



Army Reserve IT Manual

Information Technology Design and Construction Guide



Army Reserve IT Manual

15 February 2008
With Change 1, 20 October 2008

FOREWORD

This Manual is a living document and will be periodically reviewed, updated and made available to users as part of the Army Reserve's responsibility for providing technical criteria for facility design and construction. The proponent for Army Reserve Information Technology is USARC G2/6. Development and maintenance of this Manual and its technical content is the responsibility of ACSIM-AR, in coordination with USARC G2/6 and Information Systems Engineering Command, Ft. Detrick Engineering Directorate. For ARNET users, lessons learned and recommended changes with supporting rationale may be submitted to the following website:

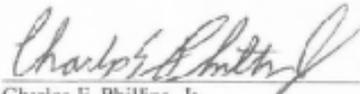
<https://xtranet/organization/DCGUSARC/CoS/Coordinating/DCSG-26/G26Pand/>

For those without access to ARNET, lessons learned and recommended changes with supporting rationale may be submitted to the following e-mail address:

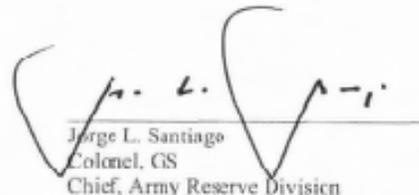
DLL-CELRL-PM-R-Tech-Team@usace.army.mil

Recommended changes received and other anticipated changes to Army Reserve Information Technology will be reviewed in a quarterly conference call involving USARC G2/6, ACSIM-AR, and the Louisville District Corps of Engineers Reserve Support Team

AUTHORIZED BY:



Charles E. Phillips, Jr.
Colonel, GS
Deputy Chief of Staff, G-2/6



Jorge L. Santiago
Colonel, GS
Chief, Army Reserve Division

Change 1 Summary Sheet**Subject:** Army Reserve IT Manual**Cancel:** Army Reserve IT Manual, dated 15 February 2008**Description of Changes:**

- Editorial and typographic corrections throughout

Chapter 2 – Army Reserve Information Technology Spaces and Requirements

- **2.2.1.3.** Clarified direction for mechanical cooling design parameters
- **2.2.5.2.** Added clarification regarding preferred location of SIPRNET Café space based on need to support weight of safe or security container; added information on weight of safe or container.
- **2.2.5.4.** Added requirement for supplemental card-key system for SIPRNET Café space, and design criteria for the card-key system.
- **2.2.5.5.** Added requirement to connect supplemental card-key system to IDS for Café.
- **2.2.5.6.** Added supplemental card-key system to space design information. Added IDS provisions and direction on windows to space design information for consistency with other secure spaces in Manual.
- **2.2.6.3.** Added IDS provisions to space design information for consistency with other secure spaces in Manual.

Chapter 3 – Infrastructure

- **3.1.3.5.** Revised conduit sizes to match furniture specifications.
- **3.2.6.1.3.** Clarified criteria for cable color coding.
- **3.3.5.6.** Added description of standard IT outlet configuration.
- **3.5.2.2.2.** Added mounting height for black outlet boxes.
- **3.5.2.2.4.** Added mounting height for electrical receptacles.
- **3.5.2.3.4.** Corrected mounting height for red outlet boxes.
- **3.5.2.5.** Changed to 3.5.3 and added AGCCS and COMSEC spaces. Changed keypad to card-key reader.
- **3.5.2.6.** Changed to 3.5.2.5.
- **3.5.2.7.** Changed to 3.5.2.6.
- **3.5.2.8.** Changed to 3.5.2.7.
- **3.7.1.1.5.** Clarified Clean Power requirement for modular furniture.
- **3.7.1.7.** Change mounting height to 12 inches.

Change 2 Summary**Subject:** Army Reserve IT Manual Change 2 **Cancels:** Army Reserve IT Manual, Change 1 dated 20 October 2008**Description of Changes:**

- Editorial and typographic corrections throughout

Chapter 1 – Introduction and General Overview

- 1.2.2.2: Changed AR to Army Reserves and added service provider clarification
- 1.2.3.1: Changed Reserve Center to ARC and AFRC. Also changed DEMARC or MPOP to EF
- 1.2.3.2: Changed Reserve Center to ARC and added joint-use statement
- 1.2.3.3: Added joint-use information
- 1.2.4.1: Changed from project provided to GFGI
- 1.2.4.2: Added option for RTU
- 1.2.5.2: Removed RRC reference
- 1.2.6.4: Added reference to NSTISSI document
- 1.2.6.6: Added document name
- 1.2.7.1: Added service examples
- 1.2.7.3: Added reference to units
- 1.2.9.3: Reworded paragraph
- 1.3.3: Updated to reflect current industry standards

Chapter 2 – Army Reserve Information Technology Spaces and Requirements

- 2.1.2: Changed to reflect move of space design information to UFC 4-171-05
- 2.1.2.1: Removed and placed in UFC 4-171-05
- 2.1.2.2: Removed and placed in UFC 4-171-05
- 2.1.3: Removed and placed in UFC 4-171-05
- 2.2.1.2: Removed and placed in UFC 4-171-05
- 2.2.1.3: Removed and placed in UFC 4-171-05
- 2.2.2.3: Removed room location information (moved to UFC 4-171-04) and changed figure reference
- 2.2.2.4: Removed and placed in UFC 4-171-05
- 2.2.3.2: Removed basic room requirement (move to UFC 4-171-05) and changed figure reference
- 2.2.3.3: Removed and placed in UFC 4-171-05
- 2.2.3.4: Removed and placed in UFC 4-171-05
- 2.2.4: Removed and placed in UFC 4-171-05
- 2.2.5.1: Removed and placed in UFC 4-171-05
- 2.2.5.2: Removed and placed in UFC 4-171-05
- 2.2.5.3: Removed and placed in UFC 4-171-05
- 2.2.5.4: Removed and placed in UFC 4-171-05
- 2.2.5.5: Removed and placed in UFC 4-171-05
- 2.2.5.6: Removed and placed in UFC 4-171-05
- 2.2.5.7: Removed and placed in UFC 4-171-05

Chapter 2 change 2 descriptions-continued:

- 2.2.6: Removed and placed in UFC 4-171-05
- 2.2.7: Removed and placed in UFC 4-171-05
- 2.2.8: Removed and placed in UFC 4-171-05
- 2.2.9: Removed and placed in UFC 4-171-05

Chapter 3 – Infrastructure

- 3.1.3.1.3: Added I3A requirement
- 3.1.3.3: Added I3A requirement
- 3.1.3.5: Removed “adjacent to cable tray”
- 3.1.3.6: Reworded to clarify
- 3.1.4.1: Removed “slotted bottom or ventilated trough”
- 3.1.4.4: Changed “cable tray” to “ladder type cable runway. Also changed figure reference
- 3.1.4.5: Changed to state center hung cable tray not an option
- 3.1.4.7: Added clearance requirement
- 3.1.5.1: Changed figure references
- 3.1.5.4: Added rack to runway mounting kit requirement
- 3.1.6.1: Change to two post racks with 6” channel
- 3.1.6.3: Changed figure reference
- 3.1.6.4.1: Edited to clarify requirements
- 3.1.7.1.1: Changed figure reference
- 3.1.7.1.2: Added “double sided” and changed figure reference
- 3.2.2.1.5: Added 200 pair OSP copper requirement and removed service sizing guidelines
- 3.2.3.1.2: Removed metallic armor requirement and added bonding of OSP shield
- 3.2.5.2: Added figure reference
- 3.2.5.3: Updated fiber cable requirements
- 3.2.5.4: Removed
- 3.2.6.1.3: Clarified cable color requirements
- 3.2.7 Added paragraph
- 3.3.2.1: Added reference to TER and TR
- 3.3.3: Added reference to TER and TR
- 3.3.4.2: Added ISP reference
- 3.3.4.3: Added requirement for 110 type wall mount blocks and tie cable
- 3.3.5.1: Removed reference to T568B pinout
- 3.3.5.3: Added separate rack requirement
- 3.3.5.5: Added same color as cable jacket requirement
- 3.3.6.1.1: Clarified colors
- 3.3.6.3: Clarified to require single mode cable only
- 3.3.8.2: Added paragraph
- 3.3.8.3: Added paragraph
- 3.4.1: Changed to reflect PABX and handsets GFGI
- 3.4.1.3: Removed paragraph
- 3.4.1.4: Removed paragraph
- 3.4.1.5: Removed paragraph
- 3.4.1.6: Removed paragraph
- 3.4.1.7: Removed paragraph

Chapter 3 change 2 descriptions-continued:

- 3.5.2.1: Added paragraph
- 3.5.2.1.1: Added paragraph
- 3.5.2.1.2: Added paragraph
- 3.5.2.2: Clarified equipment rack requirement
- 3.5.2.3.1: Clarified equipment rack requirement
- 3.5.2.3.2: Changed voice/data outlet requirements
- 3.5.2.3.3: Changed conduit, rack and cable requirements
- 3.5.2.3.4: Changed mounting height
- 3.5.2.4.1: Clarified equipment rack requirements
- 3.5.2.4.3: Reworded to reflect updated requirements
- 3.5.2.5: Clarified for use of simple PDS
- 3.5.2.5.1: Removed paragraph
- 3.5.2.5.3: Removed paragraph
- 3.5.2.5.4: Removed paragraph
- 3.5.2.5.5: Removed paragraph
- 3.5.2.7: Added mounting height requirement, equipment rack requirement.
- 3.5.2.8: Added circuit size, equipment rack requirements
- 3.5.3.1: Added IDS provision requirements
- 3.5.3.2: Removed paragraph
- 3.6.1.2.2: Changed to 6000 Btu/hr per rack
- 3.6.1.4.1: Added 6000 Btu/hr per rack requirement
- 3.6.1.5: Added paragraph
- 3.7.1: Added non-linear load reference
- 3.7.1.1.2: Added k-rating use recommendation
- 3.7.1.1.6: Added paragraph
- 3.7.1.1.7: Added furniture receptacle clarification
- 3.7.1.2: Removed reference to EF, TER and TR
- 3.7.1.3: Reworded to add updated requirements
- 3.7.1.7: Changed to 15" mounting height
- 3.7.1.8: Added paragraph
- 3.7.2.3: Added requirement for vertical rack bus
- 3.7.2.6: Added paragraph
- 3.7.3: Removed and placed in UFC 4-171-05
- 3.8: Removed and placed in UFC 4-171-05
- 3.9: Added paragraph
- Figure 3-1: Updated
- Figure 3-2: Updated
- Figure 3-3: Updated
- Figure 3-4: Updated
- Figure 3-5: Updated
- Figure 3-6: Added
- Figure 3-7: Added
- Figure 3-8: Added
- Figure 3-9: Added
- Figure 3-10: Added
- Figure 3-11: Added
- Figure 3-12 & Figure 3-13: Added

Table of Contents

	Page
Chapter 1 – Introduction and General Overview	
1.1 Purpose of this Manual	8
1.2 Overview of strategy for telecommunication services for Army Reserve facilities	8
1.2.1 Area Processing Center concept	8
1.2.2 Telecommunication service provider.....	9
1.2.3 Information Technology service and distribution spaces	9
1.2.4 Telephone switch	10
1.2.5 Mission IT requirements	10
1.2.6 Secure communications	10
1.2.7 Joint-use facilities	11
1.2.8 Funding of IT provisions	12
1.2.9 Future developments.....	13
1.3 Applicable criteria	13
Chapter 2 – Army Reserve Information Technology Spaces and Requirements	
2.1 Army Reserve IT spaces – general	14
2.2 Individual Space Criteria	14
2.2.1 Entrance Facility	14
2.2.2 Telecommunications Equipment Room.....	15
2.2.3 Telecommunications Room	15
Chapter 3 – Infrastructure	
3.1 Pathways.....	16
3.2 Cabling.....	19
3.3 Terminations.....	22
3.4 Telephone System Requirements	24
3.5 SIPRNET	25
3.6 HVAC.....	27
3.7 Electrical.....	28
3.8 Joint Use Facilities Data Network	30
Chapter 3 Figures.....	31
Appendix A – Glossary of Terms and Acronyms in this Manual	44
Appendix B – Army Reserve Information Technology Matrix.....	46
Appendix C- MILCON/IT Supply/Install Responsibility Matrix.....	51

Chapter 1 – Introduction and General Overview

1.1 Purpose of this Manual

- 1.1.1 The Army Reserve has a large inventory of facilities throughout the country, and continues to acquire additional facilities. The purpose of this Manual is to define current Army Reserve standards and requirements for telecommunication systems, and especially standards and requirements for new facilities and facility revitalization. The Manual's goal is to encourage consistent and efficient design and construction of Army Reserve IT provisions.
- 1.1.2 Army Reserve telecommunication strategy will evolve over time, and individual facilities may have unique requirements. This Manual is intended to present the "80% solution" for the moving target of telecommunications strategy – it presents the preferred Army Reserve strategy that should apply 80% of the time, and does not resolve every issue for every project. The Manual will be updated periodically to reflect Army Reserve telecommunication strategy evolution. The Army Reserve Project Officer has the responsibility for authorizing individual project criteria updates, and additions to or variations from the information in this Manual.
- 1.1.3 This Manual is intended to document and explain the Army Reserve telecommunication strategy to the Army Reserve's design and construction agent, the Corps of Engineers. Additionally, the Manual will provide guidance to individual project designers developing individual project designs or design/build requests for proposal.
- 1.1.4 USARC G2/6 is the proponent for Army Reserve Information Technology, and will participate in individual project Pre-Design and Charette Meetings to define the project IT requirements and implementation plan.
- 1.1.5 The Manual does not supersede any contract for design of an individual Army Reserve project; if conflicts exist between the Manual and a contract, the conflict must be brought to the attention of the Corps Project Engineer/Architect for resolution.

1.2 Overview of strategy for telecommunication services for Army Reserve facilities

1.2.1 Area Processing Center concept

- 1.2.1.1 The Army (including Army Reserve and Army National Guard) is moving to an Area Processing Center (APC) strategy. Almost all data servers will be located at several APC locations around the country. This move is part of a larger Army "single Directorate of Information Management (DOIM)" strategy. Army Information Management (G6) is the proponent for this strategy.
- 1.2.1.2 The Army Reserve has initiated implementation of the APC strategy. As of the date of this document, Army Reserve servers are up and running in Peachtree City, GA, and Ft. Carson, CO.

- 1.2.1.3 Army Reserve projects in design and construction should be reviewed, and the new Army Reserve APC strategy and the provisions for Army Reserve IT spaces and provisions described herein should be implemented where practical. The Project Officer must authorize such implementation if it will vary from the project authorization document, DD 1391 (1391).
- 1.2.2 Telecommunication service provider
 - 1.2.2.1 When a Reserve Center is located off of an Installation, out in the community, the Army Reserve will obtain telecommunications service from a public service provider.
 - 1.2.2.2 On any military Installation, the Army Reserves prefers to obtain telecommunications service through the Installation, if the Installation can provide the services the Army Reserve requires. If the Installation cannot provide the services the Army Reserve requires, the Army Reserve Project Officer will provide direction on whether to pursue service through a public service provider. The Army Reserve will obtain data services from a public service provider to be delivered to the Installation Demarcation Point. The service will then be extended over existing/new OSP fiber optic cable to the entrance facility of the building/campus.
 - 1.2.2.3 The Army Reserve envisions a single service provider for all Army Reserve data service (Verizon as of the date of this Manual), but this should not affect facility or infrastructure requirements. Single service provider for voice service is not planned. Thus there will likely be two service providers for the “last mile” of service to any facility – one for voice and one for data. If some discrepancy with this strategy arises on an individual project, or if multiple providers offer voice service, the Project Development Team must present the issues and their recommendations to the Project Officer.
 - 1.2.2.4 Provide both copper and fiber service for Reserve Centers, if such service is reasonably available.
- 1.2.3 Information Technology service and distribution spaces
 - 1.2.3.1 Provide each Army Reserve Center (ARC) and Armed Forces Reserve Center (AFRC) with a single Entrance Facility (EF).
 - 1.2.3.2 Provide each ARC with a single Telecommunications Equipment Room (TER, formerly known as Network Operations Center or NOC). Provide a TER for each Service (Army Reserve, Army National Guard, USMC, etc) occupying a joint-use AFRC. Refer to 1.2.7 and Figure 3-12. No encryption/decryption devices are located in the TER.
 - 1.2.3.3 Provide Telecommunications Rooms (TR, formerly known as IT closet), at a minimum, at each floor above the ground floor in a building with a TER, and at each floor of other buildings. No TR is required in buildings with minimal telecommunications provisions, such as Unheated Storage (UHS). Provide a TR for each Service (i.e. Army Reserve, Army National Guard, USMC, etc) occupying a joint-use Reserve Center (AFRC) as described above. Refer to 1.2.7 and Figure 3-12.

- 1.2.3.4 Additional TRs may be required in larger buildings to maintain compliance with TIA/EIA 568-B.1 295 ft. (90 m.) horizontal link distance limit.
- 1.2.4 Telephone switch
 - 1.2.4.1 Each Reserve Center will have a GFGI telephone switch.
 - 1.2.4.2 No switch is typically necessary for on-Installation Reserve Centers, if the Installation can provide Army Reserve-desired switching capabilities. However, some Installation systems may require the Army Reserve facility to provide a switch or Remote Telephone Unit (RTU).
 - 1.2.4.3 When not located on a military Installation, if the service provider cannot support a local switch on their system, the Army Reserve will accept remote switching provided by the local service provider as a last resort.
- 1.2.5 Mission IT requirements
 - 1.2.5.1 The following are the general mission IT requirements for Army Reserve facilities, regardless of unit type. Specific User IT requirements for individual projects will be determined by USARC G6 in coordination with the Command/Unit G6.
 - 1.2.5.2 Regional Support Command (RSC), Brigade, Operational and Functional Command, and major Subordinate Command facilities
 - Video-teleconferencing (VTC) and secure VTC (SVTC)
 - Sensitive But Unclassified (SBU) Network or NIPRNET
 - Secure or Classified Network, or SIPRNET
 - Community/Cable Access Television (CATV)
 - Industry standard voice Private Automatic Branch Exchange (PABX)/interface switches and data communication connections
 - 1.2.5.3 Battalion Headquarter facilities
 - VTC (SVTC may be required for mobilizing or deploying units)
 - SBU Network or NIPRNET
 - Secure or Classified Network, or SIPRNET
 - CATV
 - Industry standard voice PABX/interface switches and data communication connections
 - 1.2.5.4 Company and below facilities
 - VTC
 - SBU Network or NIPRNET
 - Secure or Classified Network, or SIPRNET
 - CATV
 - Industry standard voice PABX/interface switches and data communication connections
- 1.2.6 Secure communications
 - 1.2.6.1 Presently, the ACSIM Project Officer must validate User requests for secure communication provisions not documented in the project 1391 or Functional Space Detail backup to the 1391. In the future, individual project secure communication requirements should be fully described in the project 1391.

- 1.2.6.2 Provide each Reserve Center with a “SIPRNET Café” room cabled and ready for secure communications to be installed by USARC G2/6 action. The Army Reserve’s shift from a Strategic Reserve to an Operational Reserve dictates that this increased capability is needed to support the Army Force Generation (ARFORGEN) training and deployment requirements.
 - 1.2.6.3 The necessary equipment for secure communication capability noted immediately above will be provided to the Reserve Center at the appropriate point in the ARFORGEN cycle. New Army Reserve Centers will only have this secure communications capability when the “secure” equipment is provided. Secure communications equipment is funded and provided by the USARC, not the facility project.
 - 1.2.6.4 At this time, SIPRNET to individual office or workstation desktops is authorized only for General Officers (G.O.). USARC G3 must authorize any exceptions for ACSIM approval, subject to funding. It is unlikely that a G.O. office or suite will be constructed or operated as a Controlled Access Area (CAA), so SIPRNET cabling to the G.O. space will require a hardened protective distribution system (PDS) as described in NSTISSI 7003, Protective Distribution Systems. Designers may want to contact Information Systems Engineering Command, Fort Detrick Engineering Directorate (ISEC-FDED) for creative suggestions on how best to accomplish this with minimal visual and operational impact to the G.O. space.
 - 1.2.6.5 At this time, provisions for SVTC will be provided to one space in each facility only. Provide one classroom or conference room for each Army Reserve facility with a SIPRNET data drop to allow for SVTC use on an as-needed basis. The space will not need to be constructed as a Secure Room; it can be guarded on the occasions when being used for SVTC. It must have either provisions for light-tight window blinds or no windows.
 - 1.2.6.6 A Secure Compartmented Information Facility (SCIF), when authorized for an Army Reserve project, must comply with appropriate Director of Central Intelligence Directive No. 6/9 Physical Security Standards for Sensitive Compartmented Information Facilities.
- 1.2.7 Joint-use facilities
- 1.2.7.1 Project authorization documents will determine whether any Service (i.e. Army Reserve, National Guard, etc) has authorization for its own separate IT spaces or other telecommunication provisions. When separate spaces are authorized, they will be provided, preferably collocated to be able to utilize common HVAC systems.
 - 1.2.7.2 Infrastructure to each Service’s exclusive space will be exclusive. In joint-use spaces with telecommunications drops (classrooms, Assembly Hall, etc.), separate drops for each service with separate IT provisions will be provided.
 - 1.2.7.3 While Services may have separate IT provisions, components of a single service (i.e. units) will not.
 - 1.2.7.4 When the Army Reserve is the host in a joint-use facility, it is responsible for providing other Service tenants with telecommunications service, operations and maintenance, but not separate equipment. When separate IT spaces and other provisions are authorized for other Services,

any required separate equipment remains the responsibility of the other Service. For example, the Army Reserve will provide telephone switching for a facility – if another Service requires their own telephone switch, it is their responsibility to either fund it, or provide and install it.

1.2.7.5 The Army Reserve Project Officer will determine joint and separate IT provisions for individual projects.

1.2.8 Funding of IT provisions

1.2.8.1 The following installed equipment and provisions are designed, constructed and funded through the individual project design and construction authorization. Project funding is further divided into Military Construction Army Reserve (MCAR) funding and Operations and Maintenance Army Reserve (OMAR) funding.

- Infrastructure (MCAR): this includes cabling, conduit, cable trays, computer racks, backboards, patch panels, and Protective Distribution Systems (PDS), if required.
- Telephone switch (OMAR): situations may arise where Users require a proprietary switch to match or interface with existing equipment. In such cases, the Government will determine whether to include a sole-source specification in the project specifications, or transfer funds to the User to purchase the switch and provide it to the project for Contractor installation. A sole-source waiver is required if the proprietary switch is to be included in the project specifications; the Users must provide a justification to the Corps of Engineers to obtain such a waiver.
- Standard handsets (OMAR)
- Power and HVAC provisions (MCAR)

1.2.8.2 The following installed equipment and provisions are designed, installed and funded by other sources.

- Computers, servers, data switches, routers, and network setup
- Uninterruptible Power Supply (UPS) systems
- Secure communications devices (KIV equipment, secure telephones, safes, etc.), including ARFORGEN equipment provided during the training cycle

1.2.8.3 For MCAR projects, starting in FY08, the OMAR IT Tail funding associated with MCAR projects will no longer be sent to USARC. It will now be provided to the (ISEC-FDED) Construction Team, and will be dispersed appropriately after validation of requirements.

1.2.8.4 For Base Realignment and Closure (BRAC) projects, all OMAR IT Tail funding will be programmed by the ISEC BRAC Office. ISEC must see all requirements and solutions and be able to recommend to Headquarters, Department of the Army, Chief Information Office (HQDA CIO/G-6) for validation of BRAC requirements prior to programming these funds through Assistance Chief of Staff Installation Management (ACSIM). When the requirement is validated, and the funding is required, the ISEC BRAC office will request the funds from ACSIM, and it will forward to U.S Army Reserve Command (USARC) for their distribution to the appropriate execution vehicle.

1.2.9 Future developments

- 1.2.9.1 Army Reserve G6 has authorized a 500-day plan to transition to voice over Internet protocol. Scheduling and implementation of this plan is subject to funding.
- 1.2.9.2 Wireless provisions are not currently authorized for Army Reserve facilities. While a future transition to wireless networks is anticipated, wireless provisions have not yet been determined.
- 1.2.9.3 The Army Reserve standard for horizontal cabling is CAT 6. CAT 6a will not be utilized at present for voice or data even though an industry standard for CAT 6a has been ratified.

1.3 Applicable criteria

- 1.3.1 Army Reserve design and construction criteria, and telecommunications terminology will move toward compliance with industry standards, with limited Government criteria being cited, except in the case of secure communications provisions.
- 1.3.2 The current versions of the following Government criteria are applicable to telecommunications design for Army Reserve facility projects, except for specific deviations noted in this Manual:
 - 1.3.2.1 UFC 3-580-01; *Telecommunications Building Cabling Systems Planning and Design*
 - 1.3.2.2 UFC 4-171-05; *Army Reserve Facilities* (Design Guide or DG)
 - 1.3.2.3 AR 380-5; Department of the Army Information Security Program - Chapter 7, Section III
 - 1.3.2.4 Military Handbook (MIL HDBK) 1013/1A, *Design Guide for Physical Security of Facilities*, for protection of openings into secure areas such as SIPRNET Café, COMSEC, and Army Global Command and Control System (AGCCS).
 - 1.3.2.5 *Technical Guide for Installation Information Infrastructure Architecture (I3A)*, **for outside plant design criteria only**
 - 1.3.2.6 If on an Installation, any Installation design and construction guidance (bring any conflicts with Army Reserve requirements in this Manual to the attention of Project Officer for resolution)
 - 1.3.2.7 The documents listed above (except for Installation design guidance) may be accessed at the Louisville District Corps of Engineers website for the Army Reserve.
<http://www.lrl.usace.army.mil/ed2/default.asp?mycategory=212>
- 1.3.3 The current versions of the following are industry, national and local criteria applicable to telecommunications design for Army Reserve facility projects:
 - 1.3.3.1 ANSI/TIA/EIA-568-C.0 (February 2009) *Generic Telecommunications Cabling for Customer Premises*
 - 1.3.3.2 ANSI/TIA/EIA-568-B.2 *Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components*
 - 1.3.3.3 ANSI/TIA/EIA-568-C.1 (February 2009) *Commercial Building Telecommunications Cabling Standard*

- 1.3.3.4 ANSI/TIA/EIA-568-B.2-4 Addendum 4 *Solderless Connection Reliability Requirements for Copper Connecting Hardware*
- 1.3.3.5 ANSI/TIA/EIA-568-C.2 (August 2009) *Balanced Twisted Pair Telecommunications Cabling and Components Standards*
- 1.3.3.6 TIA-568-C.3 (June 2008) *Optical Fiber Cabling Components Standard*
- 1.3.3.7 Local ANSI/TIA/EIA-569-B *Commercial Building Standard for Telecommunications Pathways and Spaces*
- 1.3.3.8 ANSI/TIA/EIA-526-7 *Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant*
- 1.3.3.9 ANSI/TIA/EIA-526-14A *Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant*
- 1.3.3.10 ANSI/TIA/EIA-606-A *Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings*
- 1.3.3.11 ANSI-J-STD-607-A-2002 *Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, Telecommunications Industry Association (TIA), October 2002*
- 1.3.3.12 NFPA 70 *National Electrical Code*
- 1.3.3.13 Local codes and regulations for individual project locations
- 1.3.3.14 Service provider requirements

Chapter 2 – Army Reserve Information Technology Spaces and Requirements

2.1 Army Reserve IT Spaces - General

- 2.1.1 The Army Reserve IT spaces described below are the spaces in an Army Reserve facility that are dedicated to housing telecommunication service and distribution provisions for the facility, or to providing space solely for User data processing and telecommunications operations. Almost all Army Reserve spaces have some IT provisions to allow Users access to data or communications; the spaces described below have data access and telecommunication as their primary purpose.
- 2.1.2 Descriptions and requirements for most Army Reserve spaces are found in UFC 4-171-05 *Army Reserve Facilities* (Design Guide or DG). The information for IT spaces listed in this manual are in addition to what is specified in UFC 4-171-05. It is intended to be IT specific and used by the designer of the IT infrastructure for the Army Reserve facility.

2.2 Individual Space Criteria

2.2.1 Entrance Facility (EF)

- 2.2.1.1 The purpose of this room is to isolate telecommunication service provider equipment and provisions from the remainder of the facility telecommunications infrastructure. Due to Government servers and other equipment in TER, the EF is required to be a separate space to maintain security of TER from service provider personnel
- 2.2.1.2 Refer to Figures 3-2 and 3-6 for typical EF plan view and elevation drawings.

2.2.2 Telecommunications Equipment Room (TER)

2.2.2.1 This space is provided to house file and print servers, data switches and the telephone switch. It will typically be located in the main building of a multi-building facility, normally the Reserve Center building. It is the main telecommunications distribution point for its building and the facility.

2.2.2.2 The TER may serve as the TR for the floor it occupies; larger buildings or building configuration may require additional TRs on that floor.

2.2.2.3 Refer to figures 3-3 and 3-7 for typical TER plan view and rack elevation drawings.

2.2.3 Telecommunications Room (TR)

2.2.3.1 These spaces serve as distribution points for workstation voice and data cables, and other terminations.

2.2.3.2 Refer to figures 3-4, 3-5, 3-8 and 3-9 for typical TR plan views and rack elevation drawings.

Chapter 3 – Infrastructure

3.1 Pathways

3.1.1 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.

3.1.2 The preferred pathway for installing service entrance and campus outside plant (OSP) cables is underground conduits. Aerial installation will only be considered when aerial facilities exist and only as a last option.

3.1.3 Conduit Design Criteria

3.1.3.1 Service entrance conduit. Provide 4-inch (10 cm) polyvinyl chloride (PVC) or high-density polyethylene (HDPE) conduits from the EF to the point of connection for separate copper, fiber and CATV services as well as one spare.

3.1.3.1.1 The point of connection on a military installation is normally the nearest suitable maintenance hole or pedestal. The point of connection when not on a military installation is normally the property line.

3.1.3.1.2 Arrange service entrance conduits to stub up in the EF.

3.1.3.1.3 Provide direct buried conduits. Encase conduits in concrete where required by the installation, service provider or I3A.

3.1.3.1.4 Provide three 1-1/4 inch (3.2 cm) innerducts in the conduits for fiber and CATV services and in the spare conduit.

3.1.3.1.5 Provide handholes and/or maintenance holes as described for OSP conduit below.

3.1.3.1.6 Properly fire stop and moisture seal floor and exterior wall penetrations.

3.1.3.2 Provide 4-inch conduits from the EF to the TER for separate copper and fiber backbone cables. If the cable tray system extends to the corridor immediately outside the EF, then these conduits may be omitted. In this case, provide sleeves through the EF wall and route backbone cable through the cable tray.

3.1.3.3 Outside plant conduit. Refer to *Technical Guide for Installation Information Infrastructure Architecture (I3A)* for OSP design criteria. Provide separate, direct buried 4-inch (10 cm) PVC or HDPE conduits from the TER to TR in other buildings for copper, fiber, CATV services and one spare. Encase conduits in concrete where required by the installation or I3A.

3.1.3.3.1 Provide three 1-1/4 inch (3.2 cm) innerducts in the conduits for fiber and CATV services and in the spare conduit.

- 3.1.3.3.2 On military installations, provide handholes and/or maintenance holes a minimum of one every 600 feet (183 m) or as required to keep pulling tension within cable manufacturer's recommendations or closer as required by the local installation.
 - 3.1.3.3.3 When not on a military installation, provide handholes and/or maintenance holes a minimum of one every 1500 feet (457 m) or as required to keep pulling tension within cable manufacturer's recommendations or as required by the service provider.
 - 3.1.3.4 Sleeves. Provide four 4-inch (10 cm) conduit sleeves through the floor of each TR to connect to the TR or TER below it. Properly fire stop floor penetrations with removable, modular self-sealing, elastomeric inserts that allow for cable revisions without the need to remove or replace any fire stop materials.
 - 3.1.3.5 Workstation conduit. Provide 1-inch (2.5 cm) conduit from each outlet to accessible ceiling space. For connections to modular system furniture, provide flush wall or flush floor mounted junction boxes for each group of furniture of up to six workstations. Provide (2) 1-1/4 inch (3.2 cm) conduits from the box to accessible ceiling space and a 1-1/4 inch (3.2 cm) liquid-tight flexible metal conduit from the box to the modular system furniture base feed point for every six workstations.
 - 3.1.3.6 Provide a non-continuous support system of dedicated independent rods or wires and Category 6 rated J-hooks spaced at intervals that shall not exceed 60 inches from the conduit stub up to the cable tray. J-hooks shall not exceed 24 cables or 50 percent of the fill capacity, whichever is less.
- 3.1.4 Cable Tray Design Criteria
- 3.1.4.1 Provide wire basket type cable tray with a minimum size of 6 inches x 2 inches (15 cm x 5 cm) and a maximum depth of 6 inches (15 cm).
 - 3.1.4.2 Design cable tray to be filled with project provided cabling to a maximum of 25% of the physical dimension of the tray. This will provide 100% growth in installed cable before the *National Electrical Code* (NEC) maximum fill of 50% is reached.
 - 3.1.4.3 Design a continuous cable tray system to support 90% of the project provided premises cabling, primarily through cable tray mounted above corridor lay-in ceiling.
 - 3.1.4.4 Design cable tray system to originate in the TER or TR serving the respective area. Provide ladder type cable runway within the TER/TR as shown in the TER/TR typical room and rack diagrams in Figures 3-4 thru 3-9. Cable tray may be terminated at the farthest point from the TER/TR when cable fill of the smallest tray reaches 5% of the physical dimension of the tray. See Conduit Design Criteria for EF considerations.
 - 3.1.4.5 Mounting style in order of preference - wall mount or trapeze mount. Center hung cable tray is not an option.
 - 3.1.4.6 Provide normal access to the cable tray via lay-in ceiling tile. Provide access panels in non lay-in ceilings such that there is no point in the cable tray system that is more than 20 feet from an access point.

- 3.1.4.7 Provide 12-inch (30 cm) minimum clearance above the top of the tray and 3-inch (7.5 cm) minimum clearance below the tray.
 - 3.1.4.8 Provide rectangular, modular, fire rated wall penetration assemblies using either integral, sliding covers or removable plugs. Provide usable penetration area equal to cable tray cross section.
- 3.1.5 Cable Runway Design Criteria
- 3.1.5.1 Provide cable runway in TER/TR above equipment rack and along plywood backboard as shown in the TER/TR typical room and rack diagrams in Figures 3-4 thru 3-9.
 - 3.1.5.2 Cable runway is a heavy duty, flat top, ladder rack style pathway system designed for use in TR and TER spaces. Construct runway of 1-1/2 inch x 3/8 inch (3.75 cm x 1 cm) tubular stringers with 1/2 inch x 1 inch (1.25 cm x 2.5 cm) welded rungs at 9-inch (23 cm) intervals. The minimum width is 18 inches (45 cm). Equip runway with metal cable dropouts where cables feed to equipment racks.
 - 3.1.5.3 Design cable runway to hold premises cabling, including service loops, backbone, and workstation cables according to sizing criteria described for cable tray in item 3.1.4.
 - 3.1.5.4 Install cable runway 6 inches (15 cm) above equipment racks and fastened to equipment racks with elevation kits and rack to runway mounting kits; fasten to wall with support brackets.
- 3.1.6 IT Racks
- 3.1.6.1 Provide heavy duty, two post, standard 19-inch racks with 6-inch channels in quantities sufficient to accommodate the cabling systems and equipment provided for the project.
 - 3.1.6.2 Provide adequate rack space for the Government-furnished, Government-installed network equipment.
 - 3.1.6.3 Provide as a minimum the racks shown in the typical TER and TR layouts shown in Figures 3-7, 3-8 and 3-9.
 - 3.1.6.4 In joint use facilities, separate data networks are required for each military service as described under Voice and Data Horizontal Cabling.
 - 3.1.6.4.1 The separate data patch panels described under Voice and Data Horizontal Cable Terminations shall be installed in separate racks in TR. In TER, provide separate data racks for each service. Note that these separate racks may be required to be physically separated by caging, partition walls, or separate lockable data racks within the TER.

3.1.7 Rack Cable Management Design Criteria

3.1.7.1 Provide the following cable management in addition to the basic criteria shown in UFC-3-580-01.

3.1.7.1.1 Provide horizontal cable managers installed as shown on the typical rack diagrams in Figures 3-5, 3-8, 3-9 and with the following:

3.1.7.1.1.1 Minimum of one single sided, 2 RU, horizontal wire manager between every two 48-port patch panels.

3.1.7.1.1.2 Minimum of one horizontal cable manager at the top of every equipment rack.

3.1.7.1.1.3 Minimum of two spare horizontal cable managers on the bottom section of each rack for management of voice and data network equipment connections.

3.1.7.1.2 Provide double sided, vertical cable managers installed as shown on the typical rack diagram in Figures 3-7, 3-8 and 3-9. Vertical cable managers shall include cable management for patch cables on the front of the rack and backbone cables on the rear of the rack.

3.1.7.1.3 Provide horizontal and vertical cable managers equipped with double-hinged covers.

3.2 Cabling

3.2.1 Provide cable meeting the requirements of the NEC and listed for the intended application. Other telecommunication systems, including CCTV, audio-video, security, paging, intercom, fire alarm, energy management or other smart building systems may utilize portions of the cabling system described in this document. However, it is not the intent of this document to describe unique communications cabling systems that may not be required in typical Army Reserve facilities.

3.2.2 Service Provider Cabling

3.2.2.1 The Army Reserve prefers optical fiber service cable over copper cable when fiber is available. The designer shall contact the service provider(s) and determine the availability and cost of services and provide that information to the Government for a determination of what level of service the Government will contract for.

3.2.2.1.1 Route service cables directly into the EF and terminate on the plywood backboard as shown in Figure 3-2.

3.2.2.1.2 Service Provider Splice Case. Notwithstanding the figures shown in UFC-3-580-01, the Army Reserve does not require nor desire a splice case on service entrance cabling. Provide a splice case only if required by the installation or the service provider.

- 3.2.2.1.3 Optical Fiber Service Cable Sizing. The minimum recommended size and type is 12-strand single mode. The actual strand count will depend on the level of service authorized and the type of fiber available from the service provider.
- 3.2.2.1.4 Copper service cable sizing for remote switch service. Size the service entrance cable by determining the number of authorized telephone instruments, elevator cab phone, fax, modem, fire alarm, IDS, Entry Control System (ECS), and specialty lines. Take the sum of all such line requirements, multiply by 1.5 and round up to the nearest standard cable size.
- 3.2.2.1.5 Copper service cable sizing for local switching with T1 service shall be 200 pair OSP copper. CATV Service. If CATV service is authorized and available, coordinate with the local service provider. The CATV service provider will typically provide a coaxial cable feed into the building. However, an optical fiber cable may be used for CATV service as an alternate to coaxial cable at the service provider's discretion. Locate CATV service cabling termination and head-end equipment in the EF.

3.2.3 Campus OSP Cable

- 3.2.3.1 Where an Army Reserve Center consists of multiple buildings, provide OSP campus backbone cable to make connections to the required and authorized communication systems. A typical arrangement is shown in Figure 3-1.
 - 3.2.3.1.1 Voice Unshielded Twisted Pair (UTP) and optical fiber backbone cables for campus OSP installation follow the same cable sizing design criteria applicable to service provider cabling when the campus OSP cable provides the services to the building.
 - 3.2.3.1.2 Provide OSP cables rated for outdoor use, filled with a water blocking compound. Bond the cable shield of OSP copper cables to the communications grounding system at both ends.

3.2.4 Voice Backbone UTP Cable

- 3.2.4.1 Provide multi-pair, voice grade cable for voice backbone cables installed in a star configuration from the TER to each TR sized so there is a minimum of two pair for every user workstation voice outlet served by the TR.
- 3.2.4.2 Provide one voice cabling system in a facility even though it may be a joint use facility with separate military components and/or separate military services as tenants. Provide white cable jacket color for voice cabling system.
- 3.2.4.3 See Figure 3-1 for a typical backbone arrangement.

3.2.5 Optical Fiber Backbone Cable

- 3.2.5.1 Provide optical fiber cable installed in a star configuration from the TER to each TR.
- 3.2.5.2 Provide separate data backbone cables to support separate data networks for each service in joint use facilities as described under Voice and Data Horizontal Cabling. Refer to Figure 3-10 for a basic configuration diagram for joint use facility network.
- 3.2.5.3 Provide optical fiber cable with a minimum of 24 strands of single-mode (SM) Verify applications and requirements with the using agency on a project by project basis. In joint use facilities at this point in time, each military service requires a separate fiber optic backbone.
- 3.2.5.4 See Figure 3-1 for a typical arrangement.

3.2.6 Voice & Data Horizontal Cabling

- 3.2.6.1 Provide Category 6 horizontal voice and data cabling from TER/TR to user workstation locations, including those in modular furniture systems.
 - 3.2.6.1.1 The maximum physical length of the permanent link (cable length from TER or TR termination to user workstation outlet) shall be 295 ft (90 m) and the maximum physical length of the channel (link plus workstation cable and TER/TR patch cords) shall be 328 ft (100 m) in accordance with ANSI/TIA/EIA-568-B.
 - 3.2.6.1.2 Provide one voice cabling system in a facility even though it may be a joint use facility with separate military components and/or separate military services as tenants. Provide white cable jacket color for voice cabling system.
 - 3.2.6.1.3 In Army Reserve facilities, provide black cable jacket color for data cabling. In joint use facilities at this point in time, each military service component requires a separate data network. For example: The Army Reserve, Army National Guard and Marine Corps sharing a facility would each have a separate data network (refer to Figure 3-12 for a basic configuration diagram for a joint use facility). Provide black data cable jacket color for Army Reserve, and provide the following cable jacket colors for each service: Army National Guard-Green; Air Force Reserve-Blue; Navy Reserve-Grey; Marine Reserve-Tan.

- 3.2.7 Panel System Furniture Communication Cabling
 - 3.2.7.1 For requirements on communications cabling and connections for panel system furniture in common office areas refer to document titled “Army Reserve Standards: Furniture Panel System Electrical/Communication Requirements”. Document can be found at:
<http://www.lrl.usace.army.mil/ed2/default.asp?mycategory=212> or
<ftp://ftp.usace.army.mil/pub/lrl/Army%20Reserve%20-%20LRL%20Design%20Guide%20Files/IT%20Spreadsheets/>
- 3.2.8 CATV Cabling
 - 3.2.8.1 When CATV service is authorized and available for a facility, provide a 75-ohm broadband coaxial cabling system installed in a “trunk and tap” method.
 - 3.2.8.1.1 Provide RG-11 cables for trunk lines from the EF to taps (or couplers) mounted in accessible ceiling spaces or TR. Provide RG-6 cable routed from taps (or couplers) to CATV outlets. Provide required amplifiers, splitters, taps, outlets, and F-type connectors for a complete and usable system.
- 3.3 Terminations
 - 3.3.1 Service Provider Terminations
 - 3.3.1.1 Service provider copper UTP cables will be terminated on entrance protector terminals or primary protector blocks. The service provider will typically provide the entrance protectors for their cable to serve as the demarcation point.
 - 3.3.1.2 Service provider optical fiber are typically terminated in a wall mounted, lockable enclosure near the entrance protector panels to serve as the demarcation point.
 - 3.3.2 Campus OSP Terminations
 - 3.3.2.1 Terminate campus OSP copper UTP cable on 110-type entrance protector terminals or primary protector blocks in the TER and TRs of each building.
 - 3.3.3 Optical Fiber Cable Terminations
 - 3.3.3.1 Terminate optical fiber cables with duplex SC-type connectors in rack-mounted enclosures placed near the top of equipment racks in the TER and TRs of each building.
 - 3.3.4 Voice Backbone Cable Terminations
 - 3.3.4.1 Notwithstanding the figures shown in UFC-3-580-01, the Army Reserve does not require nor desire the extra level of cross-connection for the voice backbone cable. Provide cross-connection as indicated in Figure 3-1.

- 3.3.4.2 Terminate multi-pair, ISP voice grade voice backbone cable on rack mounted 110-type blocks.
 - 3.3.4.3 Provide 110 type wall mount blocks and tie cable from the wall mounted Service Provider's building entrance in the EF to rack mounted 110-type blocks in the TER.
 - 3.3.4.4 Cross-connect telephones from 110-type block to workstation patch panels with patch cables (8-pin modular to 1-pair 110 clip). Label the 8-pin modular end of the patch cable with the telephone extension number to facilitate relocation of telephone instruments.
- 3.3.5 Voice and Data Horizontal Cable Terminations
- 3.3.5.1 Terminate Category 6 cabling on 8-pin, 8-conductor (RJ45 type) connectors using pin/pair assignments in accordance with the T568A pin-out sequence.
 - 3.3.5.2 Terminate voice and data horizontal workstation cables in the TER/TR on rack mounted Category 6 patch panels using separate voice and data patch panels in different racks or different spaces in a rack for clear separation of voice and data terminations.
 - 3.3.5.3 Provide separate data patch panels in separate racks to support separate data networks for each military service in joint use facilities as described under Voice and Data Horizontal Cabling.
 - 3.3.5.4 Cable terminations shall occupy the top section of the racks and not occupy more than half of any rack leaving a minimum on half of the rack space for voice and data network equipment. This includes optical fiber terminations, horizontal voice/data cable terminations, voice backbone cable terminations, and horizontal cable managers.
 - 3.3.5.5 Terminate voice and data horizontal workstation cables at the workstation on Category 6 jacks (the same color as the cable jacket and manufacturer as the patch panels) mounted in faceplates of the same material, color and style as the electrical receptacles. Provide the appropriate faceplate or adapter plate for workstation cable terminations in modular system furniture, at wall phones locations, or in floor boxes. Colors to be: Voice-White; Army Reserve-Black; Army National Guard-Green; Air Force Reserve-Blue; Navy Reserve-Grey; Marine Reserve-Tan
 - 3.3.5.6 Standard administrative workstation outlets shall consist of a two-gang box with reducer ring and a single-gang faceplate. The faceplate shall have the voice and data jacks mounted side-by-side at the top with two blank knockouts at the bottom for future expansion. 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.
- 3.3.6 Patch Cables
- 3.3.6.1 Provide Category 6, 8-pin modular to 8-pin, 8-conductor modular, patch cables in quantities and appropriate lengths so that all workstation cables are connected.
 - 3.3.6.1.1 Provide patch cables to match jacket color for voice and data.

- 3.3.6.2 Provide Category 5e, 8-pin modular to 1-pair 110 clip, patch cables in quantities and appropriate lengths for connection from voice patch panel workstation outlets to 110-type blocks in the TER.
- 3.3.6.3 Provide single-mode optical fiber patch cables, in quantities and appropriate lengths for all fiber terminations. Provide half of the fiber patch cables with duplex SC to duplex SC connectors and half of the fiber patch cables with duplex SC to LC connectors.

3.3.7 Labeling

- 3.3.7.1 Label all cable terminations and both ends of all cables with labeling methods described in UFC-3-580-01 and in accordance with TIA/EIA-606-A, including the termination field color coding.
 - 3.3.7.1.1 In joint use facilities, label each faceplate with the appropriate service component (Army Reserve, National Guard, Marine Corps, etc.), in addition to the UFC-3-580-01 and TIA/EIA-606-A requirements.
- 3.3.7.2 An Outlet Matrix Worksheet must be completed by the Designer of Record and issued as part of the construction documents. The USARC G6 Telecommunications Outlet Matrix worksheet can be found at: <http://www.lrl.usace.army.mil/ed2/default.asp?mycategory=212> or <ftp://ftp.usace.army.mil/pub/lrl/Army%20Reserve%20-%20LRL%20Design%20Guide%20Files/IT%20Spreadsheets/>

3.3.8 Testing

- 3.3.8.1 Test all cabling as described in UFC-3-580-01.
- 3.3.8.2 Test results are to be supplied electronically to the project RCDD and the Corps Project Engineer/Architect in the test program native format. If the test results are supplied in a spreadsheet format, it is a requirement to use the spreadsheets titled USARC_G6_TestResults_Copper_OSP Riser and USARC_G6_TestResults_Fiber found at: <http://www.lrl.usace.army.mil/ed2/default.asp?mycategory=212> or <ftp://ftp.usace.army.mil/pub/lrl/Army%20Reserve%20-%20LRL%20Design%20Guide%20Files/IT%20Spreadsheets/>
- 3.3.8.3 The project RCDD is required to review and approve the test results and supply the evaluation/approval to the Corps Project Engineer/Architect and be made part of the project documentation package.

3.3.9 Documentation

- 3.3.9.1 Provide as-built documentation including complete test result reports, floor plans showing user workstations with cabling labeling, and backbone cable schematic and labeling in an electronic format (PDF or other acceptable) format and a printed hardcopy.

3.4 Telephone System Requirements

- 3.4.1 The telephone system PABX and handsets are GFGI items. The contractor is responsible to provide and install all supporting cabling and equipment as described in other sections of this manual.

- 3.4.1.1 Provide one telephone system in a facility even though it may be a joint use facility with separate military components and/or separate military services as tenants.
- 3.4.1.2 Specify that the Contractor shall initiate the application for telephone service and assist the Government in completing the application for service; accepting installation of service; start-up of service; and activation of specific telephone numbers and dedicated lines for fire alarm, security, and elevator panels.

3.5 SIPRNET

3.5.1 General

- 3.5.1.1 Implementation of SIPRNET in an Army Reserve facility is based on encryption within a SIPRNET Café with a few exceptions for individual SIPRNET lines in specific spaces outside of the SIPRNET Café. The entire SIPRNET system will be reviewed with and approved by the USARC G2/6 before construction.

3.5.2 SIPRNET Café

- 3.5.2.1 SIPRNET Café are designated as small or large (refer to UFC 4-171-05 for how designations are made).
 - 3.5.2.1.1 Refer to Figures 3-10 and 3-11 for typical small and large SIPRNET Café layouts and IT requirements.
 - 3.5.2.1.2 Refer to UFC 4-171-05 for room construction criteria.
- 3.5.2.2 Encryption within the SIPRNET Café will occur in a lockable equipment rack provided by the Government. The Contractor is responsible for providing infrastructure within the SIPRNET Café to connect to the Government provided equipment.
- 3.5.2.3 Sensitive but Unclassified (SBU) (BLACK) system. The BLACK system consists of standard telecommunications pathways, cables, devices, and equipment that are physically separated from the RED system. The BLACK system processes and carries only unclassified and/or encrypted information and is the same system described under Voice and Data Horizontal Cabling and Voice and Data Horizontal Cable Terminations.
 - 3.5.2.3.1 Keep BLACK lines, devices, and equipment a minimum of 39 inches (1 m) from the CFCI locking, wall mount cabinet, and a minimum of 6 inches (15 cm) from RED lines. BLACK voice and data outlets shall be a minimum of 20 inches (50 cm) from RED outlets.
 - 3.5.2.3.2 Provide one BLACK standard voice outlet and three CAT6 cables in the SIPRNET Café with the boxes mounted at 15 inches (30 cm) AFF.
 - 3.5.2.3.3 Provide a 1-inch (2.5 cm) EMT conduit from the CFCI lockable equipment rack to the EF with one BLACK CAT6 cable necessary to support the encryption equipment.
 - 3.5.2.3.4 Electrical receptacles shall be mounted at 15 inches (46 cm) AFF.

- 3.5.2.4 RED system. The RED system consists of telecommunications pathways, cables, devices, and equipment that are visually inspectable and physically separated from the BLACK system. The RED system processes and carries unencrypted classified signals.
- 3.5.2.4.1 The CFCI lockable equipment rack will be located to provide minimum 39 inches (1 m) separation from BLACK lines except the BLACK horizontal cables noted above that connects to the CFCI lockable equipment rack. It will also be located to provide minimum 39 inches (1 m) separation from fortuitous conductors such as HVAC ducts, pipes, and equipment.
 - 3.5.2.4.2 Keep RED lines a minimum of 6 inches (15 cm) from BLACK lines and 6 inches (15 cm) from electrical feeders and branch circuits.
 - 3.5.2.4.3 Install RED lines from the CFCI locking, wall mount cabinet to each workstation within the SIPRNET Café in an exposed surface mounted simple PDS such that the entire pathway is inspectable from within the SIPRNET Café.
 - 3.5.2.4.4 Provide one RED data outlet for each desk within the SIPRNET Café. Center the outlets on the desks at 36 inches (91 cm) AFF.
 - 3.5.2.4.5 Install RED lines, if any that exit the SIPRNET Café to serve outlets in specific spaces outside of the SIPRNET Café in a PDS.
 - 3.5.2.4.5.1 Provide one RED data line to each desk in the COMSEC room.
 - 3.5.2.4.5.2 Provide one RED data line to a conference room, classroom, library reading room, and GO offices (when authorized) to be designated by the Government.
 - 3.5.2.4.5.3 Provide one RED data line for each desk in AGCCS. If the AGCCS is not co-located with the SIPRNET Café, then the lines must be in a PDS.
 - 3.5.2.4.6 Provide RED data outlets with standard jacks, except they shall be red in color.
 - 3.5.2.4.7 Provide red cable jacket color for RED lines.
- 3.5.2.5 PDS. Since the SIPRNET Café is designed to be a secure room per AR 380-05 a simplified PDS can be used in place of a hardened PDS for the cable distribution within the SIPRNET Café. The simplified PDS will constitute a distribution system that affords easy visual verification for discovery of unauthorized personnel attempting to gain access to the PDS.
- 3.5.2.5.1 Install carriers where they can be readily inspected. Do not install inside of walls or floors except for direct penetration through the wall or floor. Installation above a lay-in ceiling is not recommended due to the difficulty of performing required daily inspections. Do not mark

the carrier except as required for a SCIF. The carrier may be installed below grade as long as it is a minimum of 39 inches (1 m) below grade.

- 3.5.2.6 Provide a call button on the wall outside of the room adjacent to the door that annunciates by chime or buzzer inside the room.
- 3.5.2.7 Grounding. Provide a TGB mounted at 36" AFF immediately adjacent to the lockable equipment rack.
- 3.5.2.8 Power. Provide a Clean Power receptacle on a 20 Amp dedicated circuit inside the CFCI lockable equipment rack. Provide a Clean Power receptacle for each workstation with each being on a dedicated 20 Amp circuit.
- 3.5.3 IDS. The SIPRNET Café, AGCCS, and COMSEC require an IDS for security. This will include a Balanced Magnetic Switch (BMS) for the door, complete motion detector coverage within the space, and an entry card-key reader. The Government will provide the devices and the Contractor is responsible for conduit and box provisions and power.
 - 3.5.3.1 Provide a flush mounted 4-inch x 4-inch (10 cm x 10cm) box with ¾ inch (2 cm) conduit from each device box to the IDS Control Unit.

3.6 HVAC

3.6.1 General

- 3.6.1.1 Provide dedicated HVAC systems for air conditioning of TER, TR, and EF spaces. The systems will consist of indoor air conditioning units and condensing units located outside of the building. Comply with TIA-569-B Environmental.
 - 3.6.1.1.1 Design the systems for continuous 24 hours/day, 7 days/week operation, with both temperature and humidity control.
 - 3.6.1.1.2 Size the systems to accommodate the heat release from all the equipment located in the room, plus an additional 25% for future growth.
 - 3.6.1.1.3 Maintain positive pressure in relationship to adjoining spaces.
 - 3.6.1.1.4 Locate temperature sensors in the space adjacent to the door at 5 feet (1.5 m) above finished floor (AFF).
 - 3.6.1.1.5 No back-up systems are required but if an emergency power source is available in the facility, connect the HVAC system that serves IT spaces to the emergency power source.
 - 3.6.1.1.6 There shall not be any equipment (piping, ductwork, or machinery) that does not serve the space installed in pass-through or enter TER, TR, or EF spaces.
- 3.6.1.2 TER
 - 3.6.1.2.1 Provide a separate system dedicated to the TER that does not serve any other space.
 - 3.6.1.2.2 Cooling Capacity: Based on the estimated electrical consumption in each rack, the total electrical cooling capacity required is 6000 Btu/h (1757 W) per rack. Use this load in addition to envelope loads.

- 3.6.1.3 TR
 - 3.6.1.3.1 Provide a separate system dedicated to the TRs that does not serve any other space, except if multiple TRs are required in larger or multi-story facilities. In this case, multiple TRs may be served by the same dedicated system.
 - 3.6.1.3.2 Cooling Capacity: Based on estimated electrical consumption in each rack, the total electrical cooling capacity required is 6,000 Btu/h (1757 w) per rack. Use this load in addition to envelope loads.
- 3.6.1.4 EF
 - 3.6.1.4.1 Cooling Capacity: Based on estimated electrical consumption in each rack, the total electrical cooling capacity required is 6,000 Btu/h (1757 w) per rack. Use this load in addition to envelope loads.
- 3.6.1.5 SIPRNET Café
 - 3.6.1.5.1 Provide a separate system dedicated to the SIPRNET Cafe that does not serve any other space.
 - 3.6.1.5.2 Cooling Capacity: Based on estimated electrical consumption in each rack, the total electrical cooling capacity required is 6,000 Btu/h (1757 w) per rack. Use this load in addition to other internal, ventilation and envelope loads.

3.7 Electrical

- 3.7.1 Clean Power. Clean Power is a term defined for the purposes of this manual to indicate an electrical distribution subsystem dedicated to powering electronic equipment which are classified as non-linear loads.
 - 3.7.1.1 Clean Power circuits are those served by a K-rated transformer with the following arrangement:
 - 3.7.1.1.1 The feeder serving a Clean Power transformer may also serve additional Clean Power transformers but may not also serve non Clean Power transformers.
 - 3.7.1.1.2 Provide Clean Power transformers with a K-rating adequate for the anticipated harmonic load. Recommend using a minimum of K-4 rating for non-linear loads less than 50% of total load and for non-linear loads 50% or greater of total load use a K-13 rating. Anticipate that all workstations will be equipped with computers and IT racks will be filled with equipment
 - 3.7.1.1.3 Provide a double size neutral and an isolated equipment ground in the feeder from a Clean Power transformer secondary to a Clean Power panelboard.

- 3.7.1.1.4 Provide Clean Power panelboards equipped with double size neutral buses and standard ground buses. Clean Power panelboards are reserved for electronic equipment and may not serve any type of equipment other than electronic equipment. Transient voltage surge suppression, radio frequency filtering, and harmonic mitigation are not required.
- 3.7.1.1.5 Clean Power branch circuits shall be served by 20-amp circuit breakers with circuit wiring consisting of standard phase conductors, non-shared full size neutral conductors and equipment grounding conductors. There may not be more than three duplex receptacles per 20-amp Clean Power branch circuit, except for those in modular system furniture (wired partitions). Individual Clean Power circuits serving receptacles in modular system furniture may serve up to six duplex receptacles.
- 3.7.1.1.6 Receptacles in modular system furniture (wired partitions) shall all be served by Clean Power circuits arranged in accordance with NEC Article 605. For more details on panels system furniture workstation electrical requirements refer to document Army Reserve Standards: Furniture Panel System Electrical/Communication Requirements. This document can be found at:
<http://www.lrl.usace.army.mil/ed2/default.asp?mycategory=212> .
- 3.7.1.1.7 Clean Power receptacles shall be standard grounding type, orange in color. Clean Power receptacles in system furniture are not required to be orange.
- 3.7.1.2 Provide Clean Power for receptacles serving IT equipment at each workstation and desk.
- 3.7.1.3 For all projects, provide (2) dedicated 120V/20 Amp Clean Power circuits with NEMA L5-20 receptacles for each 19 inch (480 mm) rack or cabinet in the TER/TRs. Provide (2) dedicated 120V/20 Amp Clean Power circuits with (1) NEMA L5-20 and (1) double duplex NEMA 5-20 receptacles for each 19 inch (480 mm) rack or cabinet in the EF. These receptacles shall be installed on the backside of the cable runway above each rack/cabinet.
- 3.7.1.4 Provide a Clean Power double duplex receptacle on a dedicated 20-amp circuit at the EF.
- 3.7.1.5 Provide convenience receptacles in TR and TER spaces such that no point along the wall is more than six feet from a receptacle. Convenience receptacles are not to be served from Clean Power circuits or to serve IT equipment.
- 3.7.1.6 Provide metal multi-outlet assemblies in IT workrooms that extend the full length of the work surface and are mounted above the work surface. Provide duplex receptacles six inches on center served by Clean Power circuits. This multi-outlet assembly may be combined with the data outlet raceway described in Chapter 2, in a dual compartment assembly.
- 3.7.1.7 Provide a Clean Power receptacle at each desk in the SIPRNET Café centered on the desk and at 15 inches AFF.

3.7.1.8 Provide a dedicated Clean Power electrical panel for each TER/TR with the following minimal requirements: 120/208 volt, 3-phase, panel with a minimum 100 ampere total capacity. All IT loads within the TER/TR shall be fed from the dedicated panel and not from other branch circuits. Loads shall include, but are not limited to, servers, UPS, data switches, and PABX systems. A minimum of 30 Amp spare capacity shall be reserved in each panel with a minimum of four unused spaces for future loads. The designer shall consult with the USARC G2/6 representative to determine the necessary power requirements since the rack or cabinet may contain devices requiring 110 volt and/or 220 volt circuits. If there is a SIPRNET Café adjacent to the TER/TR, the TER/TR Clean Power panel shall also be used and sized for the Clean Power requirements of the SIPRNET Café.

3.7.2 Grounding

- 3.7.2.1 Provide a Telecommunications Main Grounding Busbar (TMGB) at the EF in accordance with ANSI J-STD-607-A, with a minimum length of 12 inches (30 cm). Bond the TMGB to the main electrical service grounding electrode system at the main switchboard with a Telecommunications Bonding Backbone (TBB) conductor using irreversible, high compression or permanent exothermic connections. Provide a TBB with a minimum size of #2 American Wire Gauge (AWG) copper wire for distances of up to 33 feet (10 m) from the main switchboard and sized in accordance with ANSI J-STD-607-A for distances in excess of 33 feet (10 m). For distances in excess of 165 feet (50 m), provide an additional TBB bonded to the nearest effectively grounded building structural steel. Provide such a TMGB in each building served by telecommunications services.
- 3.7.2.2 Provide a TGB in accordance with ANSI J-STD-607-A in each IT rack. Bond TGB within a room together with a minimum size of #4 AWG copper wire. Bond the end TGB to the TMGB with a TBB with a minimum size of #4 AWG copper wire for distances of up to 20 feet (6 m) from the TER and sized in accordance with ANSI J-STD-607-A for distances in excess of 20 feet (6 m).
- 3.7.2.3 Provide a Vertical Rack Bus on each IT rack. Bond each Vertical Rack Bus TMGB/TGB with a TBB with a minimum size of #4 AWG copper wire for distances of up to 20 feet (6 m) in accordance with ANSI J-STD-607-A.
- 3.7.2.4 Bond TMGB and TGB to structural steel in accordance with ANSI J-STD-607-A.
- 3.7.2.5 Bond cable tray within TER and TR to the TMGB or TGB with a minimum size of #6 AWG copper wire.
- 3.7.2.6 All ground connections are to be made to steel, no connections to aluminum components are permitted. Use only copper wire for ground connections, no aluminum wire permitted.
- 3.7.2.7 Refer for Figure 3-13 for more details.

3.8 Joint Use Facilities Data Network

- 3.8.1 In joint-use facilities, the data networks for each Service (Army Reserve, National Guard, etc) are considered separate from each other. Therefore, each Service's network is to be configured in a Star Topology as defined by EIA/TIA-568-C-1 and BCSI standards.
- 3.8.2 Refer to Figure 3-12 for a basic flow diagram for network configurations in a Joint-use facility. Figure 3-12 is based on a joint use facility that has both the Army Reserve and National Guard. If there are more than these Service's in a facility then each additional Service will have its own network as well.
- 3.8.3 Each Service will utilize the facility outside plant cabling supplied as part of the project to provide connection between their network in the facility and their WAN.

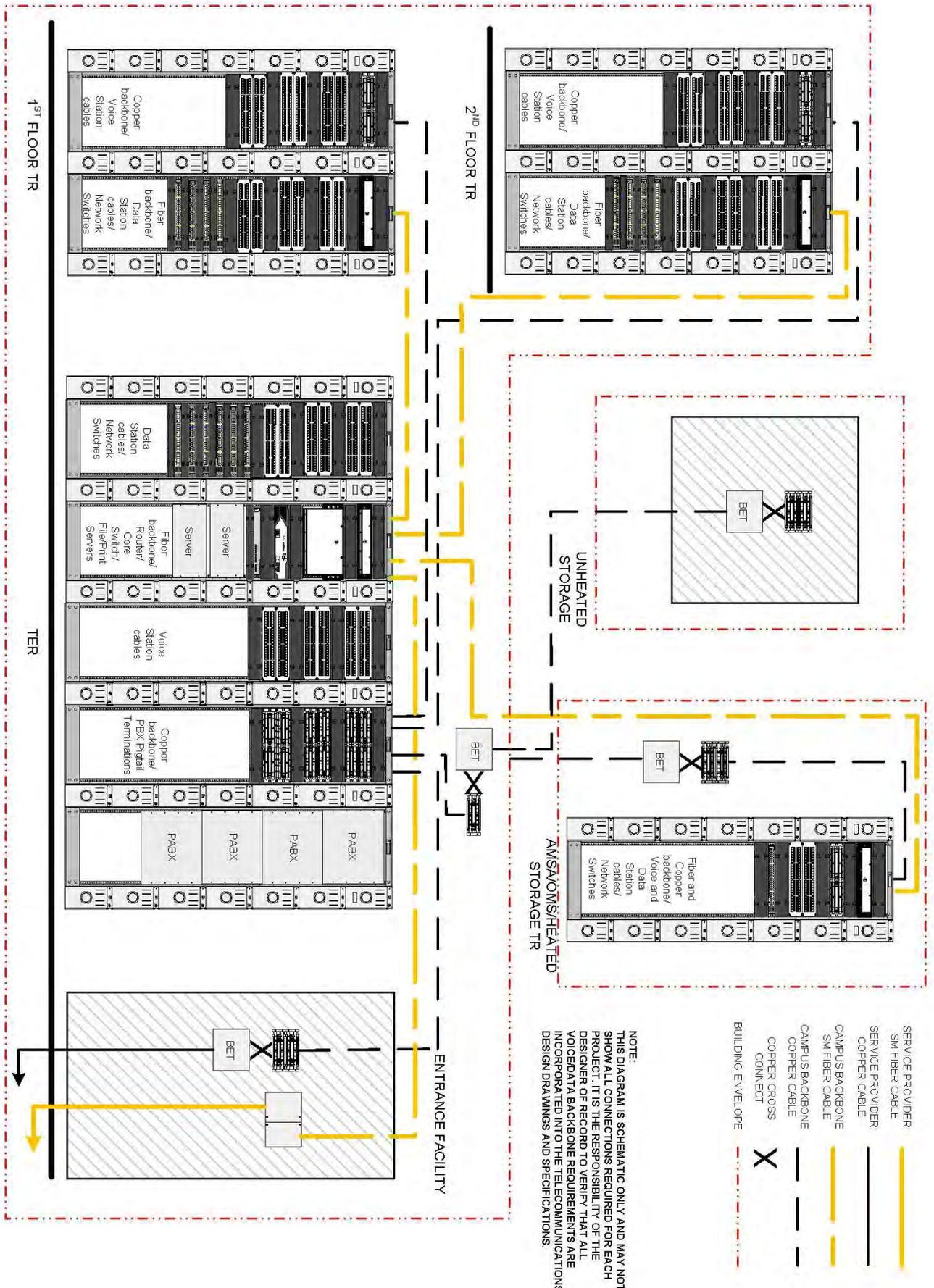


FIGURE 3-1 Typical Voice/ Data Backbone Cabling Diagram
NOT TO SCALE

KEY NOTES

1. 8'H x 3/4", AC grade, void free, fire rated plywood backboard covering two walls, with two coats of white or light grey paint. Do not paint over fire rating stamp. Typical.
2. Four 4" conduits with three 1-1/4" (3.2 cm) innerducts in each conduit.
3. Telecommunications Ground Bus bar (TGB) mounted at 7'-6" AFF.
4. CFCI Building Entrance Terminal (BET) and wall mounted, 110-type connector blocks with C-5 clips for copper backbone terminations. Typical.
5. Two NEMA L5-20 receptacles. Each receptacle has a dedicated 120V/20AMP circuit for GFCI telecommunications equipment. Outlets will be attached to the cable runway above each rack. Typical.
6. Ladder type, cable runway, made of 3/8" x 1-1/2" x .065" wall rectangular steel tubing, with cross members welded at 12" intervals, standard length is 9'-11 1/2" / 119.5". Typical.
7. Not used.
8. NEMA 5-20 duplex receptacle convenience outlet spaced at 6' intervals around the perimeter of the room. Typical.
9. Light Fixture. Provide the appropriate number of fixtures to achieve 50 foot-candles. The illumination levels are measured at 3 feet AFF at the front and back faces of IT racks. Typical.
10. Wall mount phone outlet with (1) Category 6 cable mounted at 48" AFF. Typical.

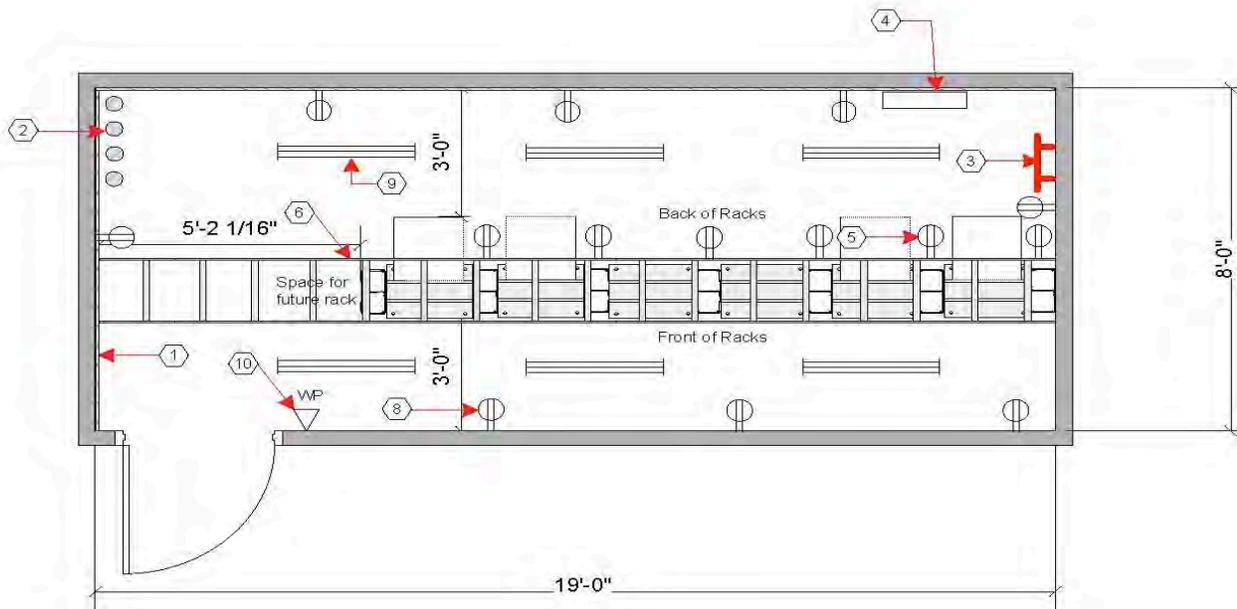


FIGURE 3-3 Typical Telecommunications Equipment Room (TER) Plan View
 SCALE: 1/4" = 1'-0"

KEY NOTES

1. 8'H x 3/4", AC grade, void free, fire rated plywood backboard covering two walls, with two coats of white or light grey paint. Do not paint over fire rating stamp. Typical.
2. Four 4" EMT sleeves down to TER/TR.
3. Telecommunications Ground Bus bar (TGB) mounted at 7'-6" AFF.
4. Not Used
5. Two NEMA L5-20 receptacles. Each receptacle has a dedicated 120V/20AMP circuit for GFCI telecommunications equipment. Outlets will be attached to the cable runway above each rack. Typical.
6. Ladder type, cable runway, made of 3/8" x 1-1/2" x .065" wall rectangular steel tubing, with cross members welded at 12" intervals, standard length is 9'-11 1/2" / 119.5". Typical.
7. Not used
8. NEMA 5-20 duplex receptacle convenience outlets spaced at 6' intervals around the perimeter of the room. Typical.
9. Light Fixture. Provide the appropriate number of fixtures to achieve 50 foot-candles. The illumination levels are measured at 3 feet AFF at the front and back faces of IT racks. Typical.
10. Wall mount phone outlet with (1) Category 6 cable mounted at 48" AFF. Typical.

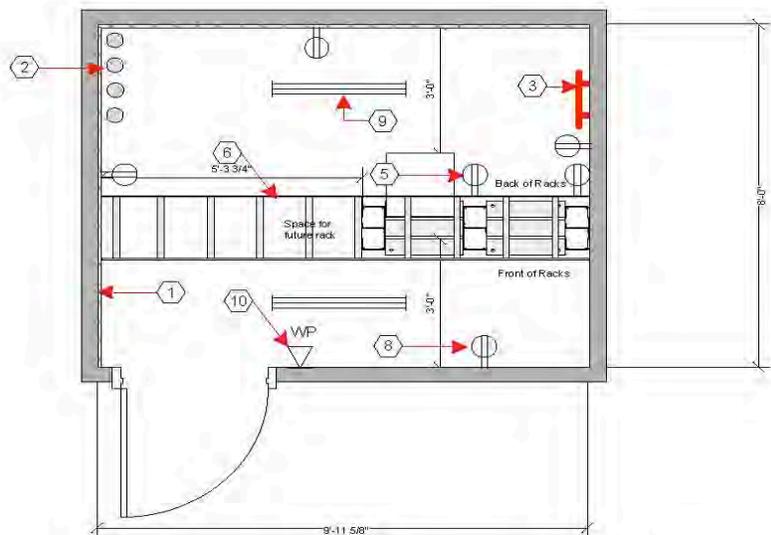


FIGURE 3-4 Typical Training Center Telecommunications Room (TR) Plan View
 SCALE: 1/4" = 1'-0"

KEY NOTES

1. 8'H x 3/4", AC grade, void free, fire rated plywood backboard covering two walls, with two coats of white or light grey paint. Do not paint over fire rating stamp. Typical.
2. Two 4" conduits with three 1-1/4" (3.2 cm) innerducts in each conduit.
3. Telecommunications Ground Bus bar (TGB) mounted at 7'-6" AFF.
4. CFCI Building Entrance Terminal (BET) and wall mounted, 110-type connector blocks with C-5 clips for copper backbone terminations. Typical.
5. Two NEMA L5-20 receptacles. Each receptacle has a dedicated 120V/20AMP circuit for GFCI telecommunications equipment. Outlets will be attached to the cable runway above each rack. Typical.
6. Ladder type, cable runway, made of 3/8" x 1-1/2" x .065" wall rectangular steel tubing, with cross members welded at 12" intervals, standard length is 9'-11 1/2" / 119.5". Typical.
7. Not used
8. NEMA 5-20 duplex receptacle convenience outlet spaced at 6' intervals around the perimeter of the room. Typical.
9. Light Fixture. Provide the appropriate number of fixtures to achieve 50 foot-candles. The illumination levels are measured at 3 feet AFF at the front and back faces of IT racks. Typical.
10. Wall mount phone outlet with (1) Category 6 cable mounted at 48" AFF. Typical.

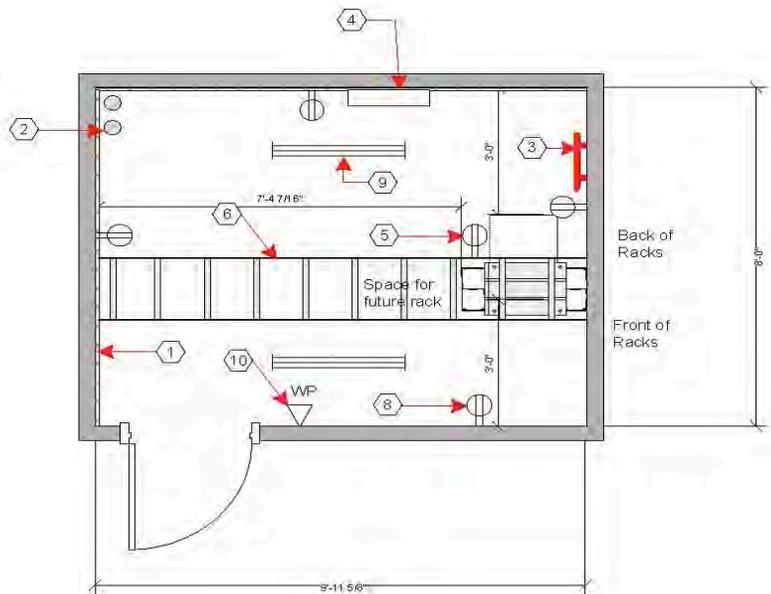


FIGURE 3-5 Typical OMS/AMSA/Heated Storage Telecommunications Room (TR) Plan View
 SCALE: 1/4" = 1'-0"

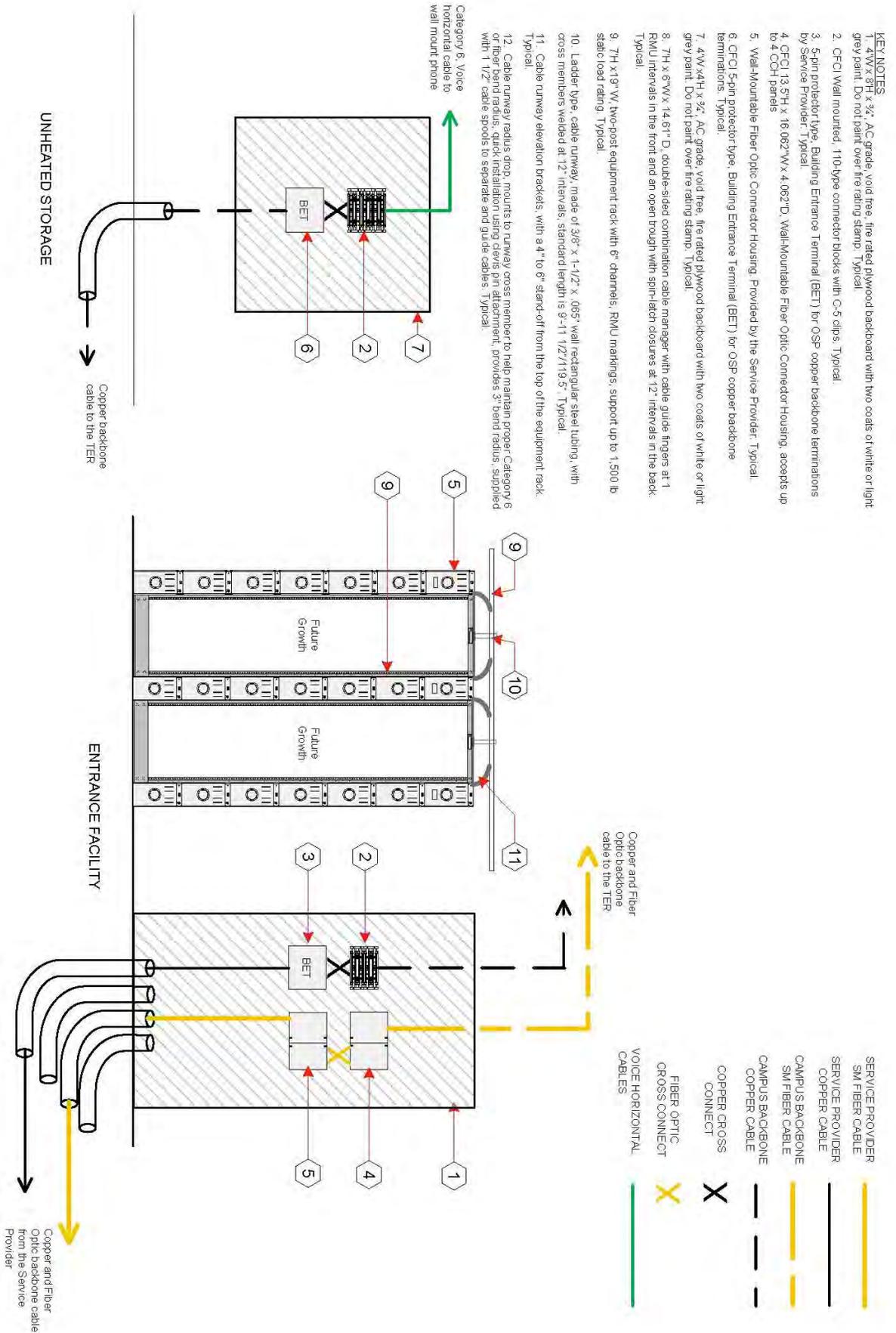


FIGURE 3-6 Typical Entrance Facility (EF) and UHS Elevations
NOT TO SCALE

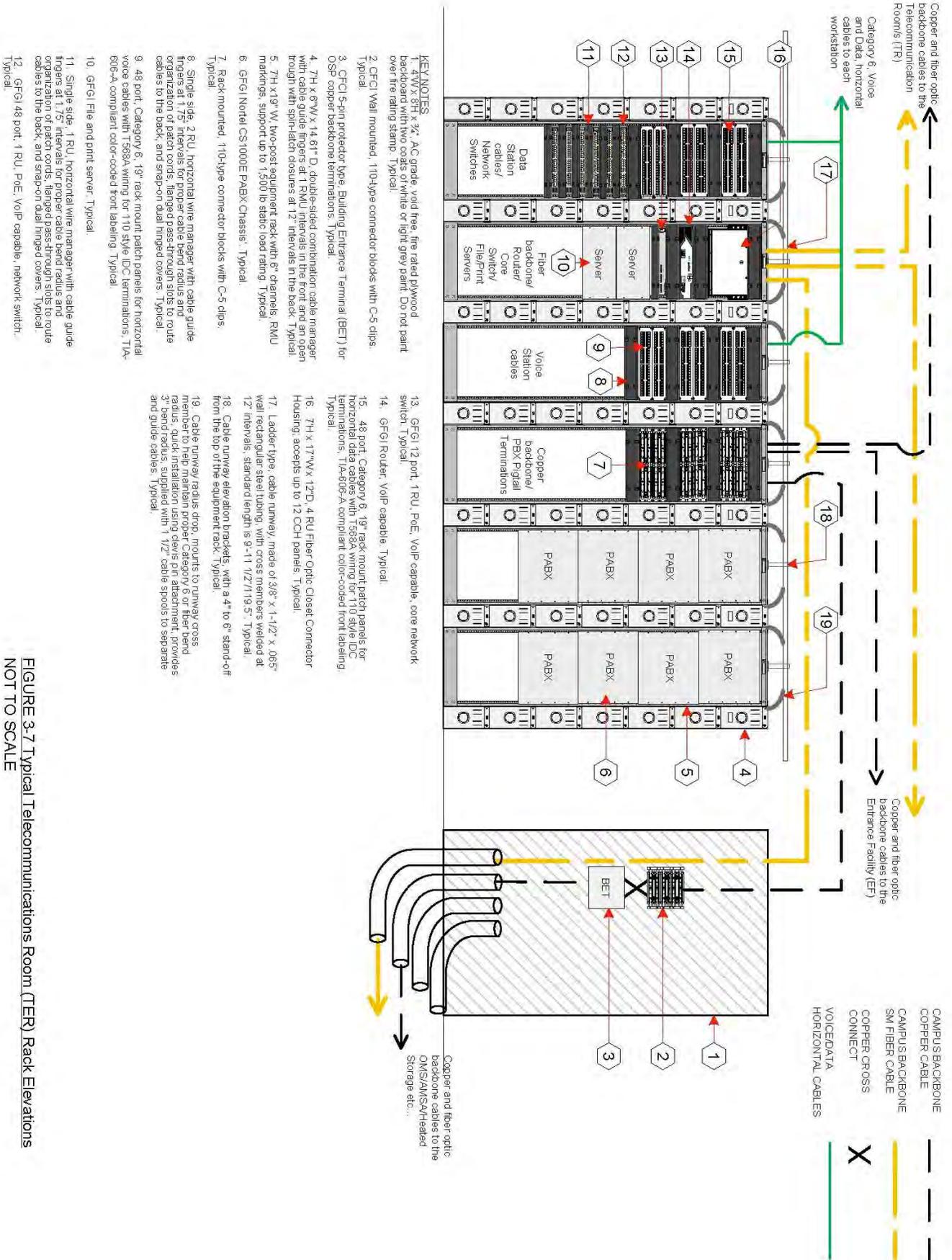


FIGURE 3-7 Typical Telecommunications Room (TER) Rack Elevations
NOT TO SCALE

- KEY NOTES:**
1. Two NEMA 5-20 receptacles. Each receptacle has a dedicated 120V/20AMP circuit for GFCI telecommunications equipment. Outlets will be attached to the cable runway above each rack. Typical.
 2. Surge protected, Vertical Power Strip with 11 "offset" mounting brackets. Power strip has one 20A Triplex breaker, one NEMA 5-20 Plug and ten simplex NEMA 5-20 receptacles. Power strip must be mounted so it does not interfere with equipment installation.
 3. Vertical mounted Rack-Ground Bar (14" sized to fit a 7' 1" high rack with an EIA-310-D Universal hole pattern and 45 RMLU. The ground bar is punched with a series of holes that align with each mounting hole on the rack.
 4. 7H x 6"W x 14.6" D, double-sided combination cable manager with cable guide fingers at 1" RMLU intervals in the front and an open trough with snap-on closures at 12" intervals in the back. Typical.
 5. 7H x 19" W, two-post equipment rack with 6" channels, RMLU markings, support up to 1,000 lb static load rating. Typical.
 6. Not used.
 7. Rack mounted, 110-type connector blocks with C-5 clips. Typical.
 8. Single side, 2 RU, horizontal wire manager with cable guide fingers at 1.75" intervals for proper cable bend radius and organization of patch cords. Hinged pass-through slots to route cables to the back, and snap-on dual hinged covers. Typical.
 9. 48 port, Category 6, 19" rack mount patch panels for horizontal voice cables with T568A and wiring and 110 style IDC terminations. TIA-608-A compliant, color-coded front labeling. Typical.
 10. Not used.
 11. Single side, 1 RU, horizontal wire manager with cable guide fingers at 1.75" intervals for proper cable bend radius and organization of patch cords. Hinged pass-through slots to route cables to the back, and snap-on dual hinged covers. Typical.
 12. GFCI 48 port, 1 RU, PCE, VoIP, parable, network switch. Typical.
 13. Not used.
 14. Not used.
 15. 48 port, Category 6, 19" rack mount patch panels for horizontal data cables with T568A wiring for 110 style IDC terminations. TIA-608-A compliant, color-coded front labeling. Typical.
 16. 3.57H x 17"W x 12"D, 2 RU Fiber Optic Closet Connector Housing, accepts up to 4 OCH channels. Typical.
 17. Ladder type, cable runway, made of 3/8" x 1-1/2" x .085" wall rectangular steel tubing, with cross members welded at 12" intervals. Standard length is 9'-11" 1/2" (119" 5"). Typical.
 18. Cable runway elevation brackets, with a 4" to 6" stand-off from the top of the equipment rack. Typical.
 19. Cable runway radius drop, mounts to runway cross member to help maintain proper Category 6 or fiber bend radius, quick installation using clevis pin attachment, provides 3" bend radius, supplied with 1 1/2" cable spools to separate and guide cables. Typical.

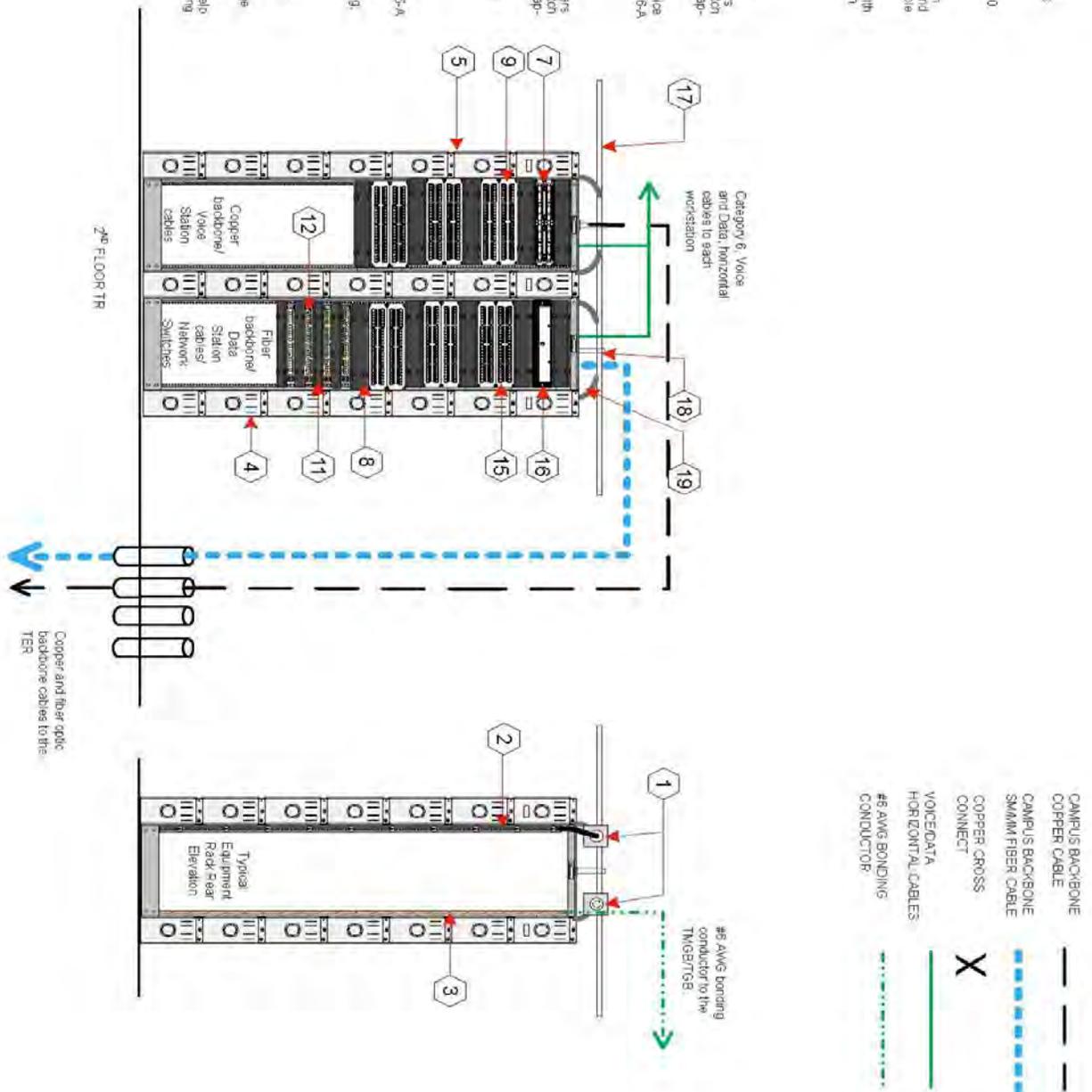
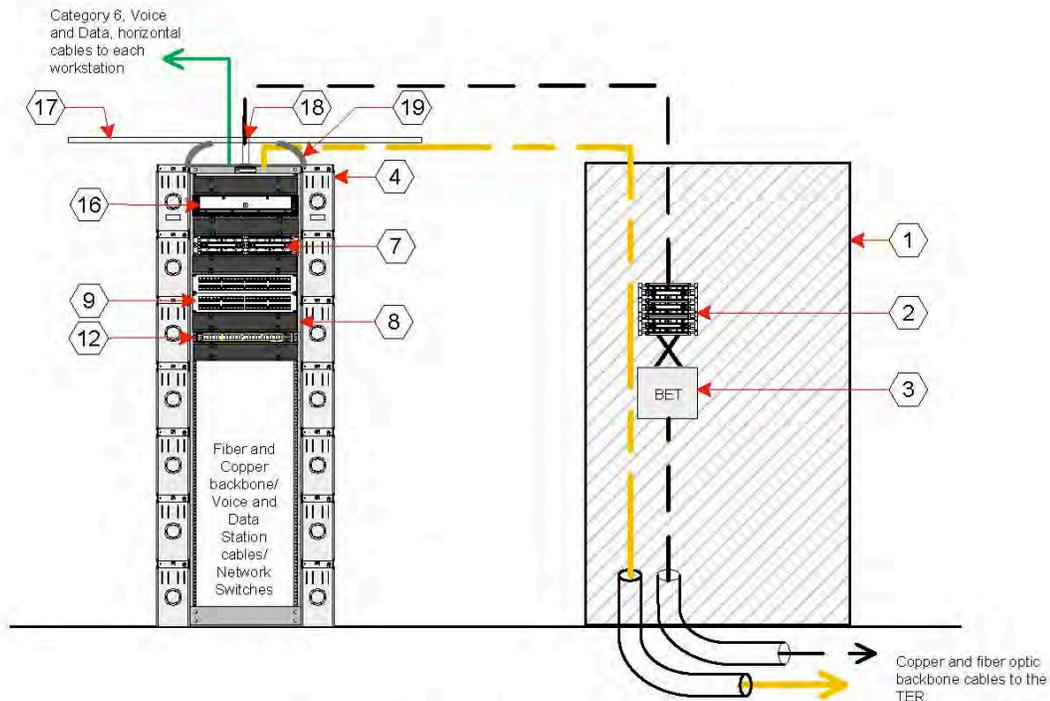
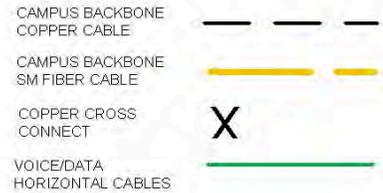


FIGURE 3-8 Typical Training Center TR
NOT TO SCALE

KEY NOTES

1. 4'W x 8'H x 3/4", AC grade, void free, fire rated plywood backboard with two coats of white or light grey paint. Do not paint over fire rating stamp. Typical.
2. CFCI Wall mounted, 110-type connector blocks with C-5 clips. Typical.
3. CFCI 5-pin protector type, Building Entrance Terminal (BET) for OSP copper backbone terminations. Typical.
4. 7'H x 6"W x 14.61" D, double-sided combination cable manager with cable guide fingers at 1 RMU intervals in the front and an open trough with spin-latch closures at 12" intervals in the back. Typical.
5. 7'H x 19" W, two-post equipment rack with 6" channels, RMU markings, support up to 1,500 lb static load rating. Typical.
6. Not used
7. Rack mounted, 110-type connector blocks with C-5 clips. Typical.
8. Single side, 2 RU, horizontal wire manager with cable guide fingers at 1.75" intervals for proper cable bend radius and organization of patch cords, flanged pass-through slots to route cables to the back, and snap-on dual hinged covers. Typical.
9. 48 port, Category 6, 19" rack mount patch panels for horizontal voice and data cables with T568A and wiring and 110 style IDC terminations. TIA-606-A compliant color-coded front labeling. Typical.
10. Not used
11. Not used
12. GFGI 48 port, 1 RU, PoE, VoIP capable, network switch. Typical.
13. Not used
14. Not used
15. Not used
16. 7'H x 17"W x 12"D, 4 RU Fiber Optic Closet Connector Housing; accepts up to 12, CCH panels. Typical.
17. Ladder type, cable runway, made of 3/8" x 1-1/2" x .065" wall rectangular steel tubing, with cross members welded at 12" intervals, standard length is 9'-11 1/2" / 119.5". Typical.
18. Cable runway elevation brackets, with a 4" to 6" stand-off from the top of the equipment rack. Typical.
19. Cable runway radius drop, mounts to runway cross member to help maintain proper Category 6 or fiber bend radius, quick installation using clevis pin attachment, provides 3" bend radius, supplied with 1 1/2" cable spools to separate and guide cables. Typical.



**FIGURE 3-9 Typical AMSA/OMS/Heated Storage TR
NOT TO SCALE**

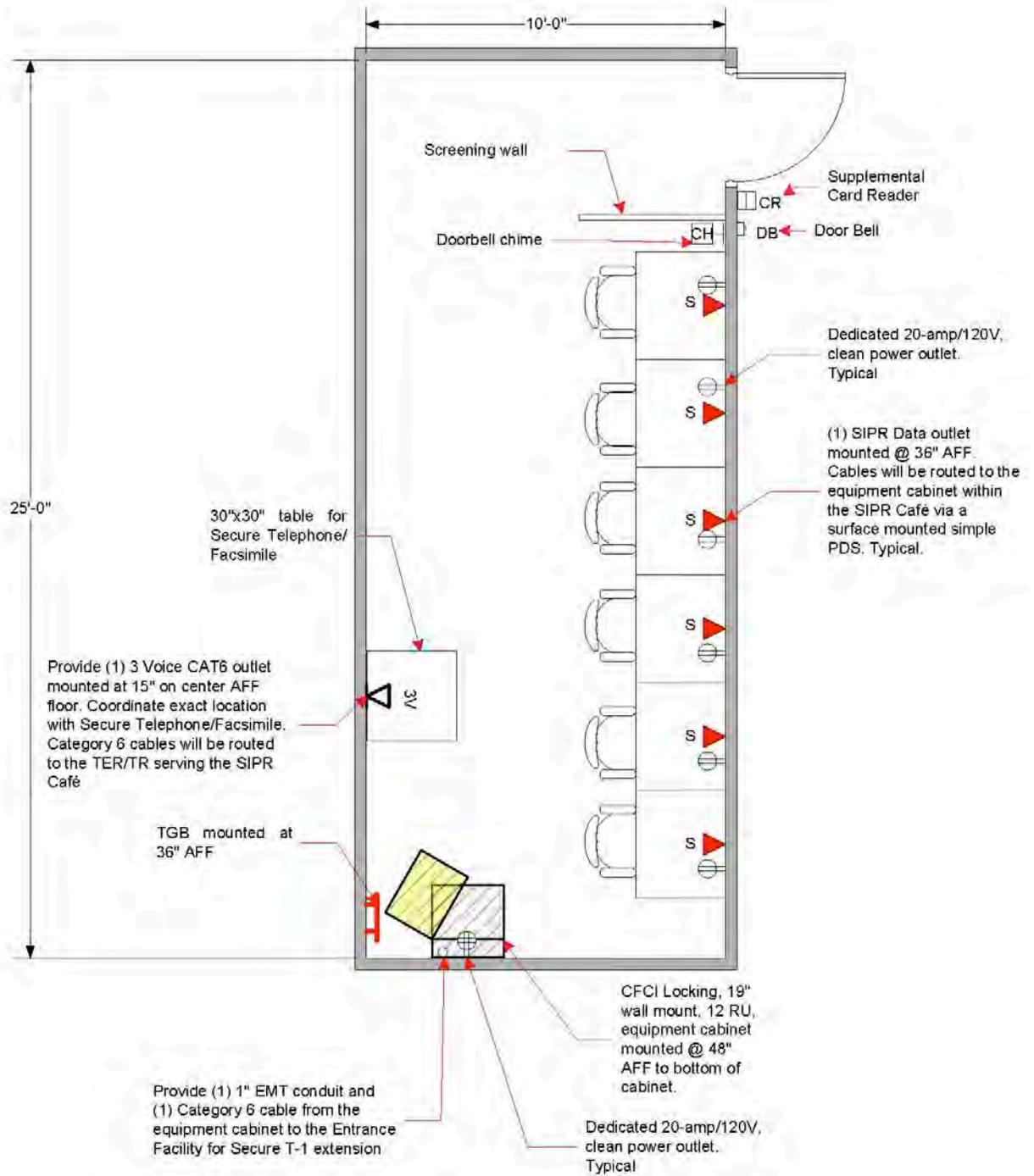


FIGURE 3-10 Typical Small SIPRNET Cafe
 SCALE: 1/4" = 1'-0"

Provide (1) 1" EMT conduit and (1) Category 6 cable from the equipment cabinet to the Entrance Facility for Secure T-1 extension

Provide (1) 3 Voice outlet mounted at 15" on center AFF floor. Coordinate exact location with Secure Telephone/Facsimile. Category 6 cables will be routed to the TER/TR serving the SIPR Café

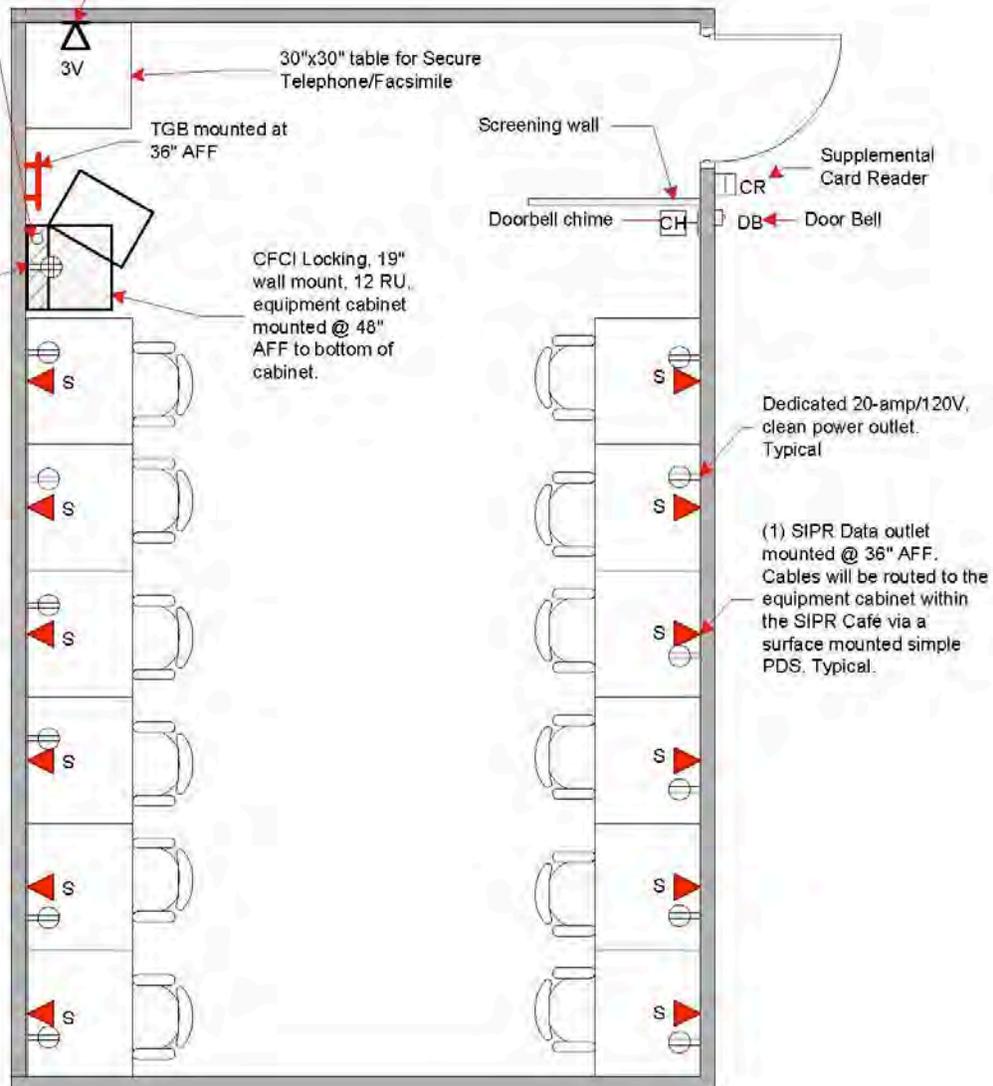


FIGURE 3-11 Typical Large SIPRNET Cafe

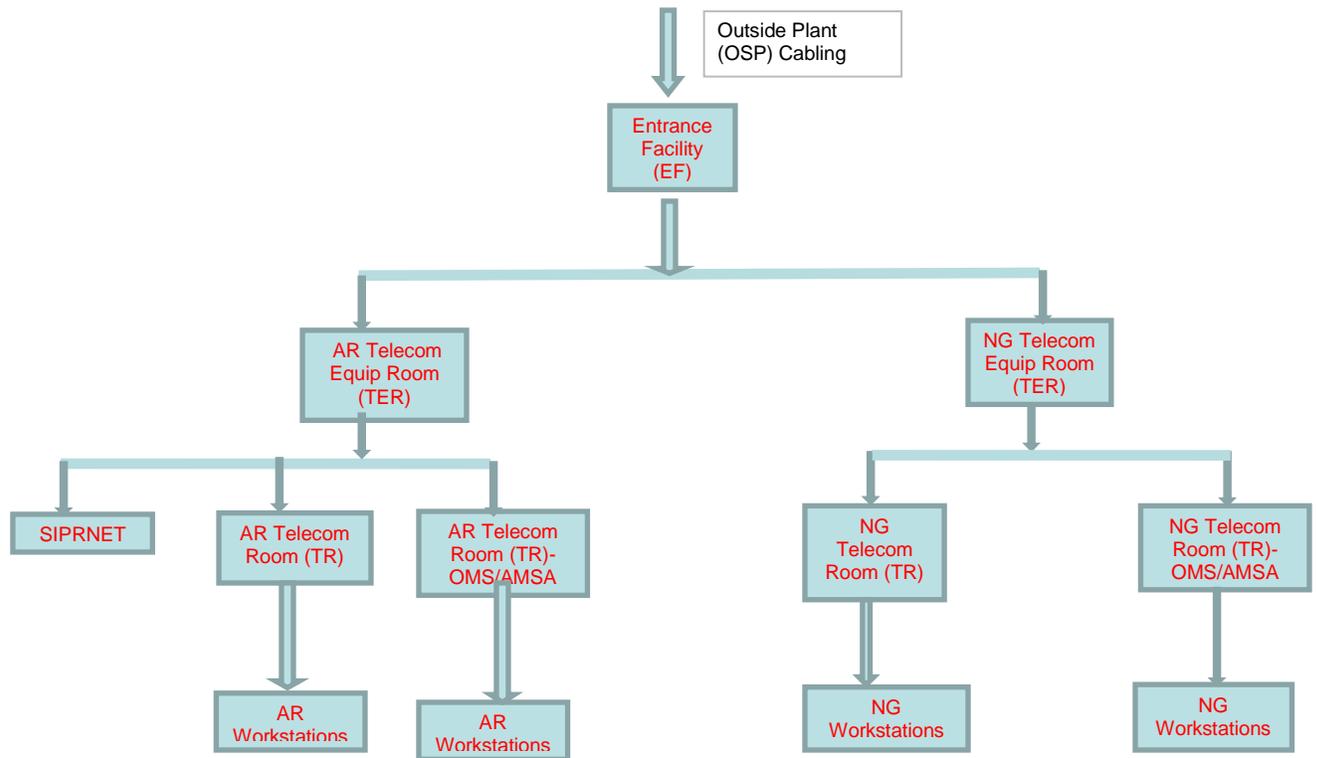


Figure 3-12: Joint-Use Facility- Basic Data Network Topology

- ACEG = Alternating current equipment ground
- BC = Bonding conductor
- BCT = Bonding conductor for telecommunications
- EF = Entrance facility
- ER = Equipment room
- GE = Grounding equalizer
- GEC = Grounding electrode conductor
- TBB = Telecommunications bonding backbone
- TGB = Telecommunications grounding busbar
- TMGB = Telecommunications main grounding busbar
- TR = Telecommunications room

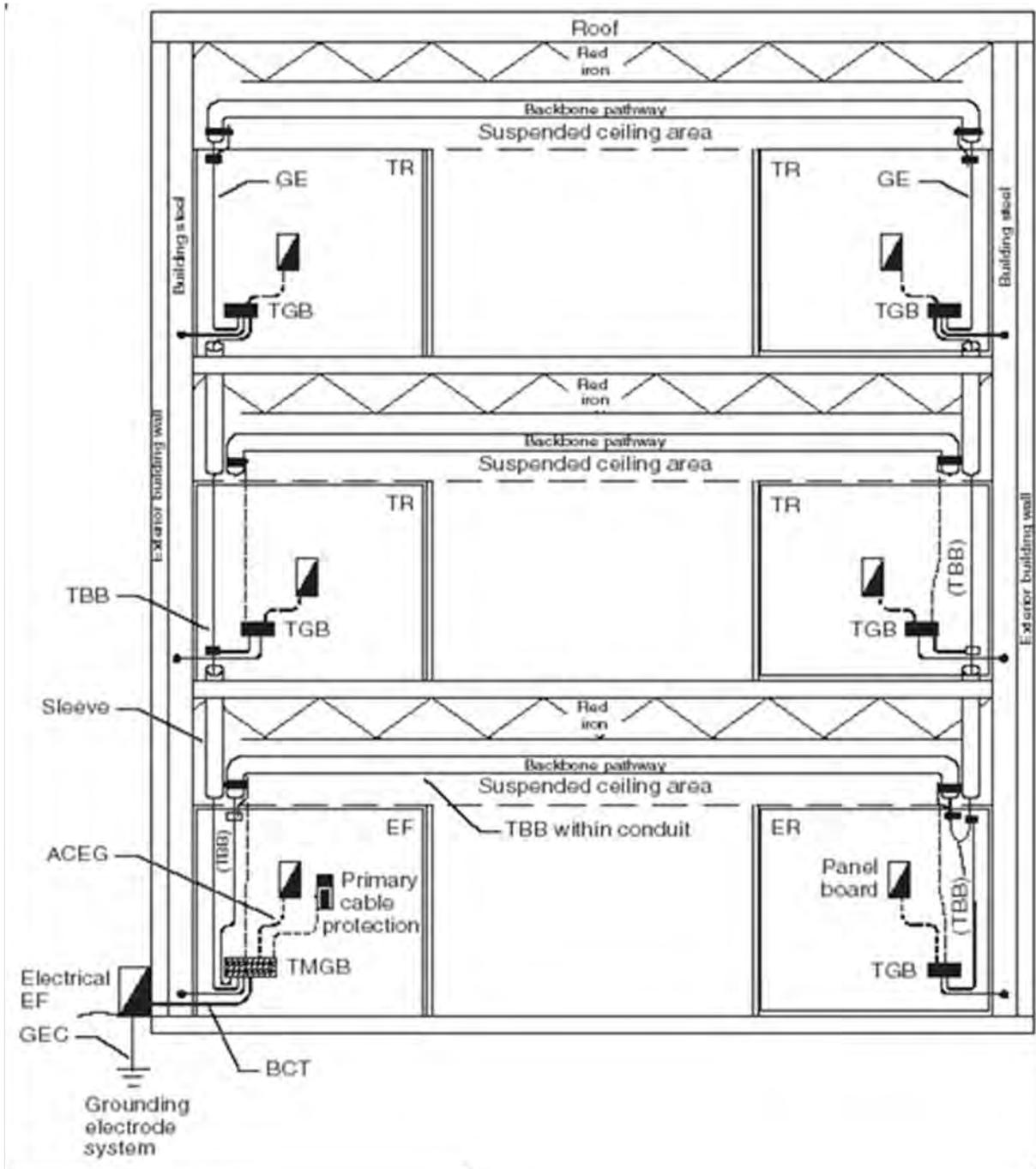


Figure 3-13: Grounding and Bonding Diagram

Appendix A – Glossary of Terms and Acronyms in this Manual

1391 = Project authorization Form DD 1391
AC = Alternating Current
ACSIM-AR = Assistant Chief of Staff Installation Management, Army Reserve
AFF – above finished floor
AGCCS = Army Global Command and Control System
ANSI = American National Standards Institute
APC = Area Processing Center
AR = Army Reserve
ARFORGEN = Army Force Generation
ARNET = Army Reserve Network
ASHRAE = American Society of Heating, Refrigerating and Air-Conditioning Engineers
AWG = American Wire Gauge
BDE = Brigade
BLACK = A term applied to equipment and lines that process or carry only unclassified and/or encrypted information. Black equipment and lines are also SBU.
BMS = Balanced Magnetic Switch
BN = Battalion
BRAC = Base Realignment and Closure
CAA = Controlled Access Area
CATV = Community/Cable Access Television
COMSEC = Communications Security
DAA = Designated Approval Authority
D/B = Design/Build
DCID = Director of Central Intelligence Directive
DG = UFC 4-171-05 Army Reserve Facilities (Design Guide)
DISA = Defense Information Systems Agency
DISN = Defense Information System Network
DOIM = Directorate of Information Management
ECS = Entry Control System
EF = Entrance Facility
EOC = Emergency Operations Center
G2 = Military Intelligence Section
G3 = Operations Section
G6 = Information Management Section
G.O. = General Officer
GSA = General Services Administration
HDPE = High Density PolyEthylene
HQ = Headquarters
HVAC = Heating, Ventilating and Air Conditioning
IDS = Intrusion Detection System
I3A = Technical Guide for Installation Information Infrastructure Architecture
IESNA = Illuminating Engineering Society of North America
ISEC-FDED = Information Systems Engineering Command, Fort Detrick Engineering Directorate
IT = Information Technology
ITU = International Telecommunication Union
JITC = Joint Interoperability Test Command
LAN = Local Area Network

MCAR = Military Construction, Army Reserve
MM = Multi-Mode
MPOP = Minimum Point of Presence
NEC = NFPA 70 National Electrical Code
NEMA = National Electrical Manufacturers Association
NIPRNET = Non-Classified but Sensitive Internet Protocol Router Network
NMCI = Navy/Marine Corps Intranet
NOC = Network Operations Center
NSTISSI = National Security Telecommunications and Information Systems Security Instruction
OMAR = Operations and Maintenance, Army Reserve
OSP = Outside Plant
O&F = Operational and Functional
PABX = Private Automatic Branch Exchange
PDS = Protected Distribution System
PDT = Project Delivery Team
POE = Power Over Ethernet
PVC = Polyvinyl Chloride
RED = A term applied to equipment and lines that processes or carry unencrypted national security information
RFP = Request for Proposal
RRC = Regional Readiness Command
RSC = Regional Support Command
SBU = Sensitive but Unclassified
SCIF = Secure Compartmentalized Information Facility
SIPRNET = Secret Internet Protocol Router Network
SM = Single Mode
STE = Secure Telephone Equipment
SVTC = Secure Video Teleconference
TBB = Telecommunications Bonding Backbone
TDM = Time Domain Multiplexing
TER = Telecommunications Equipment Room – equivalent to Equipment Room as defined in TIA 569-B
TGB = Telecommunications Grounding Busbar
TIA/EIA = Telecommunications Industry Association/Electronics Industries Alliance
TMGB = Telecommunications Main Grounding Busbar
TR = Telecommunications Room
UFC = Unified facility Criteria
UHS = Unheated Storage
UPS = Uninterruptible Power Supply
USAR-CIO = U.S. Army Reserve Chief Information Office
USARC = U.S. Army Reserve Command
UTP = Unshielded Twisted Pair
VOIP = Voice-Over-Internet-Protocol
VTC = Video Teleconference

Appendix B – Army Reserve Information Technology Matrix

The Army Reserve IT Matrix on the following pages provides a list of many, but not necessarily all, of the IT provisions for a typical Army Reserve facility. It also indicates typical funding for the various provisions.

The list is maintained by the Louisville District, Corps of Engineers, and may be used as a starting point for a checklist of IT provisions for individual Army Reserve projects.

**ARMY RESERVE
INFORMATION TECHNOLOGY MATRIX**

PROJECT:

PROJECT NO.

DATE:

Pathways and Spaces	FUNDING TYPE	MCAR	OMAR	OMAR	OTHER
Entrance Facility					
Telecomm Equip Room		X			
Telecomm Room(s)		X			
SIPRNET ROOM		X			
SIPRNET Café		X			
COMSEC		X			
AGCCS		X			
SCIF		X			
EOC		X			

ITEMS BELOW CAN BE PROVIDED BY INSTALLATION DOIM, RRC G6, ISEC, OR THE CONTRACTOR. THEY CAN ALSO BE FUNDED BY OMAR, BRAC OMAR, OR PROJECT CONSTRUCTION FUNDED (MCAR OR BRAC). ALL DECISIONS OF WHO PROVIDES INSTALLATION AND WHO PROVIDES FUNDING SHALL BE DOCUMENTED AND PROVIDED TO THE PM. THE PM SHALL PROVIDE LIST AND ASSOCIATED COSTS TO THE ACTION OFFICER.

PROVIDER FUNDING TYPE	CFCI MCAR	CFCI OMAR	GFGI USAR OMAR	OTHER
CENTREX/PABX (MULTILINE) (Switch)			X	
LINE CARDS (May be needed with Switch)			X	
UNINTERRUPTED POWER SUPPLY (UPS) (UPS required with switch)			X	
DISTRIBUTION RINGS	X			
WALL DISTRIBUTION CENTER (located in tel rm) (May or may not need this on every project)	X			
TELEPHONE SETS DESK			X	
TELEPHONE SET WALL			X	
TELEPHONE SET WEATHER PROOF			X	
MODEMS/MUX (part of equipment in rack)		X		
LINE DRIVERS (part of equipment in rack)		X		
CHANNEL BANK (part of equipment in rack)		X		

FIBER OPTIC CABLE SINGLEMODE General Rule for Outside Plant	X			
FIBER OPTIC CABLE MULTIMOLDE General Rule for Inside Plant (Each project should determine which type of fiber optic cable is needed for RRC eqt)	X			
LAN/WAN HARDWARE (usually GFGI) LAN SWITCHES/WAN ROUTERS ANTENNAS (When required, could be new or relocate existing)			X	
			X	
			X	
TELECONFERENCING ISC will fund and install VTC. (Currently not required, however may be required in the future)				
SECURE CIRCUITS (for SCIF)			X	

LAN SYSTEM NORMALLY PROVIDED BY ARMY RESERVE AFTER BOD					
USAR LAN SYSTEM	PROVIDER FUNDING TYPE	CFCI MCAR	CFCI OMAR	GFGI USAR OMAR	OTHER
LAN Servers				X	
LAN UPS				X	
LAN Testing / Operations				X	

ITEMS BELOW NORMALLY INCLUDED IN ALL CONSTRUCTION CONTRACTS. IF NOT, THE DIFFERENCE SHOULD BE DOCUMENTED AND PROVIDED TO PM.					
	PROVIDER FUNDING TYPE	CFCI MCAR	CFCI OMAR	GFGI USAR OMAR	OTHER
IT WITHIN FIVE FOOT LINE					
CONDUIT (BOXES/PULL STRINGS)		X			
RACEWAYS (cable trays)		X			
110/120 BLOCKS		X			
RJ-45 CONNECTORS (FACEPLATES) (Tel / LAN)		X			
BACKBOARD(S)		X			
CABLE CAT 6 (Tel / LAN)		X			
CABLE TEST (Tel LAN)		X			
BACKBONE CABLE (Tel / LAN)		X			
PROTECTED TERMINAL		X			
EQUIPMENT RACK(S) 19 IN. (Tel / LAN)		X			
CABINETS (if used - racks normally used)		X			
SURGE SUPERSESSOR(S) (on incoming cable)		X			
FAX OUTLET		X			

Appendix C: MILCON IT Supply/Install Responsibility Matrix

	Item	Location	Contractor		RCAS		ISEC		DOIM		Tenant	
			Prov	Inst	Prov	Inst	Prov	Inst	Prov	Inst	Prov	Inst
1	Voice Cross Connect Blks	EF,TER, TR	X	X								
2	Equipment Racks	EF (2) TER, TR	X	X								
3	Voice Cable Patch Panels	TER, TR	X	X								
4	Fiber Cable Patch Panels	EF, TER, TR Clsrm	X	X								
5	Data Cable Patch Panel	TER, TR Clsrm	X	X								
6	Data Switch	TER, TR, Clsrm			X	X					X	X
7	Router, Component Routers	TER			X	X					X	X
9	PABX											
10	AFRC	TER			X	X						
11	Active Component Installation	Installation DEMARC							X	X		
12	Handsets											
13	AFRC Installation	Workstation			X	X						
14	Active Comp Installations	Workstation							X	X	X	X
15	UPS, Rack Mount only	TER,TR			X	X						
16	Mission Switches	TER, TR									X	X
17	Cable Tray	TER,TR	X	X								
18	Backbone Cabling	EF, TER, TR	X	X								
19	Campus Cabling (OSP)	EF, TER,	X	X								
20	Voice/Data Outlets	Office, Workstation	X	X								
21	SIPRNET/Rack, Wall Mount	SIPR Café	X	X								
22	SIPRNET Encryp, Switch, Router	SIPR Café					X	X				
23	Secure Data jacks/cabling	SIPR Café	X	X								
24	UnClass feed to SIPR Café	SIPRNET	X	X								
25	CATV Horizontal Cabling	As specified in plans	X	X								
26	Servers, Fax, Copiers, Comp	Functional Work Areas									X	X