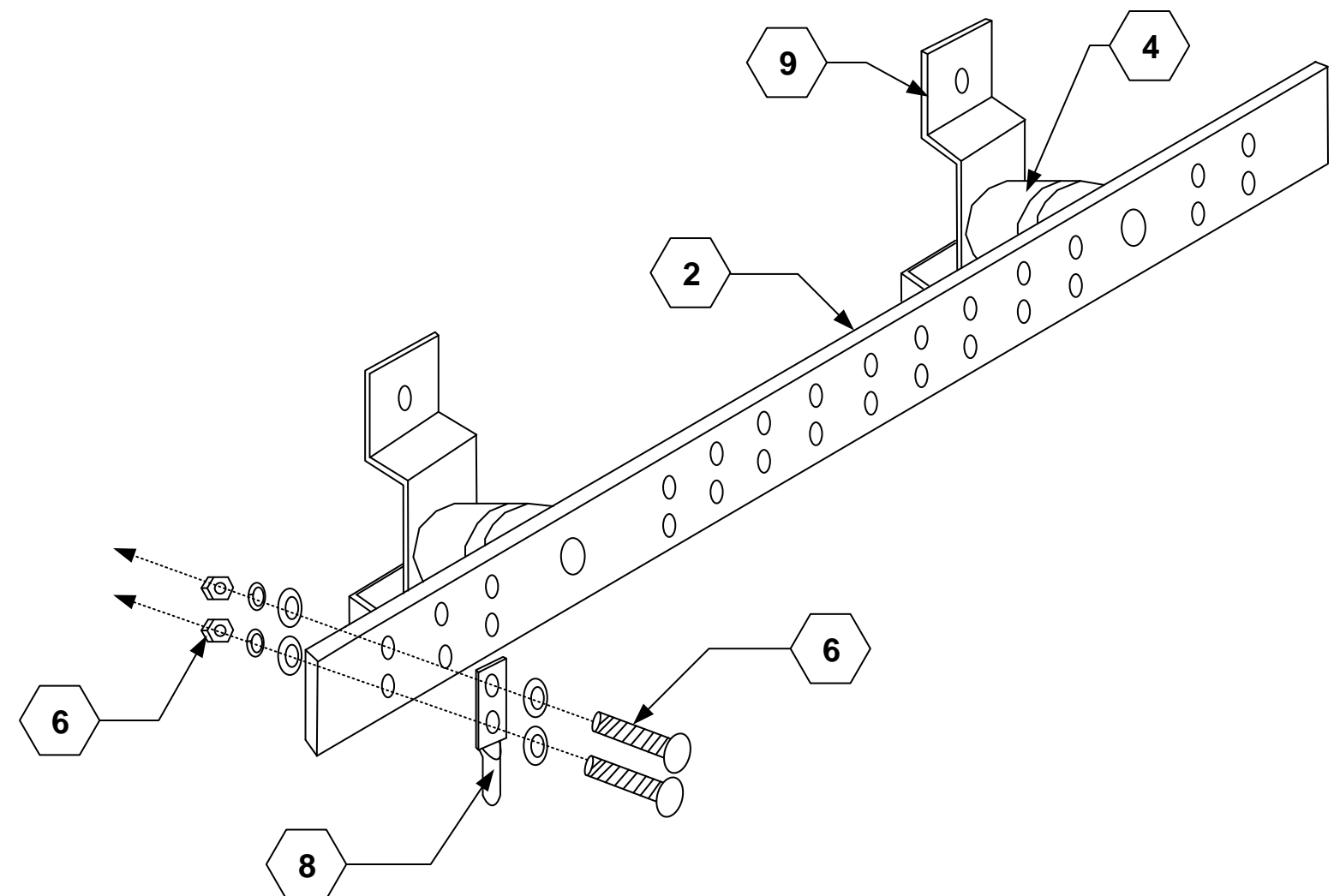


1 TMGB ENLARGED DETAIL

- SHEET KEY NOTES**
- 1 TMGB
  - 2 TGB
  - 3 RGB
  - 4 INSULATOR
  - 5 TELECOMMUNICATIONS RACK
  - 6 STANDARD HARDWARE
  - 7 STANDARD RACK HARDWARE
  - 8 GROUNDING CONNECTOR WITH INSPECTION WINDOW
  - 9 MOUNTING BRACKET



2 RACK MOUNTED BUS-BAR ENLARGED DETAIL



3 TGB ENLARGED DETAIL

**TYPICAL TELECOMMUNICATION GROUNDING BUS-BAR ENLARGED DIAGRAMS**



SYMBOL	REVISIONS	DATE	APPR.
	DESCRIPTION		

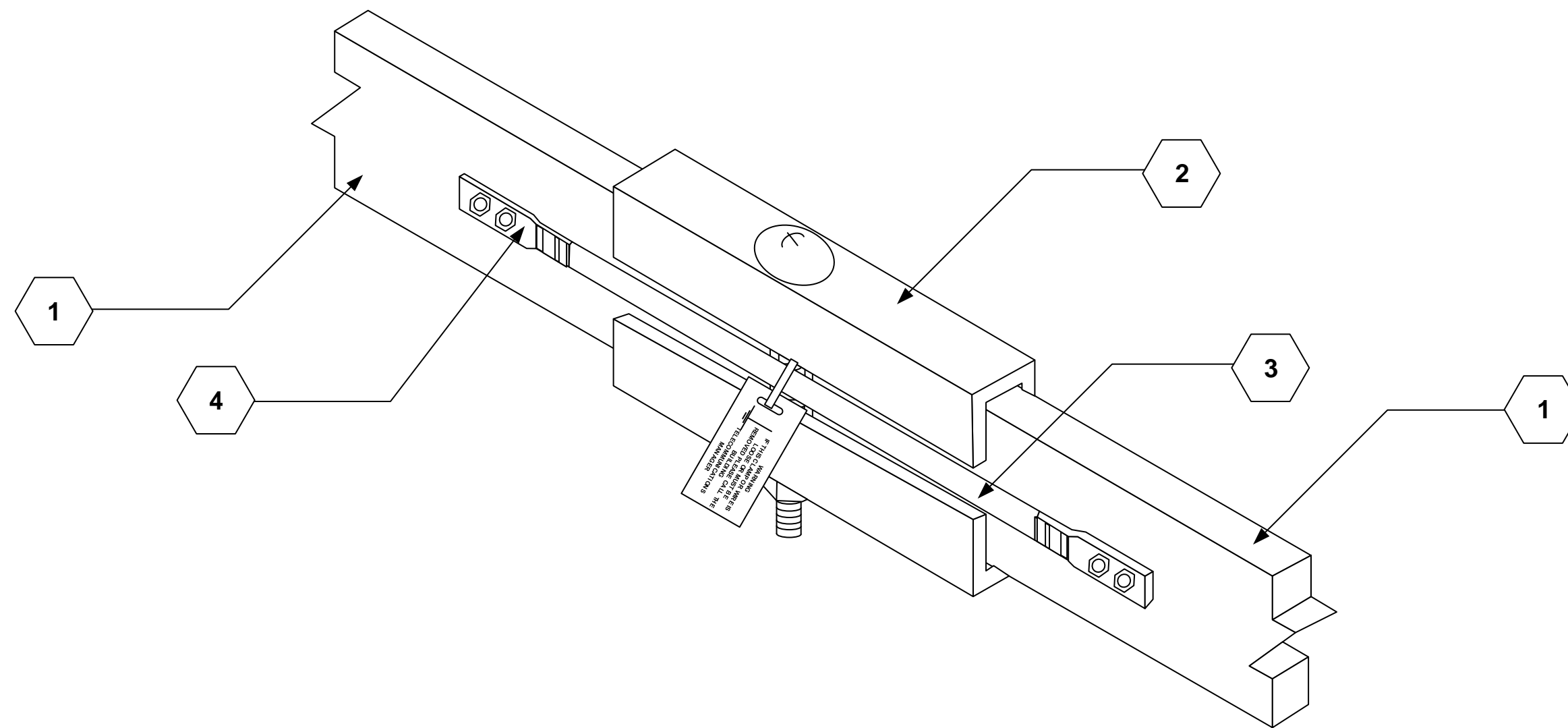
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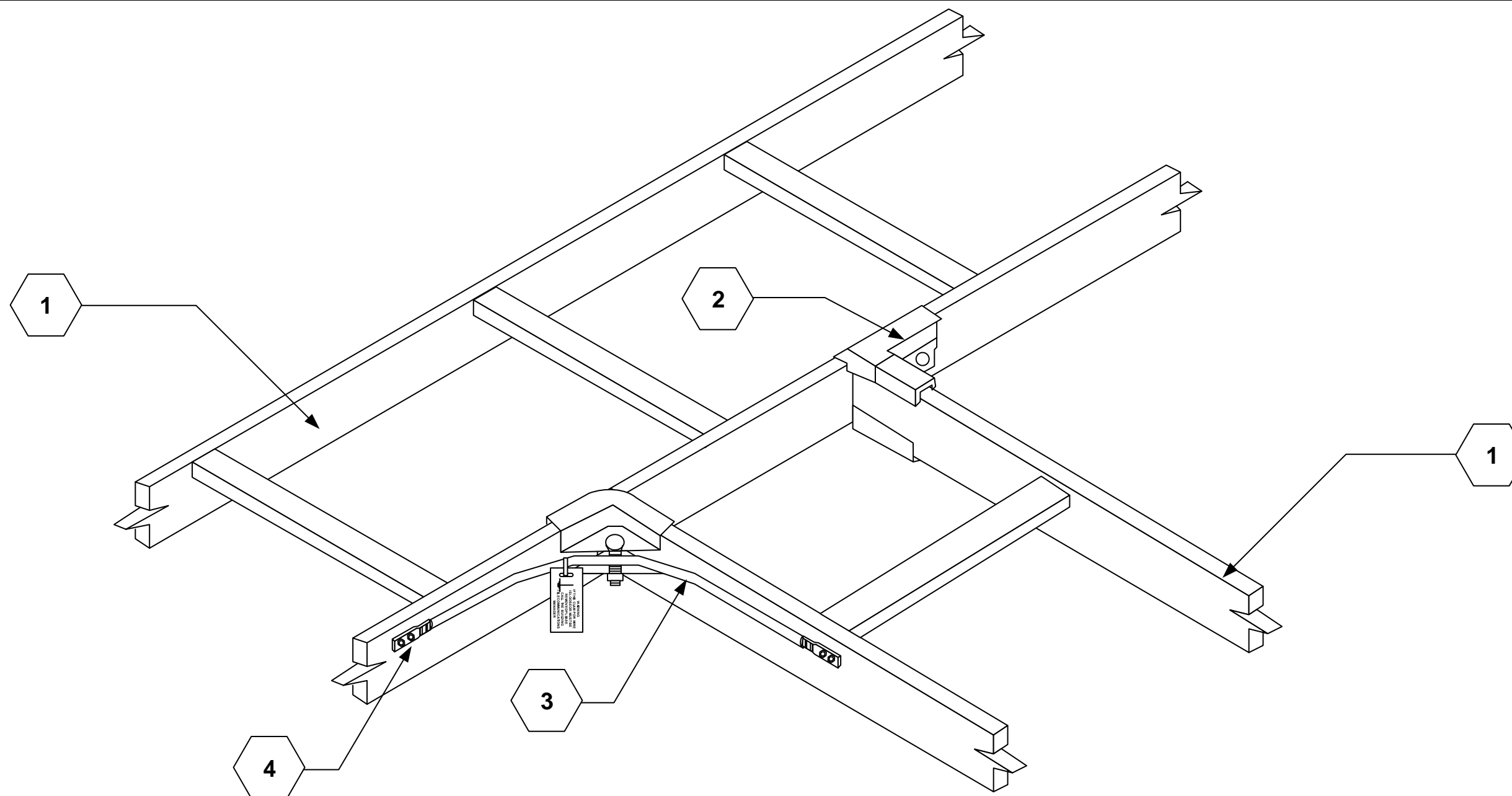
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**B.33**



1 LADDER RACK GROUNDING STRAP ENLARGED DETAIL



2 LADDER RACK GROUNDING STRAP ENLARGED DETAIL

○ TYPICAL LADDER RACK GROUNDING DIAGRAMS

⬡ SHEET KEY NOTES

- ⬡ 1 LADDER RACK SUPPORT SYSTEM SECTION
- ⬡ 2 LADDER RACK SUPPORT SYSTEM SECTION CONNECTOR
- ⬡ 3 GROUNDING CONDUCTOR
- ⬡ 4 GROUNDING CONNECTOR WITH INSPECTION WINDOW



SYMBOL	REVISIONS	DATE	APPR.
	DESCRIPTION		

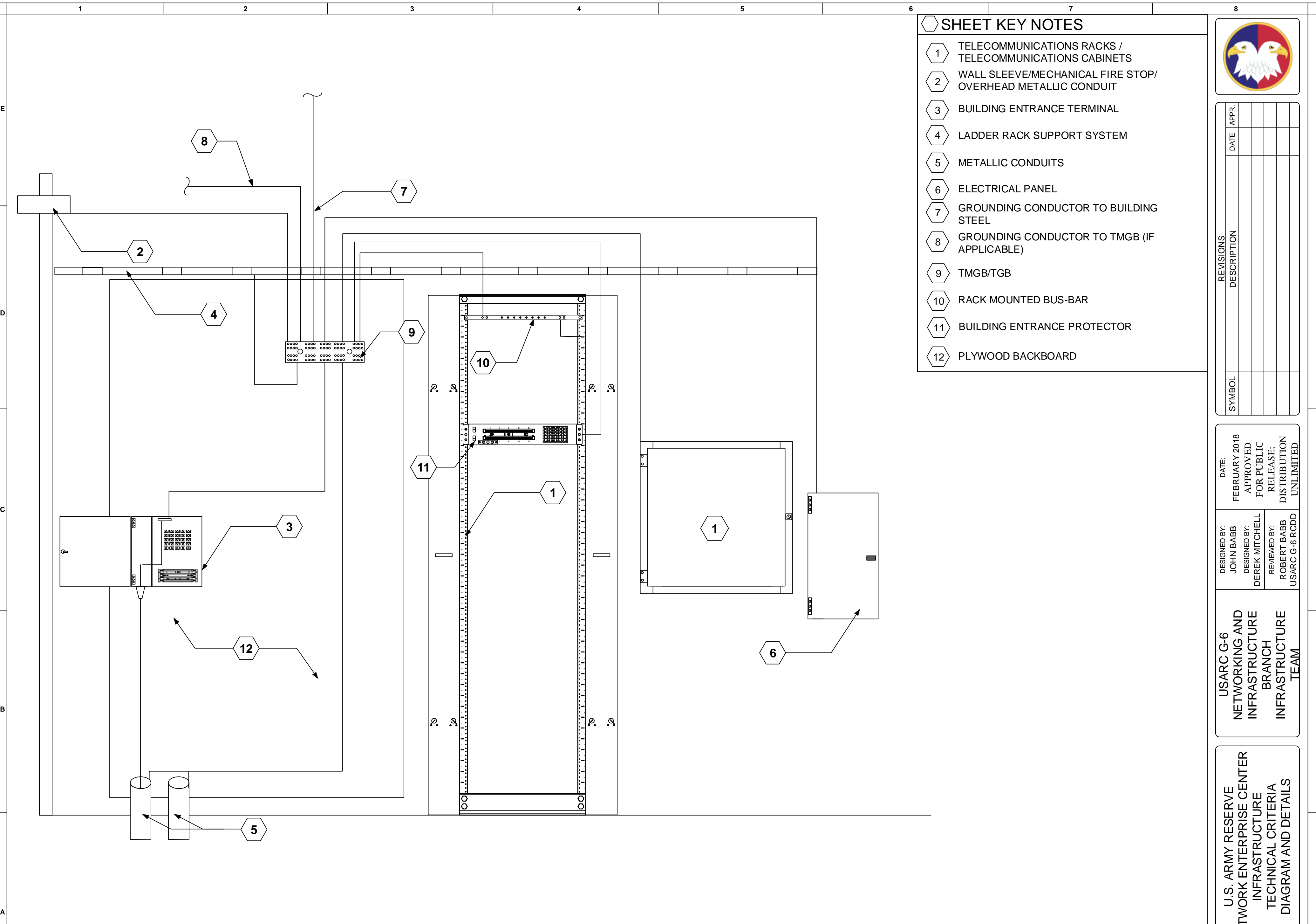
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B.34





**SHEET KEY NOTES**

- 1 TELECOMMUNICATIONS RACKS / TELECOMMUNICATIONS CABINETS
- 2 WALL SLEEVE/MECHANICAL FIRE STOP/ OVERHEAD METALLIC CONDUIT
- 3 BUILDING ENTRANCE TERMINAL
- 4 LADDER RACK SUPPORT SYSTEM
- 5 METALLIC CONDUITS
- 6 ELECTRICAL PANEL
- 7 GROUNDING CONDUCTOR TO BUILDING STEEL
- 8 GROUNDING CONDUCTOR TO TMGB (IF APPLICABLE)
- 9 TMGB/TGB
- 10 RACK MOUNTED BUS-BAR
- 11 BUILDING ENTRANCE PROTECTOR
- 12 PLYWOOD BACKBOARD



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**B.35**

**TYPICAL GROUNDING RISER DIAGRAM**

**SHEET KEY NOTES**

- 1 SERVICE PROVIDER INSTALLED COPPER BACKBONE CABLE
- 2 SERVICE PROVIDER INSTALLED SM FIBER OPTIC CABLE
- 3 DS3 COAXIAL EXTENSION
- 4 (12) CAT. 6 CABLES
- 5 12 STRAND SM FIBER OPTIC CABLE
- 6 25 PAIR COPPER BACKBONE CABLE



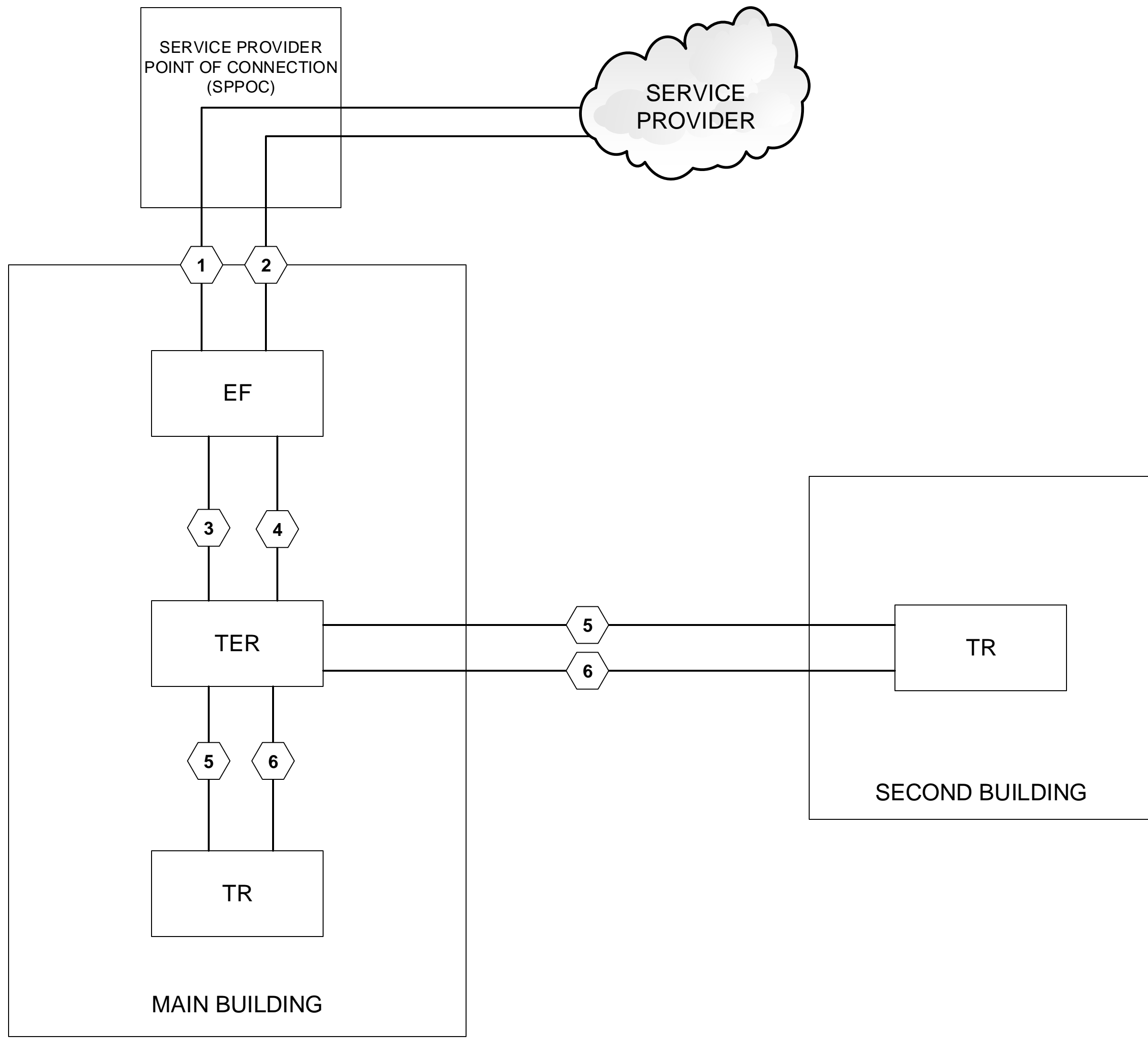
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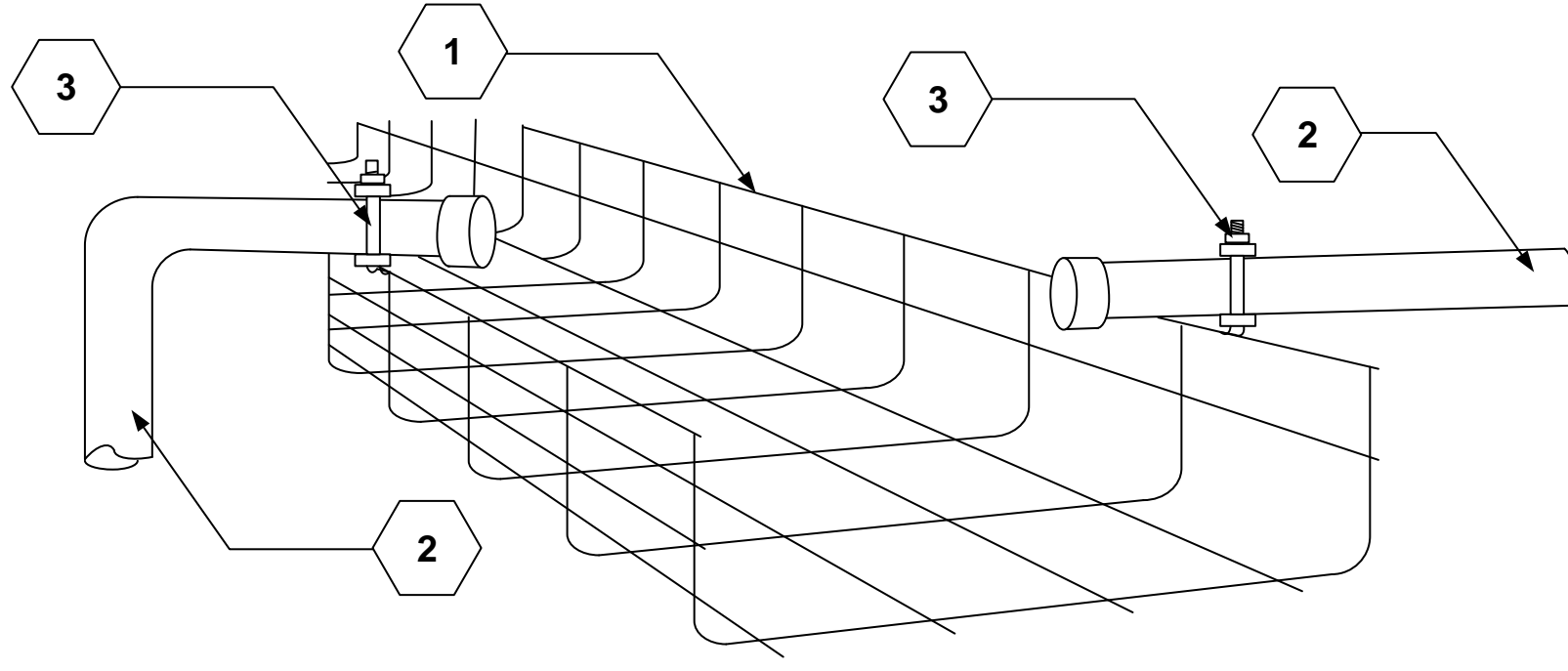
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**B.36**

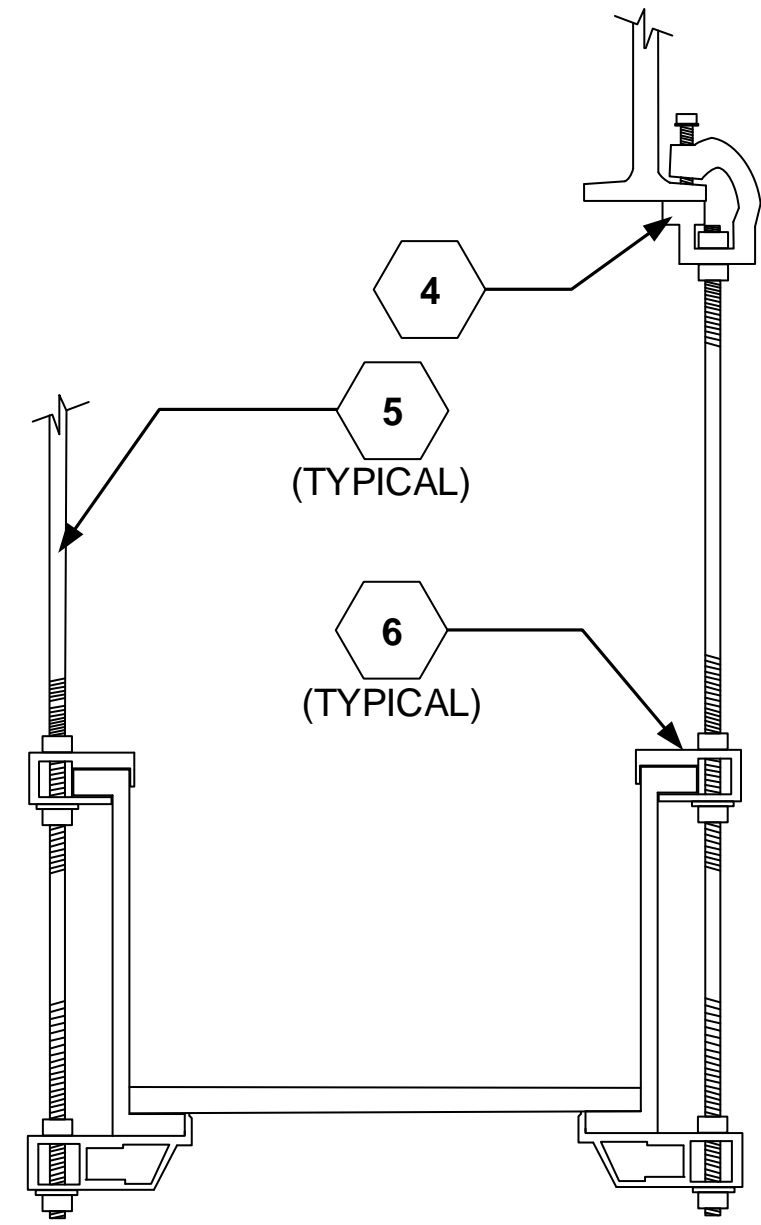


**TYPICAL BACKBONE CABLE RISER DIAGRAM**

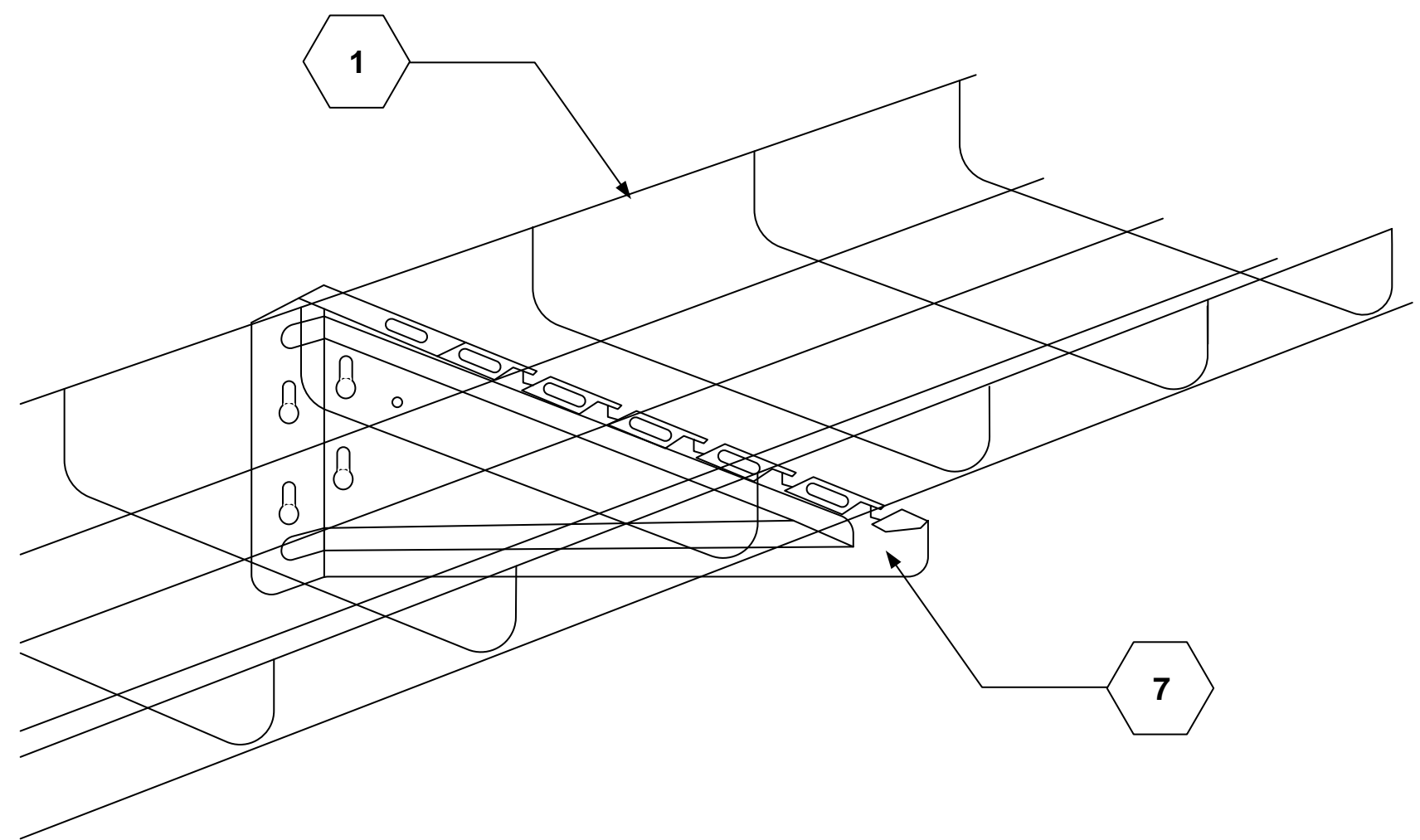


1 CONDUIT TO CABLE TRAY

- SHEET KEY NOTES**
- 1 BASKET STYLE CABLE TRAY
  - 2 CONDUIT FROM OUTLET TO CABLE TRAY
  - 3 BOND CONDUIT TO CABLE TRAY
  - 4 BEAM CLAMP FOR CABLE TRAY SUPPORT
  - 5 THREADED ROD
  - 6 CABLE TRAY SUPPORTS
  - 7 TRIANGLE CABLE TRAY SUPPORT BRACKET



2 CABLE TRAY SUPPORT DIAGRAM



3 CABLE TRAY SUPPORT DIAGRAM

○ TYPICAL CABLE TRAY ENLARGED DIAGRAMS



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**B.37**

**SHEET KEY NOTES**

- 1 CATEGORY 6 RATED J-HOOK
- 2 WIRE MESH CABLE TRAY
- 3 CONDUIT STUB-OUT TO ACCESSIBLE CEILING SPACE
- 4 J-HOOK BEAM CLAMP
- 5 OUTLET BOX
- 6 LOW VOLTAGE MOUNTING BRACKET
- 7 CATEGORY 6 CABLE



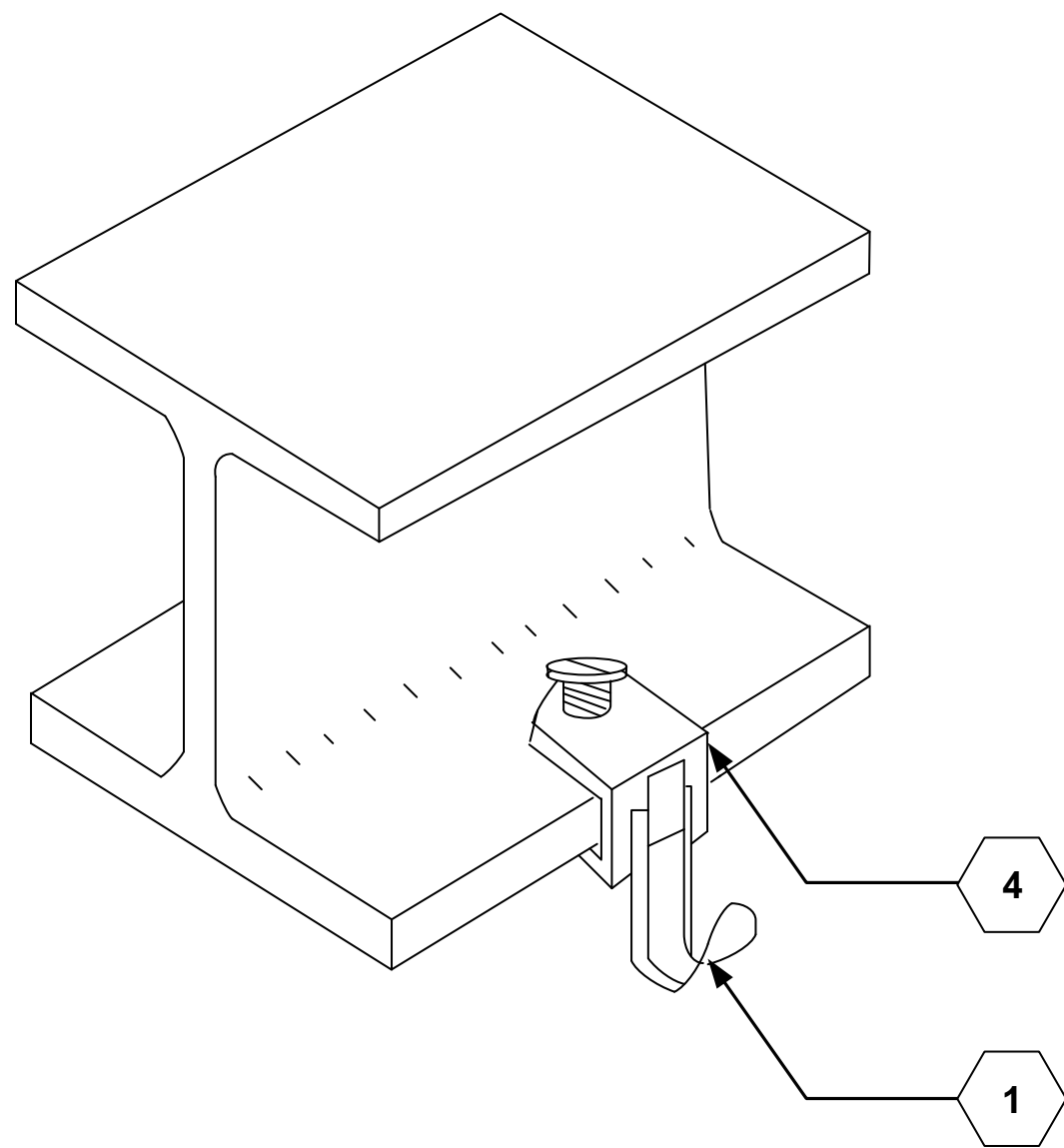
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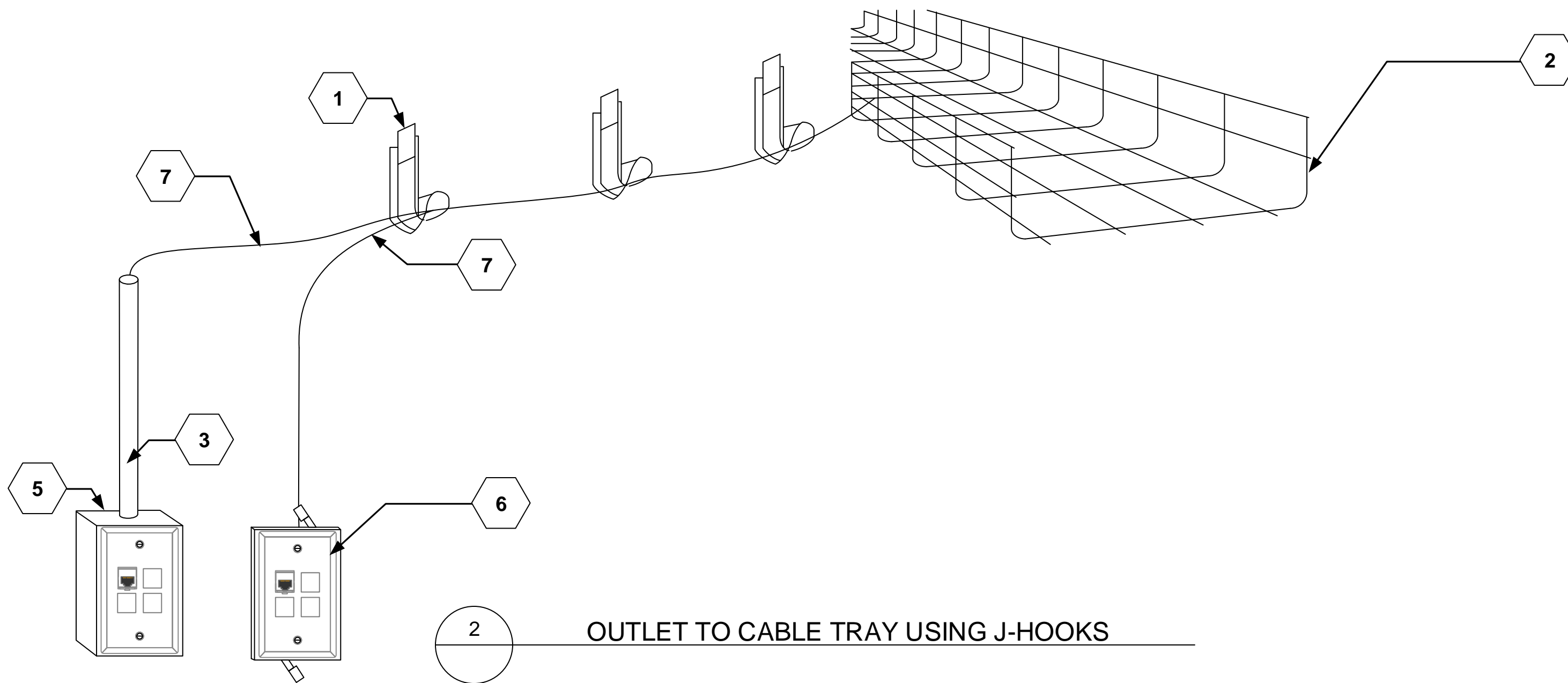
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**B.38**



1 J-HOOK TO BUILDING STEEL SUPPORT



2 OUTLET TO CABLE TRAY USING J-HOOKS

**TYPICAL J-HOOK ENLARGED DIAGRAMS**

**SHEET KEY NOTES**

- 1 ONE 1 INCH MINIMUM EMT CONDUIT HOMERUN TO TER/TR
- 2 TELECOMMUNICATIONS FLOOR BOX

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



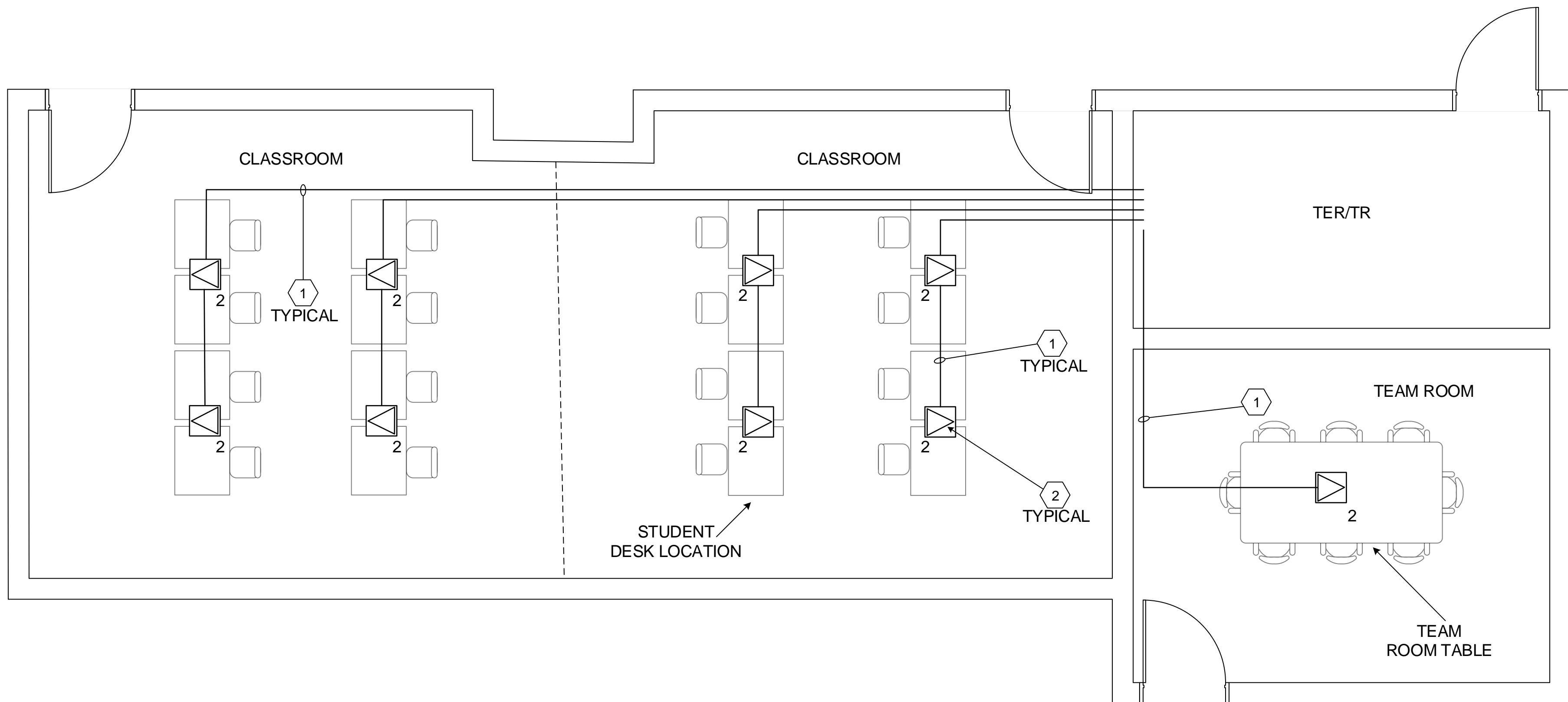
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**B.39**



**TYPICAL FLOOR BOX HOMERUN CONDUIT AERIAL DIAGRAM**

**SHEET KEY NOTES**

- ① ONE 1 INCH MINIMUM EMT CONDUIT HOMERUN TO TER/TR
- ② TELECOMMUNICATIONS FLOOR BOX
- ③ PLYWOOD BACKBOARD
- ④ HORIZONTAL LADDER RACK
- ⑤ VERTICAL LADDER RACK

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ILLUSTRATE REQUIRED COMPONENTS. THE DIAGRAMS DO NOT NECESSARILY ILLUSTRATE THE QUANTITY REQUIRED OF EACH COMPONENT NOR THE ACTUAL LOCATION FOR THESE COMPONENTS. EXACT QUANTITY AND LOCATION WILL BE DETERMINED DURING THE DESIGN PROCESS.



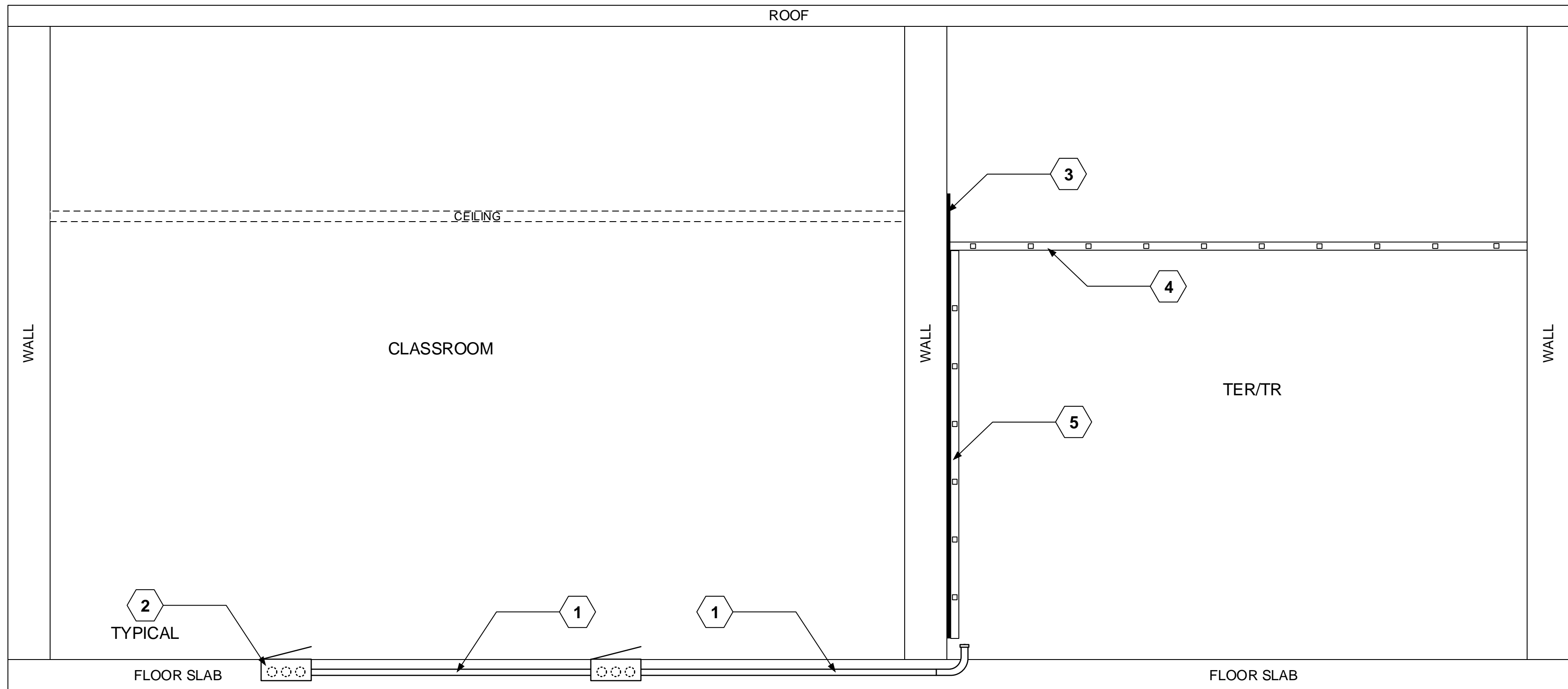
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**B.40**



**TYPICAL FLOOR BOX HOMERUN CONDUIT ELEVATION DIAGRAM**

**SHEET KEY NOTES**

- 1 FLEXIBLE METAL CONDUIT FROM FLOOR BOX TO ACOUSTIC PANEL RACEWAY
- 2 FURNITURE ACOUSTIC RACEWAY
- 3 FLOOR BOX OR POKE-THRU
- 4 WALL MOUNTED JUNCTION BOX



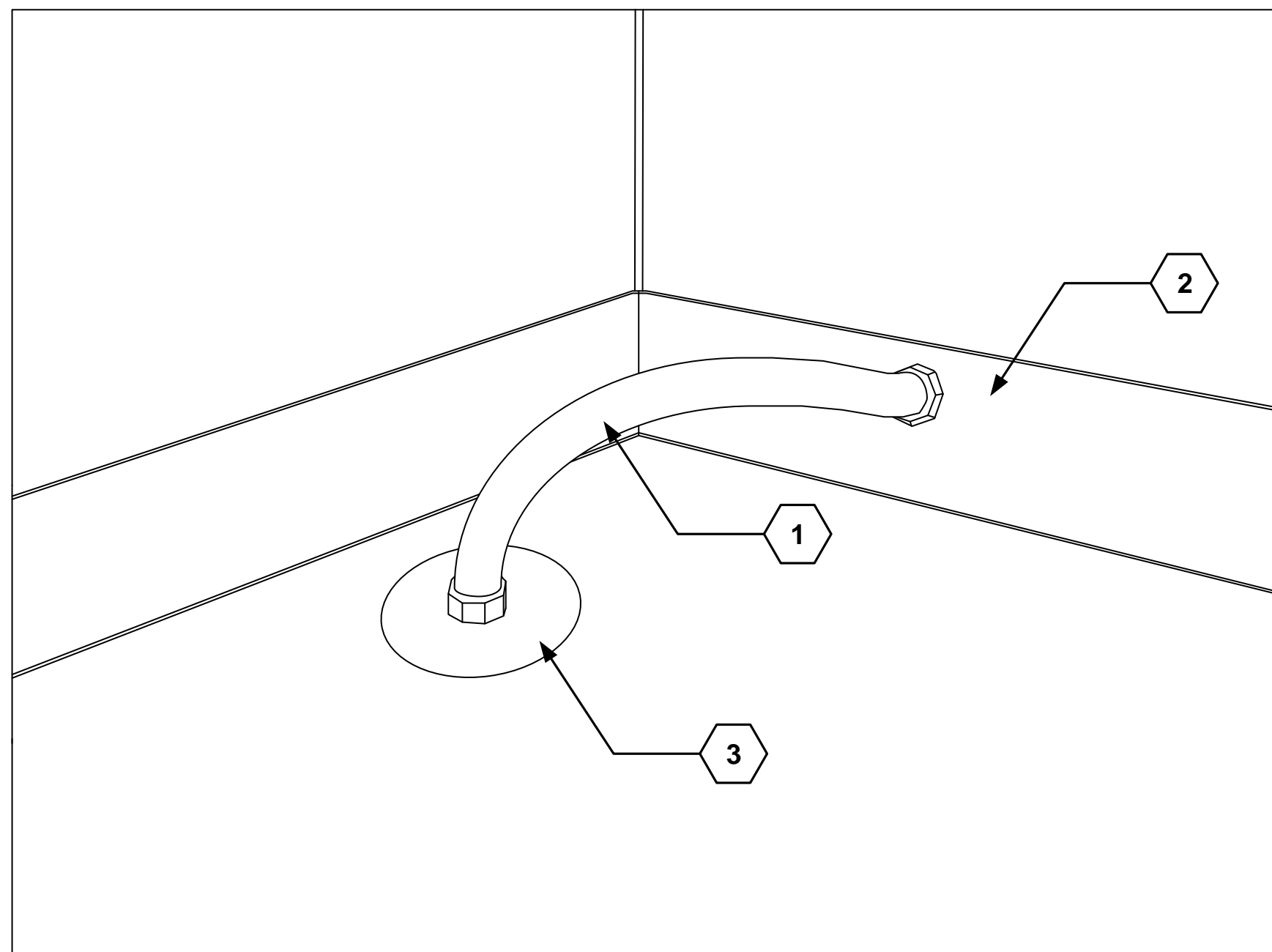
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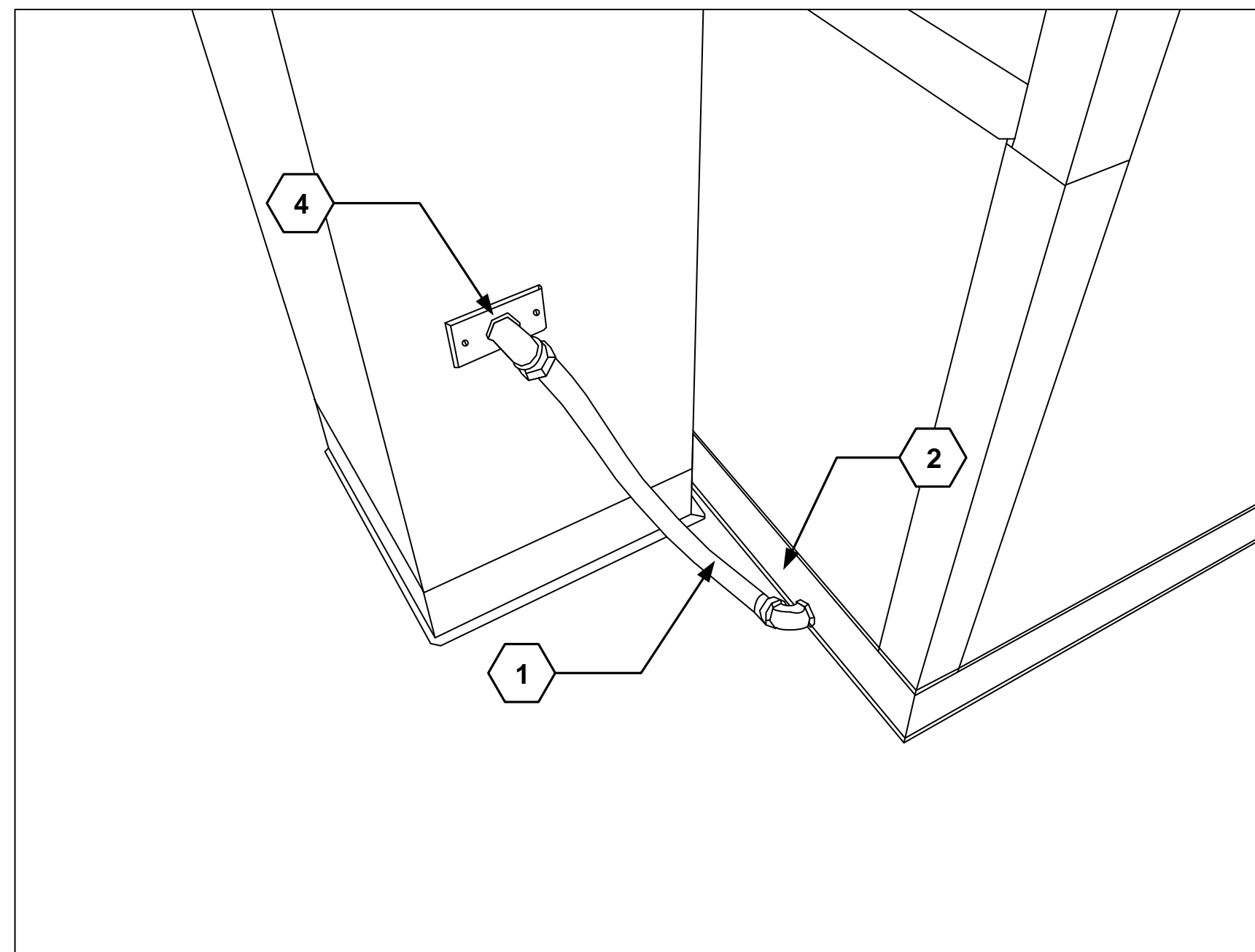
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**B.41**

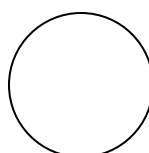


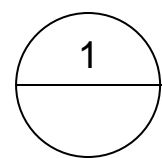
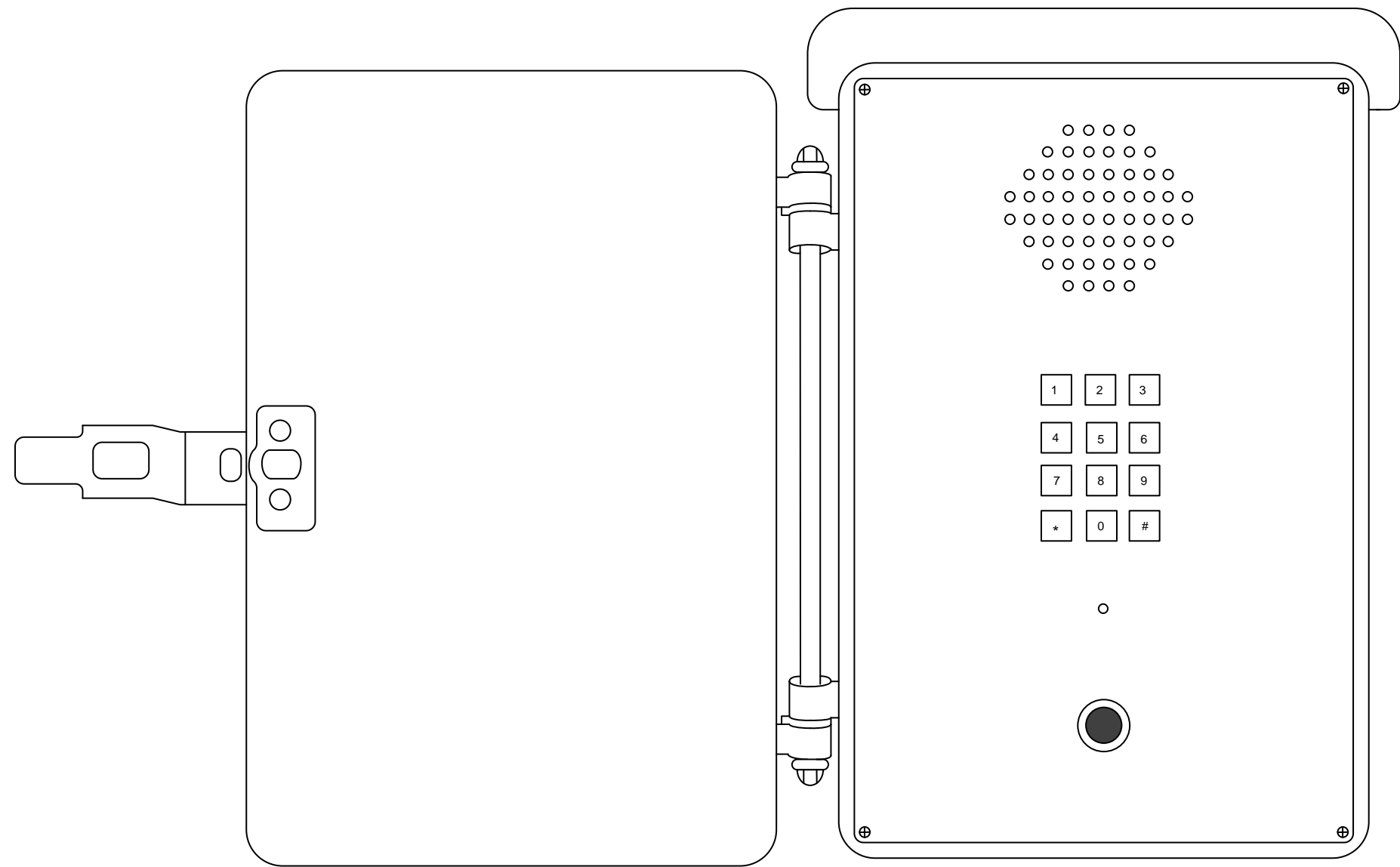
1 WHIP FROM FLOOR BOX/POKE-THRU TO KICK PLATE



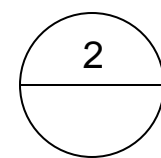
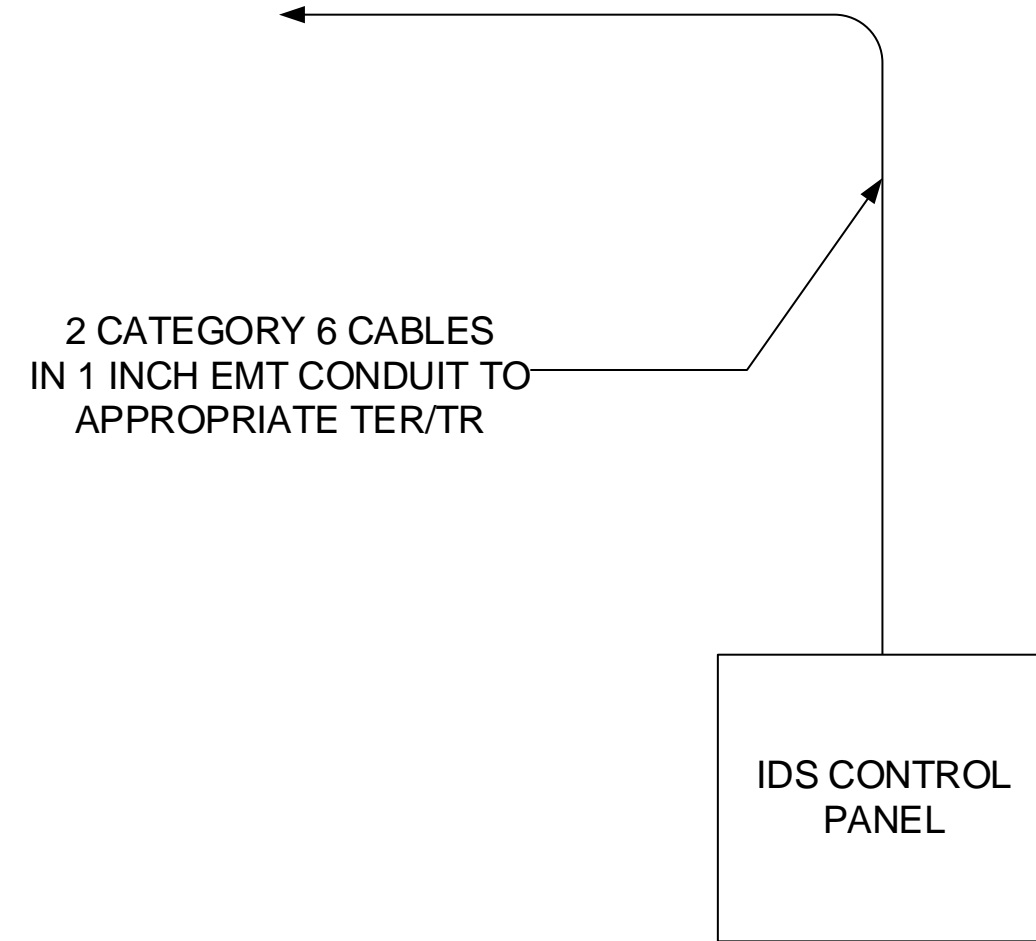
2 WHIP FROM JUNCTION BOX TO KICK PLATE

**TYPICAL FURNITURE WHIP DETAILS**

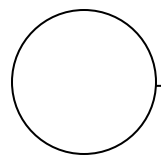




CALLBOX DETAIL



IDS CONTROL PANEL DETAIL



TYPICAL EXTERIOR CALL BOX ENLARGED DETAIL AND ARMS VAULT IDS DETAIL



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	DESCRIPTION	DATE   APPR.

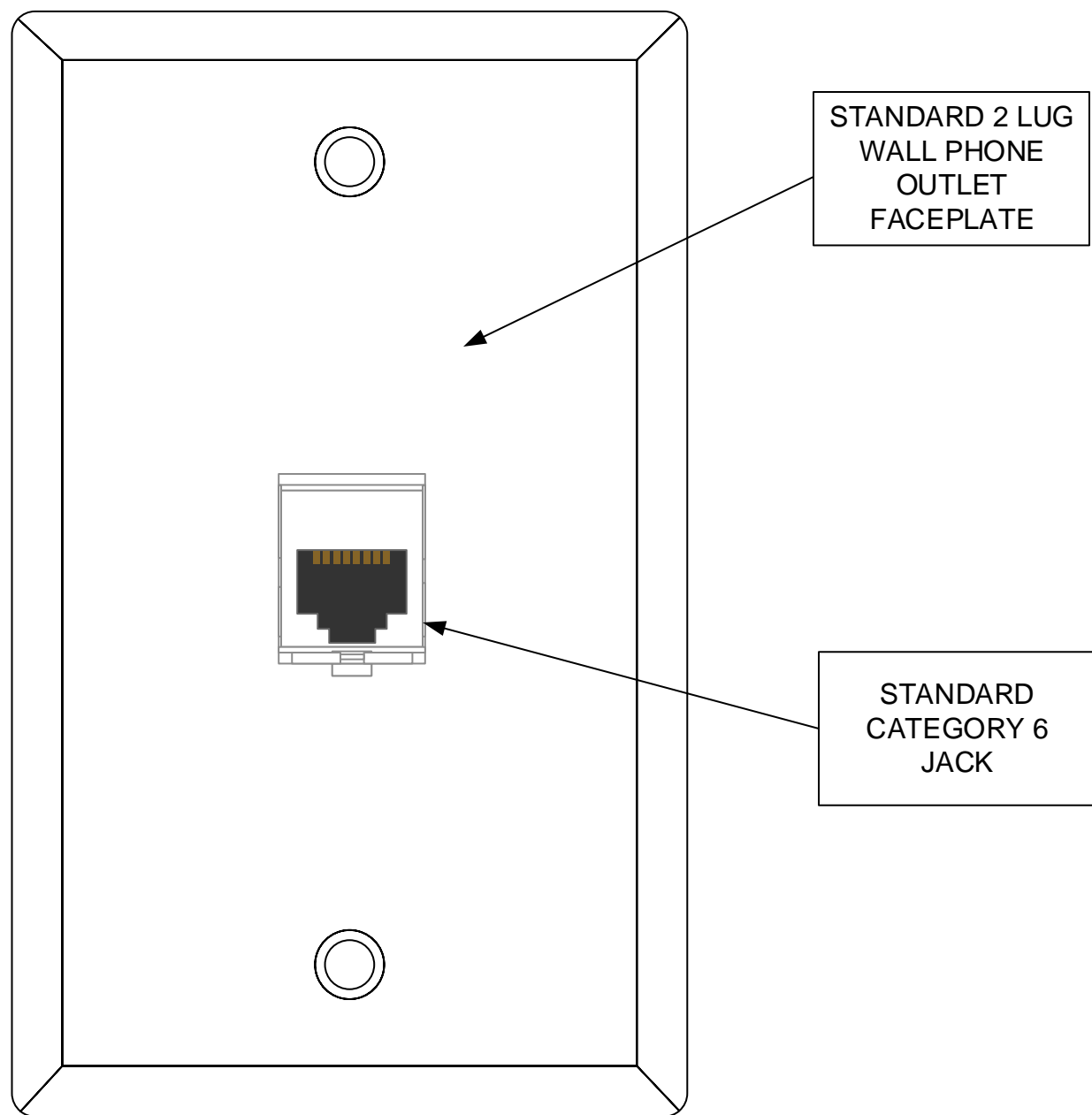
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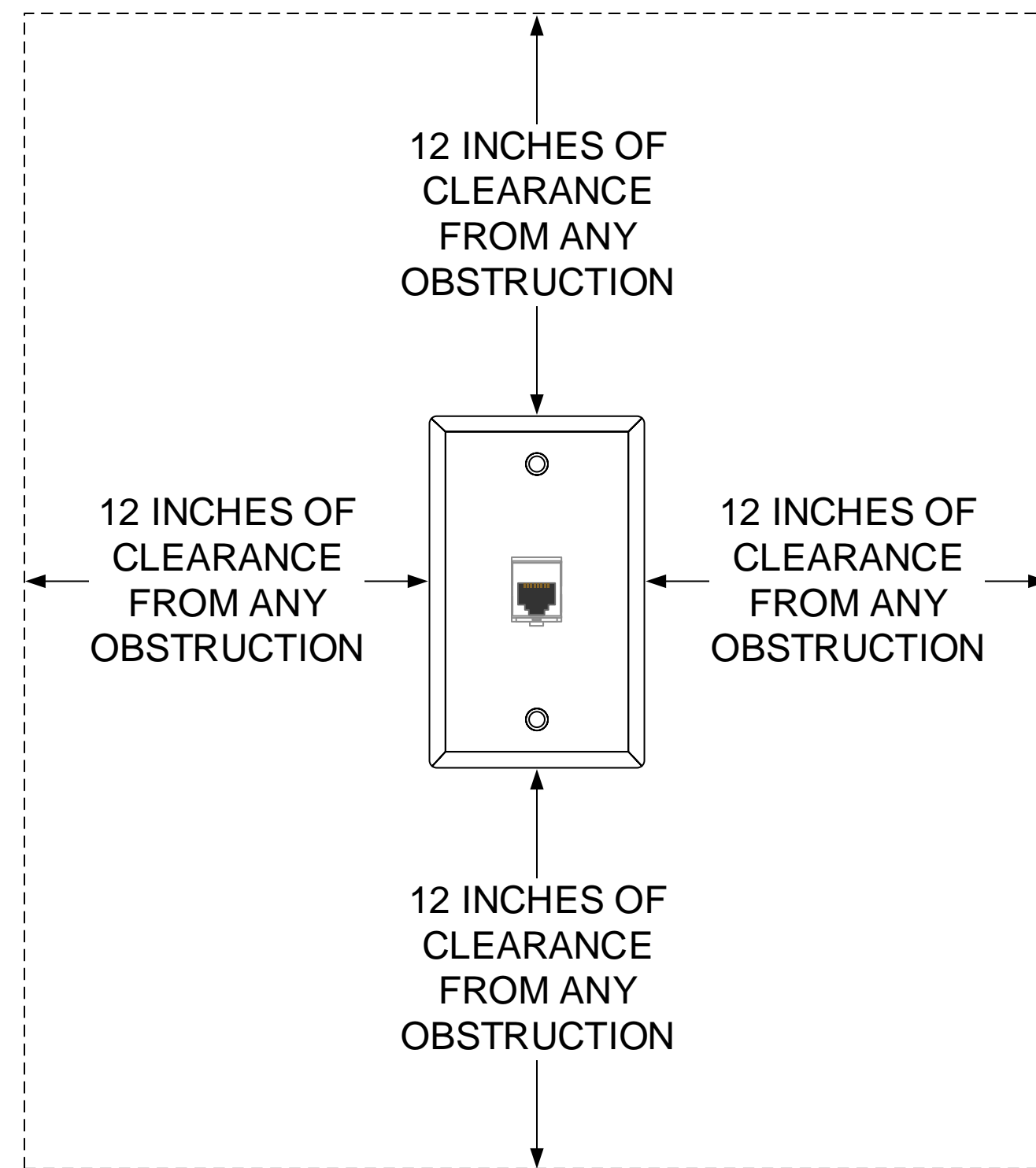
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B.42





1 ABOVE AND BELOW CEILING WAP OUTLET



2 WAP OUTLET CLEARANCE DIAGRAM

WAP OUTLET AND WAP OUTLET CLEARANCE DIAGRAMS



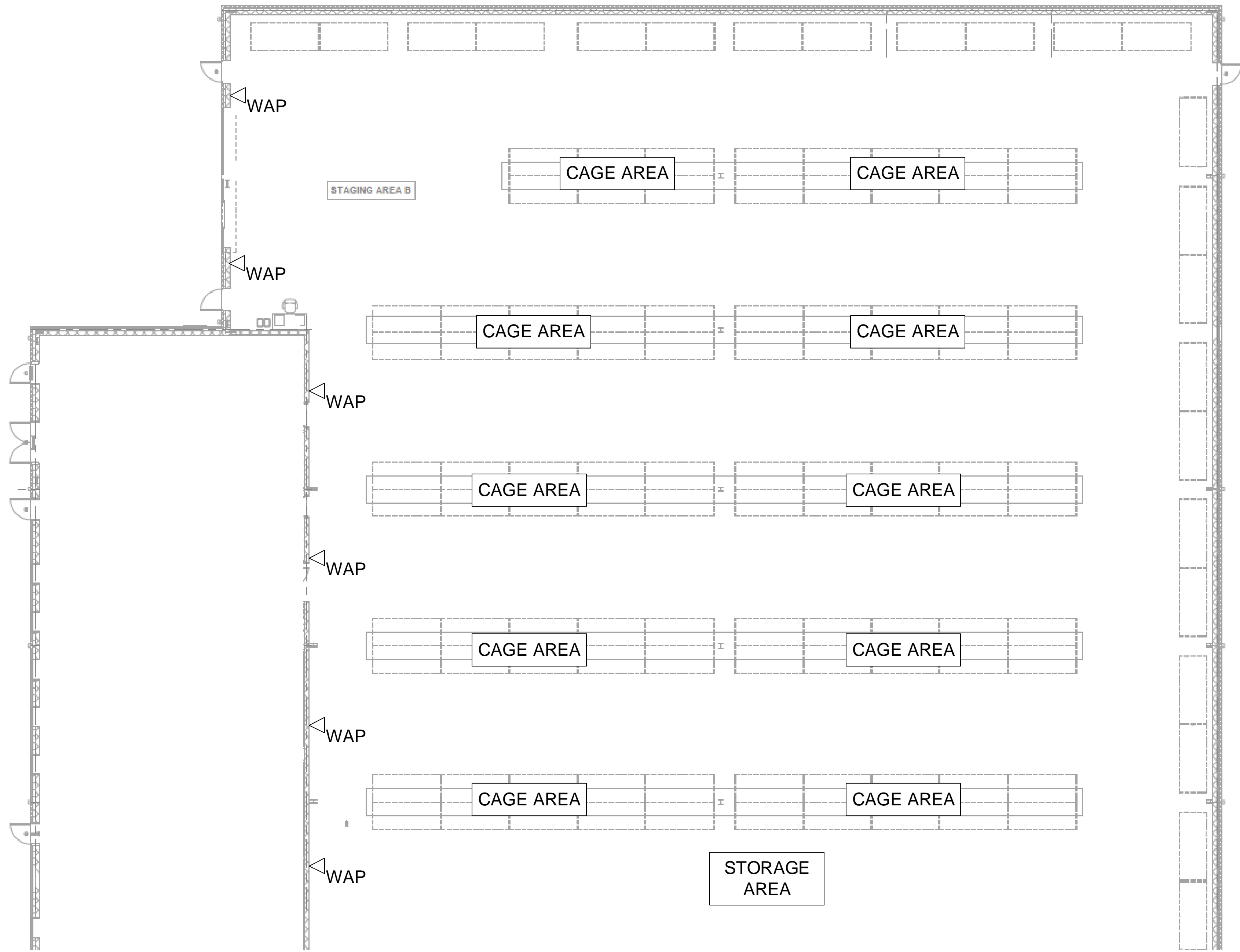
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B.43



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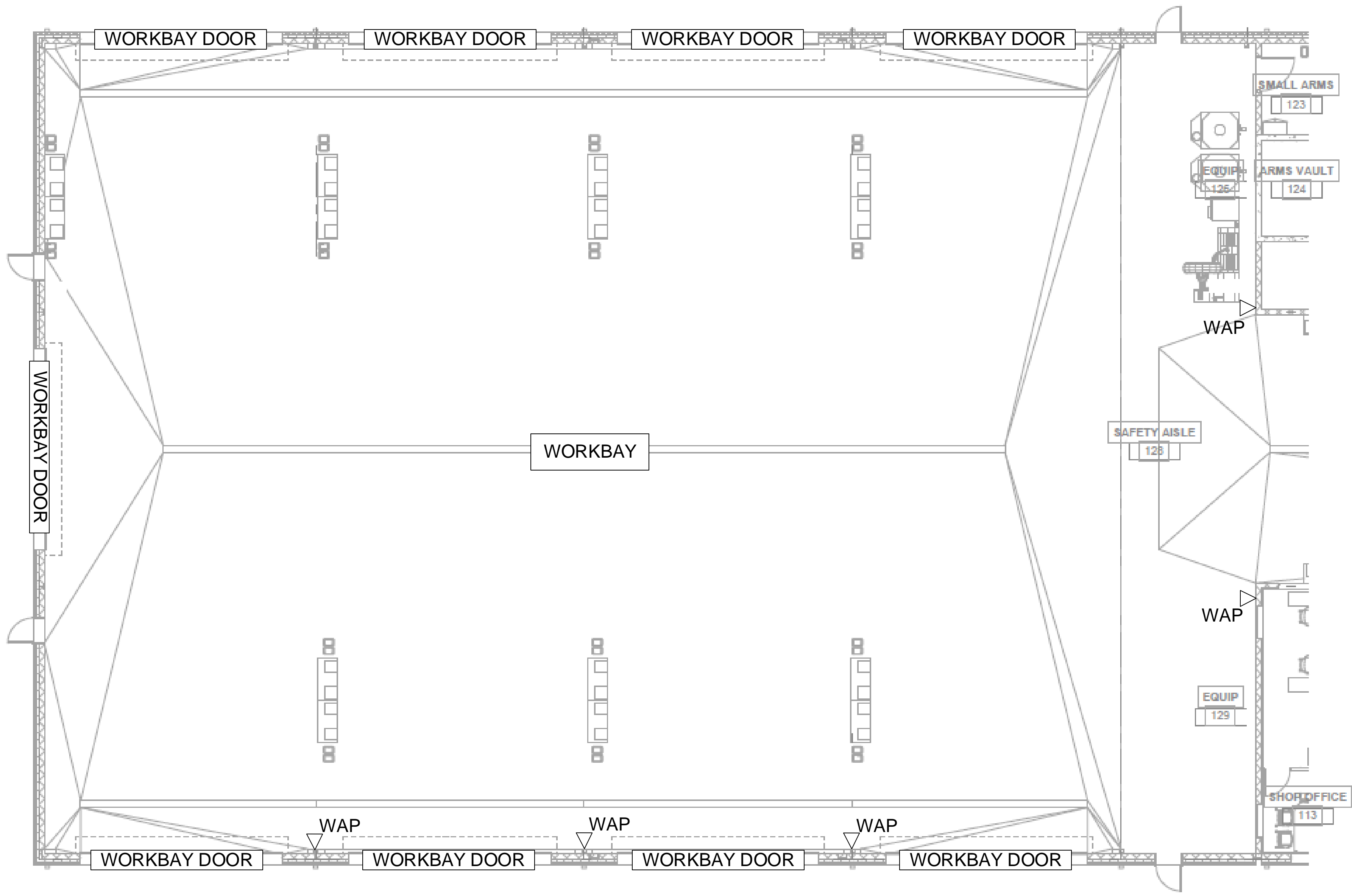
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**B.44**

**TYPICAL UNIT STORAGE/WAREHOUSE WAP OUTLET PLACEMENT DIAGRAM**



SYMBOL	REVISIONS DESCRIPTION	DATE	APPR.

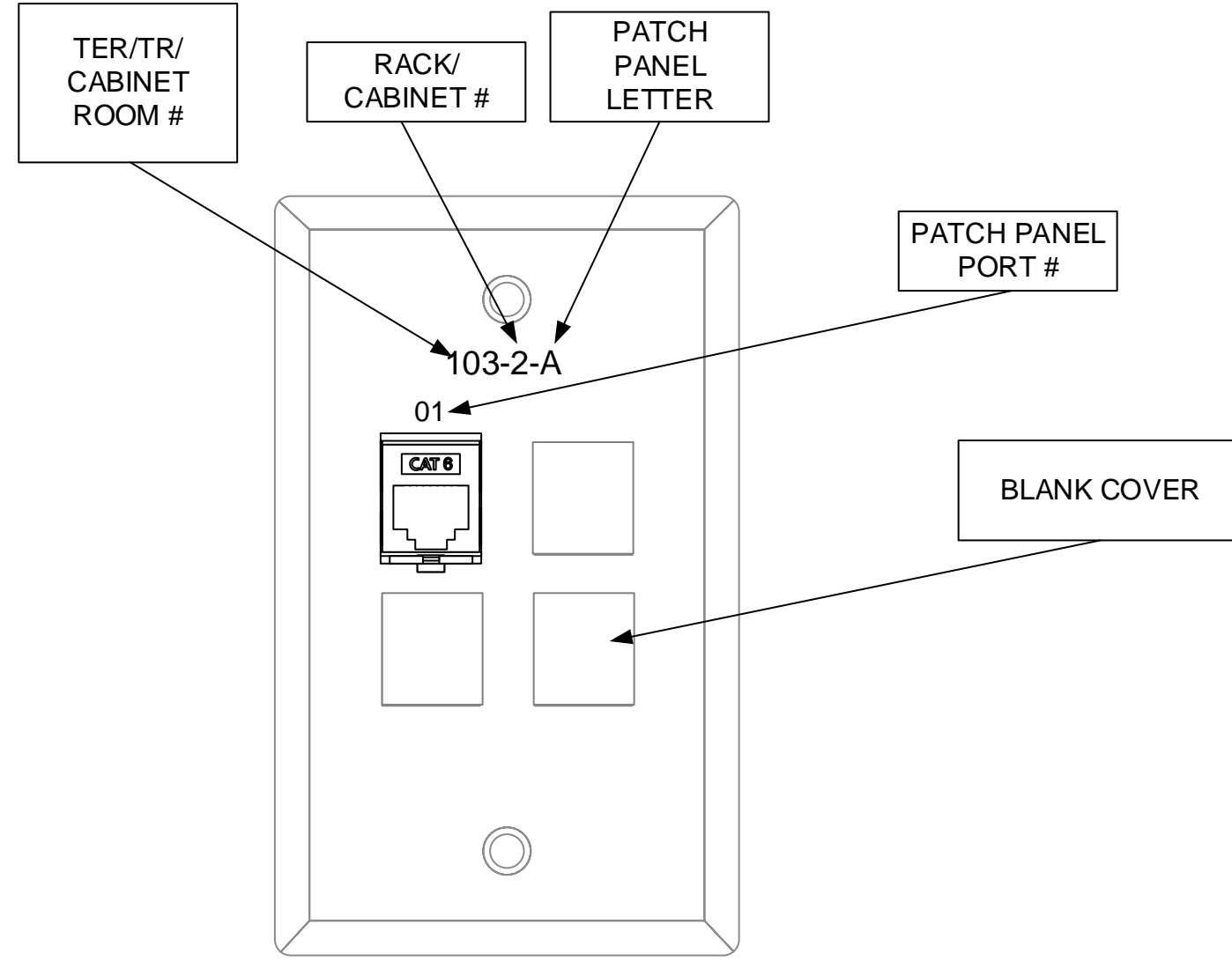
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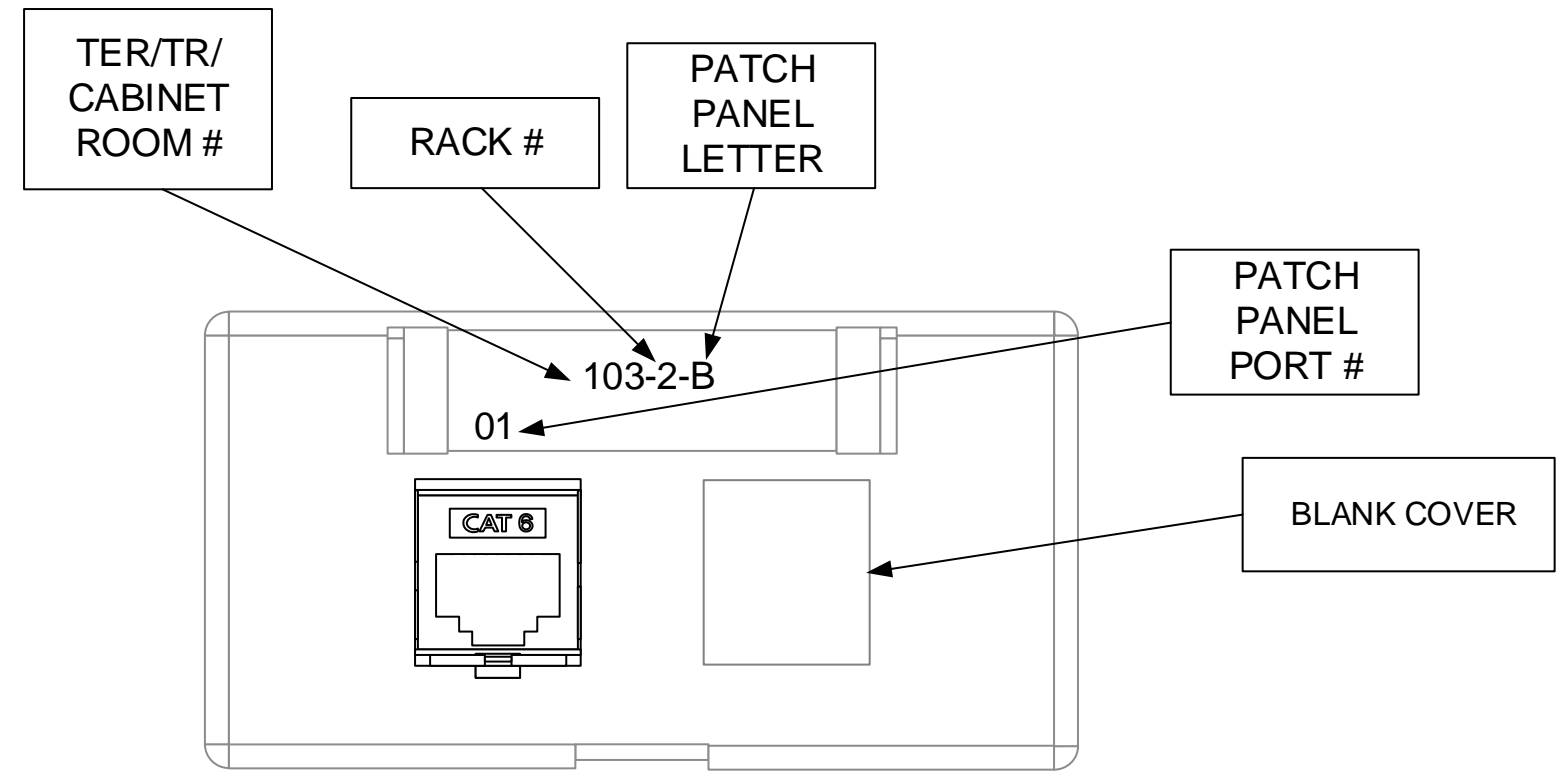
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**B.45**

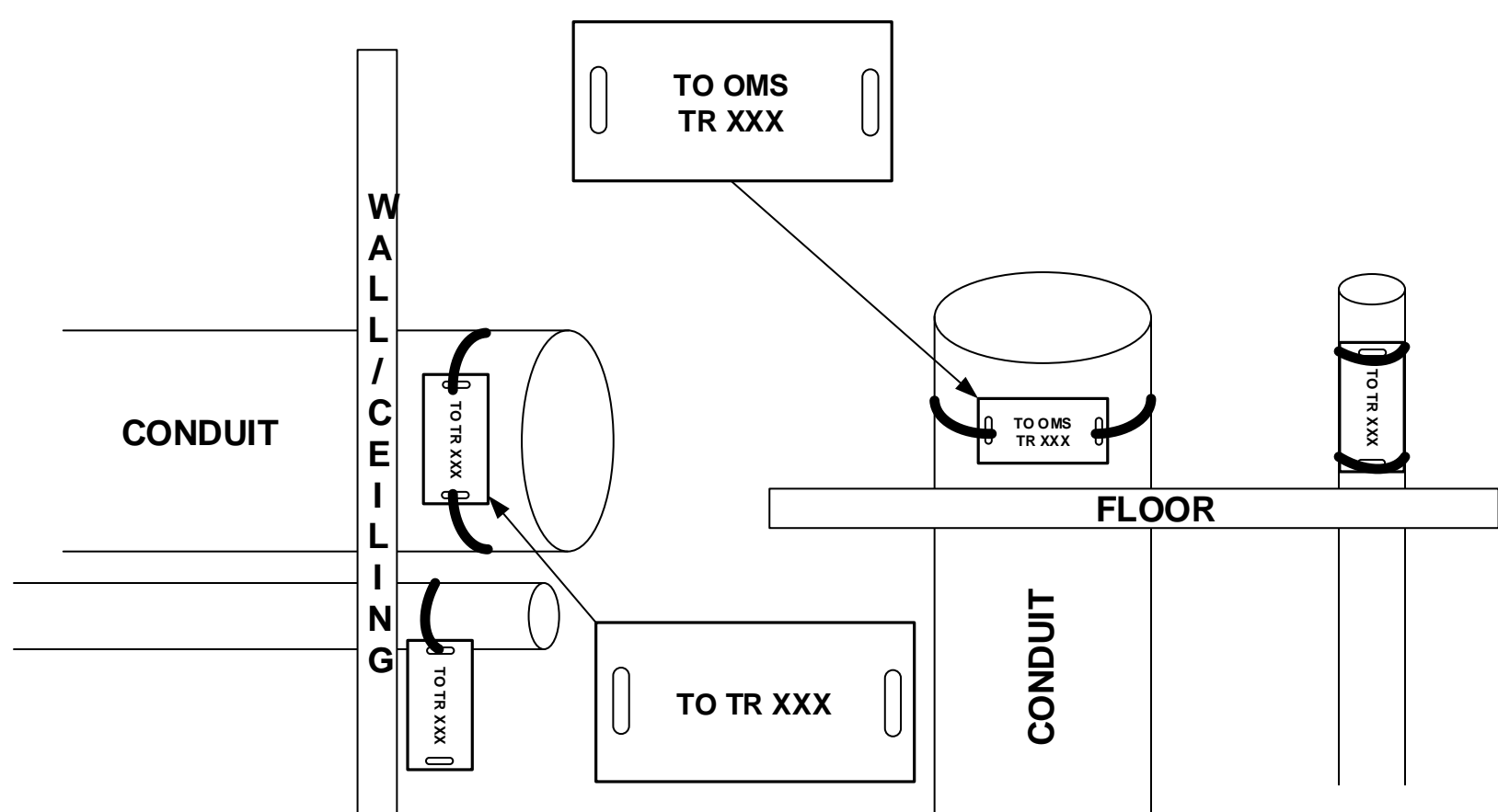
○ TYPICAL OMS/AMSA/TEMF WORKBAY WAP OUTLET PLACEMENT DIAGRAM



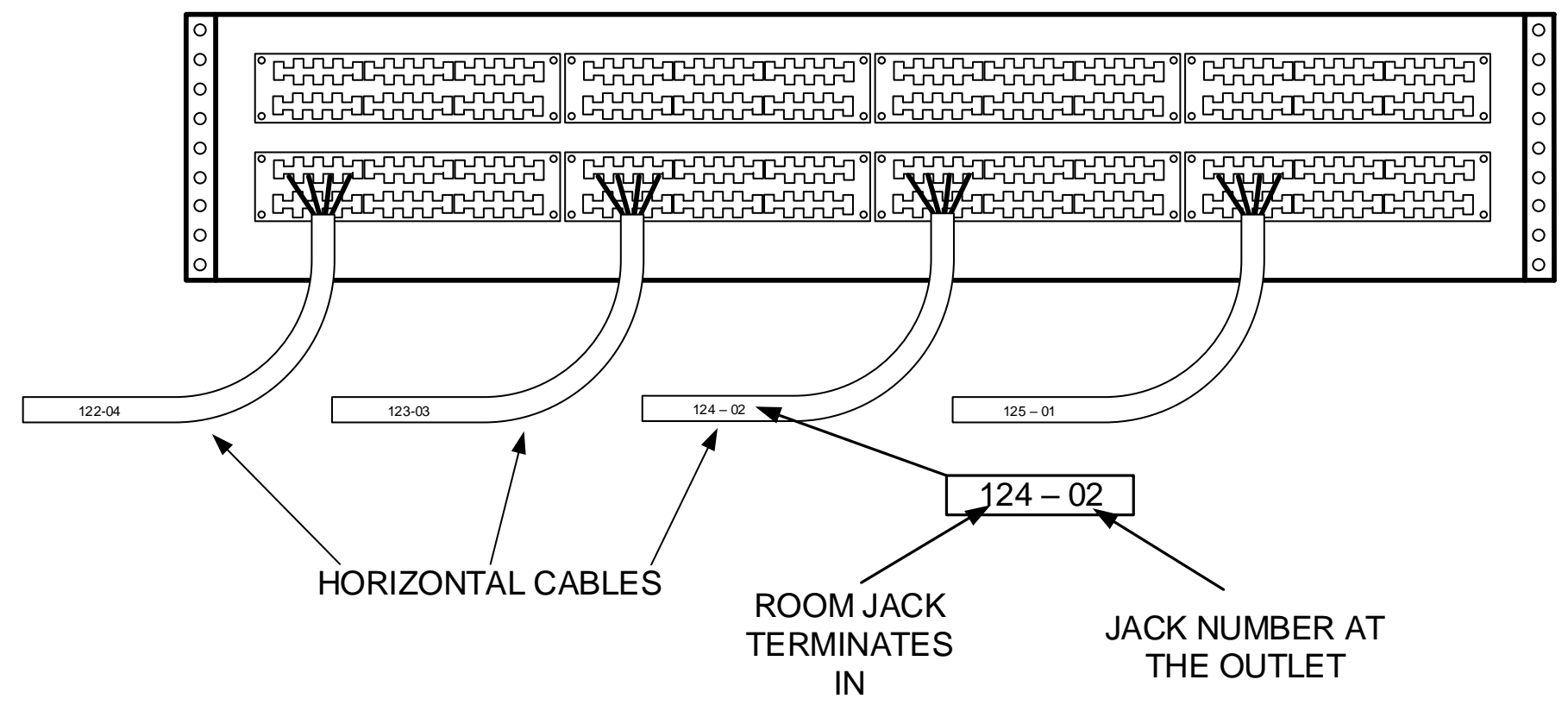
1 WALL TELECOMMUNICATIONS OUTLET LAYOUT AND LABELING SCHEME



2 FURNITURE TELECOMMUNICATIONS OUTLET LAYOUT AND LABELING SCHEME



3 CONDUIT LABELS



4 CATEGORY 6 PATCH PANEL REAR LABELING SCHEME

TYPICAL LABELING DIAGRAMS



SYMBOL	REVISIONS	DATE	APPR.
	DESCRIPTION		

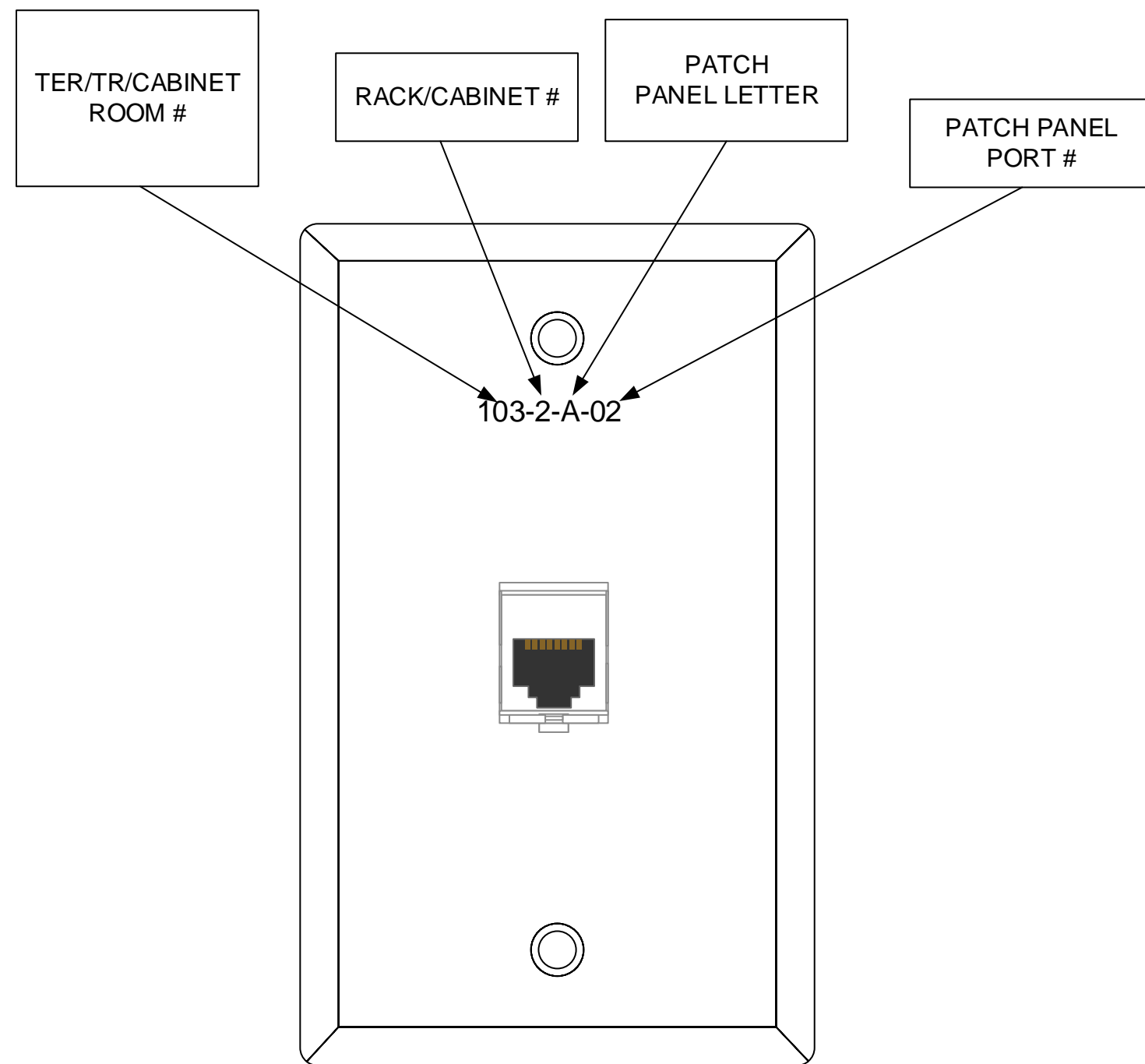
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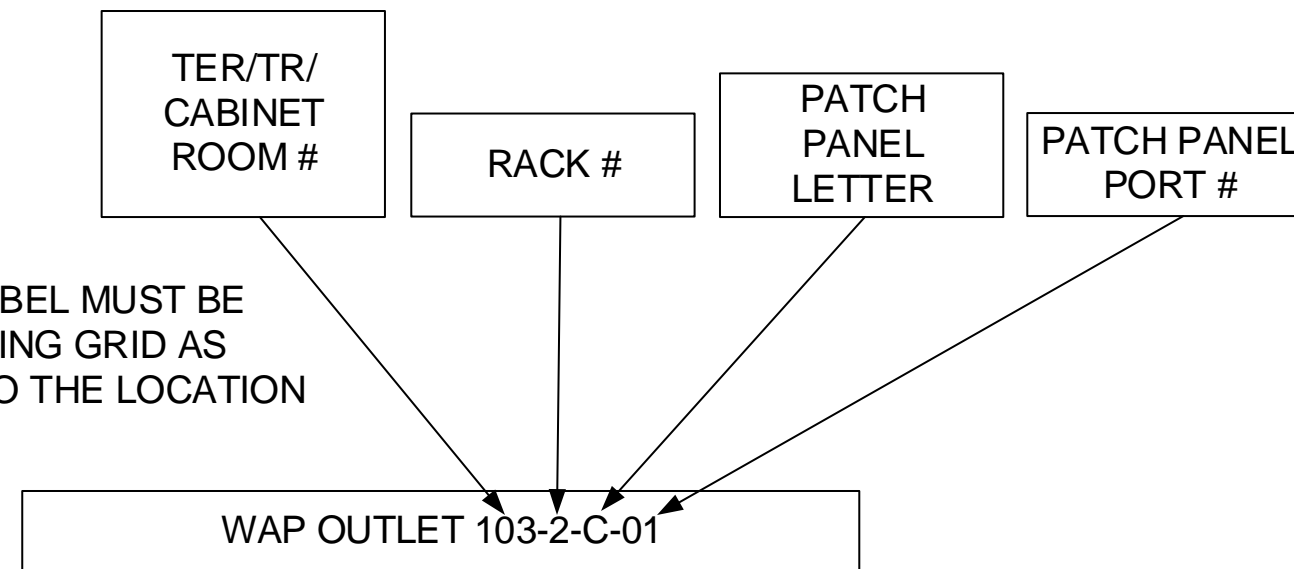
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B.46



1 WAP OUTLET LABELING SCHEME

**NOTE:** WAP OUTLET LABEL MUST BE LOCATED ON THE CEILING GRID AS CLOSE AS POSSIBLE TO THE LOCATION OF THE WAP OUTLET



2 CEILING GRID LABEL FOR ABOVE CEILING WAP

TYPICAL LABELING DIAGRAMS



SYMBOL	REVISIONS	DATE	APPR.
	DESCRIPTION		

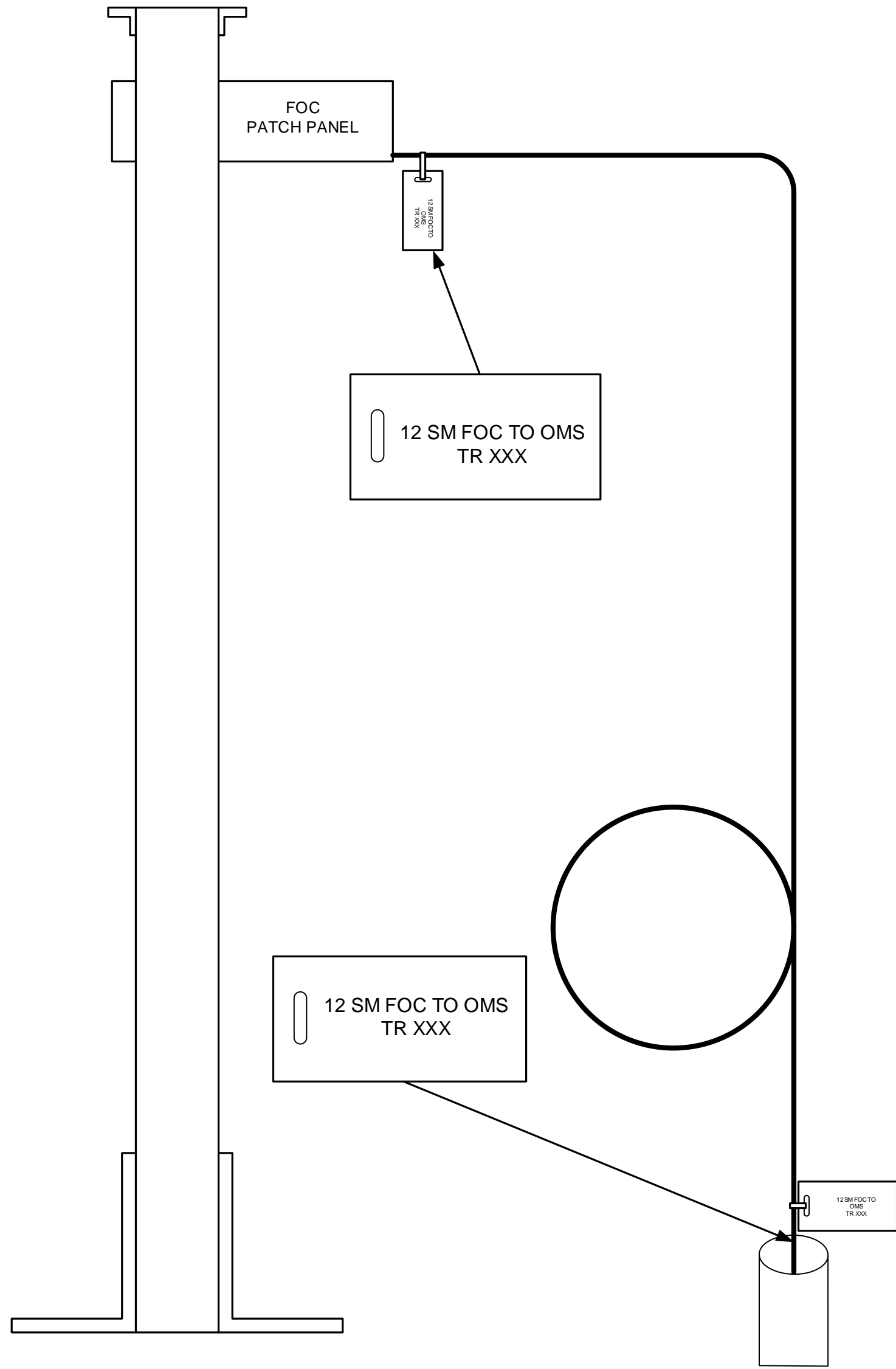
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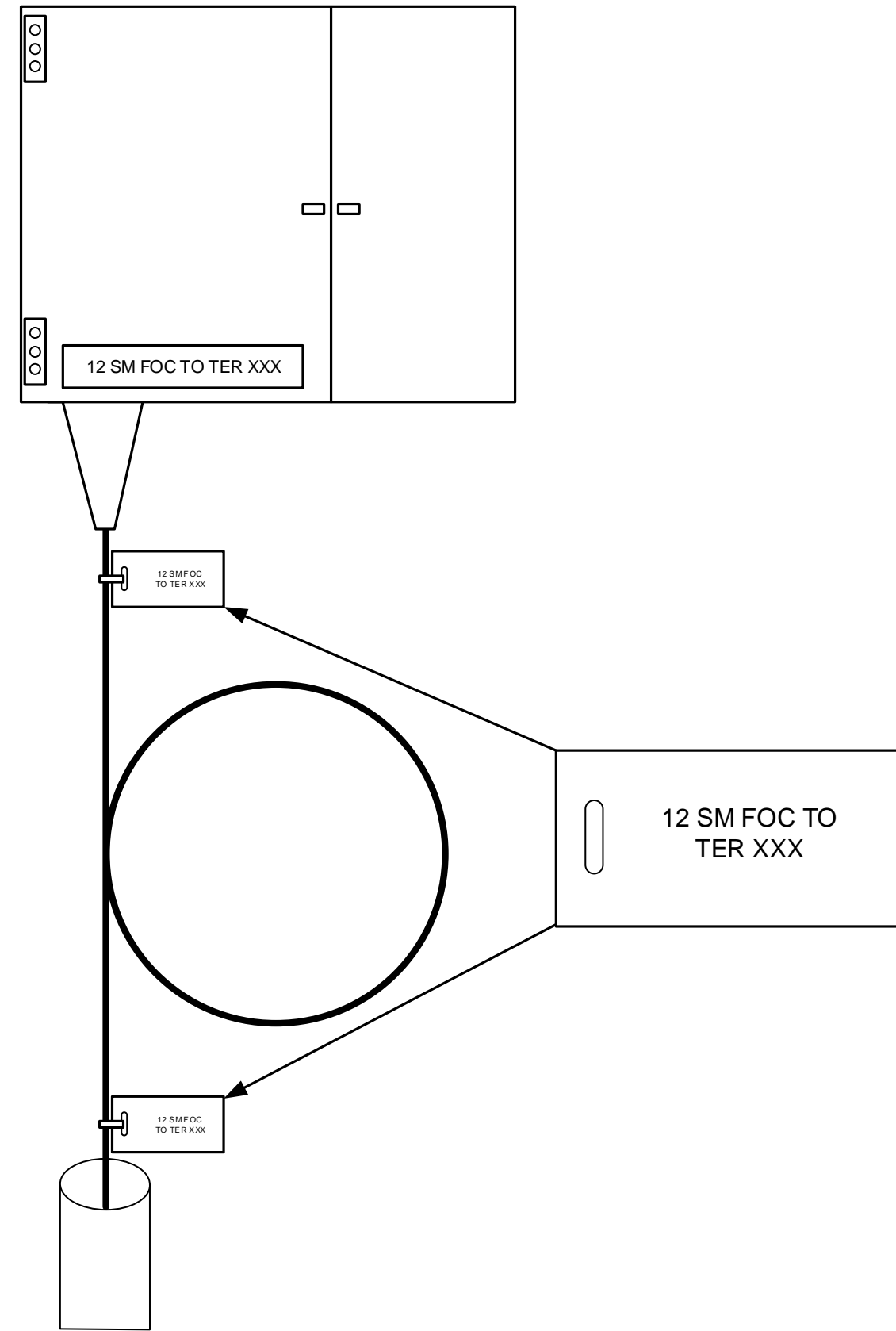
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B.47



1 FOC CABLE AND RACK MOUNTED FOC PATCH PANEL LABELS



2 FOC CABLE AND WALL MOUNTED FOC PATCH PANEL LABELS

TYPICAL LABELING DIAGRAMS



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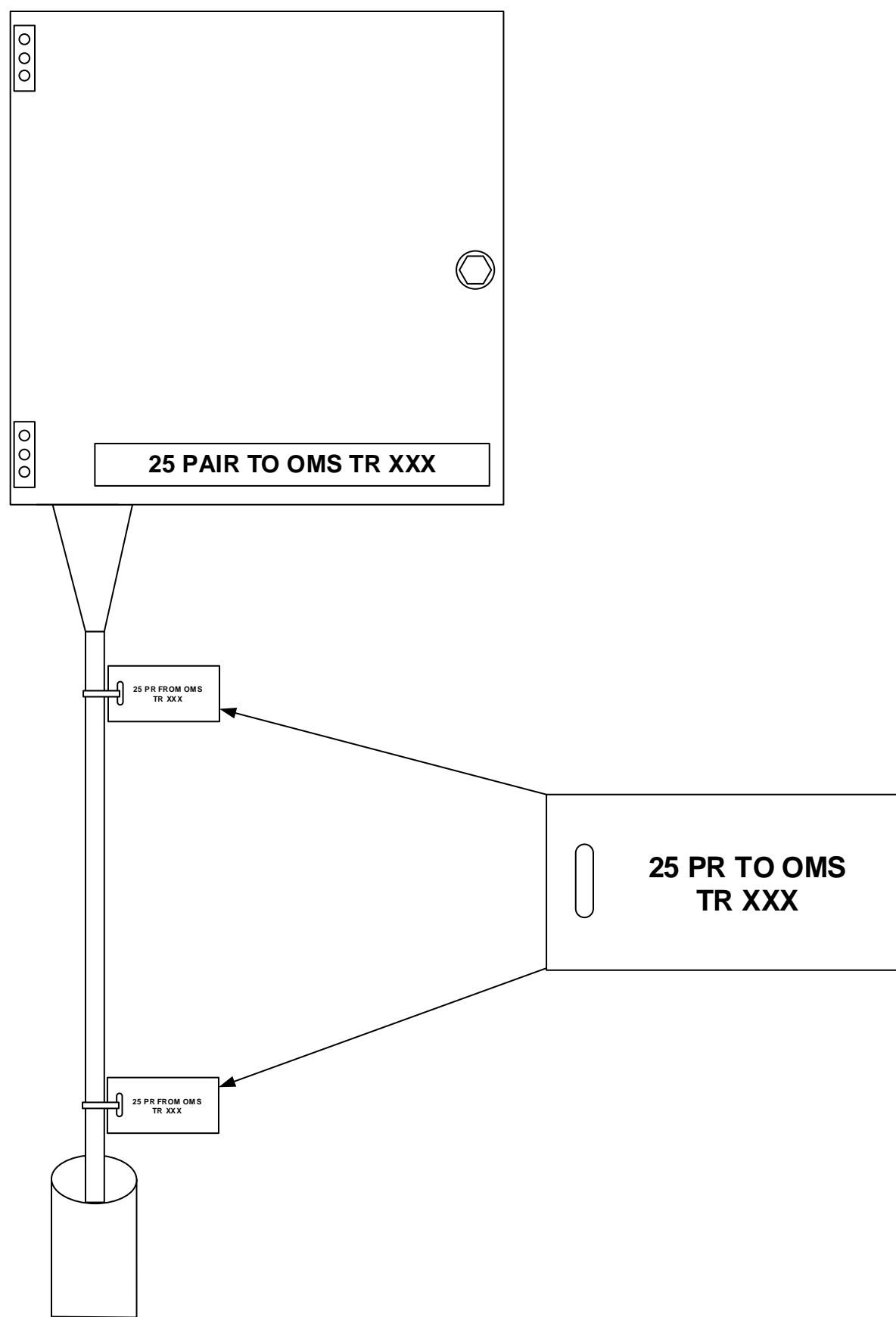
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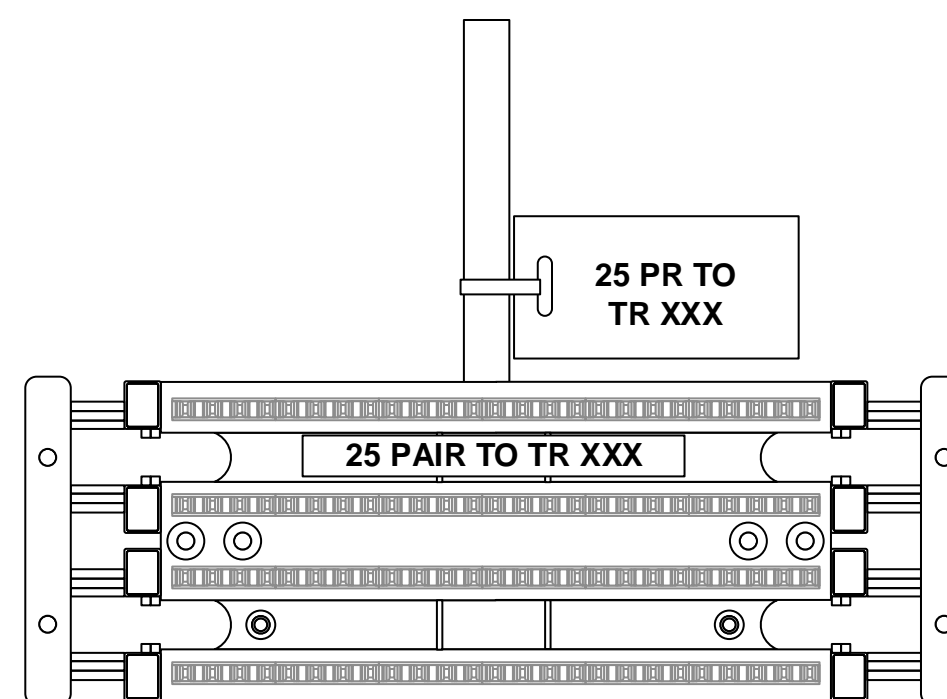
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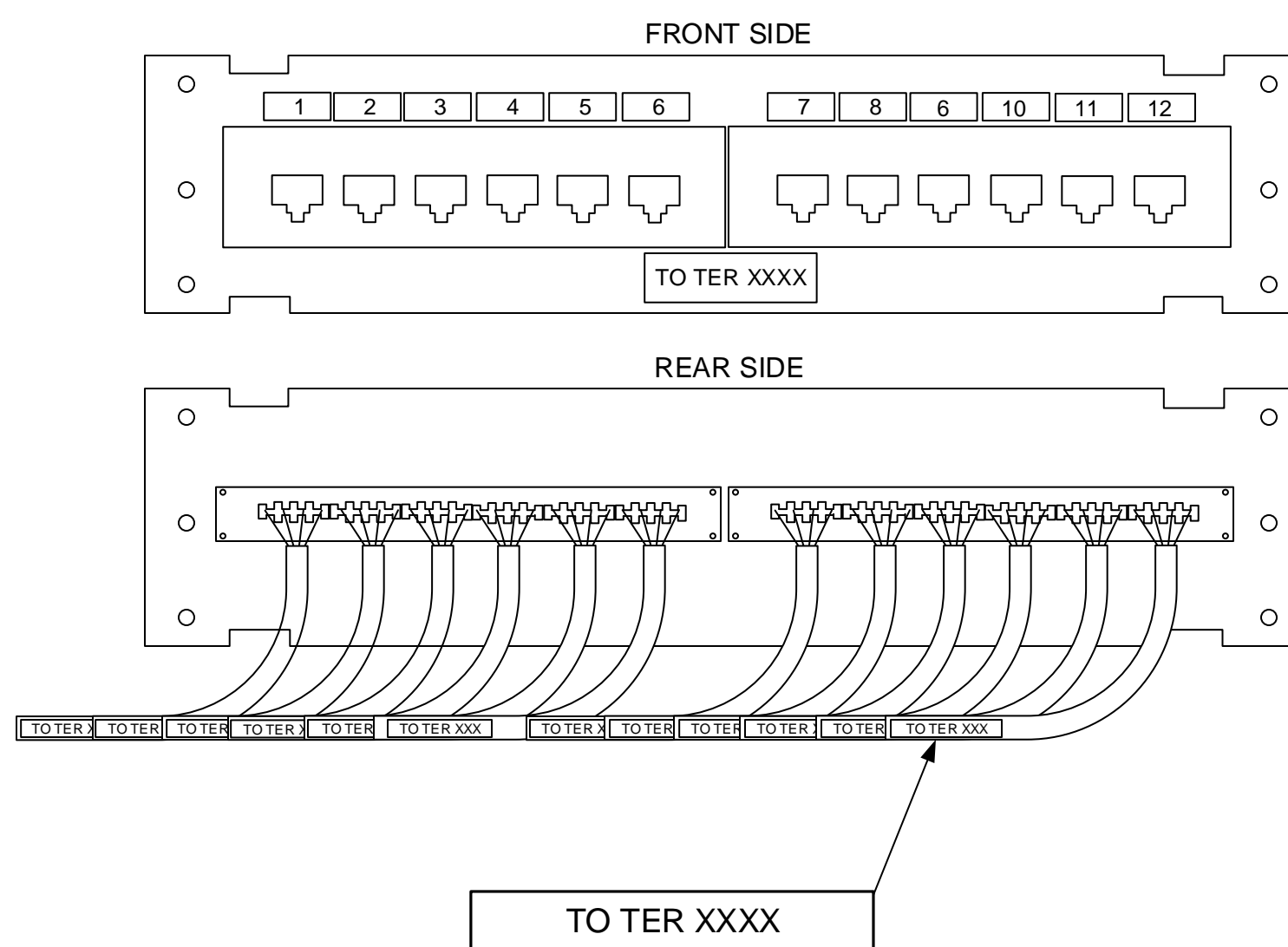
**B.49**



1 COPPER BACKBONE CABLE AND BUILDING ENTERANCE  
PROTECTOR LABLES



2 COPPER BACKBONE CABLE AND 110 BLOCK LABLES



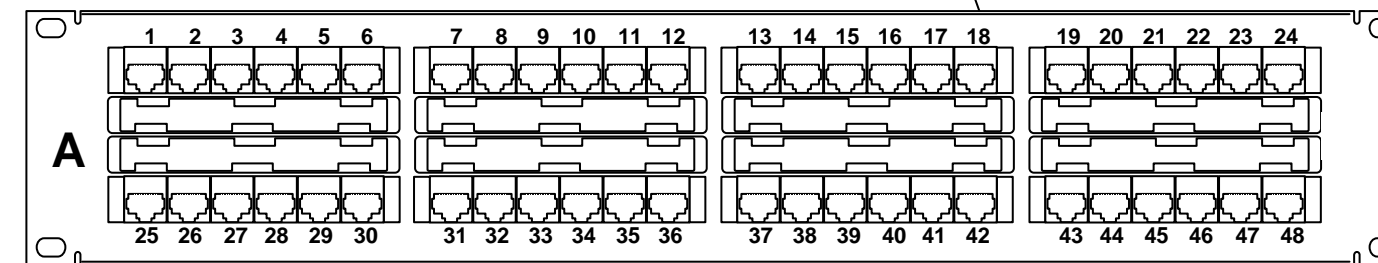
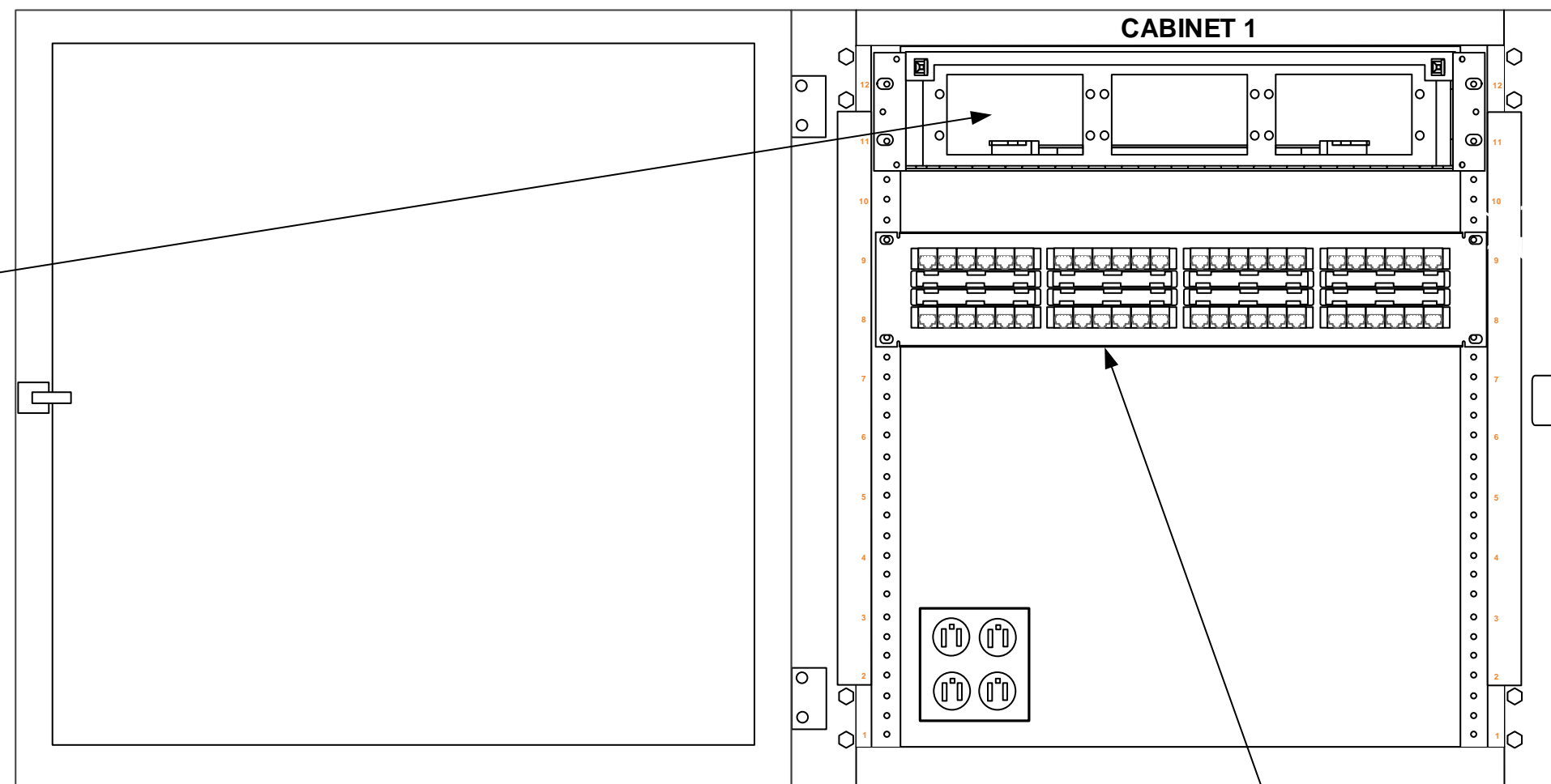
3 EF WALL MOUNTED 12 PORT PATCH PANEL LABELING  
DIAGRAM

TYPICAL LABELING DIAGRAMS

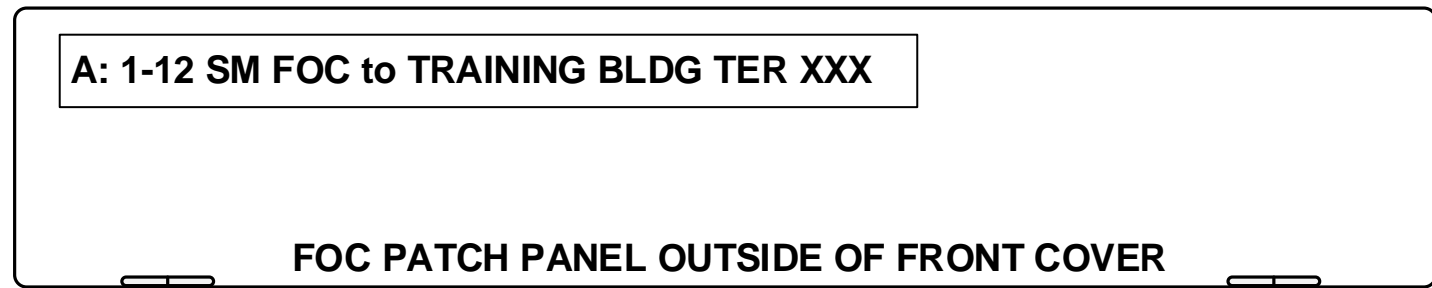
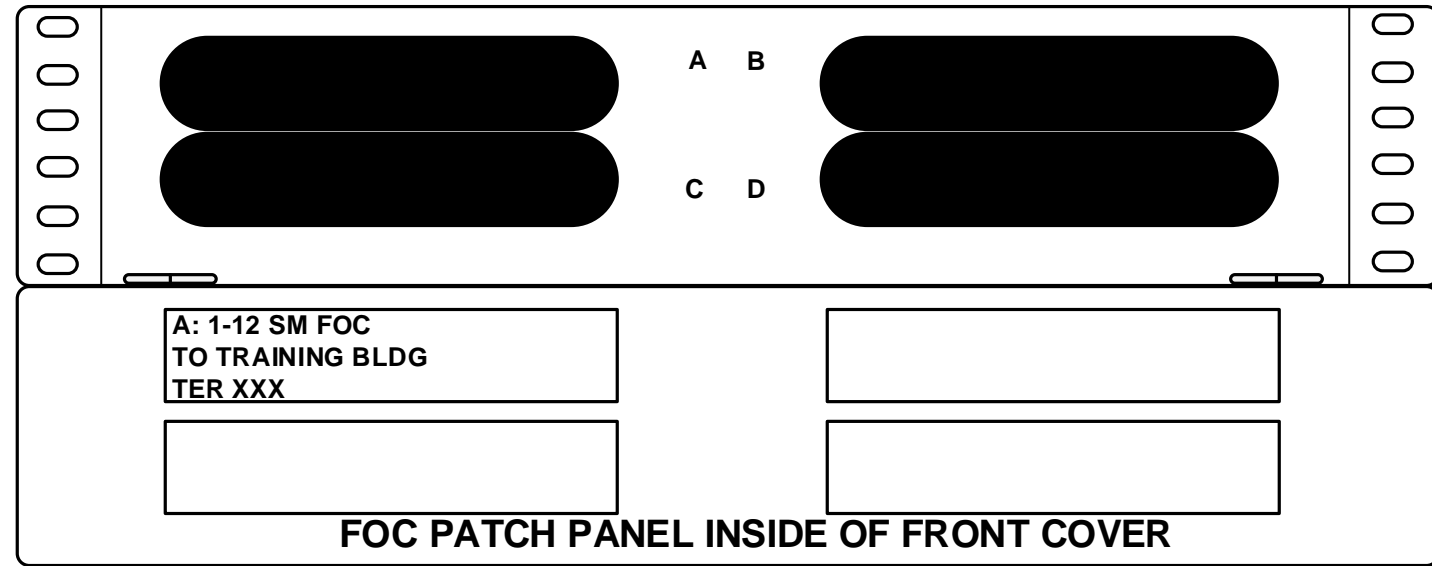




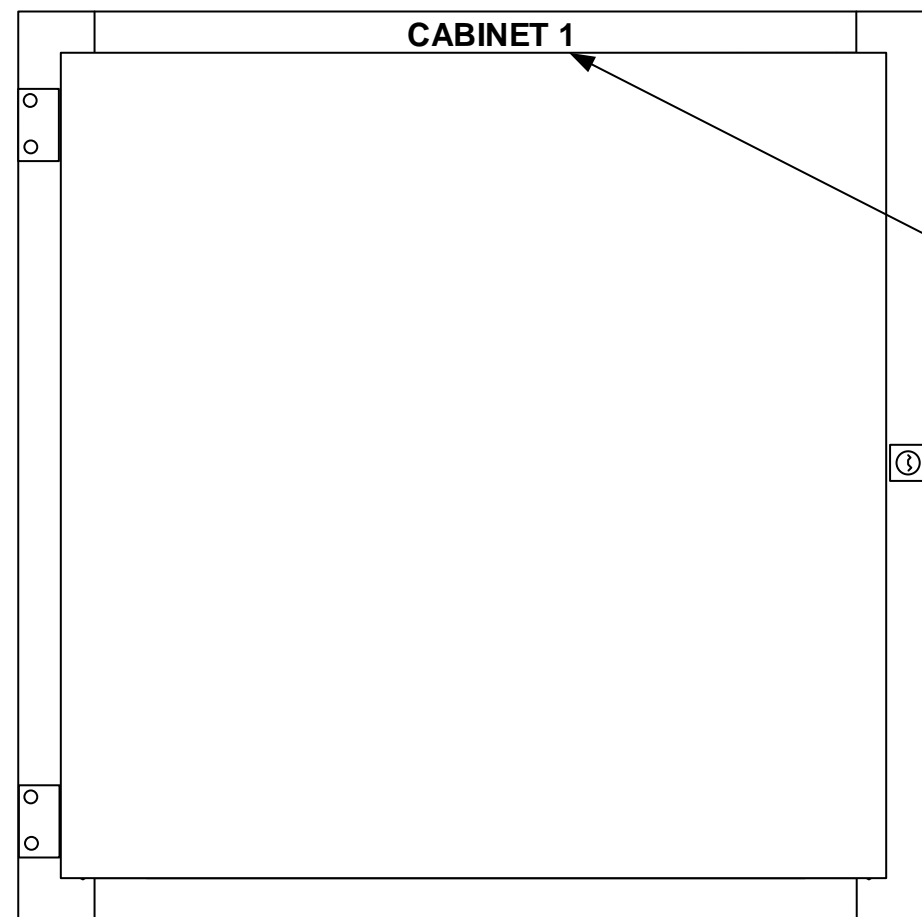
# TELECOMMUNICATIONS CABINET OPEN



## ENLARGED FOC PATCH PANEL DIAGRAM



## TELECOMMUNICATIONS CABINET CLOSED



**CABINET 1**



SYMBOL	REVISIONS	DATE	APPR.
	DESCRIPTION		

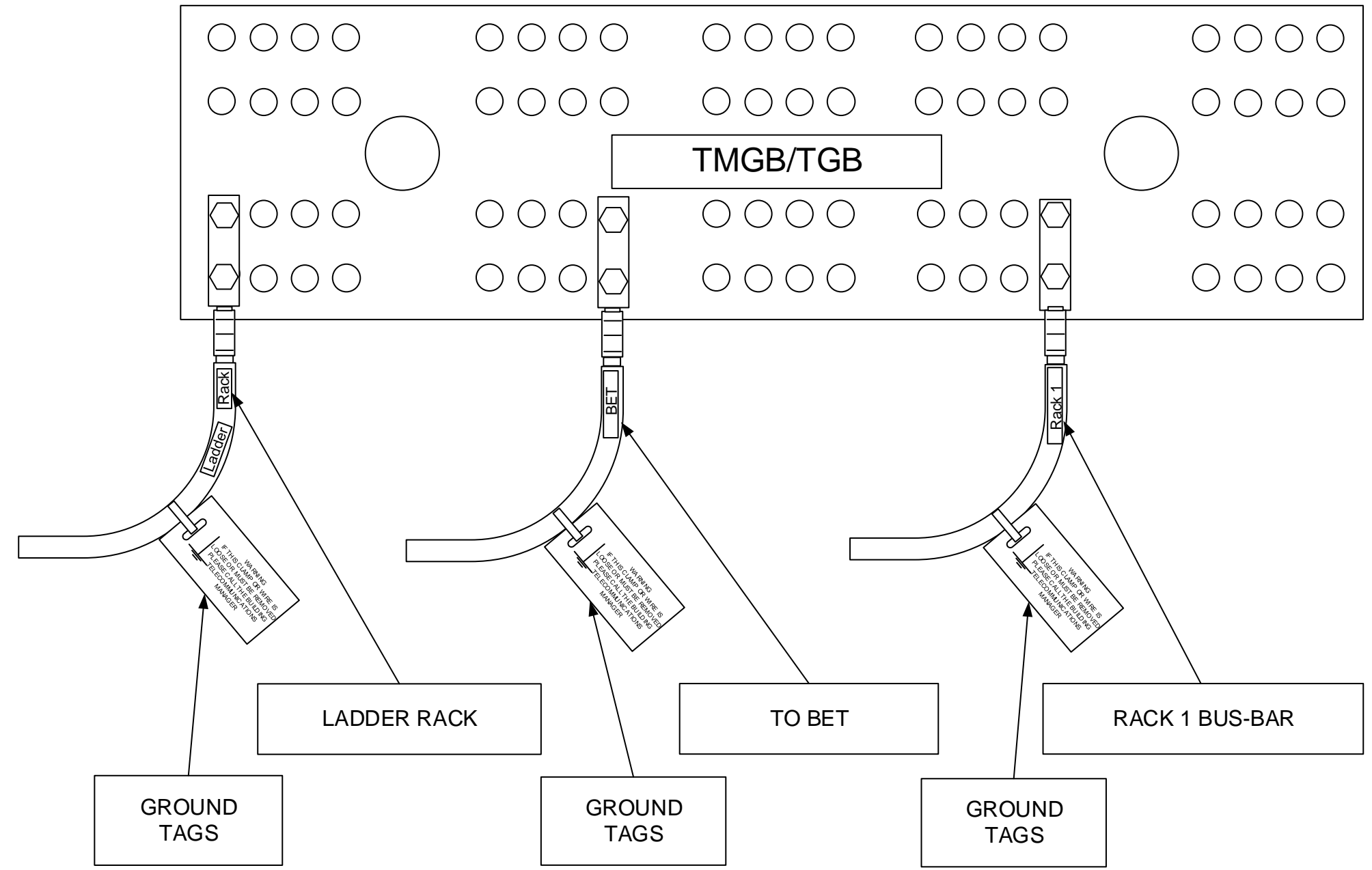
DESIGNED BY: JOHN BABB	DATE: FEBRUARY 2018
DESIGNED BY: DEREK MITCHELL	APPROVED FOR PUBLIC RELEASE:
REVIEWED BY: ROBERT BABB	DISTRIBUTION UNLIMITED
USARC G-6 RCDD	

USARC G-6  
NETWORKING AND  
INFRASTRUCTURE  
BRANCH  
INFRASTRUCTURE  
TEAM

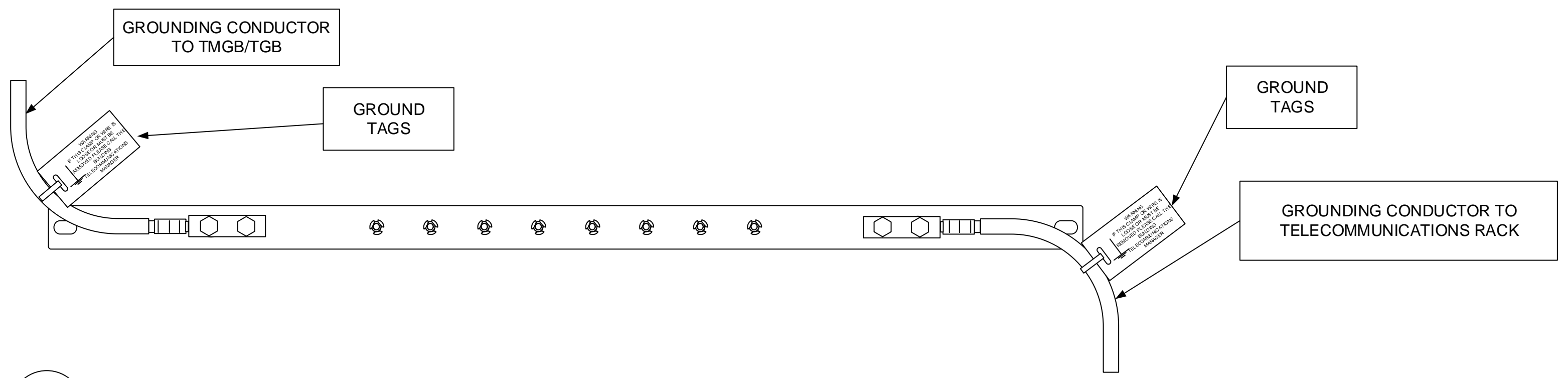
U.S. ARMY RESERVE  
NETWORK ENTERPRISE CENTER  
INFRASTRUCTURE  
TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

**B.51**

TYPICAL LABELING DIAGRAMS



1 WALL MOUNTED BUS-BAR/GROUNDING CONDUCTOR LABELING SCHEME



2 RACK MOUNTED BUS-BAR/GROUNDING CONDUCTOR LABELING SCHEME

TYPICAL LABELING DIAGRAMS



SYMBOL	REVISIONS	
	DESCRIPTION	DATE   APPR.

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INFRASTRUCTURE  
TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

B.52

**SHEET KEY NOTES**

- 1 WATER-PROOF SELF LAMINATING CABLE TAGS SHALL BE INSTALLED ON ALL BACKBONE CABLING WITHIN 1 FOOT OF ENTERING/EXITING CONDUIT OR SPLICE CASES.
- 2 MAINTENANCE HOLE STENCIL

**SHEET GENERAL NOTES**

1. ALL DIAGRAMS ARE TYPICAL EXAMPLES OF THE LABELING SCHEMES ONLY AND ARE NOT REFLECTIONS OF PROPER CABLE TERMINATIONS, LOCATIONS OR REQUIRED MAINTENANCE HOLE COMPONENTS OR SIZE



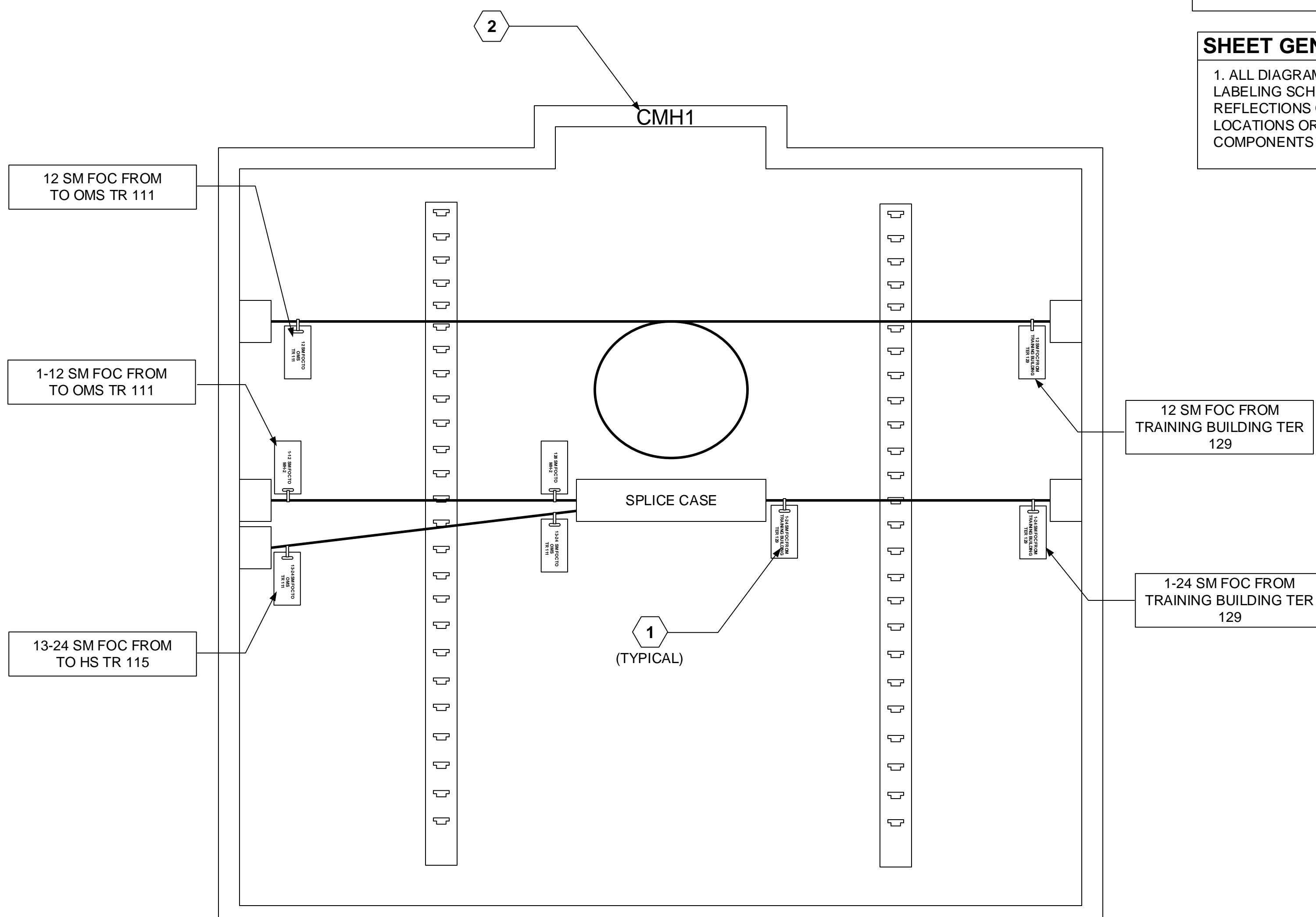
SYMBOL	REVISIONS DESCRIPTION	DATE	APPR.

DESIGNED BY:	DATE:
JOHN BABB	FEBRUARY 2018
DESIGNED BY:	APPROVED FOR PUBLIC RELEASE:
DEREK MITCHELL	ROBERT BABB
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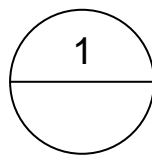
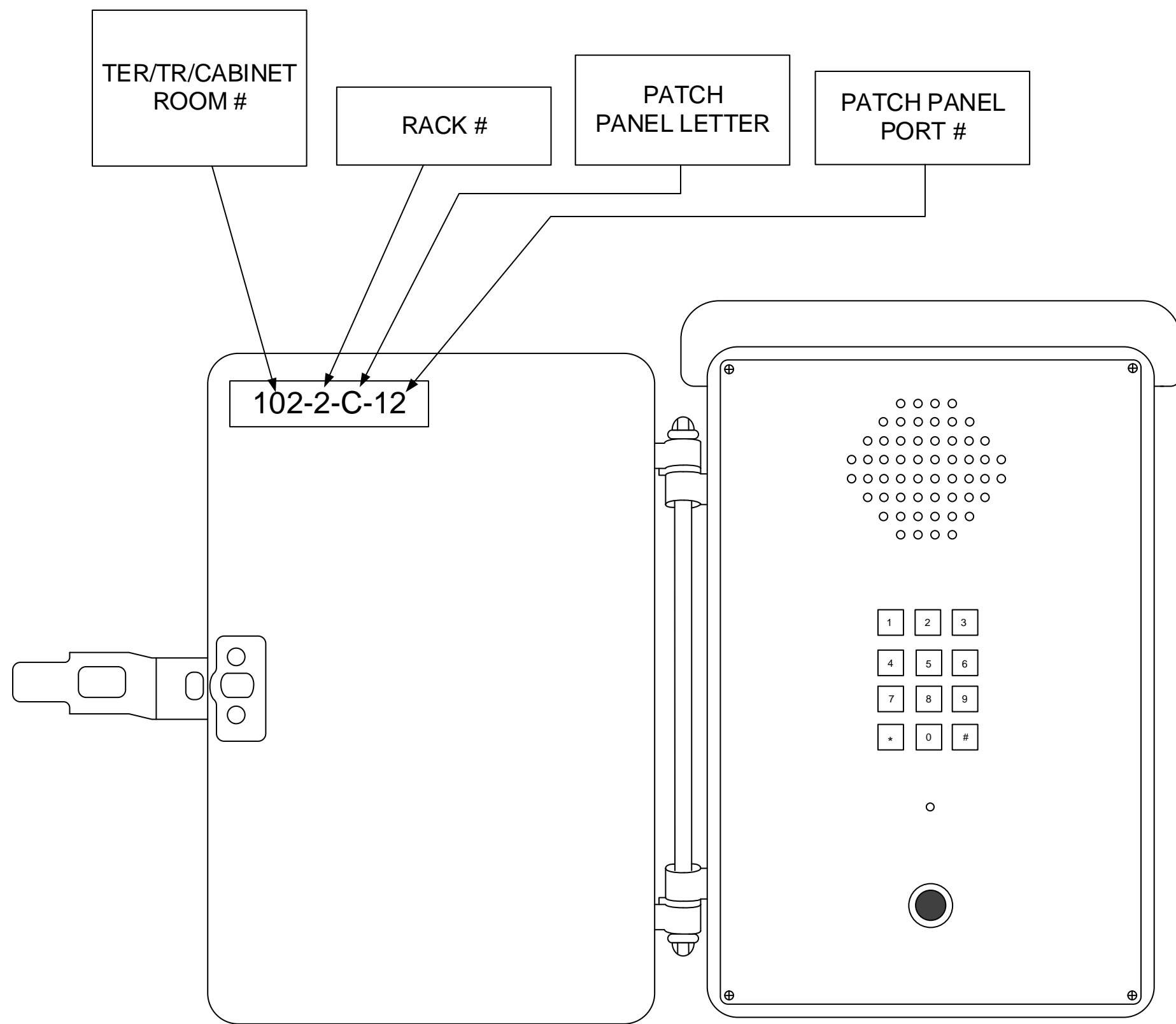
U.S. ARMY RESERVE NETWORK ENTERPRISE CENTER INFRASTRUCTURE TECHNICAL CRITERIA DIAGRAM AND DETAILS

**B.53**



1 TYPICAL MAINTENANCE HOLE LABELING SCHEMES

○ TYPICAL LABELING DIAGRAMS



CALL BOX LABELING SCHEME



SYMBOL	REVISIONS	
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INFRASTRUCTURE  
TECHNICAL CRITERIA  
DIAGRAM AND DETAILS

**B.54**

**TYPICAL LABELING DIAGRAMS**