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CELRL-PM-R

17 March 2015

ARCOS BULLETIN 2015-1

SUBJECT: IT Design

1. REFERENCE:
  - a. UFC 4-171-05, Army Reserve Facilities
  - b. Army Reserve IT Manual, Change 3
  - c. Army Reserve Design Process Submittal Requirements (DPSR)
  - d. USARC G-6 IT Design Criteria Updates, 9 March 2015 ( ENCLOSURE 1 )
2. This memorandum is to serve as updated guidance currently defined in Army Reserve IT Manual, Change 3, UFC 4-171-05, and the Army Reserve DPSR. The attached document has been prepared and approved by USARC G-6 and provides updates applicable to the design of Army Reserve Facilities.
3. The updates represent recent lessons learned and frequent IT design issues and omissions. This document will be incorporated into future updates of the Army Reserve IT Manual, Design Guide, and DPSR and is intended to be utilized as interim requirements until those updates occur.
4. This ARCOS Bulletin supersedes ARCOS Bulletin 2013-3. All applicable criteria from that bulletin have been incorporated into the attached enclosure.

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# USARC G-6

## Army Reserve

### IT Design and Construction Criteria Updates

Last Updated: 9 March 2015

#### 1. Document Purpose

- 1.1. This document is a bridging document for the Army Reserve IT Manual. Its purpose is to provide updated and/or new criteria for Army Reserve IT design and construction for MILCON projects. This document will be periodically reviewed, updated, and issued until the next major revision of the Army Reserve IT Manual is issued.

#### 2. IT Reference Documents

- 2.1. The design and construction of the IT Infrastructure for all MILCON projects follow basic industry standards and are required to be fully compliant with the criteria established by USARC G-6, ISEC and USACE.
- 2.2. To ensure that all MILCON projects are designed and constructed IAW all applicable criteria, in addition to the industry standard telecommunications references that are included in the Design Analysis, Construction Specifications and Drawings, the following criteria is to be added into the Design Analysis, Construction Specifications and Drawings as required reference documents.
  - 2.2.1. Army Reserve IT Manual
  - 2.2.2. Technical Criteria for the Installation Information Infrastructure Architecture (I3A)
  - 2.2.3. Latest ARCOS IT Bulletin

### 3. Lessons Learned

3.1. USARC G-6 has identified several Design/Construction Errors that occur on a frequent basis. In order to avoid these IT Design/Construction Errors, a description of the item and method of avoiding the Design/Construction Error are listed below;

3.1.1. **Design/Construction Error:** RCDD stamp missing from the Certified Final Telecommunications Design Package.

3.1.1.1. **Corrective Action Required:** IAW I3A and the Army Reserve IT Manual, RCDD review, approval, certification is required prior to issuing Certified Final. The Certified Final must have the RCDD stamp on the Title Page of the drawing package.

3.1.2. **Design/Construction Error:** Voice and Data outlet termination “serving areas” are not clearly defined on telecommunications drawings.

3.1.2.1. **Corrective Action Required:** IAW I3A, in buildings with the TER and TR or multiple TRs on the same floor, each telecommunications floor plan sheet (i.e. 1T-XXX) should clearly indicate the TER/TR the voice and data outlets are to be terminated in. For example, a General Note which states, “All voice/data outlets on this sheet are to be terminated in TER/TR XXX)” could be added to each applicable sheet.

3.1.3. **Design/Construction Error:** Water, Gas, and Mechanical pipes that don’t serve the EF, TER, and TR(s) are often designed to pass thru, below, or above these spaces.

3.1.3.1. **Corrective Action Required:** IAW the Army Reserve IT Manual, this is not allowed. The Designer of Record shall be cognizant of this requirement as the Fire Safety, Plumbing, and Mechanical designs are created. G-6 also requires that the following note be added to the Fire Safety, Plumbing, and Mechanical drawings general notes pages: “Equipment (piping, ductwork, machinery, etc) that does not serve the EF, TER, or TR(s) shall not be installed above, below (i.e. in or under slab) or in these IT spaces nor will this equipment pass through or enter the EF, TER, or TR(s).”

3.1.4. **Design/Construction Error:** Motors, transformers, or other electrical devices greater than 5KVA are located within 47” of the EF, TER, and TR(s). This can often cause an EMI issue. EMI issues are very difficult to isolate and often expensive to mitigate.

3.1.4.1. **Corrective Action Required:** To avoid the possibility of EMI, the Designer of Record shall be cognizant of this issue as the Mechanical and Electrical designs are created. 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, or TR(s). G-6 also requires that the following note be added to the Mechanical and Electrical drawings general notes pages: “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).”

3.1.5. **Design/Construction Error:** Windows are being included in the design of the EF, TER, and TR(s). IAW I3A, windows are not allowed in EF, TER, and TR(s).

- 3.1.5.1. **Corrective Action Required:** To avoid costly construction modifications and delays, the AE firm must thoroughly review the design to ensure that windows ARE NOT placed in the EF, TER, and TR(s). This includes the doors to these spaces.
- 3.1.6. **Design/Construction Error:** Floor plans do not include the required number of TRs.
  - 3.1.6.1. One TR is required for every 10 thousand square feet of useable floor space but there is often confusion as to what is NOT considered to be useable floor space.
  - 3.1.6.2. Typical spaces NOT considered as useable floor space
    - 3.1.6.2.1. Hallways/Corridors
    - 3.1.6.2.2. Vestibules
    - 3.1.6.2.3. Lobby
    - 3.1.6.2.4. Storage Rooms
    - 3.1.6.2.5. Kitchen (except for Kitchen office)
    - 3.1.6.2.6. Scullery
    - 3.1.6.2.7. Mechanical Rooms
    - 3.1.6.2.8. Electrical Rooms
    - 3.1.6.2.9. Janitor Closets
    - 3.1.6.2.10. Physical Readiness Room
    - 3.1.6.2.11. Locker Rooms
    - 3.1.6.2.12. Restrooms
    - 3.1.6.2.13. Unit Storage
    - 3.1.6.2.14. Arms Vault
    - 3.1.6.2.15. Elevator
    - 3.1.6.2.16. Elevator Machine Room
    - 3.1.6.2.17. Stairwells
    - 3.1.6.2.18. Battery Room
    - 3.1.6.2.19. Fluid Distribution Room
- 3.1.7. **Design/Construction Error:** Horizontal category 6 cabling is not properly supported on the back of the patch panel
  - 3.1.7.1. **Corrective Action Required:** Use support braces included with standard category 6 patch panels or support the cable so that the weight of the cable doesn't pull on the termination point.
- 3.1.8. **Design/Construction Error:** Cabling is not properly supported as it enters the IT space via sleeves/mechanical fire-stops.
  - 3.1.8.1. **Corrective Action Required:** Install wall mounted radius drop-outs directly below the sleeves/mechanical fire-stops.
- 3.1.9. **Design/Construction Error:** Basket style cable tray enters the IT space from the corridor
  - 3.1.9.1. **Corrective Action Required:** Stop the basket style cable tray at the corridor wall. Sleeves/mechanical fire-stops must be used as cable entry points.

## 4. IT Design Criteria Updates

### 4.1. New/Revised Requirements Updates

#### 4.1.1. Wireless Access Point Outlet Design Requirements

4.1.1.1. The following requirements supersede wireless/WIFI requirements found in the Army Reserve IT Manual w/change 3, and I3A February 2010.

4.1.1.1.1. Place one WAP outlet (1 Jack) at the center of each 40 by 40-foot square grid

4.1.1.1.2. The following spaces are excluded from the WAP outlet requirement. Note that these spaces are typical for a standard Army Reserve Center. Other Facility types (i.e. TEMF, TASS)/space types will be considered on a case by case basis.

4.1.1.1.2.1. SIPRNet Café

4.1.1.1.2.2. Kitchen (except for Kitchen office)

4.1.1.1.2.3. Scullery

4.1.1.1.2.4. Mechanical Rooms

4.1.1.1.2.5. Electrical Rooms

4.1.1.1.2.6. Locker Rooms

4.1.1.1.2.7. Janitors Closets

4.1.1.1.2.8. Individual Storage Rooms

4.1.1.1.2.9. Restrooms

4.1.1.1.2.10. Arms Vault

4.1.1.1.2.11. Elevator

4.1.1.1.2.12. Elevator Machine Room

4.1.1.1.2.13. Stairwells

4.1.1.1.2.14. Battery Room

4.1.1.1.2.15. Fluid Distribution Room

4.1.1.1.3. Mounting Details

4.1.1.1.3.1. For all standard height drop ceiling locations, each Wireless Access Point outlet will be mounted 12 inches above finished ceiling

4.1.1.1.3.2. For high height ceilings (i.e. Assembly Halls and Work Bays), each Wireless Access Point outlet will be mounted on the wall at 12 feet AFF

4.1.2. The Army Reserve is migrating to an enterprise VOIP solution. To help prepare for this, there no longer a distinction between voice and data outlets

4.1.2.1. All typical voice/data outlets (2 jacks) will now be designated as an IT outlet (1 jack)

4.1.2.2. All other voice only outlets will be designated as simply IT outlet (1 jack)

4.1.2.3. All horizontal category 6 cabling will now have a blue jacket and all jacks will be blue in color. The only exception to this is that SIPR outlets are still required to have red cable jacket and red jacks. Note that the category 6 cable and jack installed from the SIPRNet Café to the EF shall have a blue jacket and blue jack

4.1.3. The new benching style furniture has changed the IT outlet requirements in all Admin Common and User Common areas. New requirements are as follows;

- 4.1.3.1. Each Benching Table configuration will require 1 convenience IT outlet (1 jack). This outlet shall be located on the wall in the vicinity of the Benching Table
- 4.1.3.2. Each Benching Desk (bench with credenza) configuration will require 1 IT outlet (1 jack) per seat
- 4.1.3.3. 1 Multi-Function Device IT outlet (2 jacks) is required for each Multi-Function Device (MFD) or Copy/Print Station location
- 4.1.4. All horizontal category 6 cabling will now be terminated IAW the T568B pin-out.
- 4.1.5. The top and bottom 2U horizontal wire manager in all IT racks are no longer required. See Section 5 Diagrams for further clarification
- 4.1.6. 2U horizontal wire managers are not required in Rack 4 (spare rack) in the TER. See Section 5 Diagrams for further clarification
- 4.1.7. All consolidation points installed must allow for the cabling from the wall outlet to the TER/TR to pass all Category 6 permanent link tests. This will require the contractor to install a Category 6 consolidation point designed explicitly for this purpose.
- 4.1.8. Grounding and Bonding Requirements
  - 4.1.8.1. G-6 has determined that the grounding and bonding design requirements in the Army Reserve IT Manual are no longer valid. The Electrical DOR and construction contractor shall use the requirements listed in ANSI/TIA-607-B for all IT Grounding and Bonding.
  - 4.1.8.2. Per requirements adopted in ANSI/TIA-607-B a rack-mounted horizontal TGB must be added to each IT rack. Locate this rack-mounted horizontal TGB at the top rear of the rack. See Section 5 Diagrams for further clarification
  - 4.1.8.3. Due to the large number of metallic telecommunications components required to be bonded, each wall-mounted TMGB or TGB shall be a minimum of 24 inches in length
  - 4.1.8.4. Each wall-mounted TMGB/TGB shall be predrilled with standard 5/16" Holes in a 2 hole configuration
  - 4.1.8.5. Each wall-mounted TMGB/TGB shall have listed insulators and mounting brackets. For wall-mounted TMGB/TGB, a minimum of 50.8 mm separation from the wall is required to allow access to the rear of the bus bar
  - 4.1.8.6. Each TMGB/TGB shall be copper or a copper alloy with a minimum of 95% conductivity
  - 4.1.8.7. Each wall-mounted TMGB/TGB shall be Electro-Tin-Plated (ETP) to reduce contact resistance and corrosion
- 4.1.9. Each strand of terminated fiber will be tested at both ends with an OTDR
- 4.1.10. USARC G-6 concurrence is now required for the IT Infrastructure submittals found in Specifications sections 26 20 00, 27 05 28.36 40, 27 10 00, 27 13 23.00 40, 33 82 00. Note that CATV, security, access control, and AV specifications are excluded from this requirement.
- 4.1.11. USARC G-6 concurrence is now required for the test results for all IT Infrastructure category 6 cabling, fiber backbone cabling, copper backbone cabling, and the ground-earth resistance tests for all TMGB/TGB installed in the EF, TER, and TR(s).

- 4.1.11.1. All Low-voltage cabling tests must be performed IAW with the requirements listed in the specifications and I3A.
- 4.1.12. Specific labeling requirements have changed. See Section 5 Diagrams for further clarification
- 4.1.13. All floor sleeves are required to be mechanical fire-stop sleeves. Initial fill ratio of each sleeve shall be 40% or less
- 4.1.14. The spacing between rungs for all ladder rack has been revised from 9 inches to 12 inches
- 4.1.15. The use of plastic tie-wraps on all horizontal category 6 cabling is NOT allowed. ¾ inch (minimum) size Velcro fasteners must be used
- 4.1.16. As a possible cost savings measure, the IT DOR should consider the use of Low-voltage mounting brackets (i.e., mud ring, plaster ring, square-drawn cover, box eliminator) as an alternative to the use of standard boxes with conduit. These can be considered in non-fire rated walls only
- 4.1.17. In order to provide the IT DOR and the construction contractor additional guidance regarding Army Reserve IT requirements and USARC G-6 expectations, numerous diagrams have been revised/added to Section 5 Diagrams

#### **4.2. Previous Requirements Updates**

- 4.2.1. As the IDS Panel is no longer required in the SIPRNet Café, the IDS data and voice cables and conduit from the SIPRNet Café to the TER are no longer required.
- 4.2.2. In order to allow for the DS-3 Circuit extension, add (2) 75 ohm RG-6 cables (Siamese type) from the TER distribution rack to the EF. Terminate with BNC connectors. Cables shall be long enough so there is enough slack to reach the bottom of the distribution rack and 20 ft. of slack in the EF.
- 4.2.3. The use of (2) 3 inch-3 cell Maxcell inner duct with tracer wire (or approved equal) is allowed in place of typical rigid inner duct.
- 4.2.4. The use of the Common Cabling System Approach is now approved for use on all projects where this approach is feasible and cost effective. Note that, for all projects being built on active army camps, posts, and stations, the IT DOR must obtain NEC approval before using this approach.
  - 4.2.4.1. All Low-Voltage signal cable can share the same corridor pathway (i.e. cable tray, conduit).
  - 4.2.4.2. The initial fill ratio for cable tray has been raised from 25% to 50%.
- 4.2.5. As DS-3 circuits are now used in all Army Reserve MILCON projects, the EF is now included in the list of telecommunications spaces requiring HVAC and must be conditioned IAW the requirements listed in this bulletin, the Army Reserve IT Manual, and I3A.
- 4.2.6. A minimum of 2-4 inch conduit sleeves are required for non-fire rated wall cable entry points in the TER and TR(s). Initial fill ratio shall be 40% or less.
- 4.2.7. For all fire rated walls, the use of mechanical fire stops is required. Initial fill ratio shall be 40% or less.

- 4.2.8. All IT racks must have a minimum of 12 inches of clearance from the left or right side (whichever is closest to the wall). 36 inches of clearance is still required from the front and back of all IT racks.
- 4.2.9. Horizontal Cabling Conduit requirements
- 4.2.9.1. All conduits must be sized for an initial fill ratio of 40% or less. This 40% fill ratio must be based on an O.D. of .26". The minimum size conduit allowed to be used is 1 inch.
- 4.2.9.2. Modular furniture system connections (up to 12 Category 6 cables) require a 2 inch liquid-tight flexible metal conduit and fittings to connect each floor box or wall box to the acoustic panel raceway.
- 4.2.9.3. All in-slab floor box locations require 2-1.25 inch (minimum) conduits (**one in-use and one spare**) be installed. Only the first conduit can have cable installed. The second must remain empty.
- 4.2.10. IAW the Army Reserve IT Manual, the Category 6 cable installed in all on-grade in-slab conduits must be rated for use in wet locations.
- 4.2.10.1. Consolidation Points for transition from Wet-rated to Plenum-rated cable must be included in the design if the distance from the conduit exit point to the TER/TR exceeds 49 ft and the cable will pass thru a plenum space.
- 4.2.11. USARC G-6 has developed a Standard Telecommunications Symbols Legend. This legend is required to be used as the basis of design for the IT DOR's Telecommunications Symbol Legend. See Section 5 Diagrams for further clarification
- 4.2.12. Cable requirements from the TER to the UHS have been reduced. Only 6 pair of OSP copper cable is now required. There is no requirement for Fiber Optic cable.
- 4.2.13. Clean Power circuits as referenced in the Army Reserve IT Manual are no longer mandated. Where clean power circuits are referenced, power circuits are still required. The Electrical DOR shall design the electrical system to reduce or eliminate harmonics IAW current codes, standards, and best practices.
- 4.2.14. Electrical Outlet requirements for the EF, TER, and TR(s) have been significantly revised.
- 4.2.14.1.1. The electrical panel for the EF, TER, and TR(s) must be located in the space that it serves.
- 4.2.14.1.2. Entrance Facility – Service Provider Outlet requirements for DS3 data circuits can vary greatly. IT DOR should coordinate with the Local LEC to determine the power receptacle(s) required for the Government Furnished Data (DS3) and Voice (PRI) circuits. If unable to determine the power receptacle(s) required, then indicate one dedicated circuit with one NEMA L5-15 receptacle and one dedicated circuit with one double duplex NEMA 5-20 receptacle. These receptacles will be installed on the plywood backboard at 18" AFF near the Service Provider Conduits.
- 4.2.14.1.3. TER and all TR(s) - New requirements call for one dedicated 120V/20 Amp circuit with one double duplex NEMA 5-20 receptacle for each 19 inch (480 mm) rack or cabinet in the TER and all TR(s). This receptacle shall be mounted 15" AFF on the rear of the rack.



- 4.2.15. HVAC requirements for the TER and TR(s) have also been revised. The following is provided as additional guidance to help the HVAC Designer meet the requirements as listed in the Army Reserve IT Manual and I3A.
- 4.2.15.1.1. For heat load calculations use the heat dissipation information from the actual equipment to be installed in each rack. This information should be coordinated with the USARC G-6 representative for the project. If it is determined this information is not available, then 1650 Watts per IT rack will be used as a default value.
- 4.2.16. Conduit requirements from the TER to the UHS have been reduced. Only 1-4" conduit with 3-1.25" innerduct is now required.
- 4.2.17. The Arms Vault IDS System Panel locations now require a voice/data outlet from the IDS system panel to the nearest TER/TR. This voice/data outlet must be installed in 1" EMT conduit from the IDS panel and terminated in the appropriate patch panel. Terminate the voice and data cable in the IDS Panel with an RJ45 jack. Provide 8-12 inches of slack cable in the IDS panel.
- 4.2.18. GPON as defined in section 3.2.7 of the Army Reserve IT Manual will no longer be considered as an IT design alternative and this section is no longer applicable to Army Reserve MILCON projects.

## 5. Diagrams

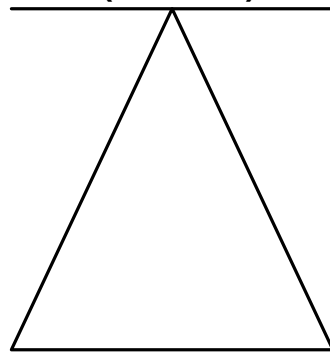
The purpose of these diagrams is to give the IT DOR and the construction contractor additional guidance regarding Army Reserve IT requirements and USARC G-6 expectations

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

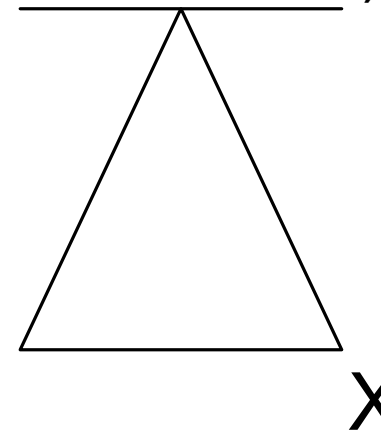
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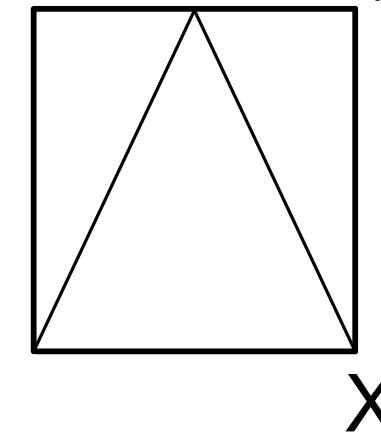
STANDARD IT OUTLET  
(1 JACK)



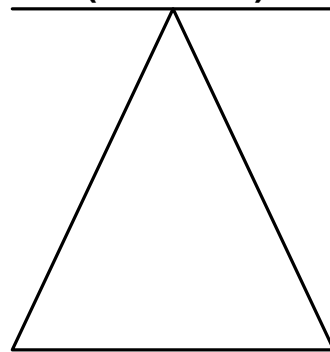
STANDARD IT OUTLET  
("X" DENOTES NUMBER OF JACKS)



FLOOR BOX STANDARD IT OUTLET  
("X" DENOTES THE NUMBER OF JACKS)

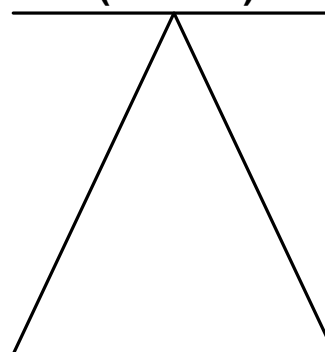


MULTI FUNCTION DEVICE IT OUTLET  
(2 JACKS)



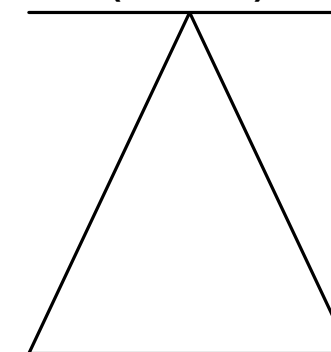
MFD

DDC SYSTEM IT OUTLET  
(1 JACK)



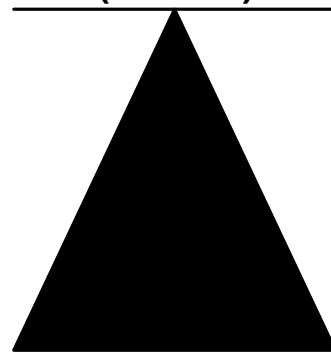
DDC

WIRELESS ACCESS POINT IT OUTLET  
(1 JACK)



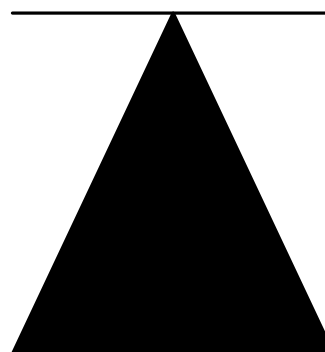
WAP

EXTERIOR CALL BOX  
(1 JACK)



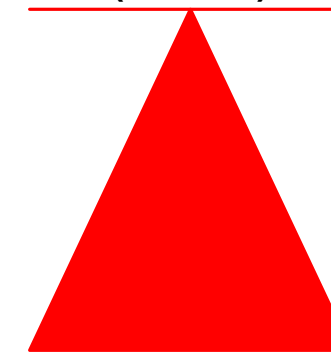
CB

STANDARD WALL PHONE IT OUTLET  
(1 JACK)  
(W= 2 LUG FACEPLATE)



W

SIPRNET WORKSTATION IT OUTLET  
(1 JACK)



S

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UNIFIED COMMUNICATIONS  
IT INFRASTRUCTURE TEAM

USARC G-6  
ARMY RESERVE  
IT DESIGN AND CONSTRUCTION  
CRITERIA UPDATES DIAGRAMS

A1 STANDARD TELECOMMUNICATIONS SYMBOL LEGEND

Figure 5.01

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

FOR OFFICIAL USE ONLY

**SHEET KEY NOTES**

- 1 7'X19"W 2 POST EQUIPMENT RACK WITH 6 INCH CHANNELS, RMU MARKINGS, SUPPORT UP TO 1500LB STATIC LOAD
- 2 2U HORIZONTAL WIRE MANAGEMENT UNIT
- 3 4U FIBER PATCH PANEL
- 4 2U 48 PORT CAT. 6 PATCH PANEL
- 5 7'HX8"WX14.61"D DOUBLE SIDED, DOUBLE HINGED VERTICAL WIRE MANAGERS



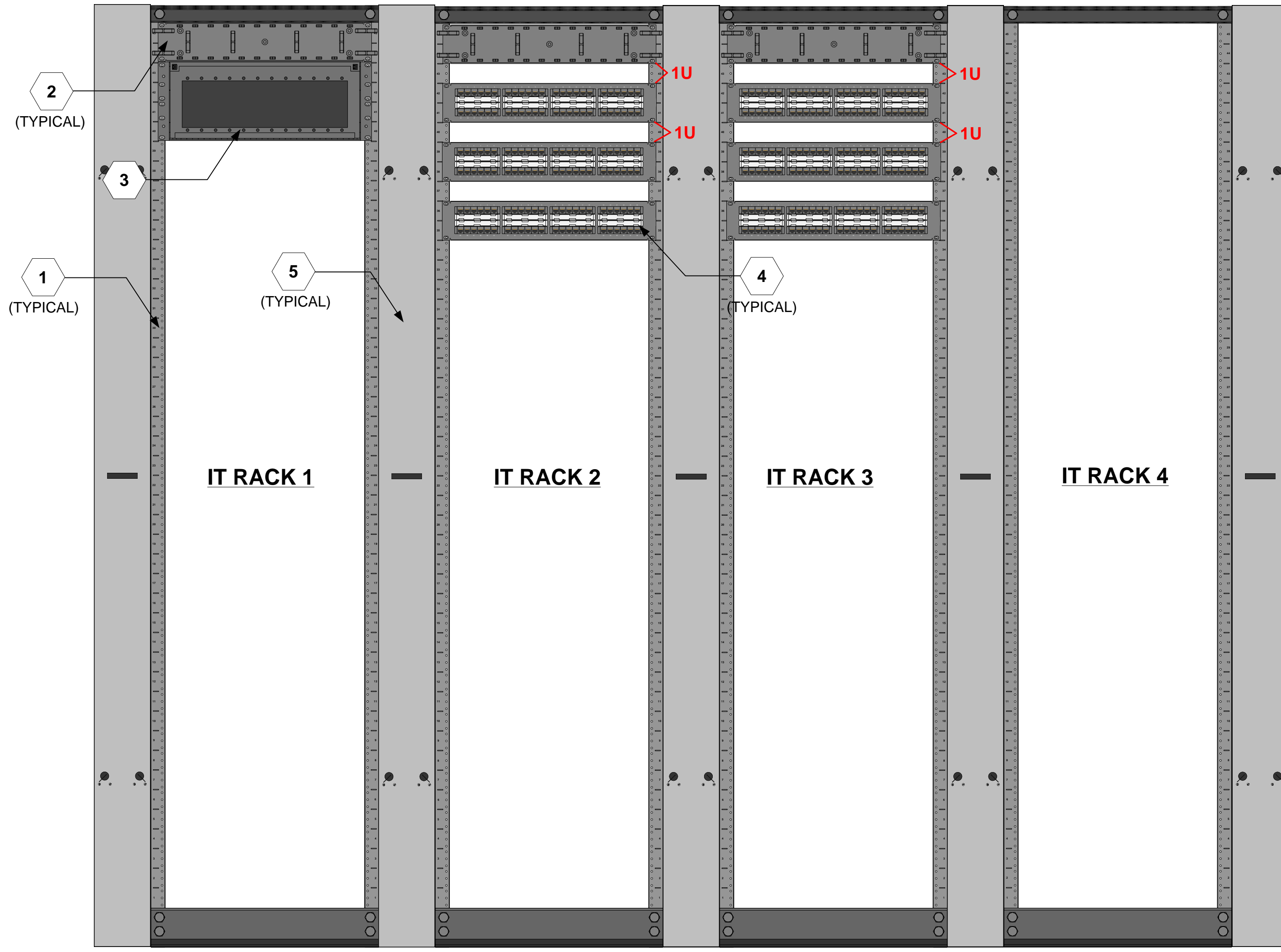
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| DESIGNED BY:<br>JOHN BABB      | DATE:<br>FEBRUARY 2015 |
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| REVIEWED BY:<br>ROBERT BABB    |                        |
|                                | USARMC G-6 RCDD        |

USARMC G-6  
UNIFIED COMMUNICATIONS  
IT INFRASTRUCTURE TEAM

USARMC G-6  
ARMY RESERVE  
IT DESIGN AND CONSTRUCTION  
CRITERIA UPDATES DIAGRAMS

Figure  
5.02



A1 TYPICAL TER IT RACKS COMPONENTS FRONT VIEW

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

FOR OFFICIAL USE ONLY

**SHEET KEY NOTES**

- 1 DEDICATED DOUBLE DUPLEX NEMA 5-20R RECEPTACLE, MOUNTED 15" AFF ON THE REAR OF THE RACK
- 2 1 INCH X 19 INCH RACK MOUNTED TGB

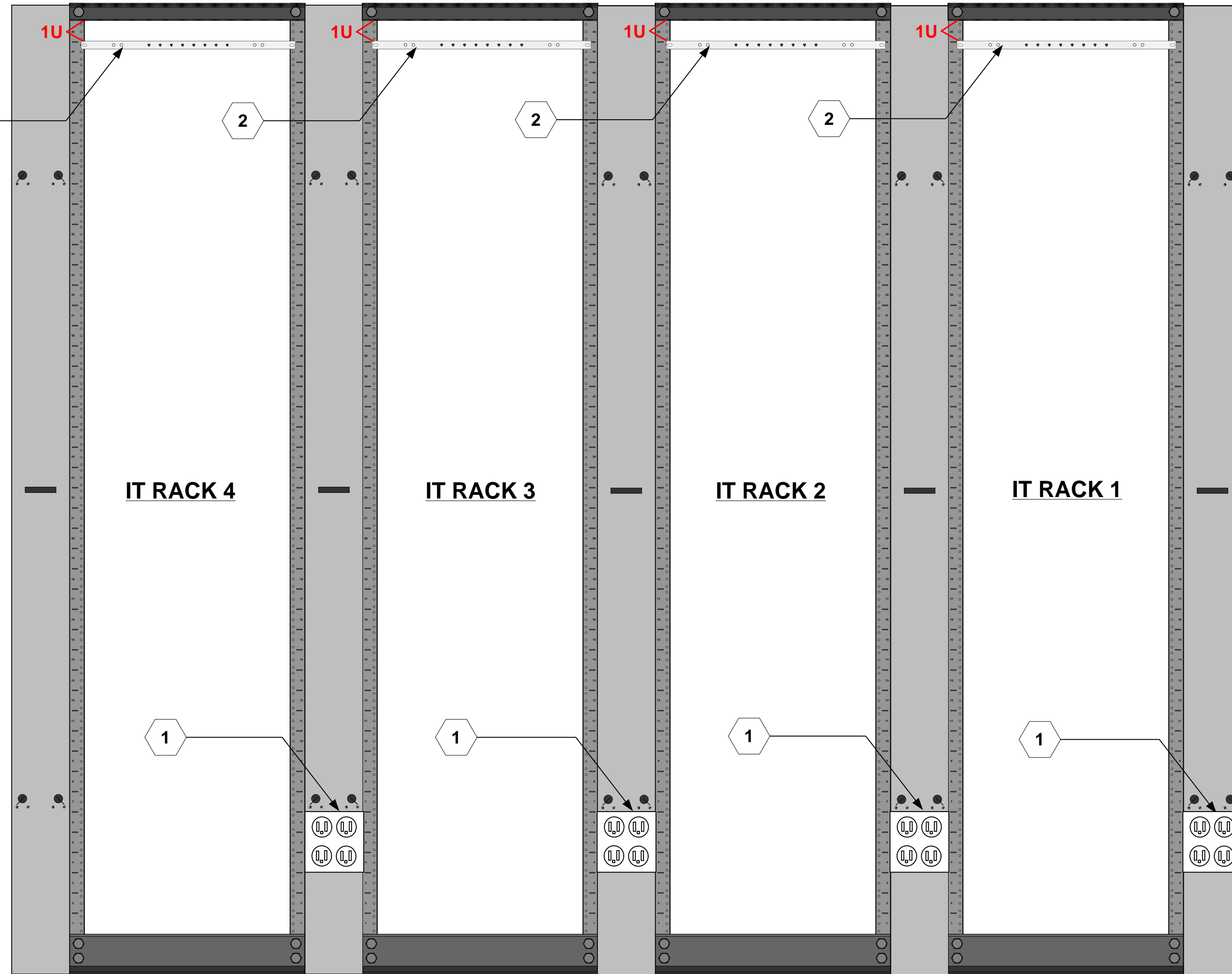


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| USAR C G-6<br>UNIFIED COMMUNICATIONS<br>IT INFRASTRUCTURE TEAM | DESIGNED BY:<br>JOHN BABB                      | DATE:<br>FEBRUARY 2015 |
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|  | REVIEWED BY:<br>ROBERT BABB<br>USAR C G-6 RCDD |                        |

USAR C G-6  
ARMY RESERVE  
IT DESIGN AND CONSTRUCTION  
CRITERIA UPDATES DIAGRAMS

Figure  
5.03



A1 TYPICAL TER IT RACKS COMPONENTS REAR VIEW

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

FOR OFFICIAL USE ONLY

**SHEET KEY NOTES**

- 1 7'X19"W 2 POST EQUIPMENT RACK WITH 6 INCH CHANNELS, RMU MARKINGS, SUPPORT UP TO 1500LB STATIC LOAD
- 2 2U HORIZONTAL WIRE MANAGEMENT UNIT
- 3 2U FIBER PATCH PANEL
- 4 2U 48 PORT CAT. 6 PATCH PANEL
- 5 7'HX8"WX14.61"D DOUBLE SIDED, DOUBLE HINGED VERTICAL WIRE MANAGERS
- 6 DEDICATED DOUBLE DUPLEX NEMA 5-20R RECEPTACLE, MOUNTED 15" AFF ON THE REAR OF THE RACK
- 7 1 INCH X 19 INCH RACK MOUNTED TGB

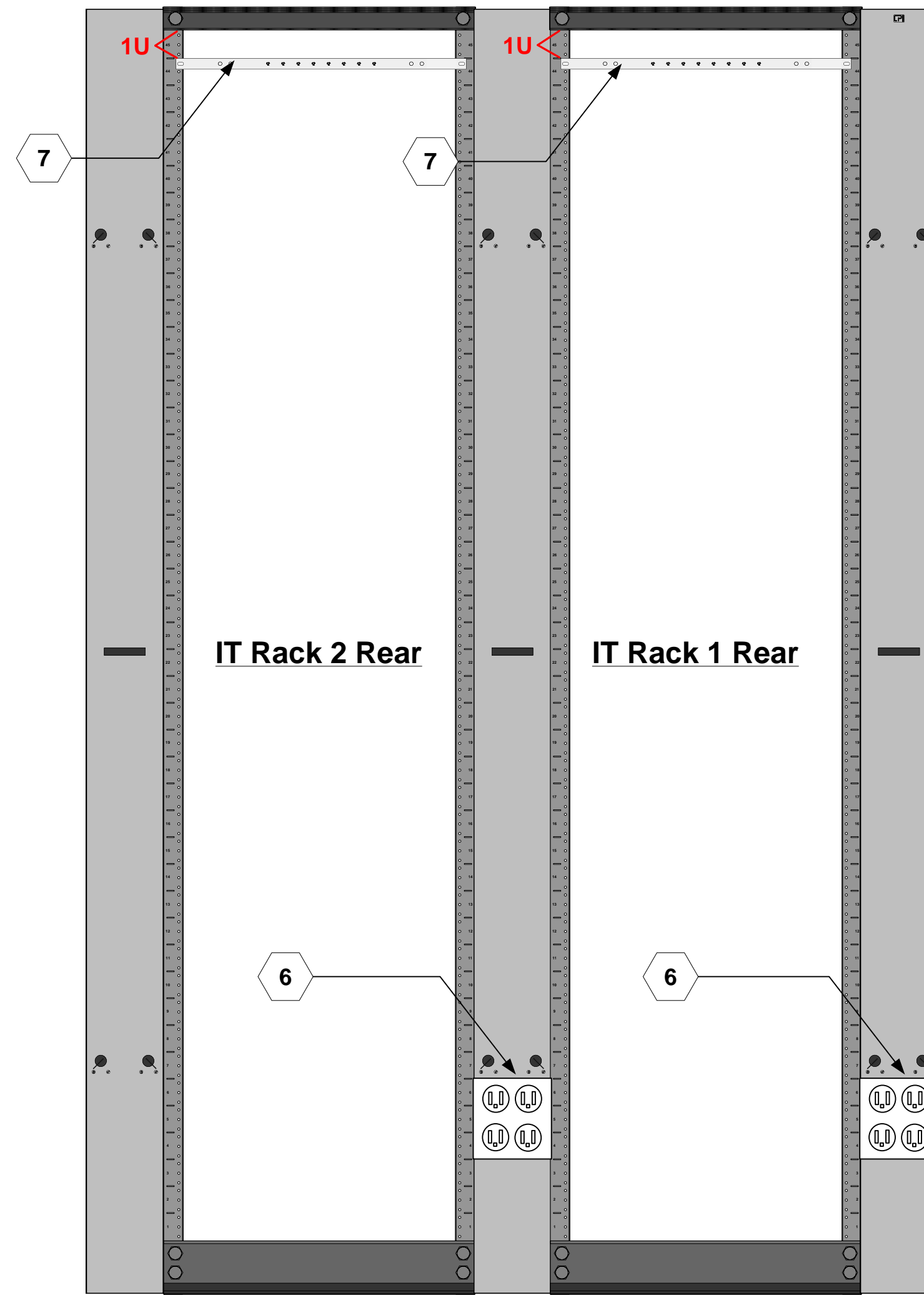
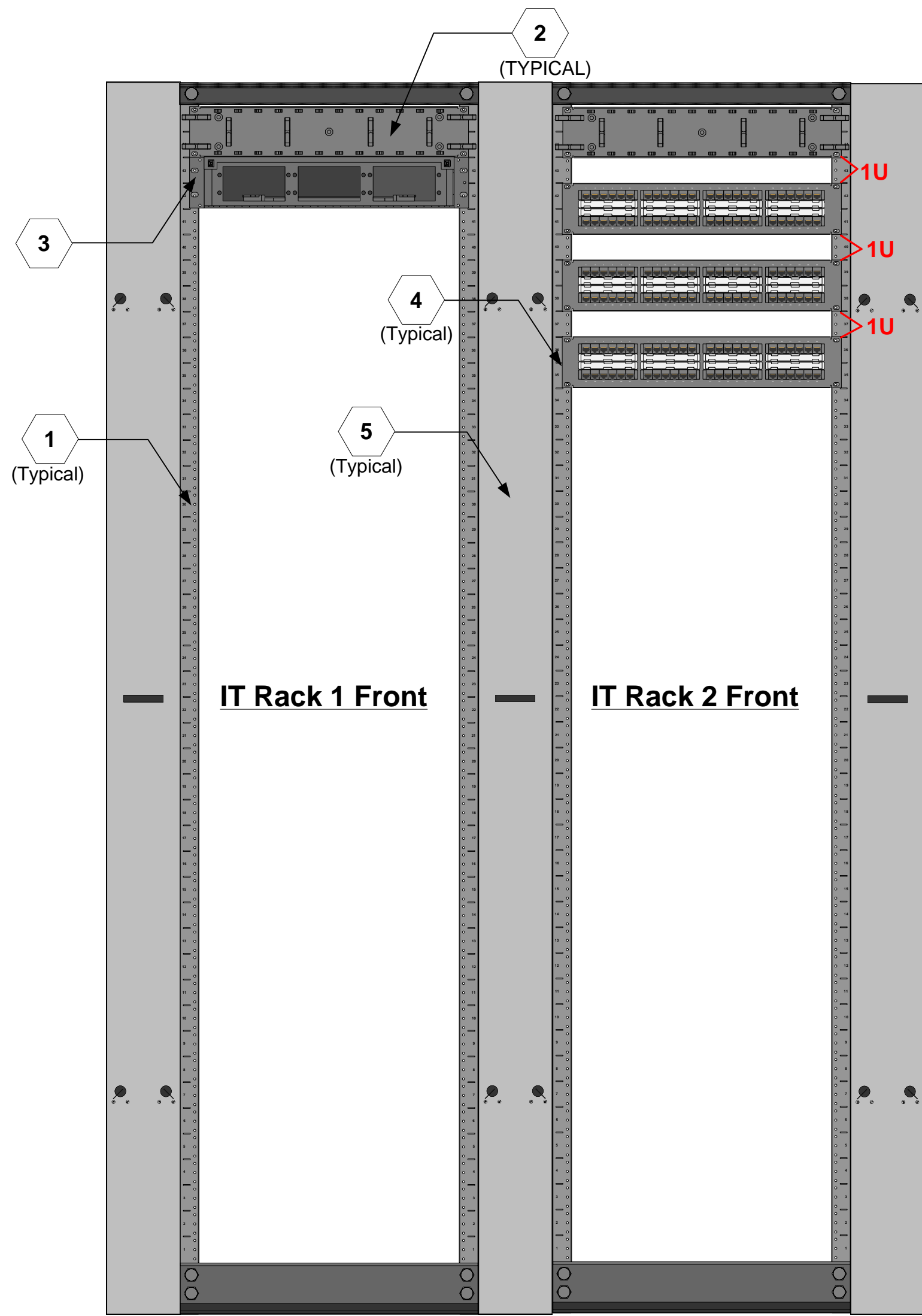


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| USARC G-6<br>UNIFIED COMMUNICATIONS<br>IT INFRASTRUCTURE TEAM | DESIGNED BY:<br>JOHN BABB      | DATE:<br>FEBRUARY 2015                        |
|   | DESIGNED BY:<br>DEREK MITCHELL | REVIEWED BY:<br>ROBERT BABB<br>USARC G-6 RCDD |

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Figure 5.04



A1 TYPICAL TR IT RACKS COMPONENTS FRONT AND REAR VIEW

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

FOR OFFICIAL USE ONLY

**SHEET KEY NOTES**

- 1 7'X19"W 2 POST EQUIPMENT RACK WITH 6 INCH CHANNELS, RMU MARKINGS, SUPPORT UP TO 1500LB STATIC LOAD
- 2 2U HORIZONTAL WIRE MANAGEMENT UNIT
- 3 2U FIBER PATCH PANEL
- 4 2U 48 PORT CAT. 6 PATCH PANEL
- 5 7'HX8"WX14.61"D DOUBLE SIDED, DOUBLE HINGED VERTICAL WIRE MANAGERS
- 6 DEDICATED DOUBLE DUPLEX NEMA 5-20R RECEPTACLE, MOUNTED 15" AFF ON THE REAR OF THE RACK
- 7 1 INCH X 19 INCH RACK MOUNTED TGB



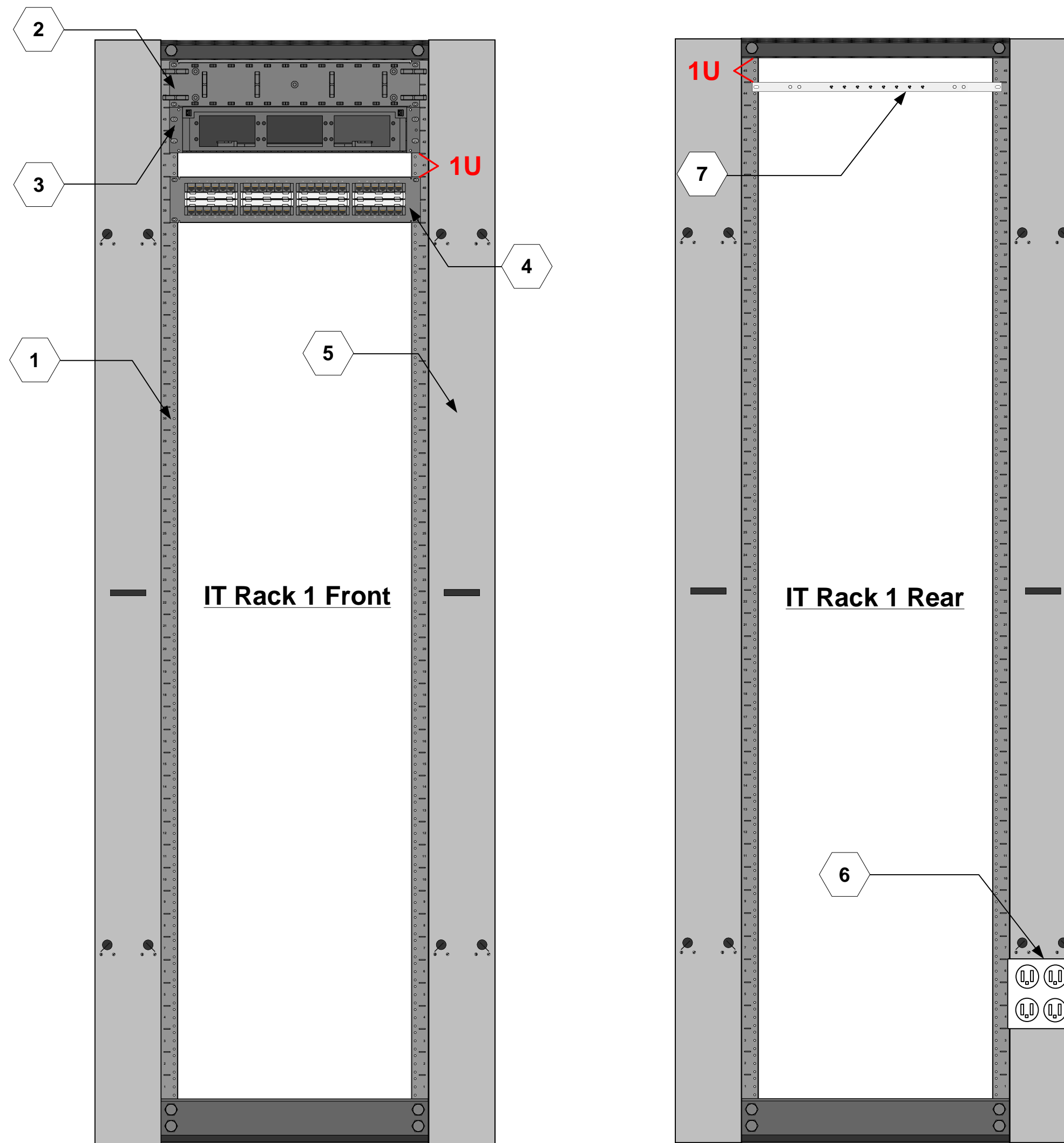
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| DESIGNED BY:<br>DEREK MITCHELL |                        |
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Figure  
5.05



A1 TYPICAL OMS TR IT RACK COMPONENTS FRONT AND REAR VIEW

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

FOR OFFICIAL USE ONLY

### SHEET KEY NOTES

- 1 12RU 24"X24"X30"D LOCKABLE EQUIPMENT CABINET MOUNTED AT 48" AFF TO THE BOTTOM. EQUIPMENT CABINET SHALL BE VENTED WITH LOUVERS AND A FAN.
- 2 TMGB/TGB MOUNTED 36" AFF IMMEDIATELY ADJACENT TO THE SIPRNET EQUIPMENT CABINET.
- 3 (1) DEDICATED DOUBLE DUPLEX NEMA 5-20R RECEPTACLE, MOUNTED INSIDE THE CABINET AT THE LOWER LEFT CORNER
- 4 (1) 1 INCH EMT CONDUIT WITH (1) CAT6 CABLE FROM THE EF. BOTH THE CABLE JACKET AND JACK(S) SHALL BE BLUE
- 5 BISCUIT JACK FOR CAT 6 CABLE FROM THE EF. MOUNT AT BACK OF IT CABINET
- 6 (1) 24 PORT CAT6 PATCH PANEL



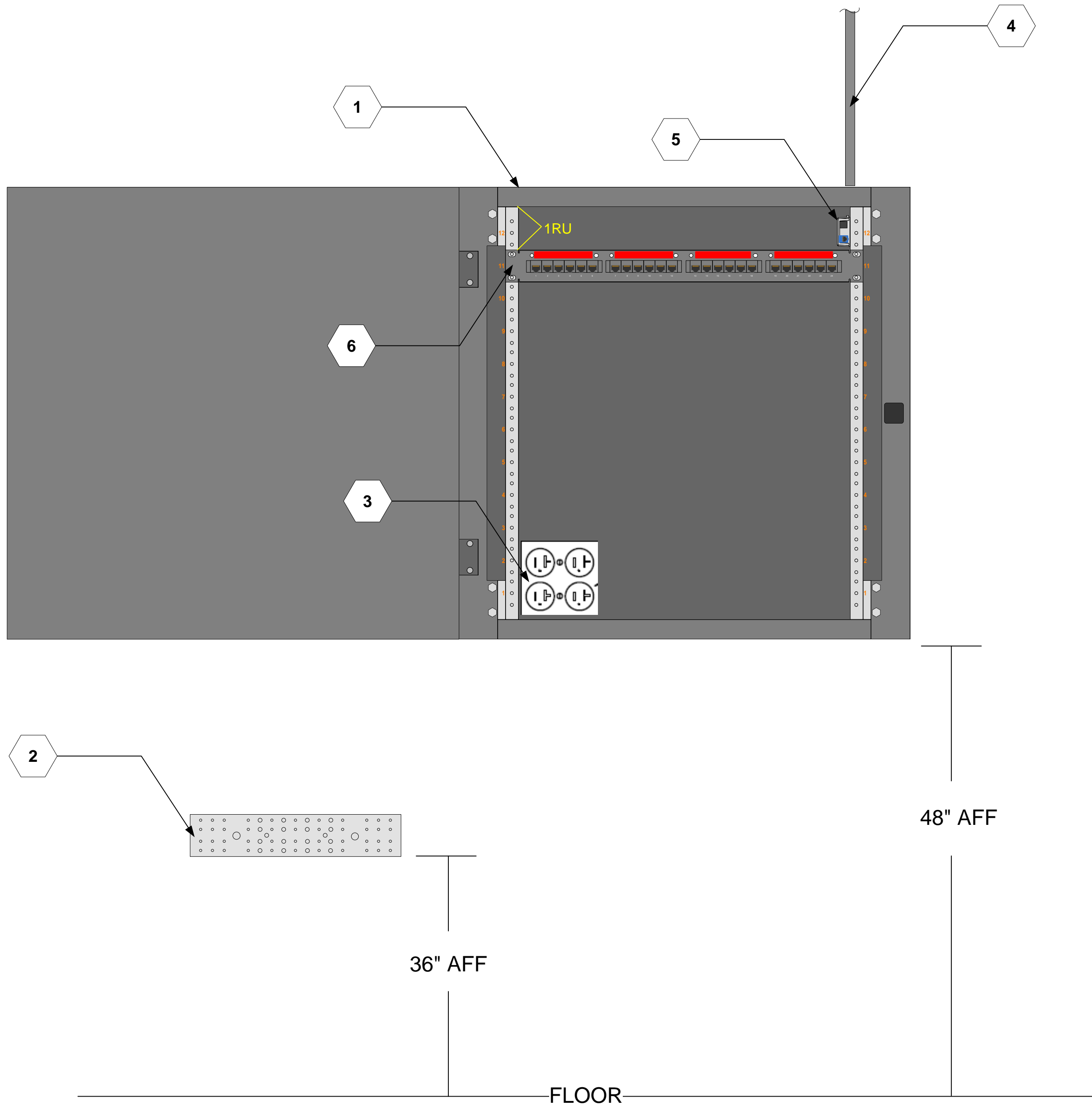
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Figure  
5.06



TYPICAL SIPRNET CAFÉ WALL MOUNTED EQUIPMENT CABINET ELEVATION DIAGRAM

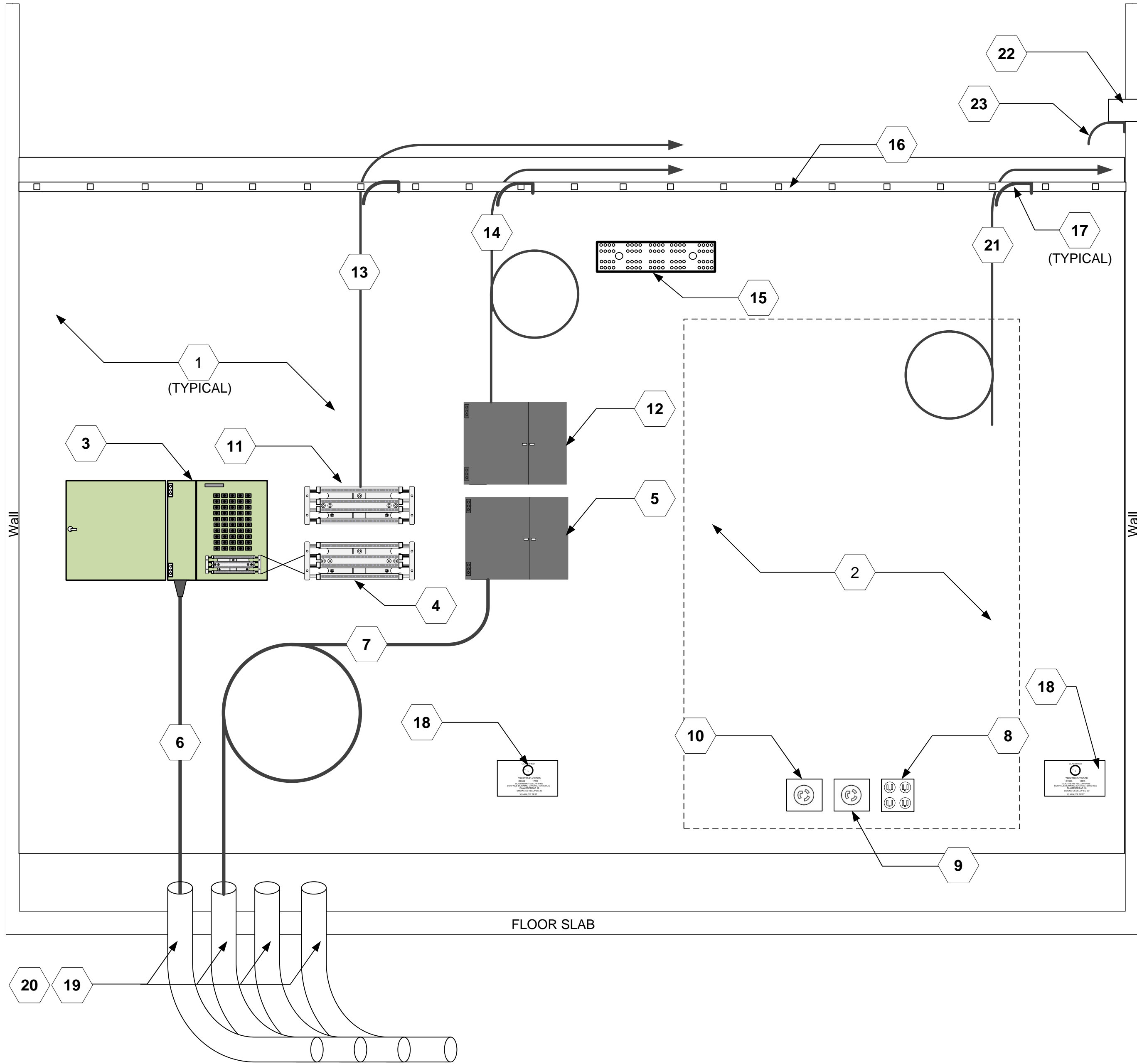
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NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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### SHEET KEY NOTES

- 1 8'Hx4'W AC GRADE, VOID FREE, FIRE RATED PLYWOOD BACKBOARDS. MOUNT 8" AFF
- 2 SPACE RESERVED FOR LEC INSTALLED DS3 EQUIPMENT
- 3 LEC INSTALLED OSP COPPER CABLE BUILDING ENTRANCE PROTECTOR FOR COPPER BACKBONE CABLE
- 4 LEC INSTALLED 110 BLOCK FOR COPPER BACKBONE CABLE
- 5 LEC INSTALLED WALL MOUNTED FOPP
- 6 LEC INSTALLED COPPER BACKBONE CABLE. MINIMUM 50 PAIR.
- 7 LEC INSTALLED SM FOC. MINIMUM 12 STANDS
- 8 1 DEDICATED DOUBLE DUPLEX NEMA 5-20R POWER RECEPTACLE. MOUNT AT 18" AFF NEAR SERVICE ENTRY CONDUITS
- 9 1 DEDICATED NEMA L5-15R POWER RECEPTACLE. MOUNT AT 18" AFF NEAR SERVICE ENTRY CONDUITS
- 10 1 DEDICATED NEMA L5-20R POWER RECEPTACLE. MOUNT AT 18" AFF NEAR SERVICE ENTRY CONDUITS
- 11 110 BLOCK FOR 50 PAIR COPPER CABLE TO TER
- 12 WALL MOUNTED FOPP FOR 12 STRAND SM FOC TO TER
- 13 50 PAIR COPPER CABLE TO TER
- 14 12 STRAND SM FOC TO TER
- 15 TMGB MOUNTED 6'-6" AFF
- 16 18"W LADDER RACK STEEL TUBING WITH RUNGS WELDED AT 12 INCH INTERVALS.
- 17 CABLE RADIUS DROP OUTS. INSTALL WHERE NEEDED.
- 18 DO NOT PAINT OVER FIRE-RATED STAMP ON EACH SHEET OF PLYWOOD
- 19 (4) 4" CONDUITS, 3 CONDUITS WITH (1) 3 INCH 3 CELL FABRIC MESH INNER-DUCT FROM SPPOC.
- 20 THE TRANSITION FROM PVC TO RMC SHALL TAKE PLACE AT THE BOTTOM OF THE TRENCH PRIOR TO THE SWEEP WHERE THE CONDUITS ENTER THE BUILDING. CONDUITS SHALL BE TERMINATE 4"-6" AFF.
- 21 (2) 75 OHM RG6 COAXIAL CABLES (OF A SIAMESE CONSTRUCTION) TO TER IT RACK 1. TERMINATE WITH BNC CONNECTORS. LEAVE 20' OF COILED SLACK IN EF
- 22 4" WALL SLEEVES (IF REQUIRED). IF WALL IS FIRE-RATED, THEN MECHANICAL FIRE-STOPPING UNITS ARE REQUIRED.
- 23 WATERFALL SUPPORT SYSTEM. IF THE DISTANCE FROM THE EXIT POINT OF THE CONDUIT/SLEEVE TO THE LADDER RACK EXCEEDS 5' THEN THE CABLE MUST BE SUPPORTED FROM THE EXIT POINT OF THE CONDUIT/SLEEVE UNTIL IT MEETS THE LADDER RACK.



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| DESIGNED BY: | DEREK MITCHELL |
| REVIEWED BY: | ROBERT BABB    |
|              | USARC G-6 RCDD |

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Figure 5.07

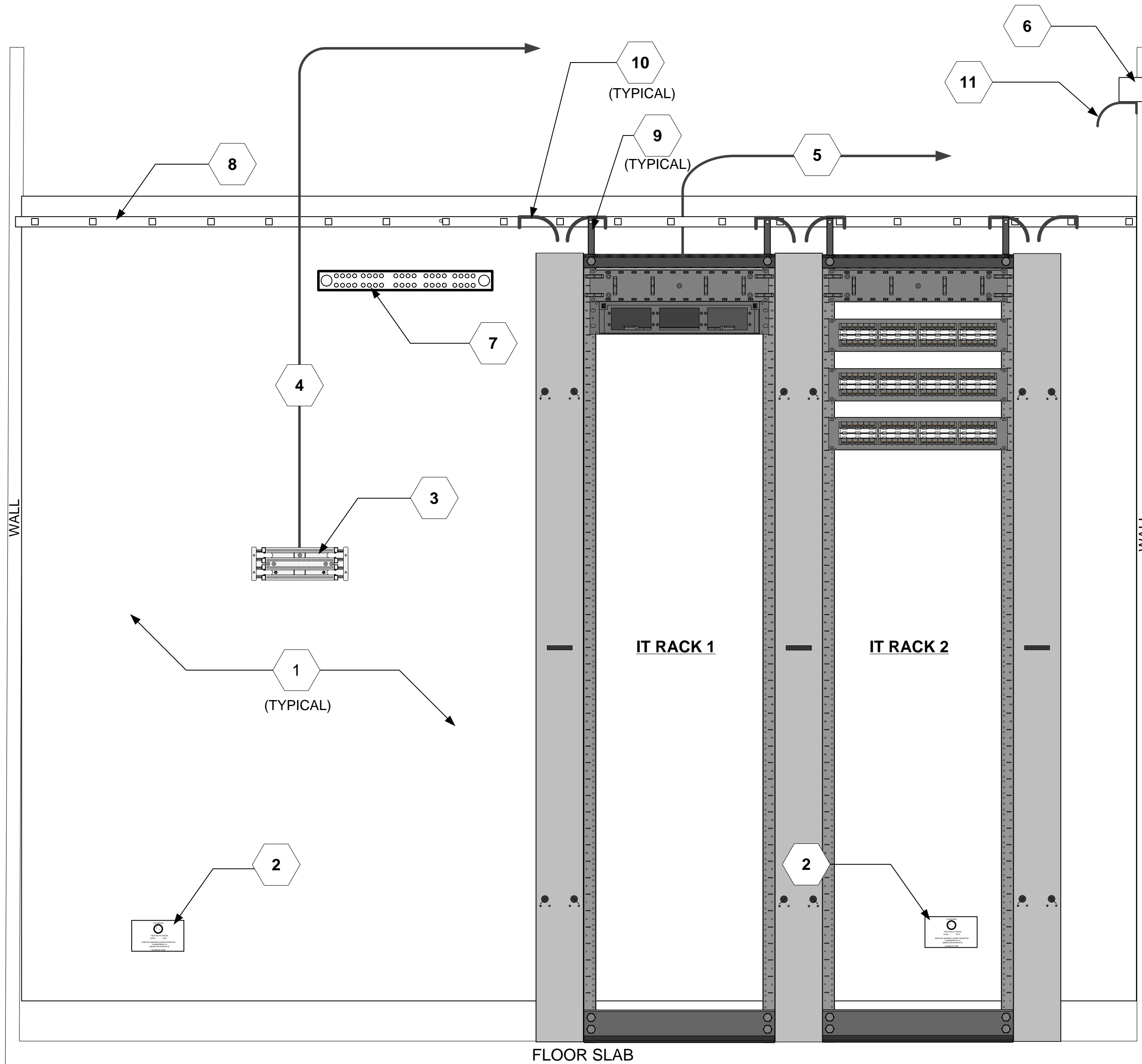
A1 TYPICAL EF ELEVATION DIAGRAM





NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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**SHEET KEY NOTES**

- 1 8'HX4'W AC GRADE, VOID FREE, FIRE RATED PLYWOOD BACKBOARDS. MOUNT 8" AFF
- 2 DO NOT PAINT OVER FIRE-RATED STAMP ON EACH SHEET OF PLYWOOD
- 3 110 BLOCK FOR 25 PAIR COPPER TO TER
- 4 25 PAIR COPPER CABLE TO TER
- 5 12 Strand SM FOC to TER
- 6 4" WALL SLEEVES (IF WALL IS FIRE-RATED, THEN MECHANICAL FIRE-STOPPING UNITS ARE REQUIRED)
- 7 TGB. MOUNTED 6'-6" AFF
- 8 18"W LADDER RACK STEEL TUBING WITH RUNGS WELDED AT 12 INCH INTERVALS
- 9 6 INCH LADDER RACK ELEVATION KITS
- 10 CABLE RADIUS DROP OUTS. INSTALL IN BOTH DIRECTIONS WHEREVER POSSIBLE
- 11 WATERFALL SUPPORT SYSTEM. IF THE DISTANCE FROM THE EXIT POINT OF THE CONDUIT/SLEEVE TO THE LADDER RACK EXCEEDS 5' THEN THE CABLE MUST BE SUPPORTED FROM THE EXIT POINT OF THE CONDUIT/SLEEVE UNTIL IT MEETS THE LADDER RACK.



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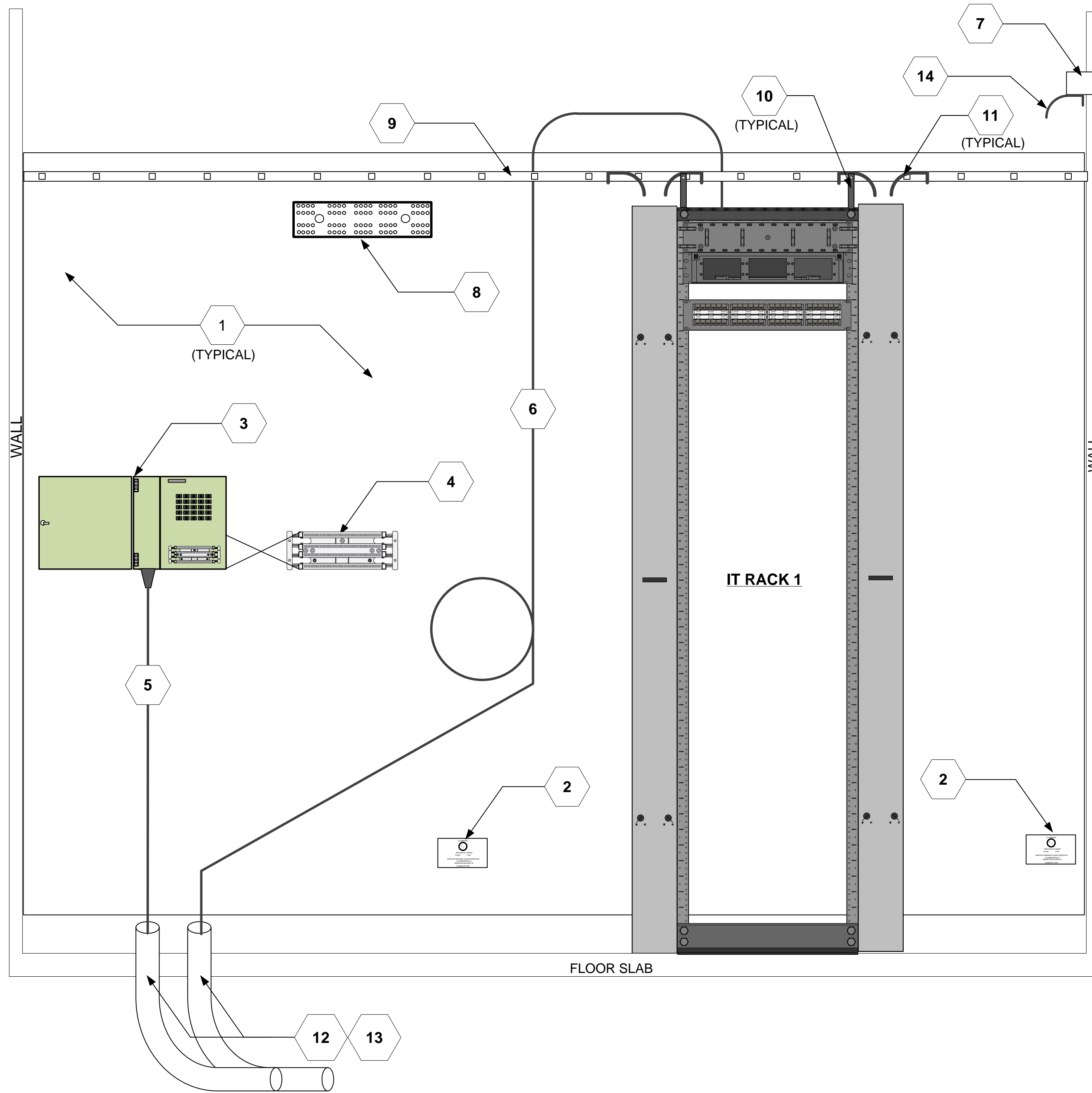
Figure  
5.09

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**TYPICAL TR ELEVATION DIAGRAM**

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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### SHEET KEY NOTES

- 1 8'Hx4'W AC GRADE, VOID FREE, FIRE RATED PLYWOOD BACKBOARDS. MOUNT 8" AFF
- 2 DO NOT PAINT OVER FIRE-RATED STAMP ON EACH SHEET OF PLYWOOD
- 3 OSP COPPER CABLE BUILDING ENTRANCE PROTECTOR FOR 25 PAIR COPPER TO TRAINING BUILDING TER
- 4 110 BLOCK FOR 25 PAIR COPPER TO TRAINING BUILDING TER
- 5 25 PAIR OSP COPPER CABLE TO TRAINING BUILDING TER
- 6 12 STRAND SM FOC TO TRAINING BUILDING TER
- 7 4" WALL SLEEVES (IF WALL IS FIRE-RATED, THEN MECHANICAL FIRE-STOPPING UNITS ARE REQUIRED)
- 8 TMGB. MOUNTED 6'-6" AFF
- 9 18"W LADDER RACK STEEL TUBING WITH RUNGS WELDED AT 12 INCH INTERVALS
- 10 6 INCH LADDER RACK ELEVATION KITS
- 11 CABLE RADIUS DROP OUTS. INSTALL IN BOTH DIRECTIONS WHEREVER POSSIBLE
- 12 (2) 4" CONDUITS, BOTH CONDUITS WITH (1) 3 INCH 3 CELL FABRIC MESH INNER-DUCT TO THE TRAINING BUILDING TER
- 13 THE TRANSITION FROM PVC TO RMC SHALL TAKE PLACE AT THE BOTTOM OF THE TRENCH PRIOR TO THE SWEEP WHERE THE CONDUITS ENTER THE BUILDING. CONDUITS SHALL BE TERMINATED 4"-6" AFF.
- 14 WATERFALL SUPPORT SYSTEM. IF THE DISTANCE FROM THE EXIT POINT OF THE CONDUIT/SLEEVE TO THE LADDER RACK EXCEEDS 5' THEN THE CABLE MUST BE SUPPORTED FROM THE EXIT POINT OF THE CONDUIT/SLEEVE UNTIL IT MEETS THE LADDER RACK.



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| DESIGNED BY:<br>JOHN BABB                                     | DESIGNED BY:<br>DEREK MITCHELL | REVIEWED BY:<br>ROBERT BABB | DATE:<br>FEBRUARY 2015 |
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Figure 5.10

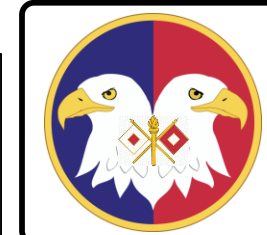
A1 TYPICAL OMS TR ELEVATION DIAGRAM

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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**SHEET KEY NOTES**

- 1 8'HX4'W AC GRADE, VOID FREE, FIRE RATED PLYWOOD BACKBOARDS. MOUNT 8" AFF
- 2 DO NOT PAINT OVER FIRE-RATED STAMP ON EACH SHEET OF PLYWOOD
- 3 OSP COPPER CABLE BUILDING ENTRANCE PROTECTOR FOR 6 PAIR COPPER TO TRAINING BUILDING TER
- 4 110 BLOCK FOR 6 PAIR COPPER TO TRAINING BUILDING TER
- 5 6 PAIR OSP COPPER CABLE TO TRAINING BUILDING TER
- 6 TMGB. MOUNTED 6'-6" AFF
- 7 (1) 4" CONDUITS, WITH 3 INCH 3 CELL FABRIC MESH INNER-DUCT TO THE UHS
- 8 THE TRANSITION FROM PVC TO RMC SHALL TAKE PLACE AT THE BOTTOM OF THE TRENCH PRIOR TO THE SWEEP WHERE THE CONDUITS ENTER THE BUILDING. CONDUITS SHALL BE TERMINATED 4"-6" AFF.



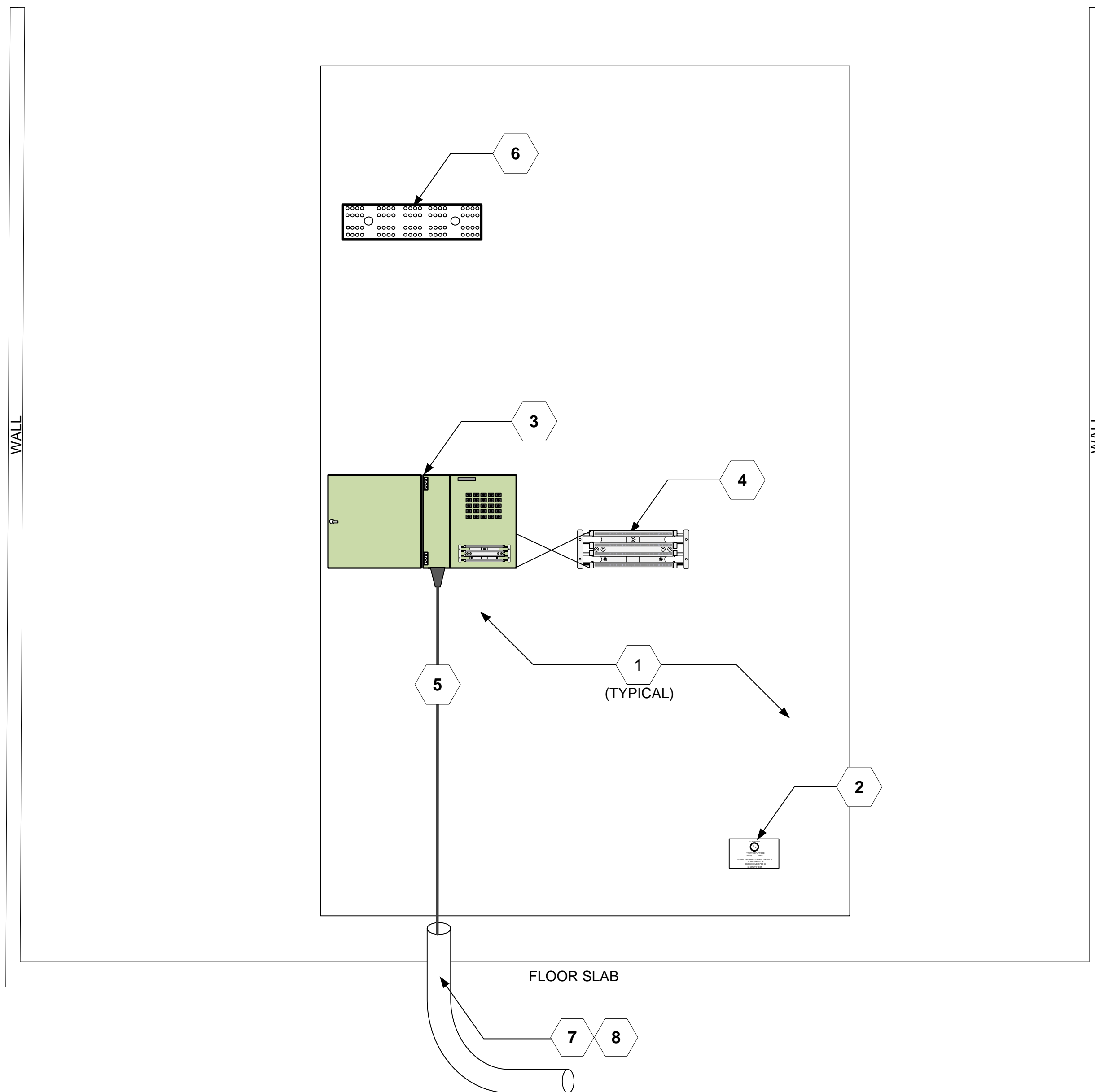
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| DESIGNED BY:<br>JOHN BABB      | DATE:<br>FEBRUARY 2015 |
| DESIGNED BY:<br>DEREK MITCHELL |                        |
| REVIEWED BY:<br>ROBERT BABB    |                        |
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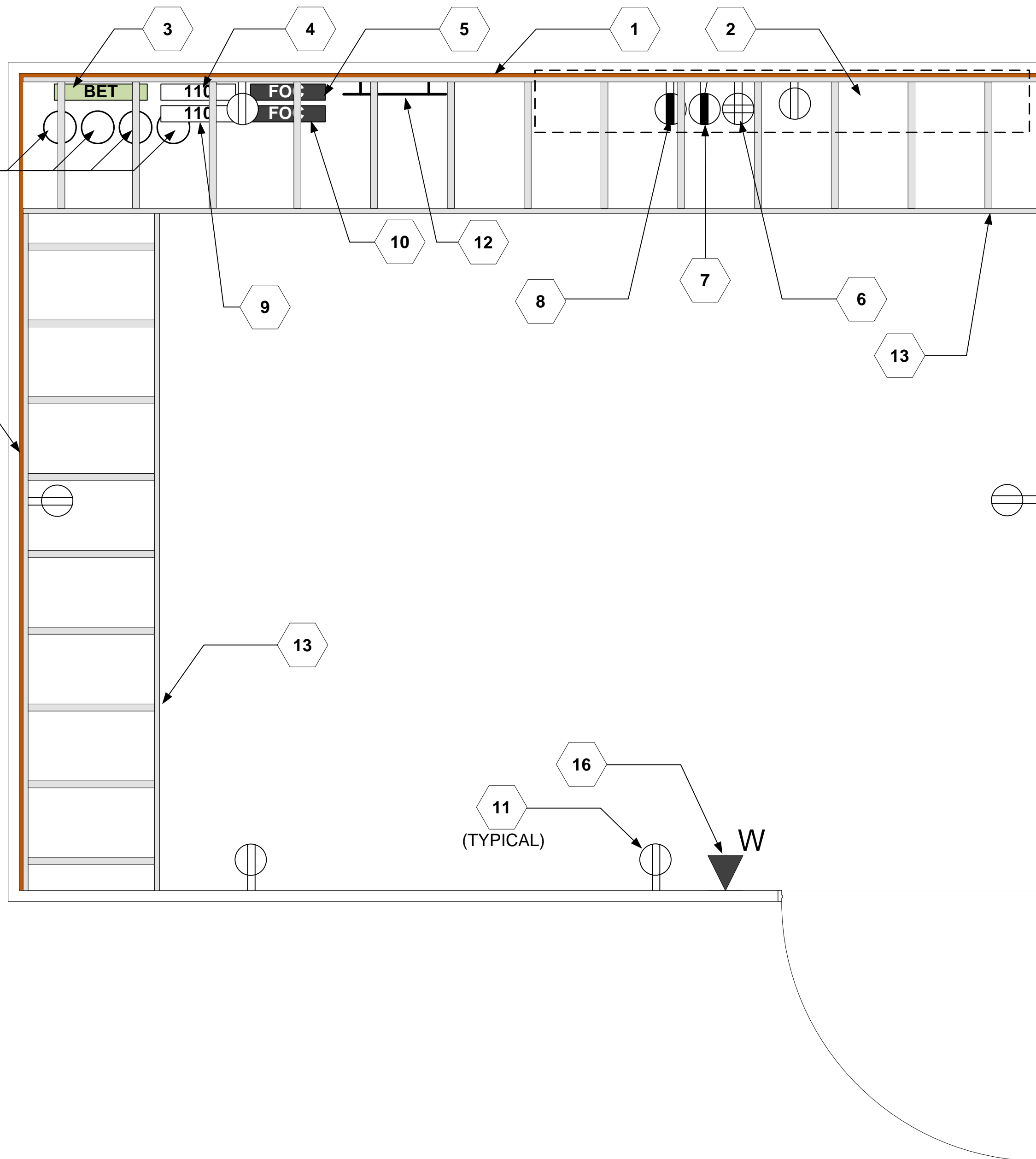
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5.11



A1 **TYPICAL UHS ELEVATION DIAGRAM**

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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### SHEET KEY NOTES

- 1 8'Hx4'W AC GRADE, VOID FREE FIRE RATED PLYWOOD BACKBOARDS. DO NOT PAINT OVER THE FIRE RATING STAMP ON EACH SHEET OF PLYWOOD. MOUNT 8" AFF
- 2 SPACE RESERVED FOR LEC INSTALLED DS3 EQUIPMENT
- 3 LEC INSTALLED OSP COPPER CABLE BUILDING ENTRANCE PROTECTOR FOR COPPER BACKBONE CABLE
- 4 LEC INSTALLED 110 BLOCK FOR COPPER BACKBONE CABLE
- 5 LEC INSTALLED WALL MOUNTED FOPP
- 6 1 DEDICATED DOUBLE DUPLEX NEMA 5-20R POWER RECEPTACLE. MOUNT AT 18" AFF NEAR SERVICE ENTRY CONDUITS
- 7 1 DEDICATED NEMA L5-15R POWER RECEPTACLE. MOUNT AT 18" AFF NEAR SERVICE ENTRY CONDUITS
- 8 1 DEDICATED NEMA L5-20R POWER RECEPTACLE. MOUNT AT 18" AFF NEAR SERVICE ENTRY CONDUITS
- 9 110 BLOCK FOR 50 PAIR COPPER CABLE TO TER
- 10 WALL MOUNTED FOPP FOR 12 STRAND SM FOC TO TER
- 11 NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLES PLACED AT 6' INTERVALS AROUND THE PERIMETER OF THE ROOM. MOUNT AT 6" AFF.
- 12 TMGB. MOUNTED 6'-6" AFF
- 13 18"W LADDER RACK STEEL TUBING WITH RUNGS WELDED AT 12 INCH INTERVALS. INCLUDE CABLE RADIUS DROP OUTS WHERE NEEDED.
- 14 (4) 4" CONDUITS, 3 CONDUITS WITH (1) 3 INCH 3 CELL FABRIC MESH INNER-DUCT FROM SPPOC.
- 15 THE TRANSITION FROM PVC TO RMC SHALL TAKE PLACE AT THE BOTTOM OF THE TRENCH PRIOR TO THE SWEEP WHERE THE CONDUITS ENTER THE BUILDING. CONDUITS SHALL BE TERMINATED 4"-6" AFF.
- 16 STANDARD WALL PHONE OUTLET. MOUNT AT 48" AFF



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| DESIGNED BY:<br>DEREK MITCHELL |                        |
| REVIEWED BY:<br>ROBERT BABB    |                        |
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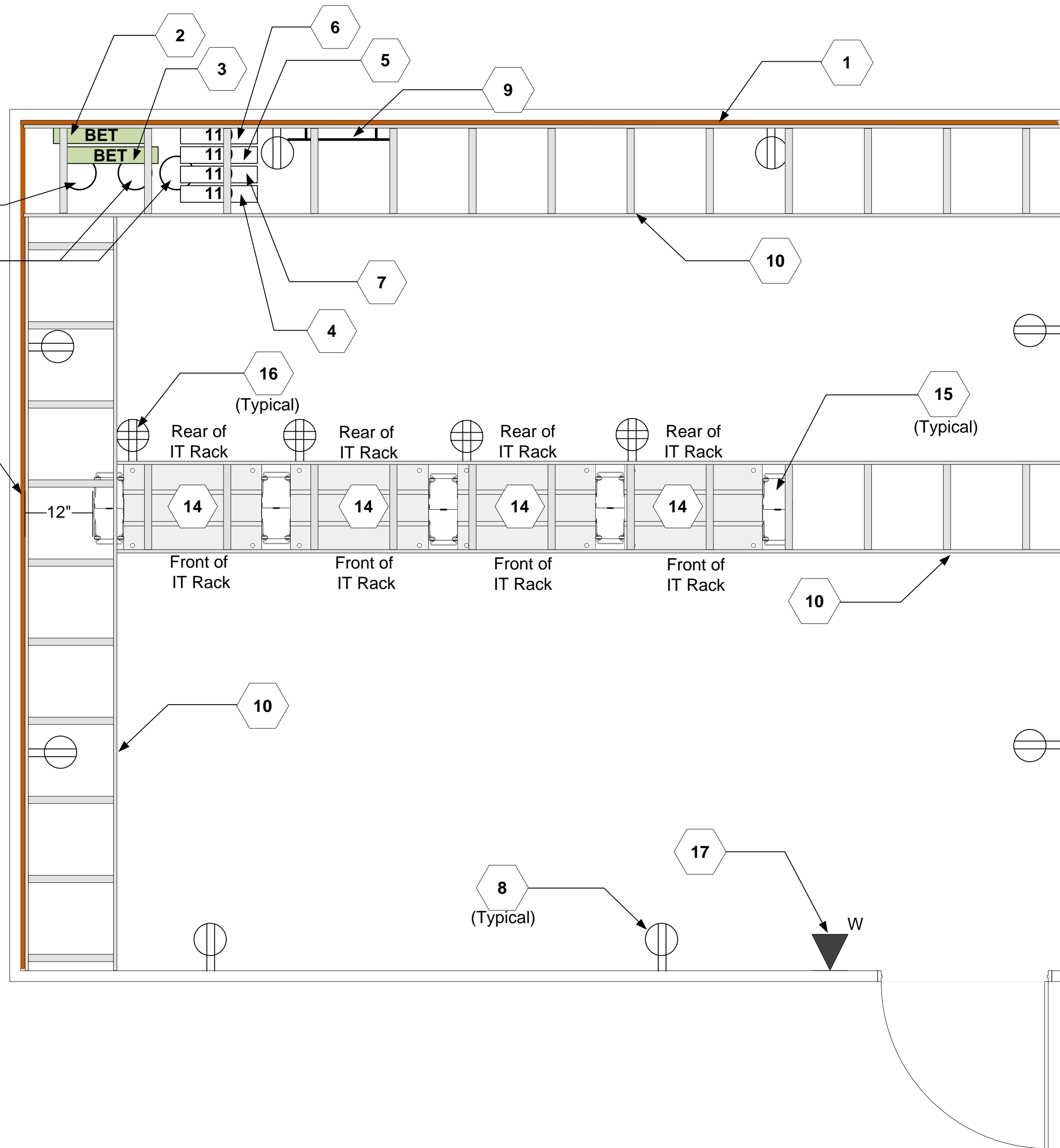
Figure  
5.12

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## TYPICAL EF AERIAL DIAGRAM

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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### SHEET KEY NOTES

- 1 8'HX4'W AC GRADE, VOID FREE FIRE RATED PLYWOOD BACKBOARDS. DO NOT PAINT OVER THE FIRE RATING STAMP ON EACH SHEET OF PLYWOOD. MOUNT 8" AFF
- 2 OSP COPPER CABLE BUILDING ENTRANCE PROTECTOR FOR 25 PAIR COPPER TO OMS TR
- 3 OSP COPPER CABLE BUILDING ENTRANCE PROTECTOR FOR 6 PAIR COPPER TO UHS (IF REQUIRED)
- 4 110 BLOCK FOR 50 PAIR COPPER CABLE TO EF
- 5 110 BLOCK FOR 25 PAIR COPPER TO TR XXX (IF REQUIRED)
- 6 110 BLOCK FOR 25 PAIR COPPER CABLE TO THE OMS TR
- 7 110 BLOCK FOR 6 PAIR COPPER CABLE TO THE UHS (IF REQUIRED)
- 8 NEMA 5-20 DUPLEX CONVENIENCE RECEPTACLES PLACED AT 6' INTERVALS AROUND THE PERIMETER OF THE ROOM. MOUNT AT 6" AFF.
- 9 TGB MOUNTED 6'-6" AFF
- 10 18"W LADDER RACK STEEL TUBING WITH RUNGS WELDED AT 12 INCH INTERVALS WITH RADIUS DROPOUT AND ELEVATION KITS
- 11 (2) 4" CONDUITS, BOTH CONDUITS WITH (1) 3 INCH 3 CELL FABRIC MESH INNER-DUCT TO THE OMS TR
- 12 (1) 4" CONDUIT, WITH (1) 3 INCH 3 CELL FABRIC MESH INNER-DUCT TO THE UHS (IF REQUIRED)
- 13 THE TRANSITION FROM PVC TO RMC SHALL TAKE PLACE AT THE BOTTOM OF THE TRENCH PRIOR TO THE SWEEP WHERE THE CONDUITS ENTER THE BUILDING. CONDUITS SHALL BE TERMINATED 4"-6" AFF.
- 14 7'X19"W 2 POST EQUIPMENT RACK WITH 6 INCH CHANNELS, RMC MARKINGS, SUPPORT UP TO 1500LB STATIC LOAD
- 15 7'HX8"WX14.61"D DOUBLE SIDED, DOUBLE HINGED VERTICAL WIRE MANAGERS
- 16 DEDICATED DOUBLE DUPLEX NEMA 5-20R RECEPTACLE, MOUNTED 15" AFF ON THE REAR OF EACH RACK
- 17 STANDARD WALL PHONE OUTLET. MOUNT AT 48" AFF



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| DESIGNED BY: | DEREK MITCHELL  |       |               |
| REVIEWED BY: | ROBERT BABB     |       |               |
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Figure  
5.13

A1 TYPICAL TER AERIAL DIAGRAM

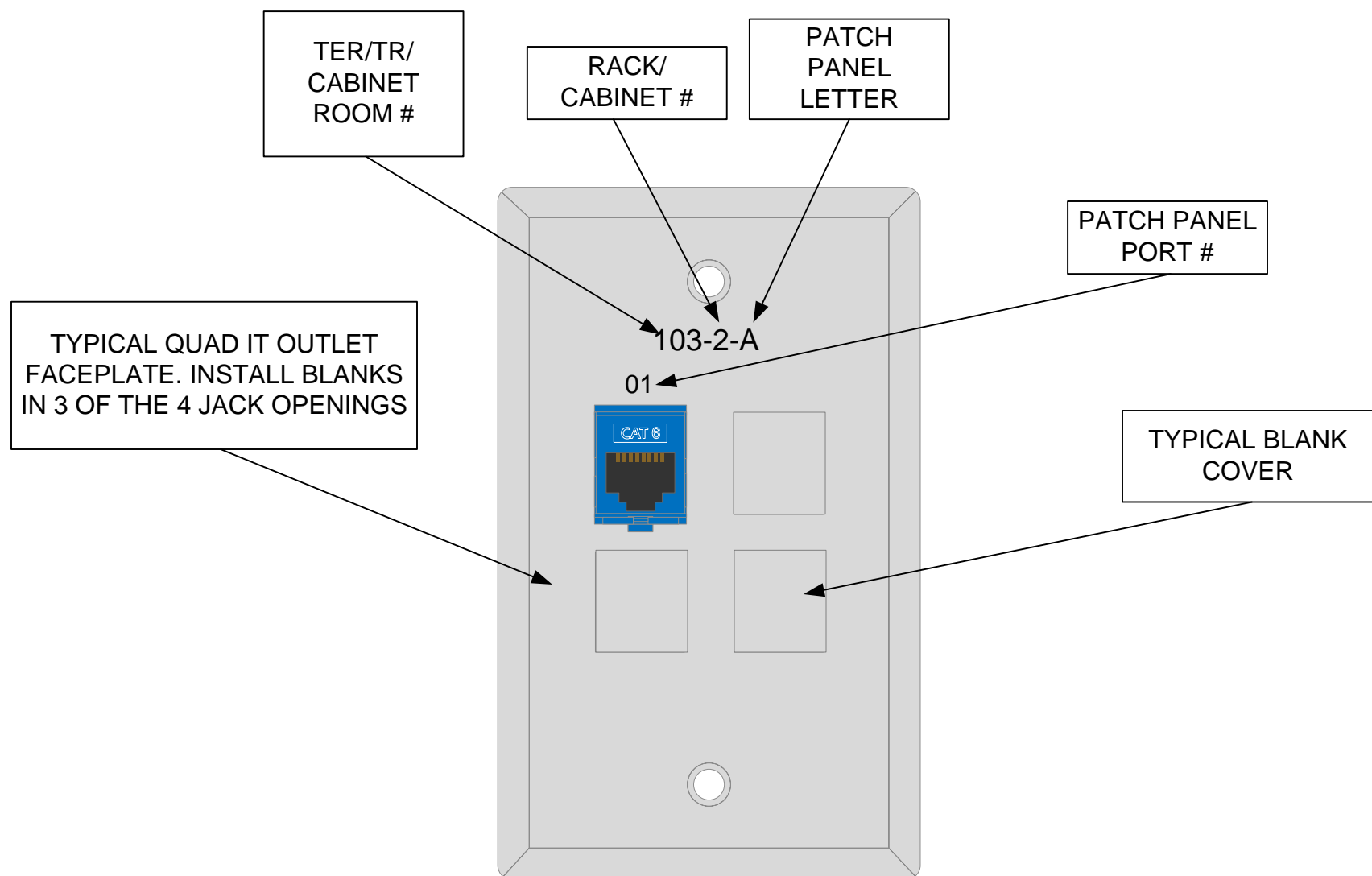




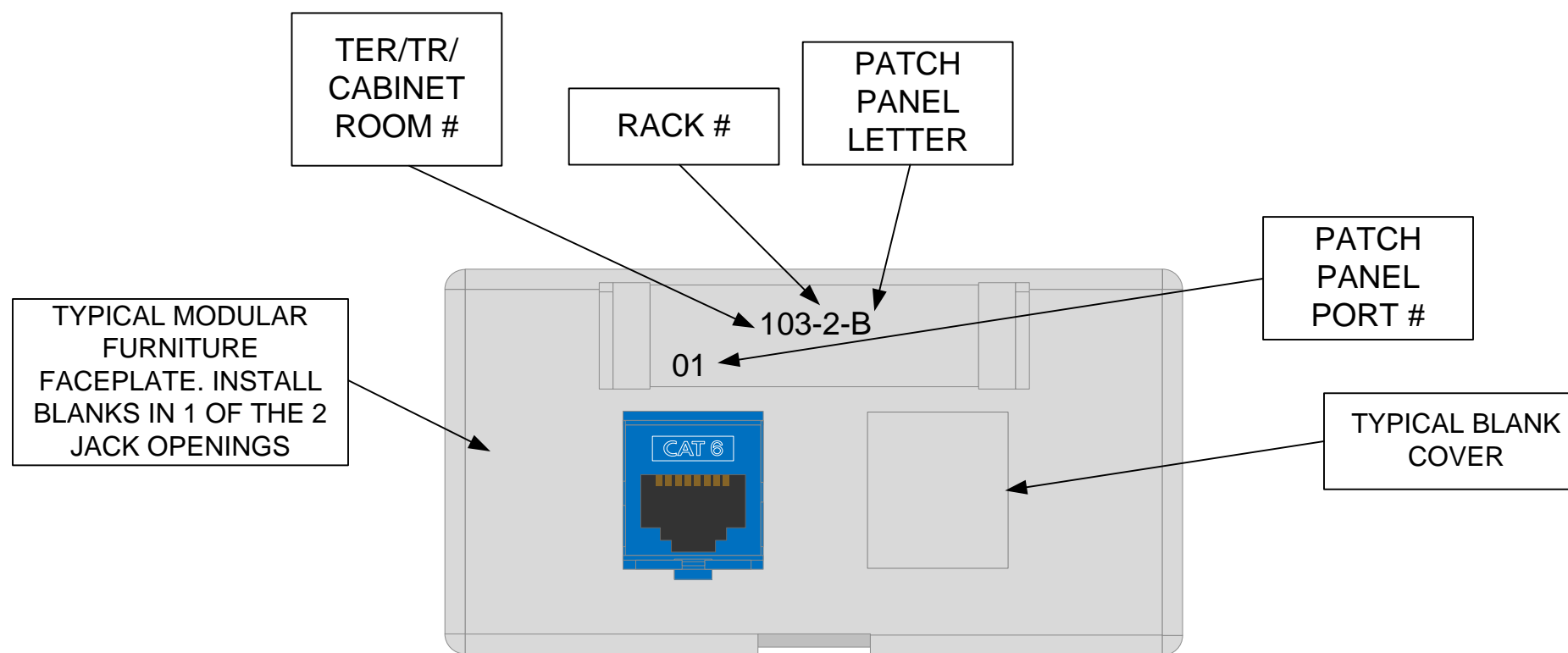


NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

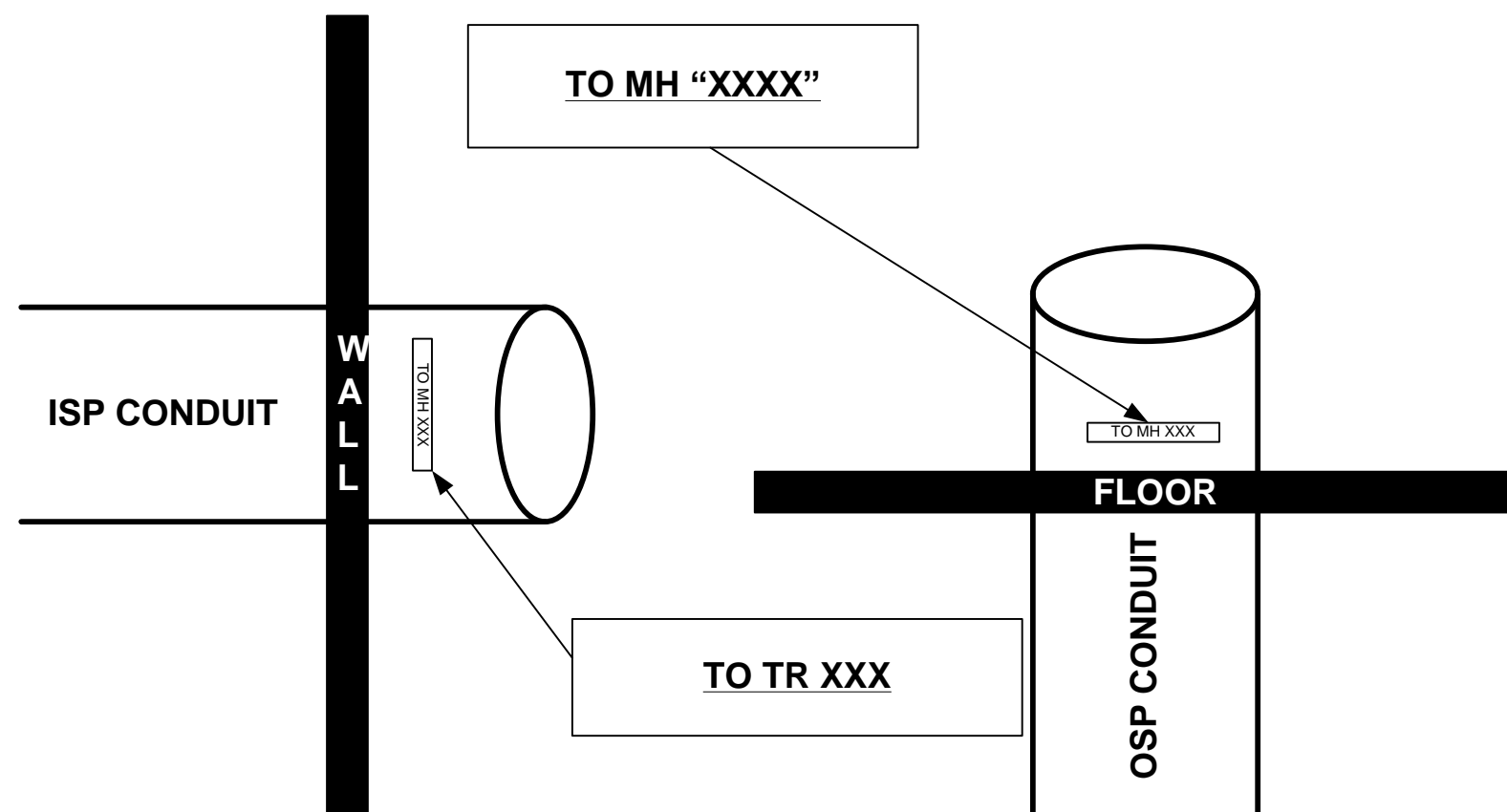
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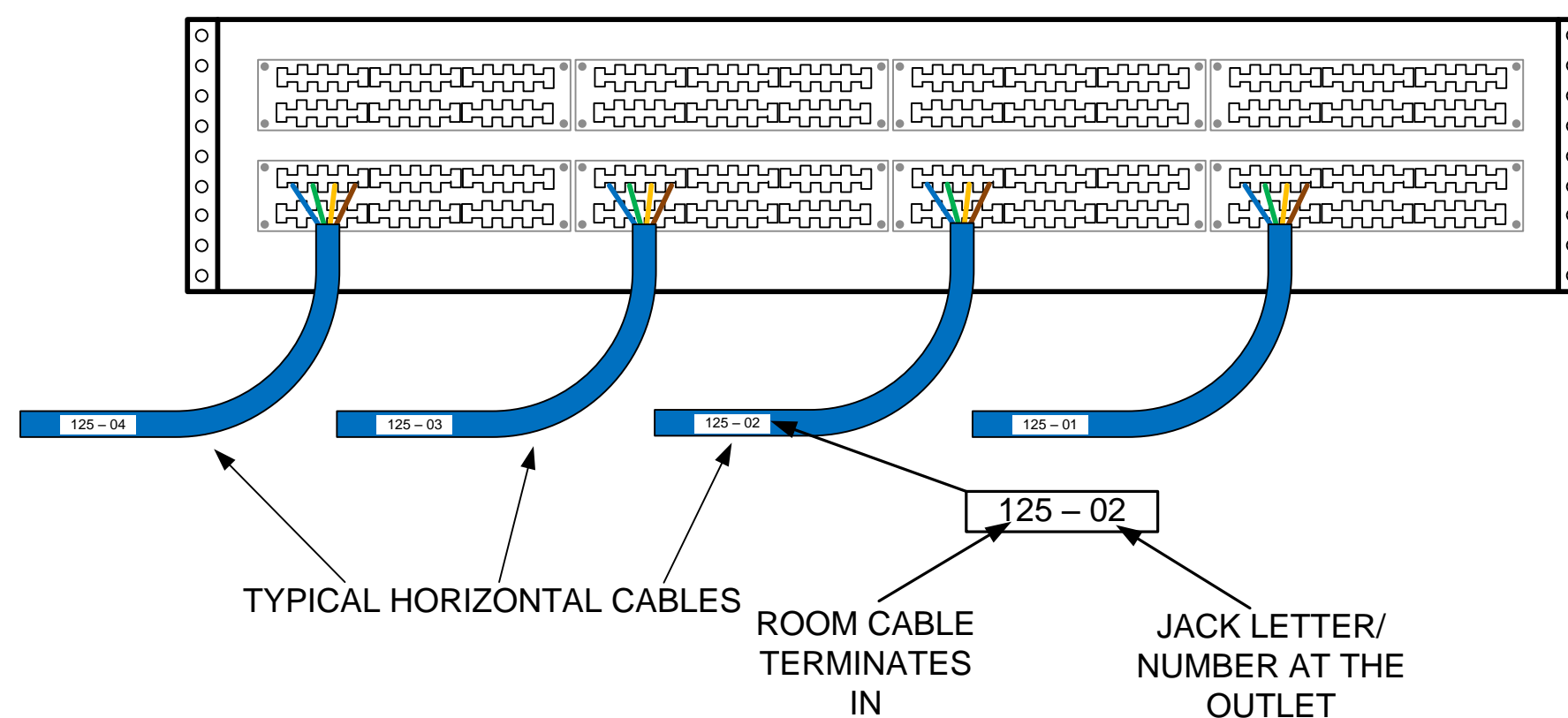
1 TYPICAL WALL FACEPLATE LAYOUT AND LABELING SCHEME  
5.16



2 TYPICAL MODULAR FURNITURE LABELING SCHEME  
5.16



3 TYPICAL ISP/OSP CONDUIT LABELS  
5.16



4 TYPICAL CATEGORY 6 REAR OF PATCH PANEL LABELING SCHEME  
5.16

A1 TYPICAL IT INFRASTRUCTURE COMPONENT LABELING SCHEMES



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| DESIGNED BY: | DEREK MITCHELL |       |               |
| REVIEWED BY: | ROBERT BABB    |       |               |
|              | USARC G-6 RCDD |       |               |

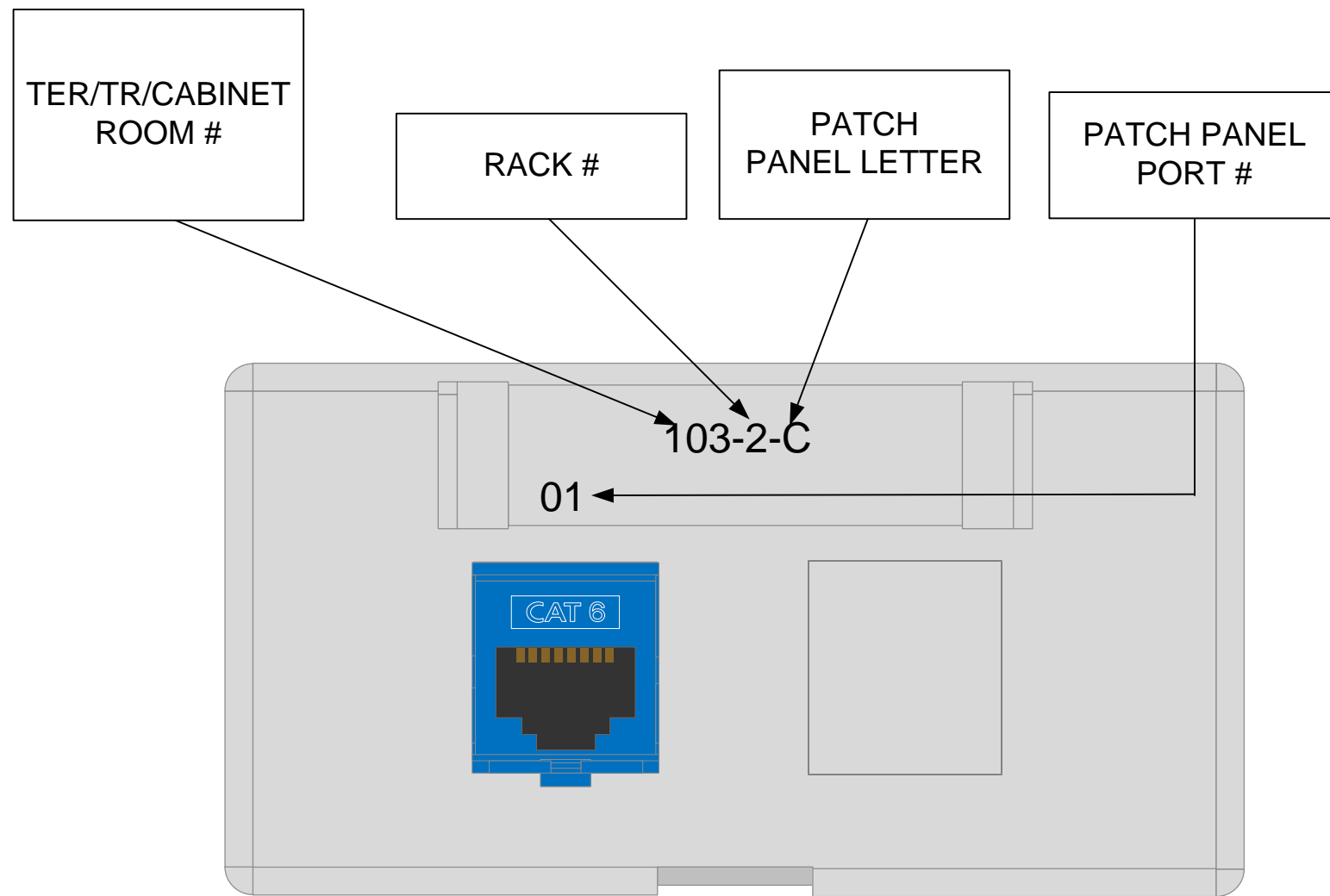
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CRITERIA UPDATES DIAGRAMS

Figure 5.16

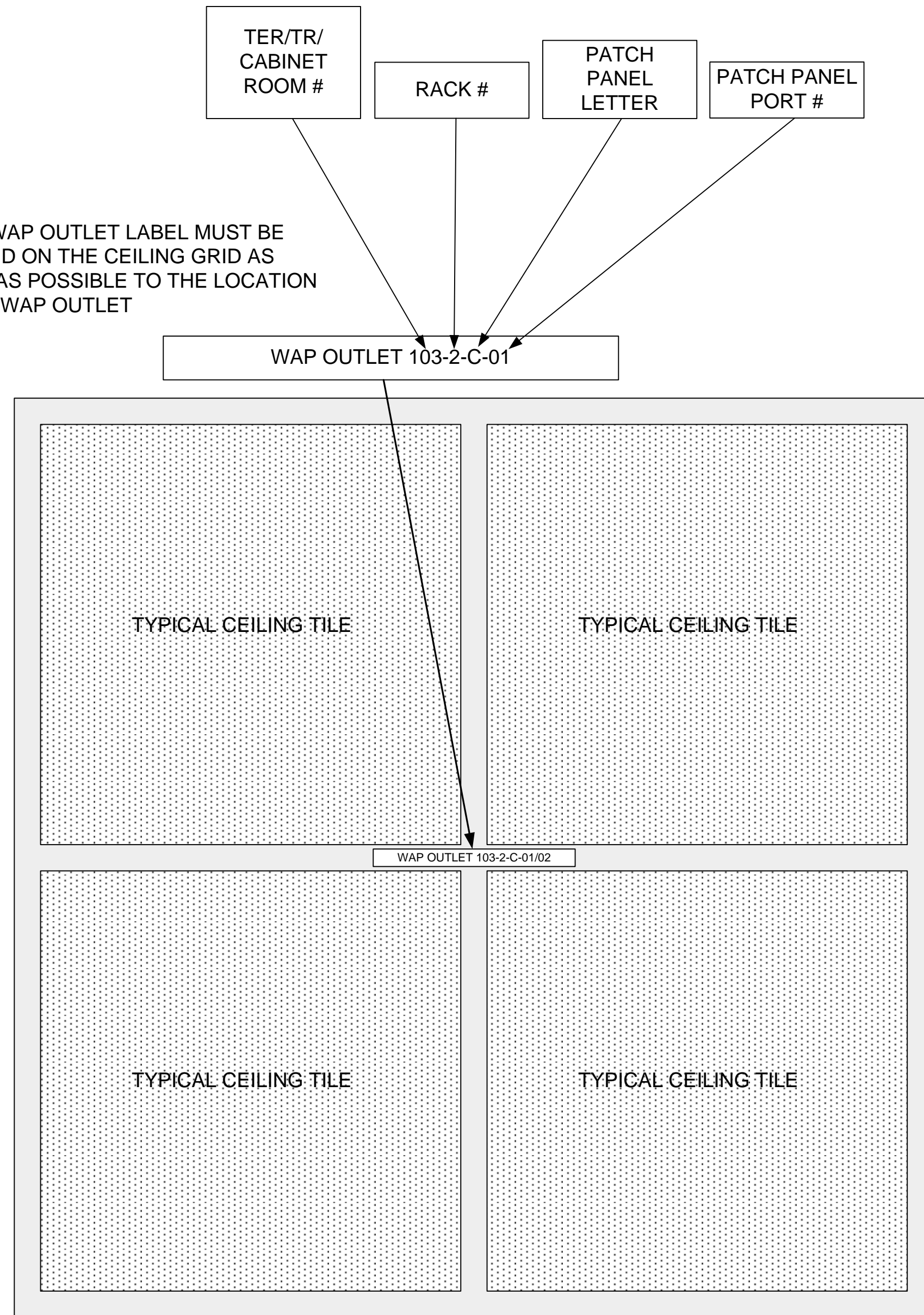
NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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1  
5.17 TYPICAL 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  
5.17 TYPICAL CEILING GRID LABEL FOR ABOVE CEILING WAP

A1 TYPICAL IT INFRASTRUCTURE WAP OUTLET/CEILING GRID LABELING SCHEMES



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| DESIGNED BY:<br>JOHN BABB      | DATE:<br>FEBRUARY 2015 |
| DESIGNED BY:<br>DEREK MITCHELL |                        |
| REVIEWED BY:<br>ROBERT BABB    |                        |
| USARC G-6 RCDD                 |                        |

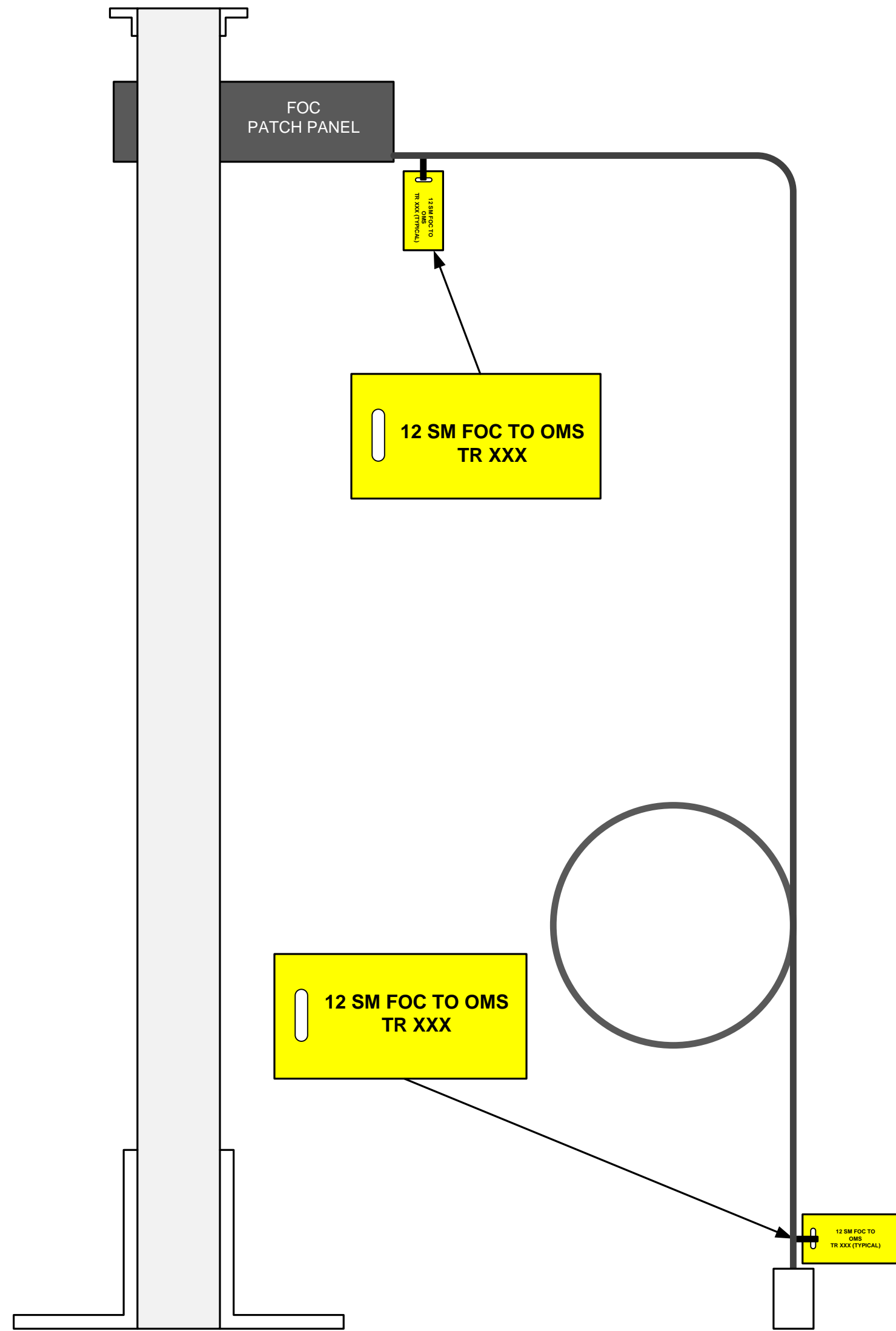
USARC G-6  
UNIFIED COMMUNICATIONS  
IT INFRASTRUCTURE TEAM

USARC G-6  
ARMY RESERVE  
IT DESIGN AND CONSTRUCTION  
CRITERIA UPDATES DIAGRAMS

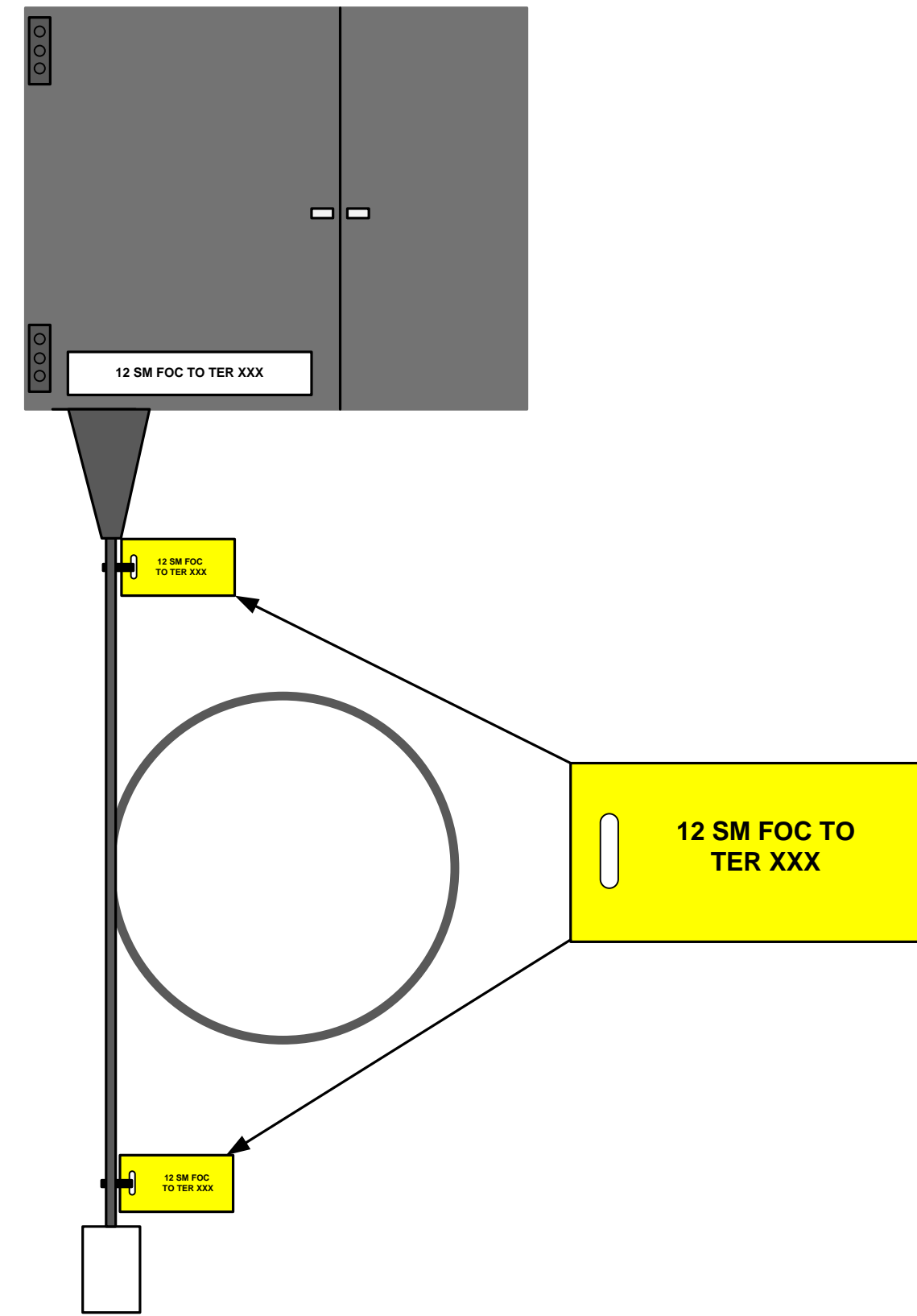
Figure  
5.17

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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1 TYPICAL FOC CABLE AND RACK MOUNTED FOC PATCH PANEL LABELS  
5.18



2 TYPICAL FOC CABLE AND WALL MOUNTED FOC PATCH PANEL LABELS  
5.18

A1 TYPICAL FIBER OPTIC CABLE AND TERMINATION HARDWARE LABELING SCHEMES



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|                                | USARC G-6 RCDD         |

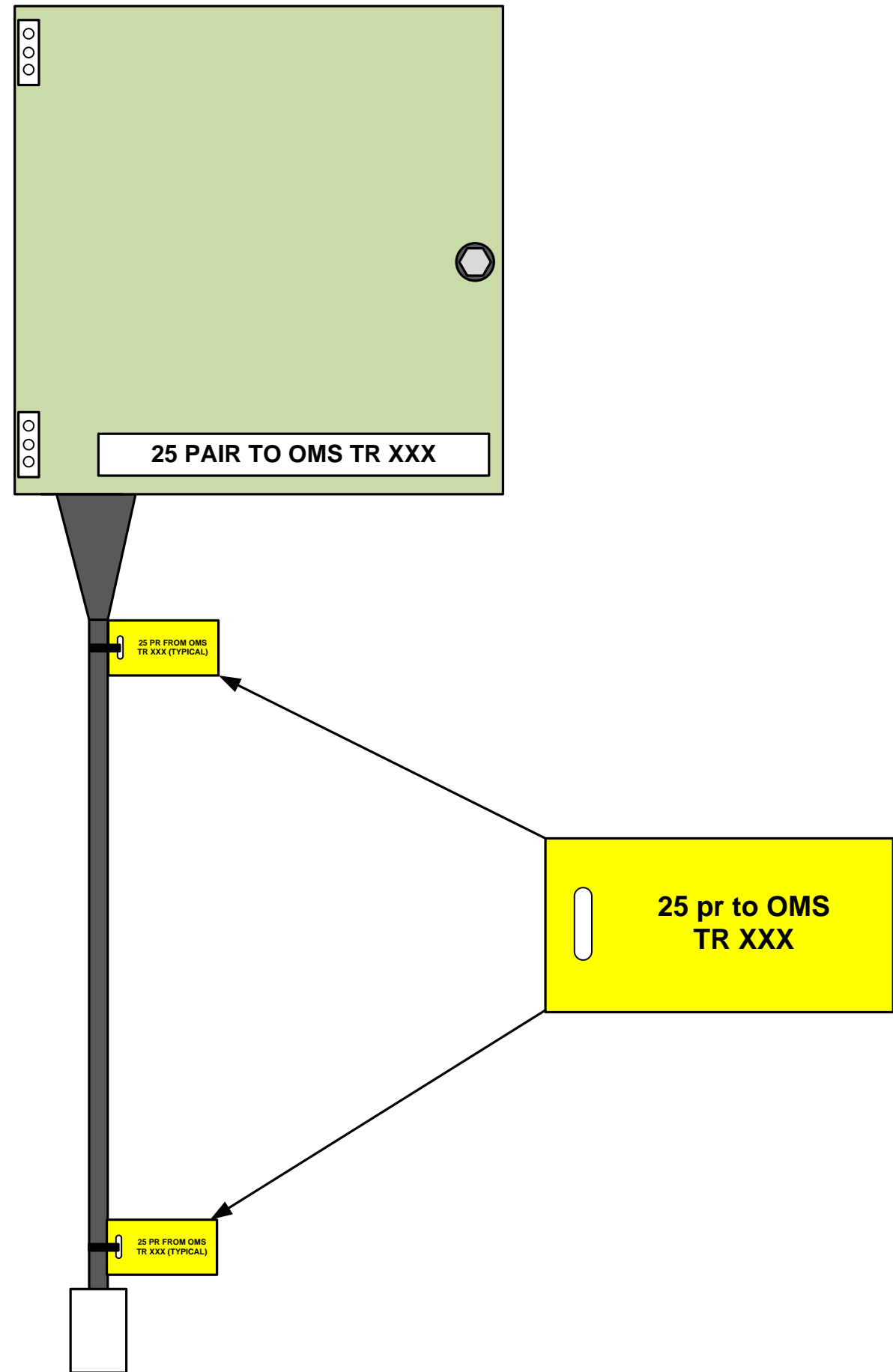
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Figure  
5.18

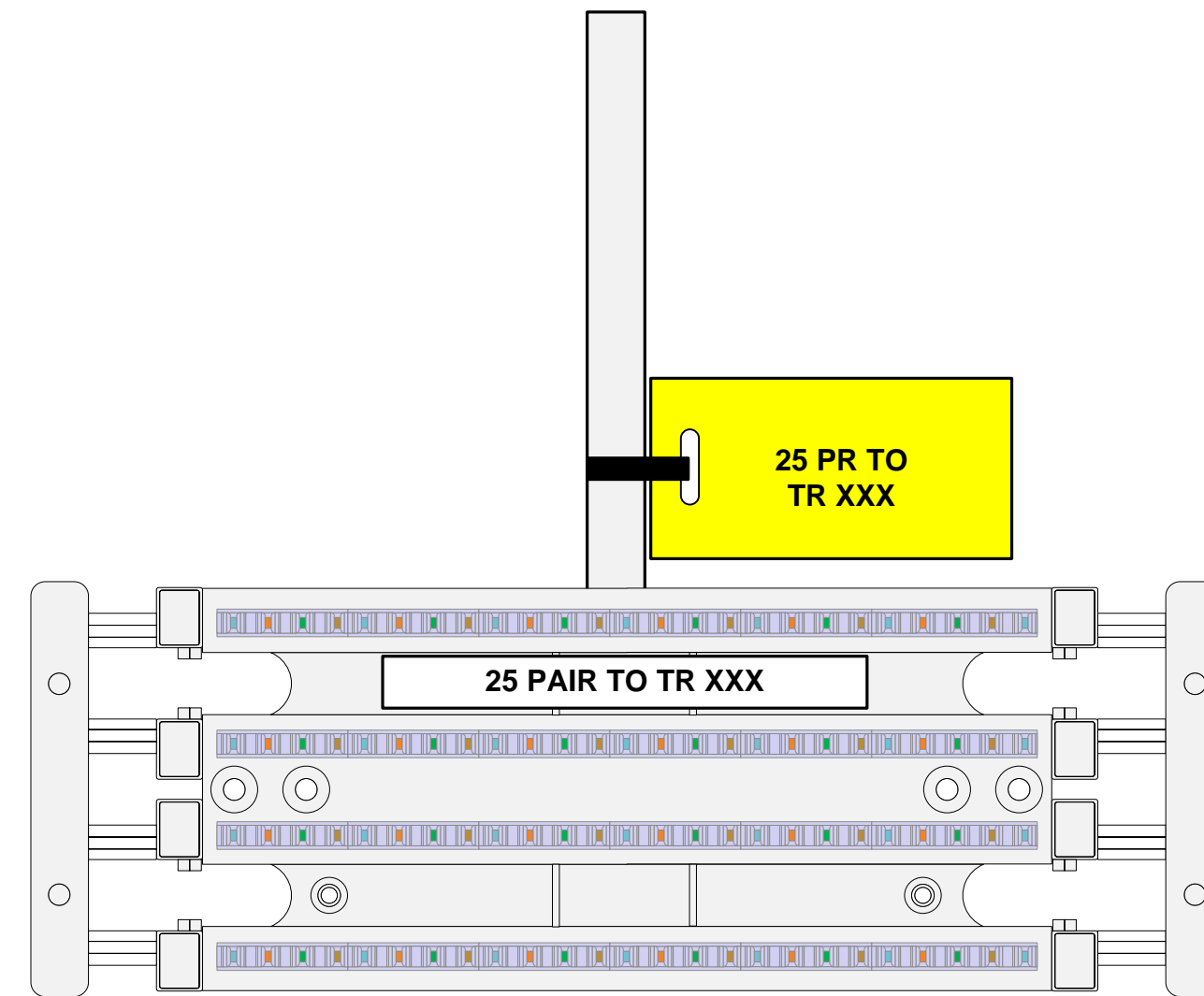
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TYPICAL COPPER BACKBONE CABLE AND BUILDING ENTERANCE PROTECTOR LABLES

1  
5.19



TYPICAL COPPER BACKBONE CABLE AND 110 BLOCK LABLES

2  
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# A1 STANDARD TELECOMMUNICATIONS SYMBOL LEGEND



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Figure  
5.19

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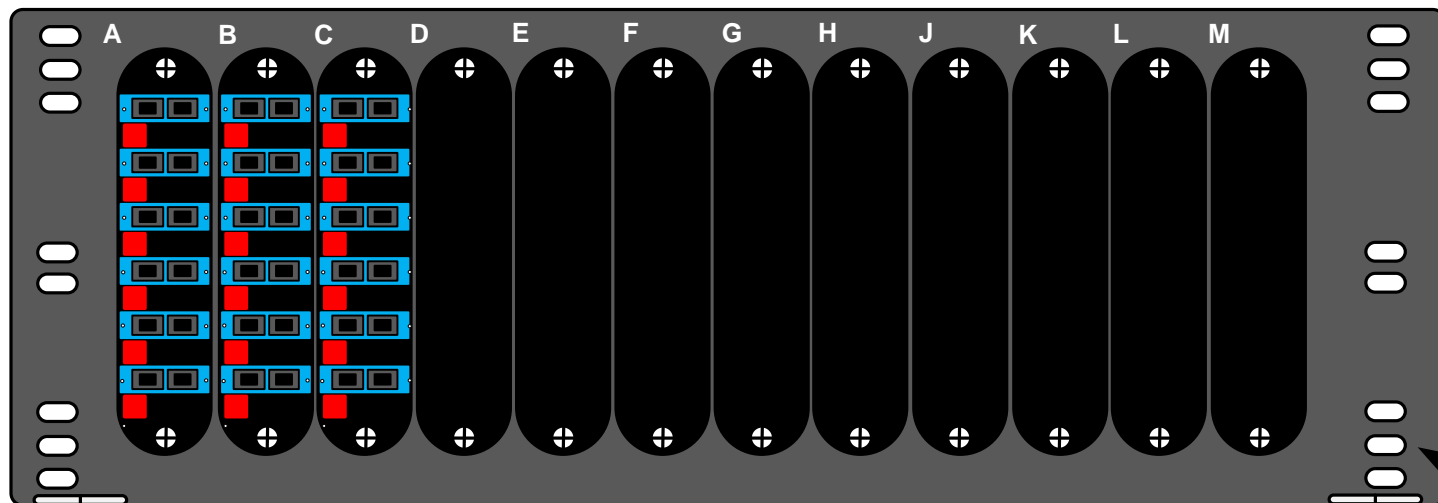
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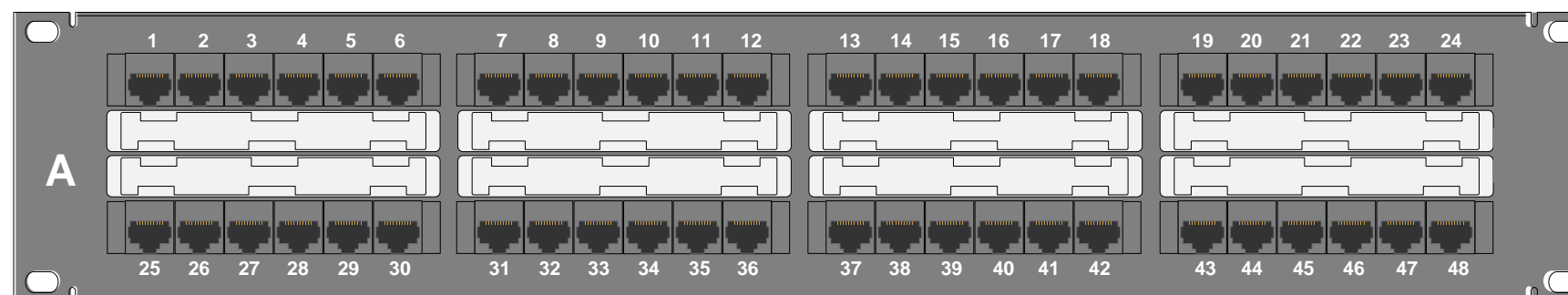
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CRITERIA UPDATES DIAGRAMS

Figure 5.20

### ENLARGED FOC PATCH PANEL DIAGRAM



### ENLARGED CATEGORY 6 PATCH PANEL DIAGRAM

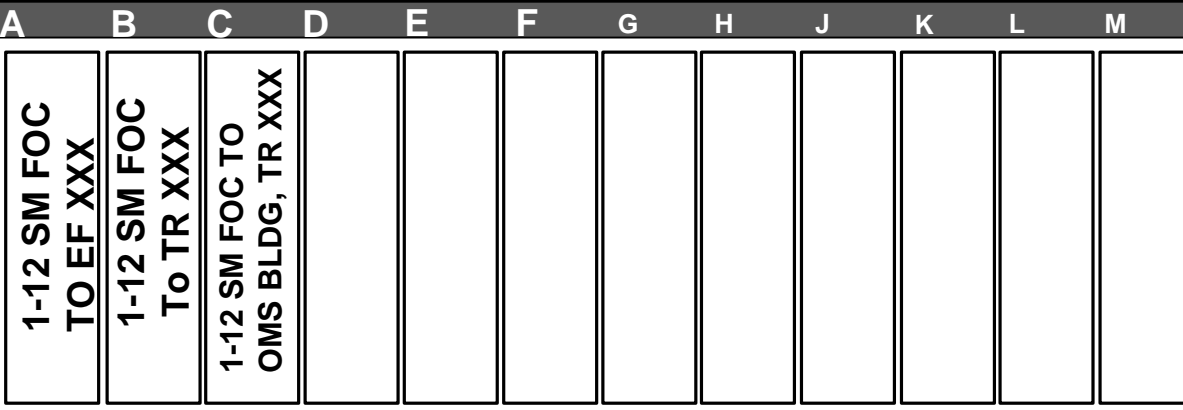


A: 1-12 SM FOC TO EF XXX

B: 1-12 SM FOC TO TR XXX

C: 1-12 SM FOC TO OMS TR XXX

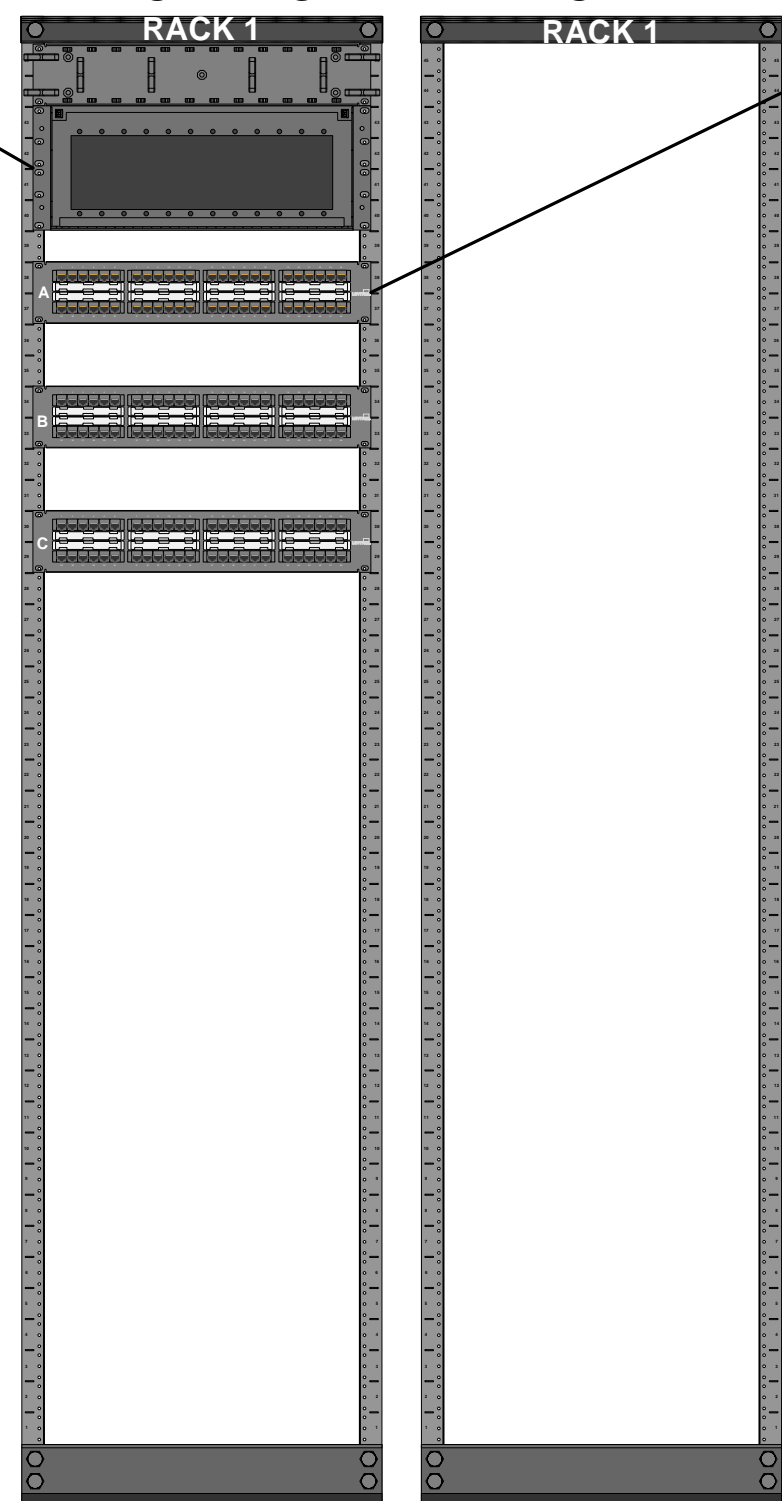
FOC Patch Panel Outside of Front Cover



FOC Patch Panel Inside of Front Cover

IT RACK FRONT

IT RACK REAR



A1

## TYPICAL RACK AND PATCH PANEL LABELING SCHEMES

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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**SHEET KEY NOTES**

- 1 LEC INSTALLED COPPER BACKBONE CABLE
- 2 LEC INSTALLED SM FIBER OPTIC CABLE
- 3 50 PAIR COPPER BACKBONE CABLE
- 4 12 STRAND SM FIBER OPTIC CABLE
- 5 (2) 75 OHM RG6 (OF SIAMESE CONSTRUCTION) COAXIAL CABLES
- 6 25 PAIR COPPER BACKBONE CABLE
- 7 6 PAIR COPPER BACKBONE CABLE

**SHEET GENERAL NOTES**

1. USARC G-6 IS RESPONSIBLE FOR THE ORDERING OF THE DS3 CIRCUIT AND THE VOICE PRI.

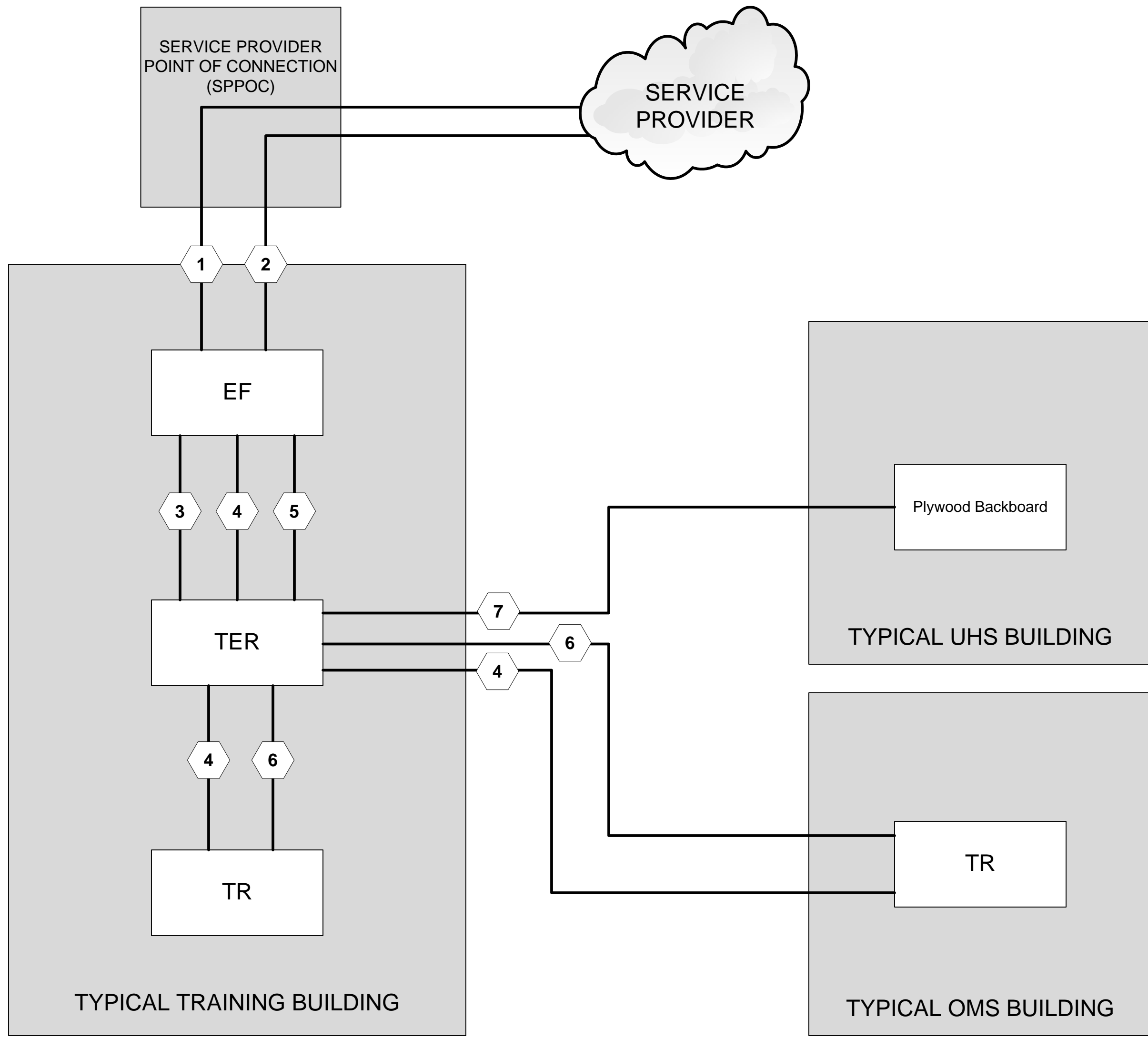


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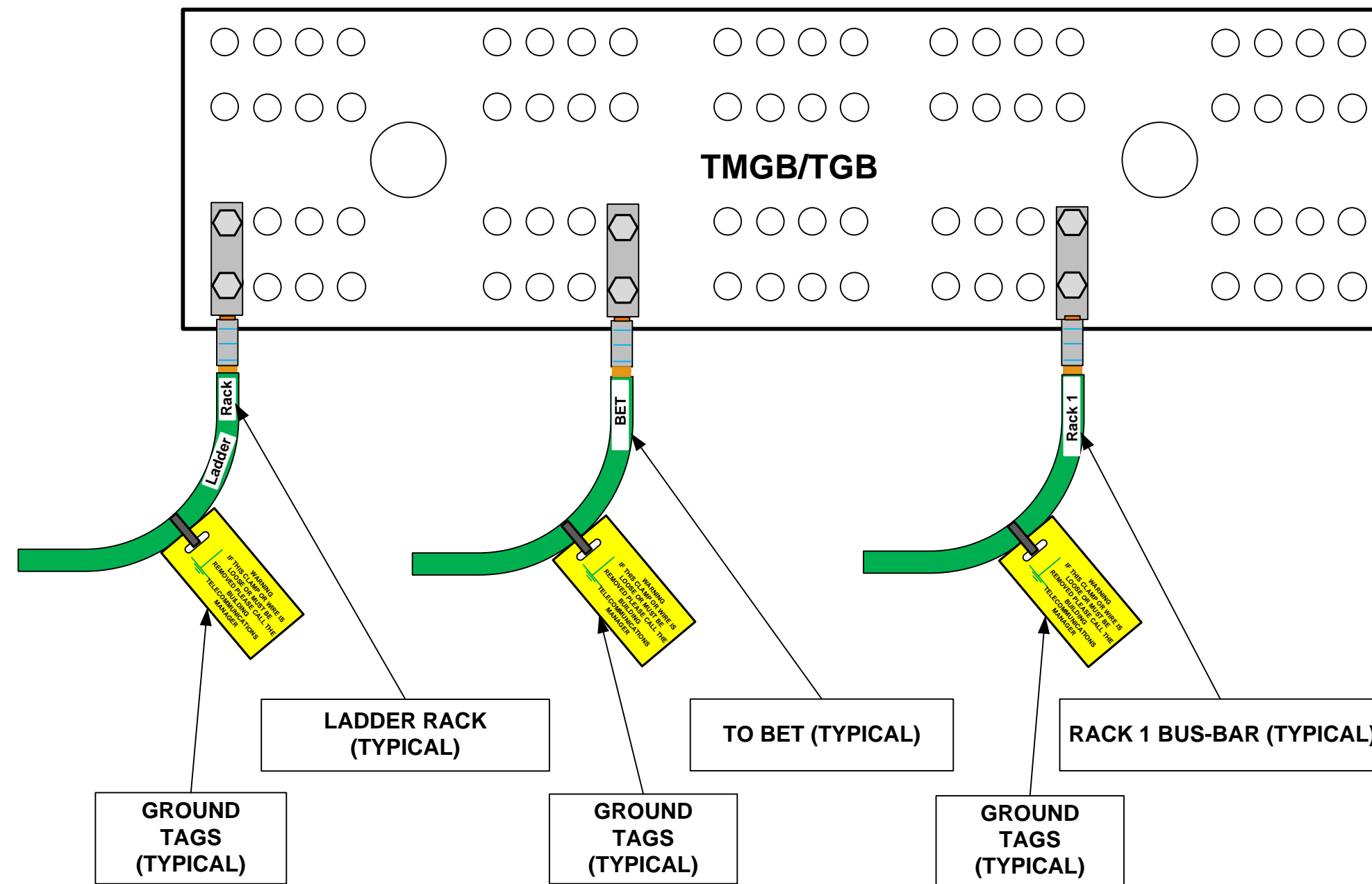
Figure 5.21



A1 TYPICAL BACKBONE CABLE RISER DIAGRAM

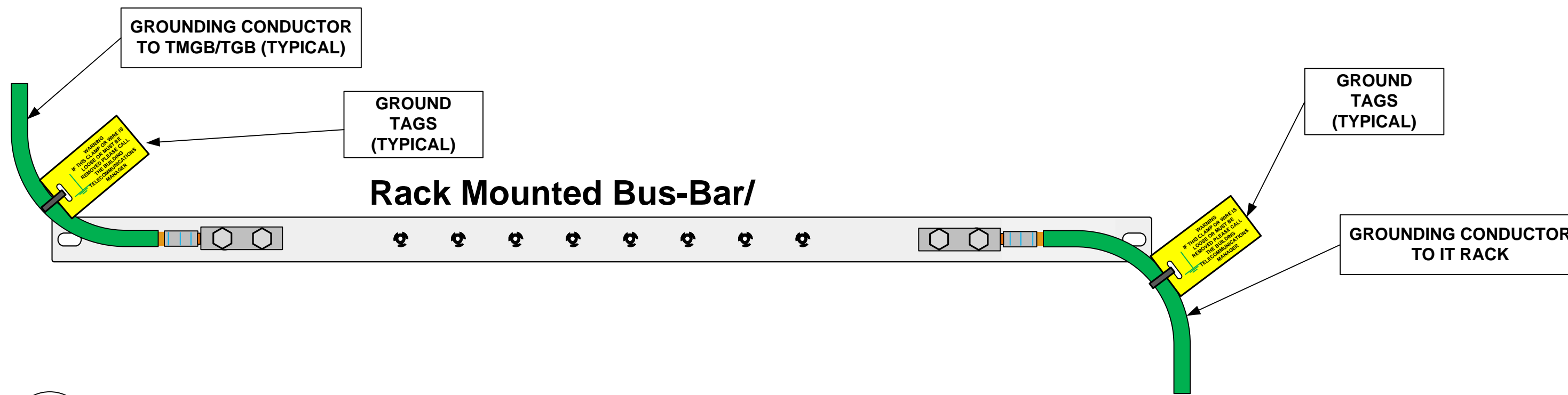
NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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1  
5.22

TYPICAL BUS-BAR/GROUNDING CONDUCTOR LABELING SCHEME



2  
5.22

TYPICAL RACK MOUNTED BUS-BAR/GROUNDING CONDUCTOR LABELING SCHEME

A1 TYPICAL GROUNDING BUS-BAR AND BONDING CONDUCTOR LABELS



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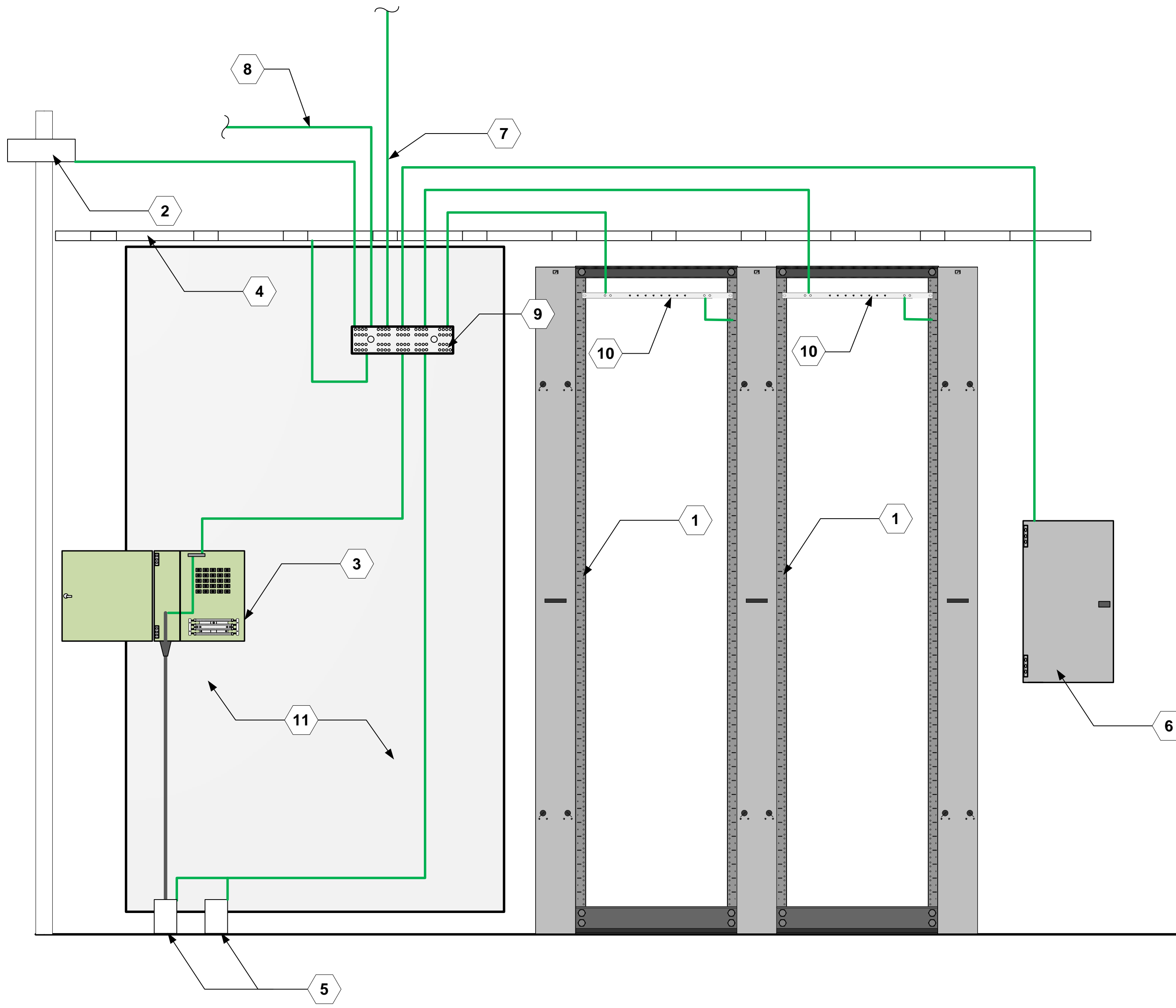
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Figure 5.22

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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### SHEET KEY NOTES

- 1 IT RACKS
- 2 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 ELECTRICAL PANEL OR TMGB
- 9 TMGB/TGB
- 10 RACK MOUNTED BUS-BAR
- 11 PLYWOOD BACKBOARD

### SHEET GENERAL NOTES

1. ALL METALLIC COMPONENTS INSTALLED IN OR ENTERING ANY IT SPACE SHALL BE BONDED TO THE TMGB/TGB WITH A MINIMUM #6 GROUNDING CONDUCTOR.
2. ALL GROUNDING AND BONDING CONDUCTOR SIZING SHALL BE IAW WITH TIA 607B
3. TWO HOLE LONG BARREL LUGS SHALL BE USED FOR ALL GROUNDING AND BONDING TERMINATIONS
4. NON-METALLIC COATINGS (SUCH AS PAINT, POWDER-COAT, LACQUER) SHALL BE REMOVED FROM ALL GROUNDING AND BONDING SURFACES AND CONNECTIONS.
5. AN ANTI-OXIDANT COMPOUND (NOALOX OR APPROVE EQUAL) SHALL BE APPLIED TO ALL NON ELECTRO-TIN PLATED SURFACES.
6. SELF TAPPING SCREWS SHALL NOT BE INSTALLED TO CONNECT BONDING TERMINATION CONNECTORS TO METALLIC SURFACES.



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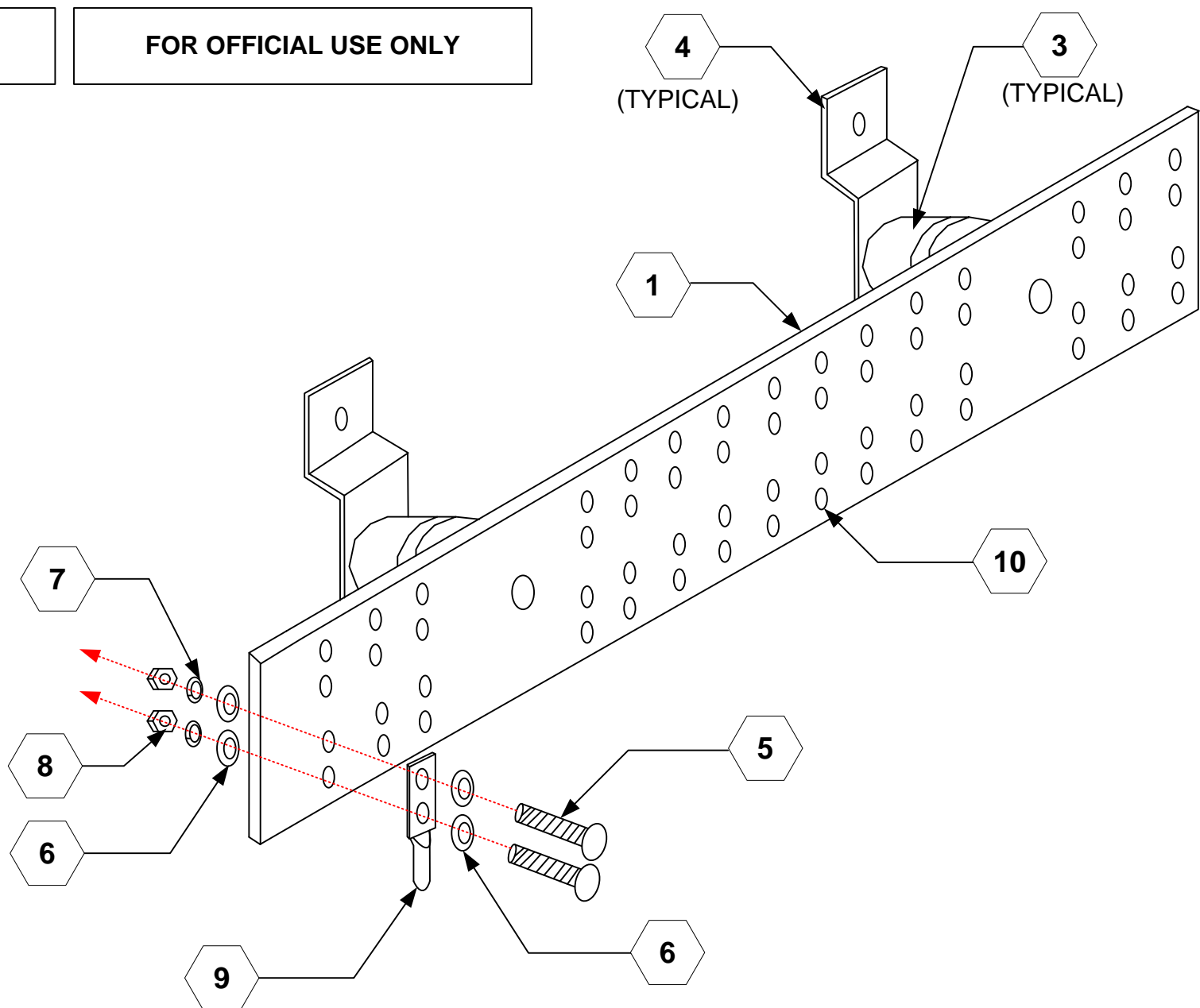
Figure  
5.23

A1 TYPICAL IT SPACE GROUNDING RISER DIAGRAM



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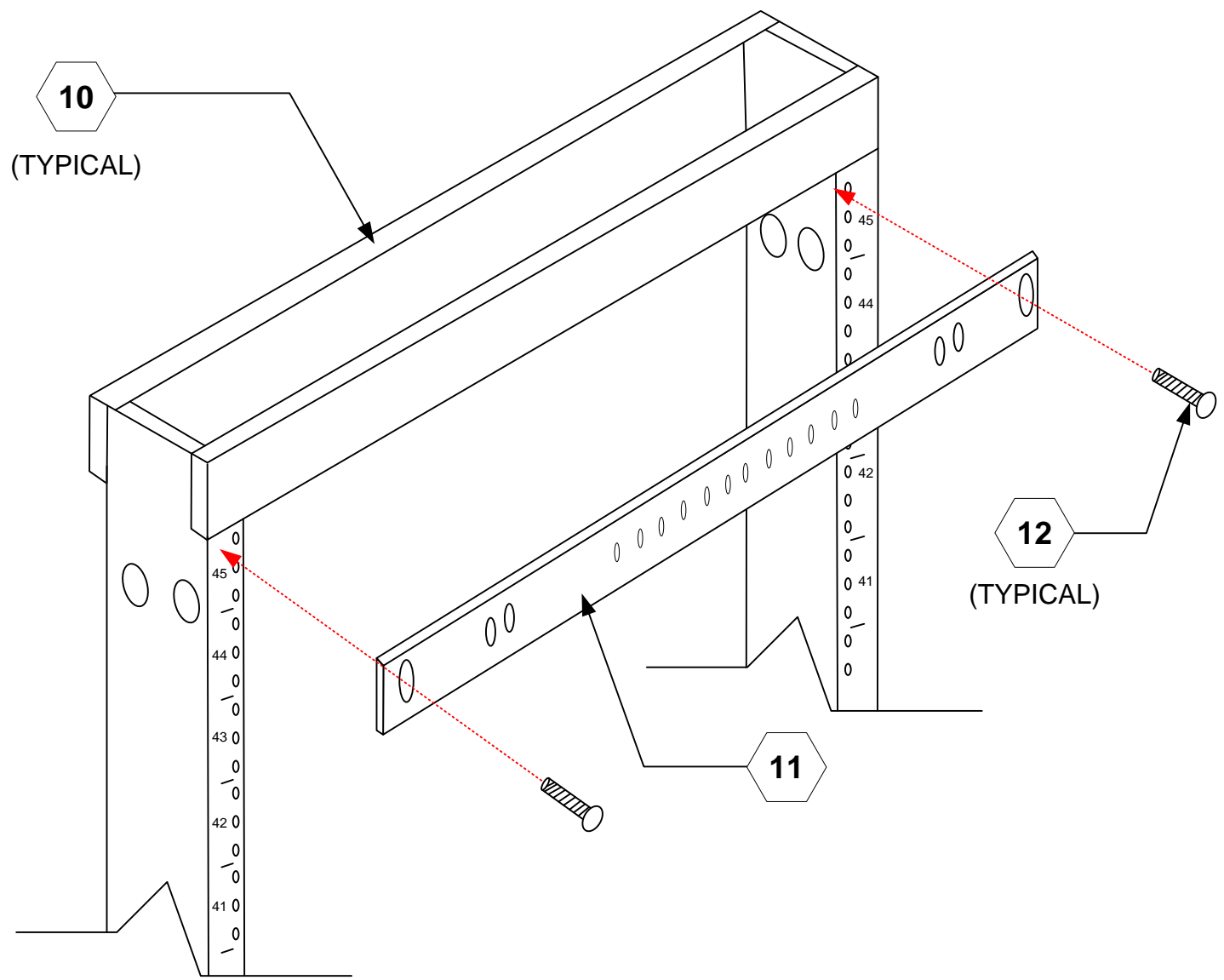
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5.24  
TYPICAL TMGB ENLARGED DETAIL

SHEET KEY NOTES

- 1 MINIMUM 24"X4"X1/4" TMGB
- 2 MINIMUM 24"X2"X1/4" TGB
- 3 UL LISTED INSULATOR, MINIMUM OF 50.8 MM SEPARATION FROM THE WALL/RACK IS REQUIRED TO ALLOW ACCESS TO THE REAR OF THE BUS BAR
- 4 TMGB/TGB MOUNTING BRACKET. SHALL BE SECURED TO THE PLYWOOD BACKBOARD WITH APPROVED 1/4" LAG BOLTS AND 1/4" FLAT WASHERS
- 5 1/4" X 20 GRADE 5 OR BETTER BOLTS
- 6 1/4" FLAT WASHERS GRADE 5 OR BETTER
- 7 1/4" FLAT LOCK WASHERS GRADE 5 OR BETTER
- 8 1/4"X20 NUT GRADE 5 OR BETTER
- 9 COMPRESSION 2 HOLE LONG BARREL CONNECTORS
- 10 TYPICAL IT RACK
- 11 1 INCH X 19 INCH RACK MOUNTED BUS-BAR. SEE FIGURES SHEETS 5.03 – 5.05 FOR BUS-BAR PLACEMENT
- 12 STANDARD RACK HARDWARE

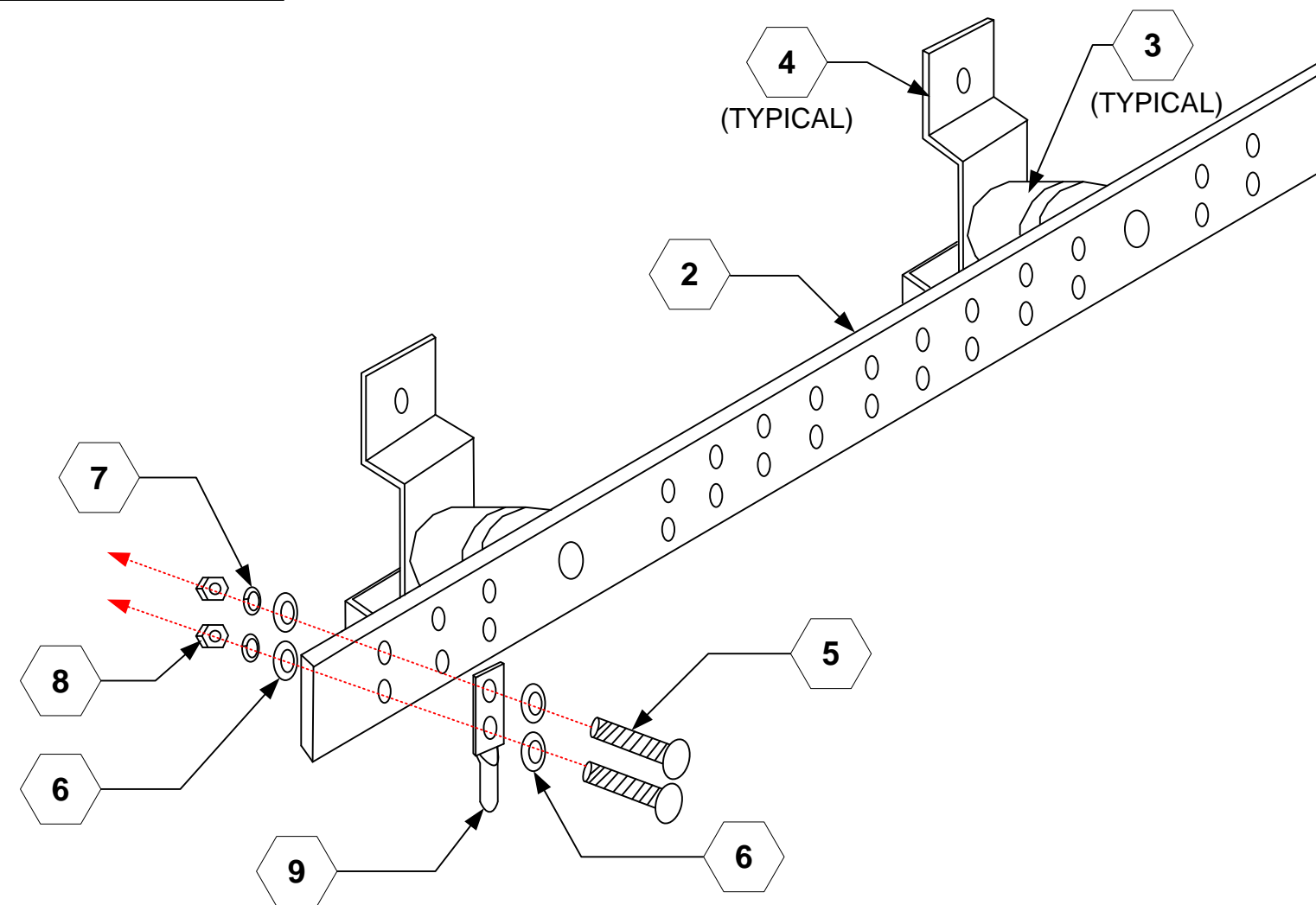
SHEET GENERAL NOTES

1. ALL WALL MOUNTED BUS BARS SHALL BE ELECTRO TIN-PLATED (ETP) TO REDUCE CONTACT RESISTANCE AND CORROSION.
2. ALL WALL MOUNTED BUS BARS SHALL BE PREDRILLED WITH STANDARD 5/16" HOLES IN A 2 HOLE CONFIGURATION.
3. TMGB/TGB(S) SHALL BE COPPER WITH A MINIMUM OF 95% CONDUCTIVITY



2  
5.24  
TYPICAL RACK MOUNTED BUS-BAR ENLARGED DETAIL

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3  
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TYPICAL TGB ENLARGED DETAIL

TYPICAL TELECOMMUNICATION GROUNDING BUS-BAR ENLARGED DIAGRAMS

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| USARMC G-6 RCDD                |                        |

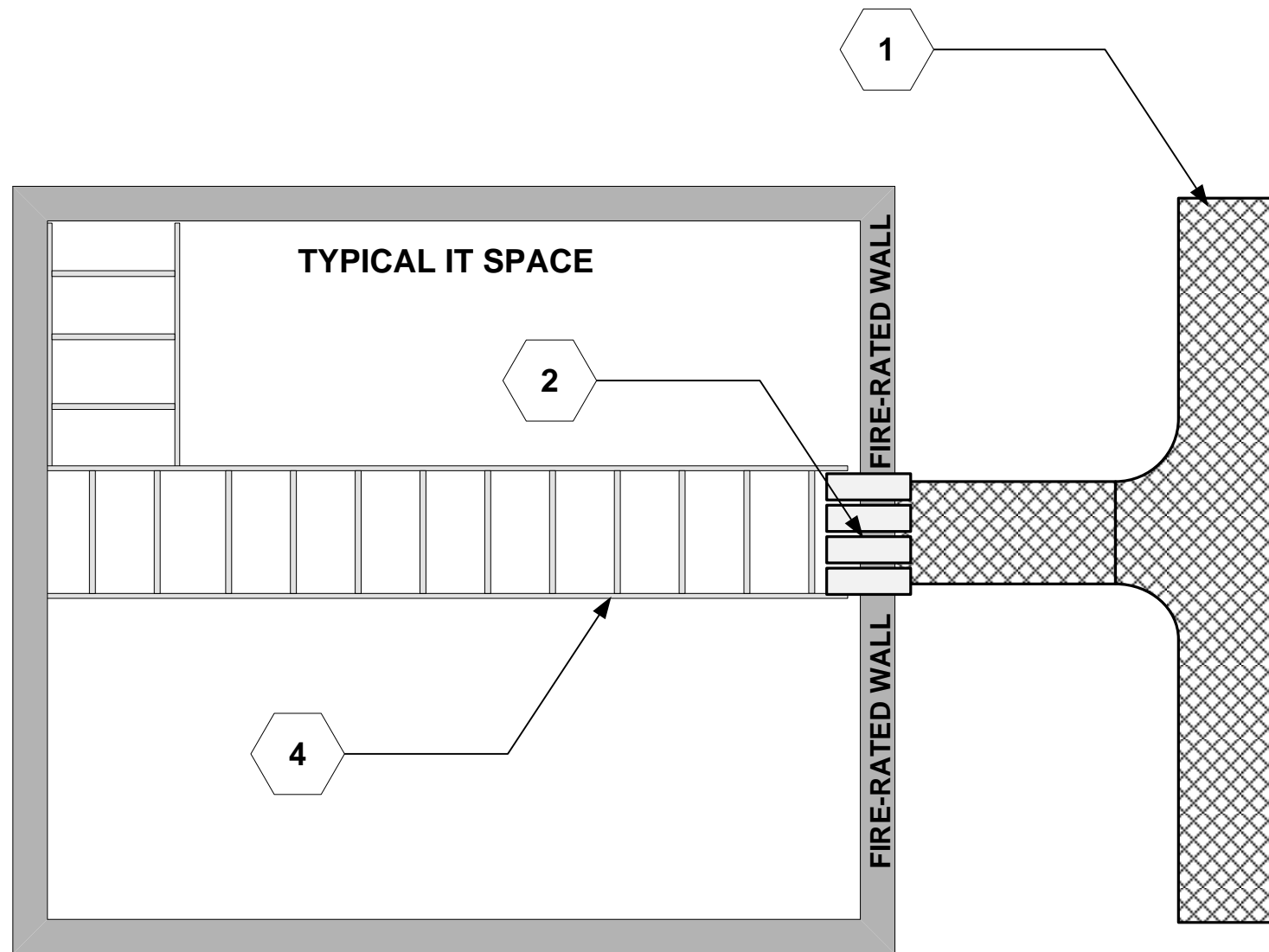
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Figure  
5.24

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WALL PENETRATION THROUGH FIRE-RATED WALL

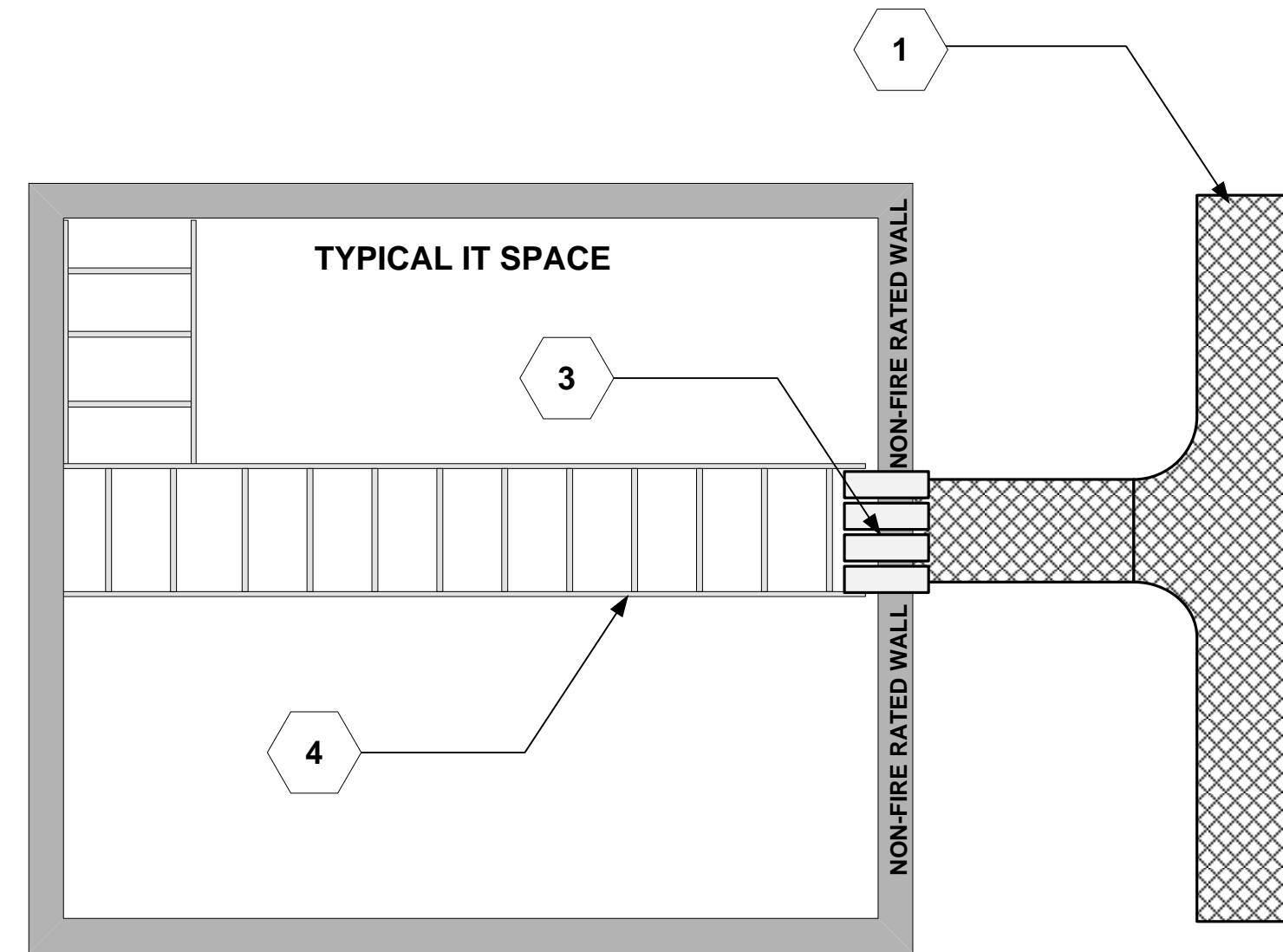
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**SHEET KEY NOTES**

- 1 BASKET STYLE CABLE TRAY. DO NOT ENTER IT SPACE WITH CABLE TRAY.
- 2 4" MECHANICAL FIRE-STOPPING UNITS
- 3 4" SLEEVES WITH REQUIRED PLASTIC BUSHINGS TO PREVENT CABLE DAMAGE.
- 4 LADDER RACK SUPPORT SYSTEM

**SHEET GENERAL NOTES**

1. NUMBER OF REQUIRED WALL MECHANICAL FIRE-STOPPING UNITS/WALL SLEEVES IS BASED UPON A 40% INITIAL FILL CAPACITY.



WALL PENETRATION THROUGH NON-FIRE RATED WALL

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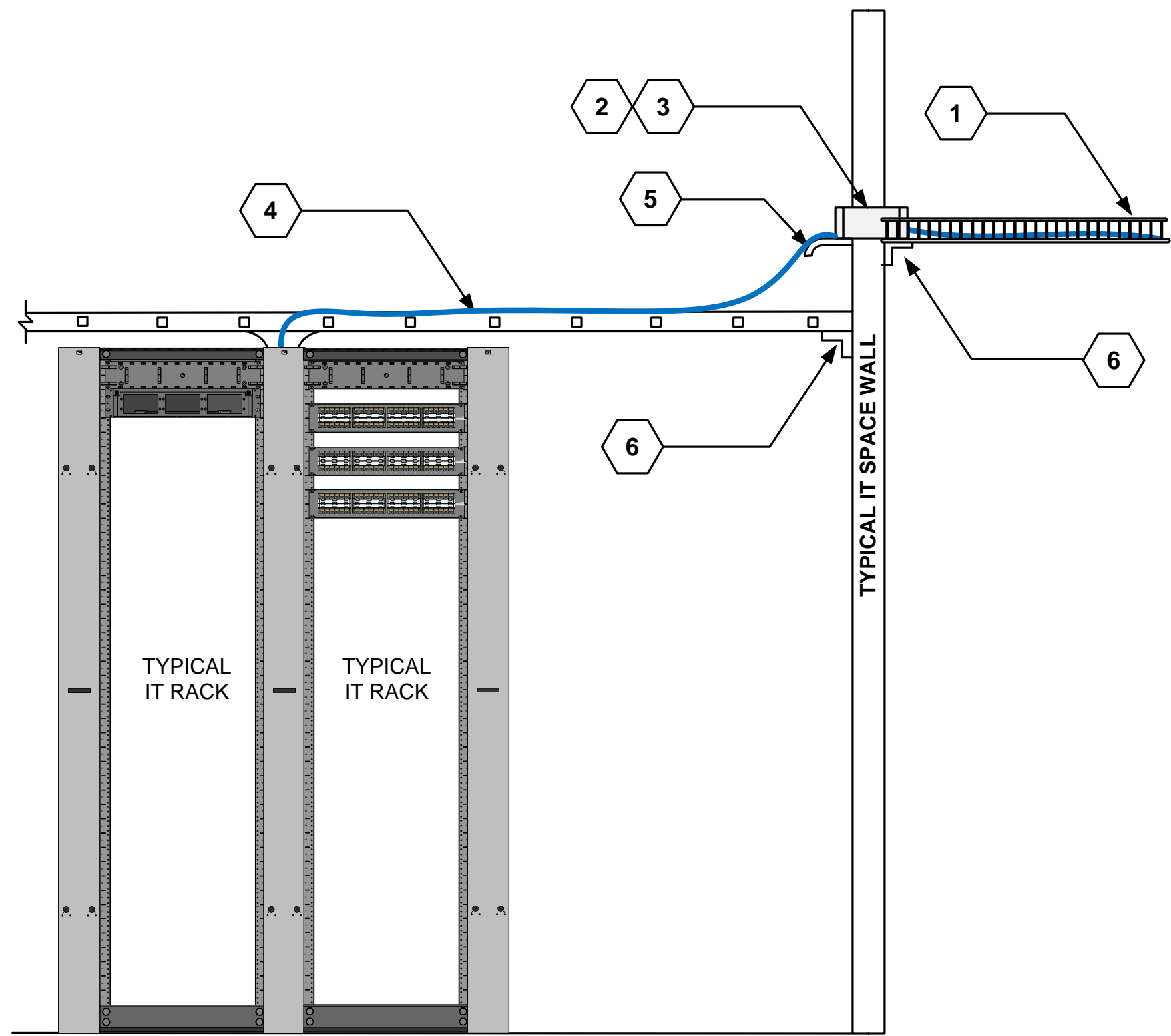
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Figure  
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A1 TYPICAL IT SPACE WALL PENETRATION AERIAL DIAGRAMS

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TYPICAL WALL PENETRATION CABLE TRAY TO LADDER RACK

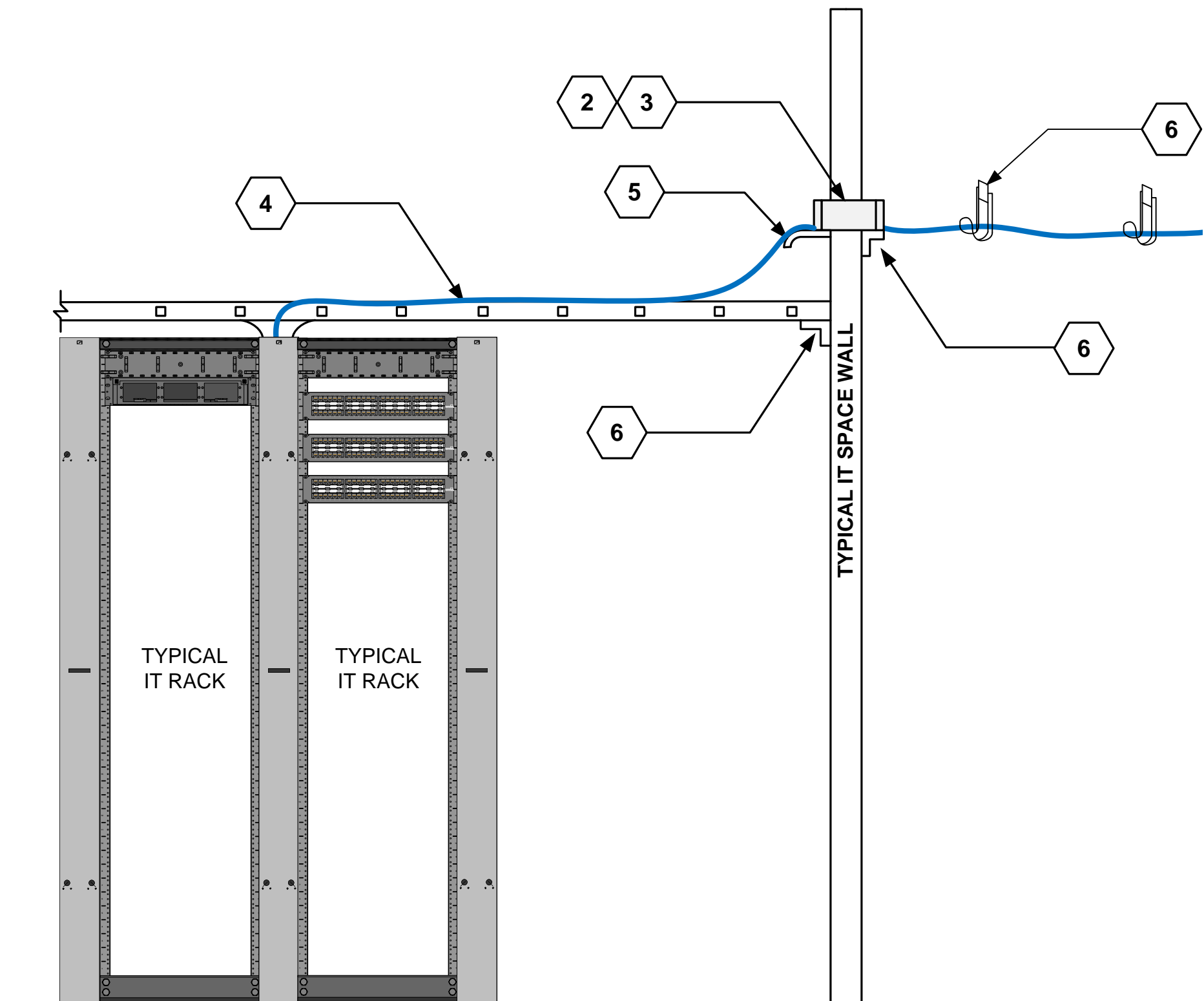
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**SHEET GENERAL NOTES**

1. NUMBER OF REQUIRED WALL MECHANICAL FIRE-STOPPING UNITS/WALL SLEEVES IS BASED UPON A 40% INITIAL FILL CAPACITY.

**SHEET KEY NOTES**

- 1 BASKET STYLE CABLE TRAY. DO NOT ENTER IT SPACE WITH CABLE TRAY.
- 2 4" MECHANICAL FIRE-STOPPING UNITS
- 3 4" SLEEVES WITH REQUIRED PLASTIC BUSHINGS TO PREVENT CABLE DAMAGE.
- 4 LADDER RACK SUPPORT SYSTEM
- 5 WATERFALL SUPPORT SYSTEM. IF THE DISTANCE FROM THE EXIT POINT OF THE CONDUIT/SLEEVE TO THE LADDER RACK EXCEEDS 5' THEN THE CABLE MUST BE SUPPORTED FROM THE EXIT POINT OF THE CONDUIT/SLEEVE UNTIL IT MEETS THE LADDER RACK.
- 6 ANGULAR SUPPORT BRACKET
- 7 CATEGORY 6 RATED J-HOOKS



TYPICAL WALL PENETRATION J-HOOK TO LADDER RACK

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5.26

**TYPICAL IT SPACE WALL PENETRATION ELEVATION DIAGRAMS**

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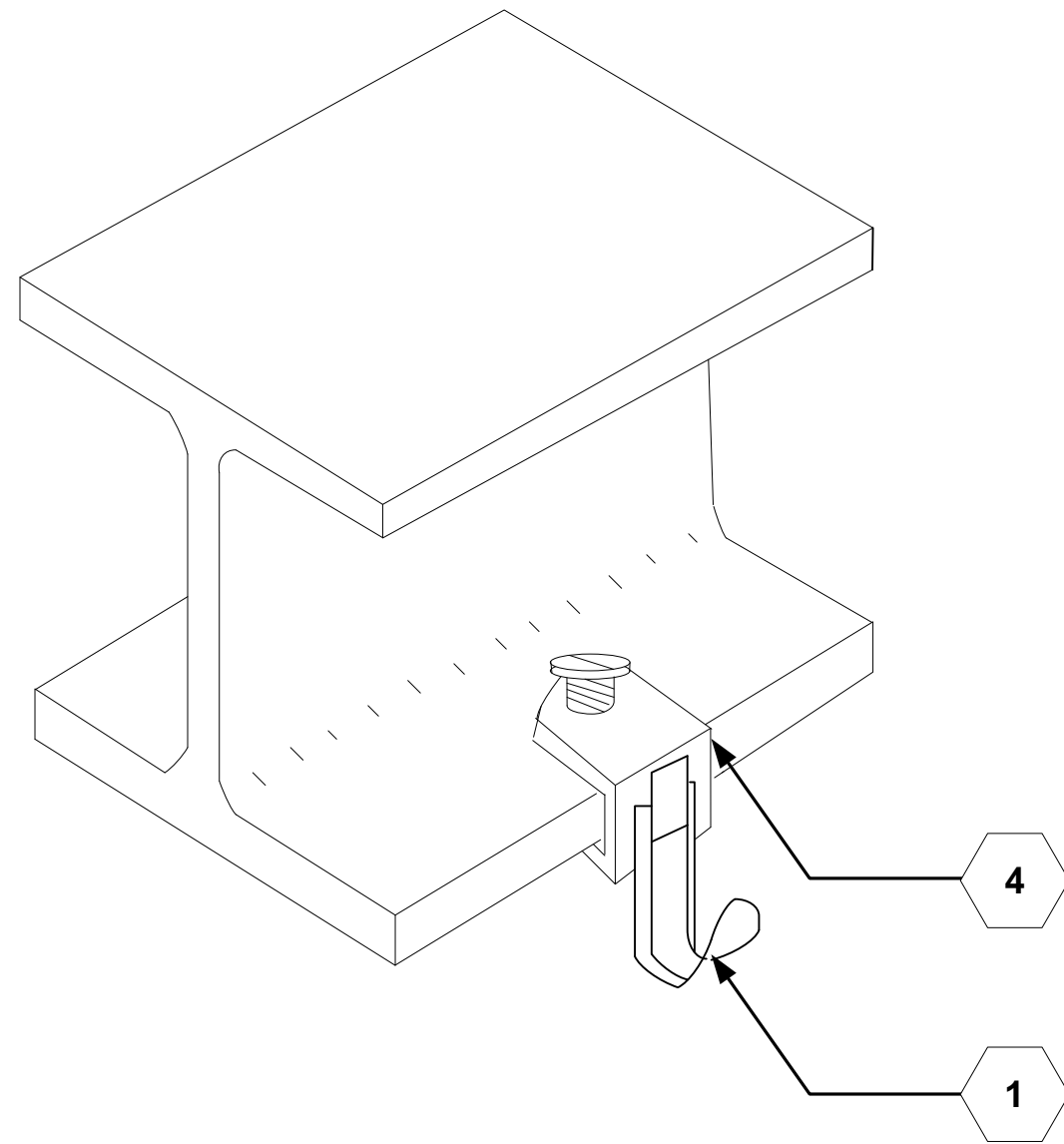
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Figure  
5.26

NOTE: ALL DIAGRAMS ARE TYPICAL EXAMPLES

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1  
5.27 TYPICAL J-HOOK TO BUILDING STEEL SUPPORT

**SHEET GENERAL NOTES**

1. J-HOOKS SHALL NOT EXCEED 60 INCHES APART
2. J-HOOKS SHALL NOT EXCEED 24 CABLES OR 50% FILL CAPACITY, WHICHEVER IS LESS.
3. J-HOOKS SHALL NOT BE INSTALLED OVER, ABOVE, OR THROUGH HARD CEILING AREAS.
4. DISTANCE FROM CONDUIT STUB OUT TO CABLE TRAY SHALL NOT EXCEED 40 FEET.
5. ALL J-HOOKS SHALL BE RATED FOR USE WITH CATEGORY 6 CABLE

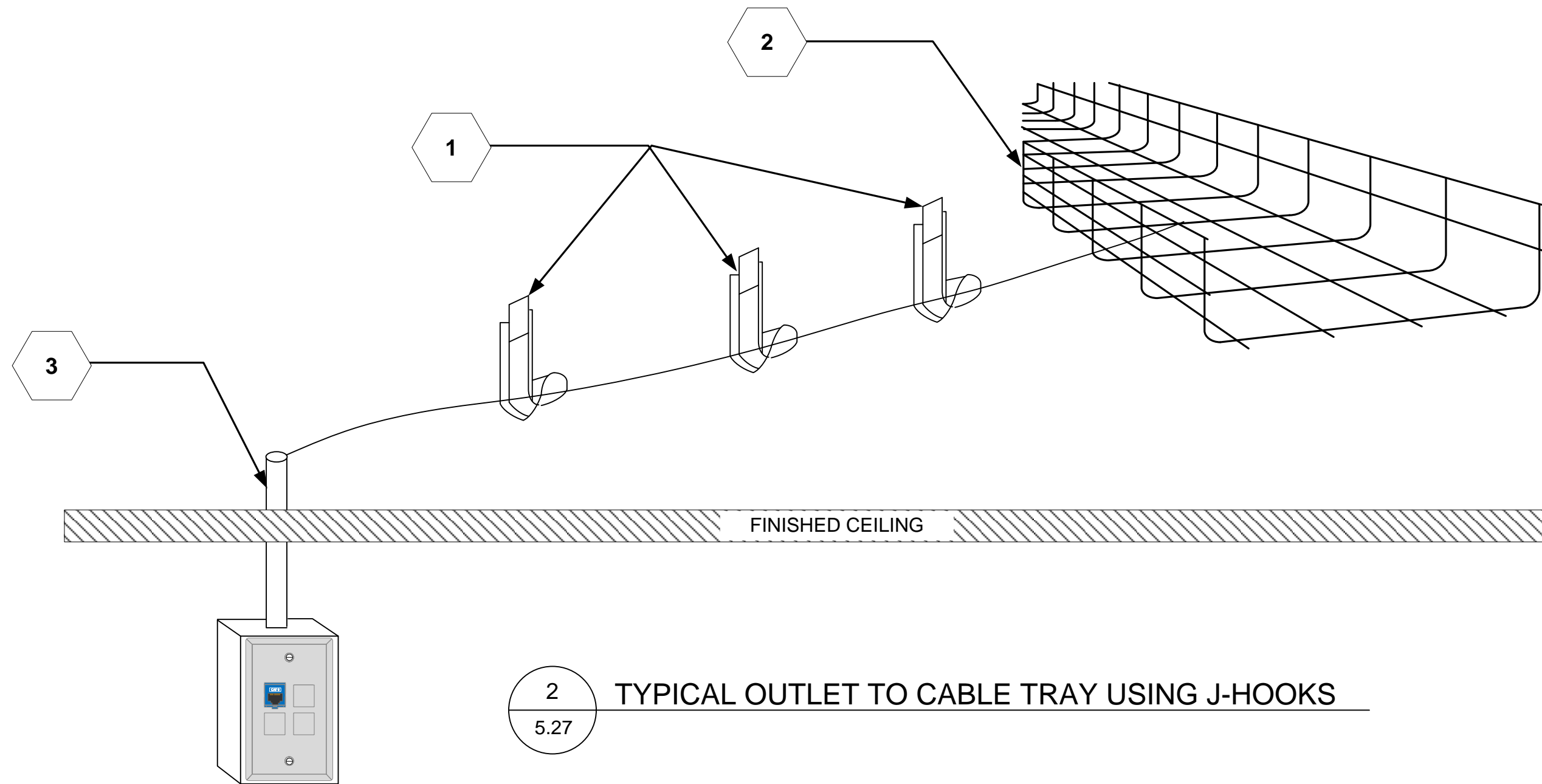
**SHEET KEY NOTES**

- 1 CATEGORY 6 RATED J-HOOKS
- 2 WIRE MESH CABLE TRAY (FLEX TRAY)
- 3 1" CONDUIT/SURFACE MOUNTED RACEWAY STUB-OUT TO ABOVE CEILING. PROVIDE BUSHINGS AT END OF CONDUIT FOR CABLE PROTECTION.
- 4 J-HOOK BEAM CLAMP



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| USARMC G-6 RCDD                |                        |



2  
5.27 TYPICAL OUTLET TO CABLE TRAY USING J-HOOKS

A1 TYPICAL J-HOOK ENLARGED DIAGRAMS

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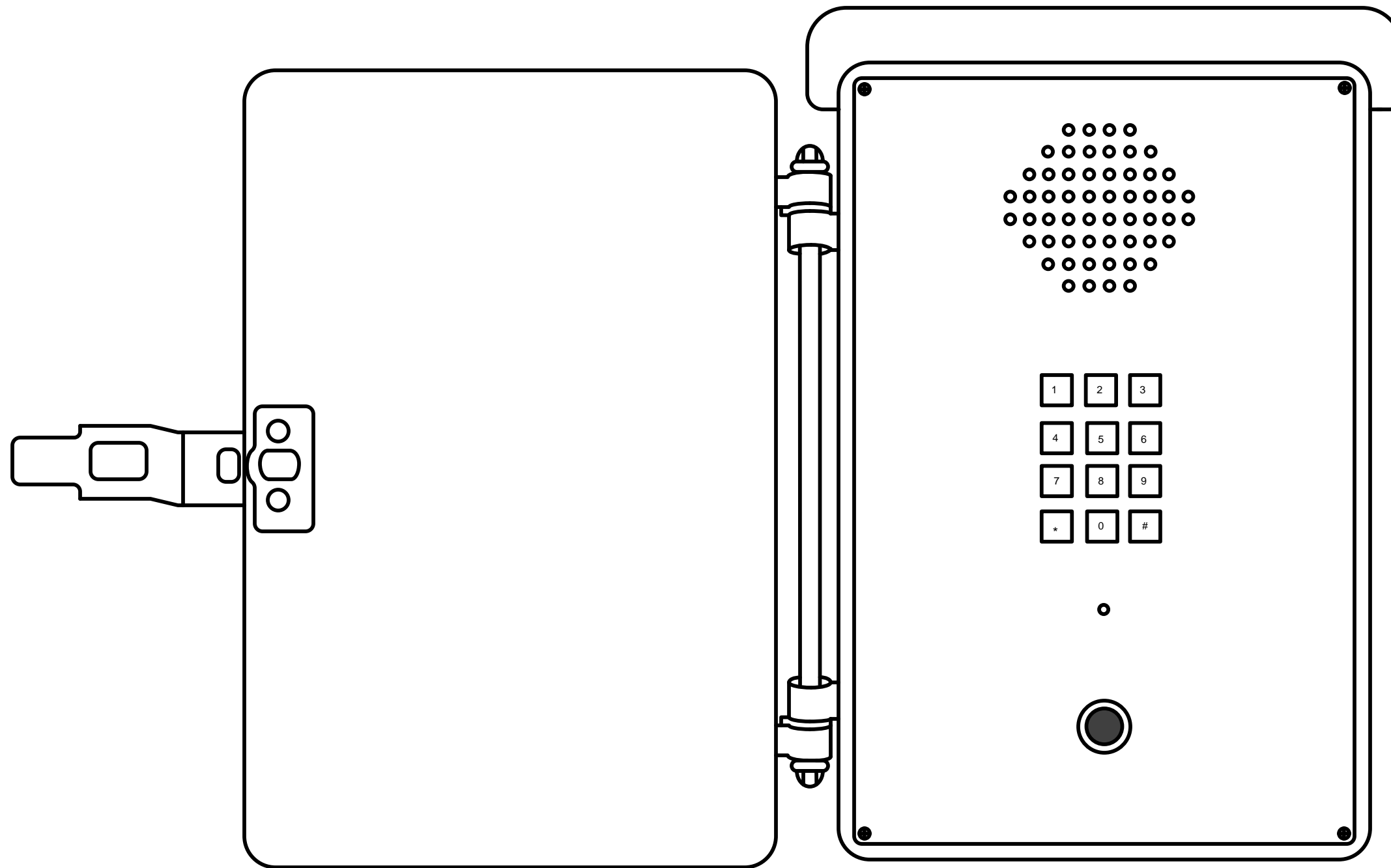
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### SHEET GENERAL NOTES

1. CALL BOX SHALL BE STAINLESS STEEL, TAMPER  
RESISTANT, AND WEATHER PROOK



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1 CEECO WPP-531-F CALLBOX OR APPROVED EQUAL  
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ARMY RESERVE  
IT DESIGN AND CONSTRUCTION  
CRITERIA UPDATES DIAGRAMS

Figure  
5.30

A1 TYPICAL EXTERIOR CALL BOX ENLARGED DETAIL