Kirtland Air Force Base

Communications Specifications

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Kirtland AFB Communications Specifications

Contents

1. Background/Overview 3
2. General Purpose 3
3. Roles and Requirements 4
4. Exterior Communications Plant 7
5. Underground Copper Installation 8
6. Underground Fiber Installation 9
7. Manholes and Duct Systems 9
8. Building/Vault Entrance 13
9. Telecommunications (Comm) Rooms 16
10. Interior/Premise Wiring- General Requirements 21
11. Interior/Premise Wiring- Copper (CAT 6) 22
12. Interior/Premise Fiber 23
13. Switches 24
14. Telecom Outlets 24
15. Other Considerations 26

Appendixes… ***32***

1. Background/Overview

1.1 These local standards have been established to minimize the long-term cost of the infrastructure, ensure interoperability and interface capability, and may only be changed when approved in writing by the Communications/Computer Systems Officer (CSO). These standards are intended to promote common skills among maintenance personnel throughout Kirtland Air Force Base and to minimize the necessity for excessive spare parts and variations in telecommunications equipment. Revisions to this document will be prepared and distributed by the 377 Communications Division (377 MSG/SC) when higher headquarters guidance, United States Air Force (USAF) communications standards, or other contributing agency standards warrant changes. Additionally, 377 MSG/SC recognizes the inherent need to maintain close interaction with Base Civil Engineering and the Army Corps of Engineers on all project issues and invite comments or recommendations for changes to this document. Any reference obtained from this document to a specific product, process, or service does not constitute or imply an endorsement by the 377 ABW, the US Air Force, or the United States Government of the product, process, or service, or its producer or provider. All product and company names are trademarks™ or registered® trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement by them.

2. General Purpose

2.1 The purpose of this instruction is to provide design criteria for planning telecommunications cabling and distribution systems for building construction and renovation efforts. Pre-wiring must be included in all Renovation/Repair and Military Construction (MILCON) projects to include. All pre- wiring must comply with industry regulatory standards, UFC 3-580-01, and this instruction. Compliance with these instructions will improve maintenance by establishing a standard for communications systems facility. Department of Defense (DOD) publications direct the use of commercial standards whenever they meet DOD needs. The commercial standards referenced in UFC 3-580-01 must be followed along with this instruction.

2.1.1 This guidance is for all MILCON, Cabling Infrastructure, and Building Renovation/Remodel/Repurpose projects within Kirtland AFB boundaries, whether managed/funded by Base Civil Engineering or Base Communications. DOE and other (Kirtland AFB) partners are encouraged to adopt these standards to the maximum extent possible to ensure government investments are maintainable for the entire

lifespan of the project/building/cabling.

2.1.2 The base CSO (377 MSG/SC) or designated authority should be contacted for approval/disapproval of any deviations to the criteria defined in this document.

3. Roles and Requirements

3.1 Customer Must:

3.1.1 The Customer is defined as the organization requesting the facility work which leads to the changes to the facility telecommunications cabling.

3.1.2 Share ideas with Base Comm as customers develop long range plans for mission requirements and building utilization- Cyber Plans & Programs (377 MSG/SCXP) so that the supporting infrastructure can be engineered. Communication regarding plan development can be shared through various modes of communication, such as AF332 submitted through Base CE or ECSRD 3215 requesting Comm support.

3.1.2 Identify work that will affect facility or infrastructure telecommunications cabling as early as possible and submit an ECSRD 3215 for Base Comm outlining any Comm requirements. At a minimum, this review should be accomplished before AF 332 submission to Base CE (377 MSG/CE). Base Comm is available to assist the customer with this task.

3.1.3 Brief changes in project scope at all design reviews, making sure to include Comm in at the earliest identification that Comm coordination will be required. Instances that will require Comm coordination may include planning of security or fire alarms, as well as office requirements for computers, faxes or printers, etc.

3.1.4 Tests must be conducted by the installer, reviewed, and accepted by Comm for any installed communications lines. Customers must not occupy facilities until AFTO form 747 is signed by all parties upon completion of the project.

3.2 Base Civil Engineering (CE) [377 MSG/CE] Must:

3.2.1 Ensure that submitted AF 332s are reviewed by 377 MSG/SC before final approval for the following types of work orders: New Buildings, Office Renovations, Repurposed/Rearranged Work Areas, Building Additions, Addition/Movement of facility walls, projects involving extensive digging/trenching, and Addition/Movement of Cubicles.

3.2.2 These types of work orders have a higher chance of requiring changes to building telecommunications cabling and distribution systems, and potentially require new cabling to be brought to the building.

3.2.3 If performing project management duties for the customer, CE must also have the duties outlined in section 3.3 – otherwise, CE must ensure that the duties outlined in section 3.3 are documented as responsibilities of the chosen project management agency.

3.3 Project Manager Must:

3.3.1 The Project Manager is defined as the individual from the project management agency having the responsibility of the planning, procurement and execution of ALL tasks of the project.

3.3.2 Provide all communications requirements to 377 MSG/SC once identified in the Requirements Document stage. All project modifications which bring new communications requirements must be emphasized at the next design review. Status updates to Comm are required throughout the duration of the project.

3.3.3 Submit an ECSRD Work Order (WO or 3215) once personnel occupying the facility/renovation is determined - requesting a determination of necessary infrastructure to support customer requirements.

3.3.4 Project Manager assigned to the 377 MSG/CE Construction/Renovation project, must submit an ECSRD WO by 10% design review.

3.3.5 Ensure that the Final Design includes a set of dedicated draft drawings relevant to Telecommunications. These drawings must depict telecommunications systems ONLY.

3.3.6 Dedicated draft drawings as defined above include:

- Man-Hole butterfly drawings
- Rack elevations
- Backboard design/layout
- Premise wiring layout
- Installation layouts for telecommunication systems

3.3.7 Allow 10 business days for the communications division personnel to review all design packages.

3.4 377 Mission Support Group, Communications Division, Plans/Programs (377 MSG/SCXP) Project Manager(s) must:

3.4.1 Continuingly review Construction/Renovation Design Packages as the project progresses.

3.4.2 Coordinate with the Base Network Control Center (NCC) and Mission System teams toprovide subject matter expertise with the incorporation of new infrastructure.

3.4.3 Coordinate with the Cyberspace System Integrator-Base (CSI-B) to provide communications assistance.

3.4.4 Inspect telecommunications system installations to verify compliance within specifications guidance.

3.5 Installer/ Contractor Certification requirements

3.5.1 Per UFC-3-580-01, Design and Engineering of Telecommunications Cabling and Distribution systems must be performed and stamped by a Registered Communications Distribution Designer (RCDD) for all projects.

3.5.2 Dedicated draft drawings utilizing electronic drawings, which are unable to be physicallystamped, must be documented to be attributable to the RCDD. Design contractor must submit acopy of the RCDD's certification to COR / contracting officer. Documents must be submitted in Visio and/or PDF.

3.5.3 Before cabling and distribution systems installation, companies must submit to the government project representative information documenting installer certification(s). Submitters/Bidders are required to meet industry standards as part of the bidding process. Bidders will be required to meet specifications outlined by Base Contracting (PK).

3.5.4 Certification(s) must be specialized in the installation of the type of cabling and equipment the installer will be working on.

3.5.5 Telecommunications contractor must submit certifications to COR/Contracting Officer forall personnel performing installations of telecommunications infrastructure and related equipment.

3.5.6 Telecommunications contractor must submit certifications to demonstrate their personnelmeet BICSI (Building Industry Consulting Service International) or New Mexico Construction Industries ES-7 Journeyman Certificate equivalency to the COR/Contracting Officer who will utilize 377 SCXP to review submitted certifications.

3.5.7 A qualified installer must be onsite during all telecommunications cabling installation.

4. Exterior Communications Plant

4.1 For all construction or remodel; design installation, and related costs must be included in the project package. Customers will need to reach out to Comm to request identification of any buried cables before the project starts. Multiple service entrance locations are required for all facilities housing command and control systems to provide diverse, redundant, survivable service.

4.2 A burial marking tape must be laid in the backfill over the conduit bank, in accordance with TIA 569B. This tape should be at least twelve inches below the finished grade and 24 inches

above the conduit bank. The tape must be rated for at least 50 years direct burial. The tape must be at least 3 inches wide and marked every five feet with 2-inch-high wording similar to the following: WARNING: COMMUNICATIONS CONDUIT BURIED BELOW. Digging cannot occur within 4 feet of buried cable, only hand digging is allowed within 4-foot range either side of buried cable.

4.3 All cables must be tagged with all pertinent identification information at splice points, all traversing manholes and termination points.

5. Underground Copper Installation

5.1 To ensure protected, easily maintainable infrastructure, outside copper cable design must use conduit to the maximum extent possible.

5.2 When direct buried copper infrastructure is prudent, it must be identified and approved by 377 MSG/S at the earliest possible design phase. Customer is required to have a digging permit before digging can begin.

5.3 All splices must use 710 modules.

5.4 All splice cases must be bonded and grounded.

5.5 All splice cases must be stainless steel.

5.6 All copper splice cases must be pressure tested to not less 10 PSI.

5.7 Copper cable splices in manholes must remain pressurized after testing.

5.8 All copper cable splices must be re-enterable / gel filled in buried cases.

5.9 End plates in splice cases must be put together and installed properly according to assembly instructions.

6. Underground Fiber Installation

6.1 Single mode fiber optic cable (SM FOC) must be used. Building network connectivity must be supplied in accordance with the "Base Information Transport Infrastructure Wired Base Area Network Technical Requirements Document". Typically, a minimum of 12 strands SM FOC (8.3/125 micron or better). Facility use and user requirements will dictate whether more fiber optic cable is required. All interior fiber connections must be LC connectors or match connectors to existing Light Interface Unit (LIU).

6.2 All FOC must be run directly, or "home run" from the closest ITB to the new facility.

6.3 Splice cases must meet the criteria established in sections 5.4 – 5.8.

6.4 All new fiber must be installed in multicell fabric innerduct and must include tracer wire.

6.5 For all base fiber optic cables between ITBs (backbone fiber), use a minimum of shielded 36 Strand Single Mode Fiber 8.3 micron with diverse routing to at least two other ITBs, consistent with long distance transport 10 Gigabit Ethernet protocol transmission equipment.

6.6 Fiber optic cable terminations must be performed by the installer and must provide manufacturer test results IAW TIA/EIA 568C.

7. Manholes and Duct Systems

7.1 All manholes must be designed and constructed to meet the requirements of all applicable commercial manuals.

7.1.1 The manhole numerical designation must be provided by 377 MSG/SC to ensure standardization and no duplication in designations with current infrastructure.

7.1.2 Manholes must provide a clear inside floor space measurement of 8’x12’. An alternate size of 6’x8’ may be approved only when no primary backbone cable passes through the manhole (lateral or dead-end service only). All manholes must provide a clear height no less than 7’. Conduit penetration banks must be at least 12” from the adjacent manhole wall and must not be centered. Conduits must enter the manhole 36-60 inches above the finish floor on the end and be perpendicular to the wall in approximate location. Mandatory items include grounding bus bar & rod, related conductors and wiring, a ladder or step, cable rack supports, a 50ft sump (French drain), pull in iron/anchor. See 7.5 and appendix A for more information on internal manhole preparations.

7.1.3 Manholes are to be located wherever a significant change in direction of the main conduit bank is needed, or a building feeder is to intersect the existing duct system. A "significant change of direction" is defined as a change in alignment that would exceed the maximum total bend parameter allowed.

7.1.4 The manhole must be set on 6 inches of level. 90% compacted granular fill, ¾ to 1 inch size extending 12 inches beyond the manhole on each vertical side. Granular fill must be compacted by a minimum of four passes with a plate type vibrator.

7.1.5 Drain sumps must be provided for precast manholes, as required. Installation also must conform to the manufacturer's instructions. When required, the sump hole must drain through 2 feet of pea gravel to allow the manhole to completely drain into the ground.

7.1.6 Minimum Ground Cover. The top of the manhole chamber must be least 12 inches below grade.

7.2 Manhole Entrance

7.2.1 Access to the manhole is to be provided by a minimum 30-inch diameter opening centered over the top of the vault with the manhole cover having the stenciled numbering designation on the side that is exposed to the service.

7.2.2 The removable metal cover (aka LID) should be round, in accordance with

specifications reliant on the estimated traffic/weight loads of the area. See Appendix A for an appropriate Manhole Neck/Lid.

7.2.3 All Neck/Lids must be of equivalent specifications to Appendix A.

7.2.4 Top access may require variable extension of the “neck” to reach ground surface level. The manhole hatchway must be even with the finished grade of the surrounding terrain and must be no more than 3/8” above any highway surface, see Appendix A.

7.2.5 Locking manhole lids requirement specifications will be approved by 377 MSG/SC. Round manhole lids should utilize Durashield-type locking mechanisms. Handholes requirement specifications will be approved by 377 MSG/SC.

7.3 Conduit/ Duct Systems

7.3.1 Manholes conduit penetrations are to be sealed against water seepage and finished inside the manhole to present a smooth, tapered entry. Unused conduits must be capped or plugged to prevent gases or wildlife from migrating between manholes. Planned conduit penetrations, such as for the main conduit bank or building feeder conduits, should be accommodated via "knock out panels" precast into the sides of the manhole.

7.3.2 Schedule 40 or better polyvinyl chloride (PVC) conduit must be used. A #10 AWG copper tracer wire or tracer tape must be installed 6" above the duct bank to assist in future location efforts. WTracer wire must be secured inside each manhole and securely fastened at the Primary Telecommunications Room (PTR). If steel pipe conduit is used, boring procedures must be followed that ensures protection of existing resources.

7.3.3 Conduit must be encased in concrete when minimum conduit depth of 24 inches cannot be attained, passing under paved roads/parking lots or high traffic area, driveways, railroad tracks or bend points that are subject to movement. These conduits must be extended an additional 3 feet on each side of the crossing for protection.

7.3.4 If the conduit must be curved, gentle sweeps must be used while maintaining a minimum radius of 25 feet. No section of conduit must contain more than two 90-degree bends between Manholes. All conduits must be sloped toward each opposing manhole at a

slope of 3" per 100' of run to promote drainage of liquids.

7.4 Manhole Location

7.4.1 The maximum spacing requirement for manhole location is derived from ANSI/TIA 758-B. The design of conduit runs potentially sporting larger copper cables, will require less spacing.

7.4.1 Manholes installation is not preferred under roadways or other normal traffic ways. It is preferred that manholes be installed under walkways or under landscaped areas if they don't interfere with tree roots, etc.

7.5 Internal Manhole Preparation

7.5.1 Each manhole must be constructed to include common interior fittings. These are intended to support the use and management of the manhole. All exposed metal fittings must be rust resistant, typically galvanized steel. Note: See Appendix A for an example of racing hardware common to communications manhole.

7.5.2 A removable metal ladder is to be provided inside each manhole. The ladder must be used by staff to enter the manhole. It should be held in place at the top by metal loops or similar anchors and must rest on the bottom of the manhole. The ladder must be easily removable to facilitate cable installation and routing within the manhole.

7.5.3 Anchors for cable installation pulleys must be provided on all four sides of manhole walls.

7.5.4 Permanently installed lighting is not required in the manhole. At least 2 hanger loops are to be provided in the manhole ceiling to accommodate temporary utility lighting.

7.6 Grounding Rod

7.6.1 All manholes must have a 10 foot long by 3/4" diameter copper plated grounding rod installed through the floor of the manhole near one corner. The rod must protrude no more than 4 inches above the floor. The hole through the manhole floor must be sealed against seepage with either epoxy filler or Room Temperature Vulcanizing caulking.

7.7 The Conduit Banks

7.7.1 All primary backbone conduit locations must be reviewed by 377 MSG/SC, to ensure there are no conflicts with existing infrastructure or upcoming projects and plans.

7.7.2 The cables enter the Manhole near the sidewalls, allowing the incoming cable to align with the cable racks (splayed configuration). Manholes must be watertight through the use of appropriate seals/caps/bores.

7.7.3 The conduit banks (manhole-to-manhole) consist of a minimum of six (each) four-inch diameter conduits, arranged in a pattern 2 wide and 3 deep. The center-to-center spacing of the conduits is 6 inches, in both directions.

7.7.4 Manhole-to-Building conduits are to be sealed with foam sealant or capped airtight to prevent water from entering the Primary Telecommunications Room (PTR). Four-inch conduits are required from manhole to building.

7.7.5 If a diverse path is required for fiber or copper, a minimum of four (each) 4” conduits, per diverse path, is required.

8. Building/Vault Entrance

8.1 The Building/Vault Entrance and PTR are often the same room. Appendix C displays a typical Entrance/PTR arrangement. Note: the connections between the BET and the distribution blocks are missing.

8.1.1 All cross-connections directly from the BET must be made by 377 MSG/SCO.

8.2 The contractor must provide underground exterior service gel filled cable, IAW Rural Electrical Association (REA) standard PE-39, Specifications for Filled Telephone Cable, or PE-89, Specifications for Filled Telephone Cable with Expanded Insulation, from main communications Building Entrance Terminal (BET) to the nearest manhole tie in point or splice case, which can provide sufficient vacant pairs to accommodate each facility with required circuits, plus 100% spare pairs, as determined by 377 MSG/SC.

8.2.1 Splice cases must meet the criteria established in sections 5.3-5.8.

8.2.2 A transition splice must be made between the exterior copper gel-filled cable and dry-filled intra-building cable in the PTR in accordance with TIA/EIA 569A.

8.2.3 In accordance with Underwriters Laboratories (UL) 497, all Building Entrance Terminals (BET's) must be provided with three-electrode gas tube or solid-state type 5-pin rated for the application. Provide gas tube protection modules in accordance with RUS Bulletin 345-83 and must be heavy duty, A>10kA, B>400A, C>65A where A is the maximum single impulse discharge current in accordance with National Electrical Manufacturers Association (NEMA) C62.61. The gas modules must shunt high voltage to ground, fail short, and be equipped with an external spark gap and heat coils, in accordance with UL 497. The number of surge protection modules must equal the number of pairs of exterior cable of the building protector assembly.

8.2.4 New Construction: Install a minimum of 25 pair #24 American Wire Gauge (AWG) copper outside plant cable. All splices for 24 AWG copper wire must be spliced using 710 modular splicing method. All splices must have a single (1) fold back (no inline splices).

8.2.5 Each building needing any form of network access must be supplied with a minimum of 12 Strand Single Mode (SM) Fiber in accordance with section 6.

8.3 Building Entrance Terminals (BET)

8.3.1 BETs must be stenciled according to designations provided by 377 MSG/SC.

8.3.2 All BETs must be provided with 5-pin element, 3B1E type gas tube protective modules and must provide equal protection to REA-PE-80, *Specifications for Gas Tube Surge Arrestors,* specifications. All BETs must be mounted in a vertical arrangement but must not be stacked more than three high. Depending on pair count of the outside TP cables, a different BET size/style may be required.

8.3.3 BET used for the termination of outside TP cables, *300 pair and less in size*, must have a built-in splice chamber with 710 type splice modules with 66B output with blocks Circamodel 1890ECS or equivalent.

8.3.4 BET used for the termination of outside TP cables, *301 to 600 pairs*, must have cable stubinput with 66B output with blocks Circa model 1890BC1-100K or equivalent. The stubs must be spliced to the incoming OP cable using a stainless-steel closure utilizing factory drilled end plates. See Appending D for examples of "typical" Vault Closure End-Plate Designs.

8.3.5 BET used for the termination of outside TP cables, *larger than 600 pair*, must be 24 AWG stubbed central office protectors Circa model 4486 type blocks or equivalent. Frame verticals must be mounted to the backboard to support central office type blocks.

8.3.6 Plenum rated cabling is not required for OSP cable but is required once transition to building interior has been made.

8.3.7 The contractor must conduct appropriate testing to provide 100% continuity and pair-test results documenting opens, shorts, and grounded pairs through the Contracting Officer/Representative to the 377MSG/SCXP office OPR.

8.3.8 FOC entering the building must terminate in the PTR in a 19" cabinet floor mounted FOC or on a wall mounted patch panel with LC connectors or matching connectors to existing.

9. Telecommunications (Comm) Rooms

9.1 A Primary Telecommunications Room (PTR) must be provided by building occupants nearest the entrance of the fiber/copper run to the building for solely communications equipment. Equipment can include Computer System (C-CS) switching and transmission equipment, (gateways, power supplies, etc.) main distribution frame(s), equipment racks, ladder racks, fiber optic cable terminations, patch panels, and other equipment needed for termination of the building's interior wiringsystems and to interface the local service equipment with the exterior base cable system.

9.1.1 In accordance with Industry Best Practices, AF Design Requirements,

Safety Instructions (AFI 91-203 / 30.1.1) and DISA Security requirements (STIGS IA-12.02.01 & PH- 03.02.01) -- Telecommunication rooms must be a dedicated space, not shared with other functions, and must not be used for storage.

9.1.2 As a dedicated space, no other equipment, such as mechanical, plumbing equipment, and electrical panels must be placed in the Telecommunications Room (or TR), the TR must be free and clear of all obstructions to the height of 8’0” to provide adequate ventilation and cooling. General purpose storage is prohibited in all TRs.

9.1.3 The PTR must be located on the first floor with an interior door only and provide uninterrupted access by authorized personnel. All TR doors must be installed so the door will open out, must be solid core, and directly accessible. A controlled and secured access cypher keypad lock on all TRs is required to allow 24-hour uninterrupted access by authorized technicians See TRs Security section for additional information.

9.1.4 TRs other than the PTR will serve as a secondary interconnection point between the CAT6 outlets and the main communications frame in the PTR. Wall and floor space must be provided for installation and maintenance of equipment such as frames or backerboards.

9.1.5 Appendix C displays a typical entrance/PTR arrangement.

9.1.6 All station cable/patch panels in the TR must be tagged/labeled according to room and

jack number to indicate its associated jack number and location. All LAN runs must be continuous from wall outlet to patch panels in the TRs.

9.2 Telecommunications Room Interconnections

9.2.1 For Horizontal cable connections between the PTR and other Telecommunications Rooms within the same building, a minimum of 12 Strand Single Mode (SM) Fiber 8.3 microns must be used – along with a CAT 3 telephone tie cable.

9.2.2 For special situations requiring interconnections between TRs, in addition to the PTR connection, single-mode (SM) fiber optic cable must also be utilized. Cables must be labeled to document origin and destination of cable. Specifications for labelling requirements will be provided by 377 MSG/SC.

9.2.3 Tie cables must connect the PTR 66M1-50 blocks to the other TRs.

9.2.4 Tie cables must be sized based on the TR user's phone requirements in accordance with 2 pairs/ user with 100% growth. For example: A TR supplying 50 traditional phones should have a tie cable of 200 pairs (2 pairs *50 Users * 2).

9.2.5 All interior fiber connections will use LC connectors or matching connectors to existing Light Interface Unit (LIU).

9.3 Telecommunications Room(s) Sizing and Location

9.3.1 The quantity and size of building TRs must comply with the standards and guidelines as shown below.

Table 1: TR Size Requirements

Building Usable Area (Square Feet)	TR Size (Square Feet)	Number of 4" Entrance Conduits
<20,000	400	3
20,000 to 100,000	500	4

100,000 to 200,000	900	5
Every additional 200,000	600+	+1

9.3.2 More than one telecommunications room per floor is required if distance to a work area exceeds 295 feet, or if floor area served exceeds 10,000 square feet. Recommended room sizing is 10' x 11' for each 10,000 square-foot area served. Best practice is for this room to be designed with a 2:1 ratio in length to width.

9.3.3 TRs will be provided with space as required and must be situated in a centralized location within the building unless the cable distance exceeds 295 ft. (90M) from the TR to the desktop/wall jacks.

9.4 TR Operational Environment and Equipment

9.4.1 Connectivity from the telecommunications outlet jacks to the TR must be provided through conduit, painted to match CE building standards based on customer requirement, stubbed to above the finished ceiling using the most direct route available, complete with pull cords. A 6 inch wide by 2 inch deep, minimum, above the ceiling cable through/raceway may be used to connect rooms. Where cable trays are provided, conduits must be extended to the cable tray and be terminated. The through/raceway will run above the ceiling on the top of proper support structures using the most direct route between the TRs. Conduit fill must not exceed the 40% rule as stipulated in the National Fire Protection Association (NFPA) 70 and TIA/EIA.

9.4.2 Cabinets housing equipment must be seismically braced, IAW local Seismic Standard 4, and have a minimum of 3 feet of clearance along all sides to facilitate equipment installation and maintenance.

9.4.2.1 Cabinets that are placed side by side must maintain the clearance as outlined above, around the row of cabinets. Type 630B-8 wall plate or equivalent, containing a CAT 6 jack must be provided to support a wall mounted telephone in the PTR, other TRs, and all electrical/mechanical rooms. This wall plate must be mounted 60" above the finished floor.

9.4.2.2 New cabinets must have a Power Distribution Unit (PDU) with the following

attributes/capabilities: provide a minimum of 20A to the rack equipment and have a minimum of TEN NEMA L5-20R output receptacles.

9.4.2.3 If designer chooses a horizontal PDU, PDU should be a maximum 1 RU.

9.5 TR Security

9.5.1 A controlled and secured access cypher keypad lock on the TR is required to allow 24-hour uninterrupted access by facility managers and authorized technicians.

9.5.2 Cabinets must have sufficient horizontal and vertical cable management equipment for all planned network equipment (patch panels, fiber distribution units, switches, etc.). Horizontal cable managers are limited to 1 RU each.

9.5.3 For TR storing inspectable SIPRNET, the installed exterior door lock must meet the latest revision of Federal Specification FF-L-2740.

9.5.4 DoD and USAF Communications security specifications require 377 MSG/SC to limit communications equipment access to 377 MSG/SC personnel and designated contractors – therefore, the use of "open" racks is not acceptable. All TR cabinets must be lockable and contain only equipment owned/operated by 377 MSG/SC.

9.5.5 Customer network equipment, supporting networks other than NIPR/SIPR, cannot be stored within the same cabinet.

9.5.6 Building designs must incorporate additional rack(s)/cabinet(s) for customer networking equipment.

9.6 Backerboards

9.6.1 BETs are required for all primary TRs. All required BETs or block terminations must be mounted on an 8' x4' x ¾" exterior plywood backerboard. The backerboard must be flame retardant or covered with flame retardant coating. The backerboard must be installed vertically, a minimum of 9" above the finished floor.

9.7 Power Requirements

9.7.1 A dedicated four-gang 115V, 60 Hertz power outlets on separate Ampere (A) circuit with isolated ground must be installed on each wall and also placed within equipment cabinets for use to power telecommunication devices. Additionally, a minimum of two-gang, 220-240 VAC 30-Amp power outlet circuit with isolated ground for use in powering uninterruptable power supply (UPS) must also be provided. Depending on customer UPS requirements, additional outlets may be required.

9.7.2 Ground all devices, cable sheaths, protectors and other equipment in accordance with applicable T.O.s, ANSI/TIA/EIA 607, MIL Standard 188-124B, and the NFPA 70. Provide a single-point ground for all communications/electronic equipment for the building within the TR.

9.7.3 Provide a telecommunications main grounding bus bar (TMGB) at a minimum of 6 inches high by 24 inches long. The ground riser from the ground plate to the single main electrical service entrance ground must be a #1 AWG or larger copper conductor directly connected to the ground plate with no taps. Per Mil standard, 188-124B, the resistance of the ground riser must be 10 ohms or less measured from the main building ground point. All connections of wire-to- wire and/or wire-to-ground rod must be exothermic-welded. Extend #6 AWG or larger copper ground wires from the TR ground plate to each secondary TR within the building and connect a telecommunications grounding bus bar (TGBB) in the TR.

9.8 Operational Environment

9.8.1 Temperature/humidity: A temperature-controlled environment is required in all TRs. Provide heating, cooling, and fresh air appropriate for the equipment housed. Maintain a positive pressure inside the room to reduce the entry of dust. Normal operating ranges should be as locally established for employee comfort, typically between 65°F to 78°F. There are no special relative humidity requirements. However, in order to minimize static discharge and condensation it is recommended that the relative humidity be between 20% and 60%.

9.8.2 Lighting: Sufficient lighting must be provided in all TR areas to promote a safe and acceptable work area. Switched lighting must be provided in all TR areas, adequate to promote work with small fiber items and miniature lettering devices. Maintain a minimum of 12" clearance between fluorescent “ballasted” light fixtures and all cable runs and cable devices. Provide a minimum of 538 lux (50 foot-candles) of illumination measured 1 meter (39 inches) above the finished floor.

10. Interior/Premise Wiring

10.1 Regardless of the interior wiring cable used, the following requirements apply to ALL Interior/Premise Wiring:

10.1.1 Distribution frames and interior conduits/cable trays must be of sufficient size to allow for 100% growth and must not exceed the 40% fill rule stipulated in the NEC NFPA 70, National Electrical Code.

10.1.2 Installation of all interior pre-wiring to include the TRs, must be performed to ensure termination as required back to the PTR.

10.1.3 Each cable must be marked with an adhesive type strip marker at both ends. Affix a permanent label to the outlet jack cover to clearly identify the outlet with the corresponding termination jack on the patch panel or termination block. Handwritten or manual embossing labels are NOT permitted. Automated embossed labels are preferred, such as Brothers P-touch systems utilizing 1/4-inch labels, with 1/8-inch lettering.

10.2 Premise wiring supporting the following networks should utilize the color code identified in Table 3. *Note- uncommon color wiring may have extensive lead times, purchasing parties should plan accordingly.

Table 3 Building Cabling/Drop Color Designation

Network	**Cabling Color**
NIPR/VOICE	Green
SIPR	Red
JWICS	Yellow
DREN	Purple
Special Access Networks	Orange
Audio-Visual (AV)	White
Commercial / Internet (non-Gov owned)	Black

10.3 Conduits and Cable Trays (Interior)

10.3.1 For new installations, and renovations, circuit connectivity from the telecommunications outlet jacks to the TR must be routed through conduit sufficient in size as not to exceed the 40% rule as stipulated in the National Electrical Code (NEC), National Fire Protection Association (NFPA) 70. Conduits must be installed above the finished ceiling, using the most direct route. Cable trays/raceways may be used to connect rooms provided that plenum type cable is used. If cable trays are used, conduits must be extended to and terminated at the cable tray; empty conduit must have pull strings installed. The cable tray/raceway must run above the ceiling, using an independent support structure, and using the most direct route between points. "J" hooks may be used with prior approval from 377 MSG/SC for distribution of wiring.

10.3.2 Where multiple TR rooms are required, attention must be given to their strategic placement to support interconnection via 4-inch conduit or 6 inch wide by 2-inch-deep minimum cable trays between each room as well as to the PTR in which the cable head/fiber connections are to be located. In existing buildings, plenum jacketed cables maybe used, where allowed by national building codes, without the noted conduits, if properly supported.

11. Interior/Premise Wiring- Copper (CAT 6)

11.1 Interior CAT 6 wiring must be four pair, 24 American Wire Gauge (AWG), solid copper conductor, CAT 6, Underwriters Laboratories (UL) tested and certified.

11.2 Each cable must be dedicated to one device or outlet only and must be terminated on the TR patch panel in accordance with T-568B.

11.3 Cables must be terminated in a 110 style, 48 port, 19-inch, cabinet mounted, CAT 6 patch panel located in the appropriate TR.

11.4 The patch rack(s) will contain two sets of patch panels. One larger group (Set A) supporting connections to all wall jacks, and a smaller group (Set B) for interconnection to the CAT 3

telephone tie cable.

11.4.1 Set A patch panels must be terminated on the panel in accordance with T-568B.

11.4.2. Set B panels consist of 48 port, 19-inch cabinet mounted, CAT 6, RJ45 voice grade, patch panels containing a minimum number of jacks equal to 75% of the pair count of the tie cable supplying the TR.

11.4.2.1. Set B panel jacks must be wired with both dual-pair and single-pair jacks. 50% of the cable pair count must be allocated to dual-pair jacks. The second half of the cable pair count will be allocated to single-pair jacks.

11.4.2.1.1. Dual-Pair jacks must utilize two pairs from the telephone tie cable connected to the terminals corresponding to pair 1 and pair 3 of T-568B. These are the "inner" pairs of the RJ-45 jack.

11.4.2.1.2. Single-Pair jacks must utilize one pair from the telephone tie cable connected to the terminals corresponding to pair 1 of T-568B.

11.5 Suitable patch cords for user end equipment must be provided by the installer as part of the project.

12. Interior/Premise Fiber

12.1. Single mode fiber optic cable (SM FOC) must be used for outside and inside premise. All interior fiber connections will use LC connectors or matching connectors to existing Light Interface Unit (LIU).

12.1.1. Fiber optic cable terminations must be performed by the contractor and must provide manufacturer test results IAW TIA/EIA 568C. Testing equipment must have passed calibration within five calendar years prior to date of testing. Project acceptance will be contingent on "pass" results of testing.

13. Switches/ Network Equipment

13.1. Switching needs are highly dependent on the location and specialized systems being used. Early coordination with 377 MSG/SC will ensure that areas and customer needs are properly understood, so that an accurate switching solution can be provided.

13.2. Customers are required to purchase network switching equipment. Projects may require additional switching capability if more personnel will occupy facility.

14. Telecom Outlets

14.1. In general office areas, use a dual modular telecommunications outlet at minimum, with two 8pin/8 position CAT 6 modular Uniform Service Order Code RJ-45 type jacks mounted in a single face plate (one for voice/one for data) in a factory-made assembly. All wall outlet components must have a removable outer bezel with molded labeling and coloring to match wiring identifying the outlet usage (see Figure 1). Communication jacks installed in or under the floor must have dust covers installed on the individual jacks. Enclosure covers with seals must be used to prevent moisture and debris from entering the enclosure. All inside wire used for telecommunications outlets must be four pair, 24 American Wire Gauge (AWG), solid copper conductor, CAT 6, Underwriters Laboratories (UL) tested and certified.

14.2 All fiber optic jacks must accommodate LC connector.

14.2.1. Fiber is not required to be installed to the desktop at this time due to increased equipment cost, maintenance complexity, with no overall increase in performance.

14.3 Each cable must be dedicated to one device or outlet only.

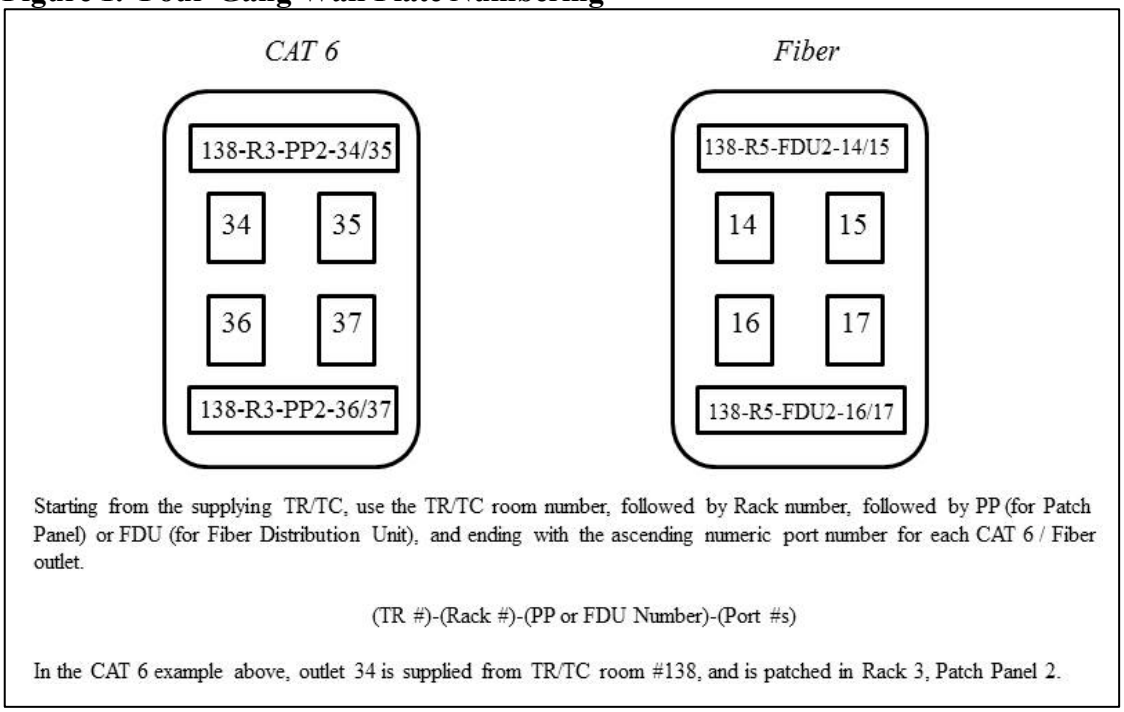
14.4 Only plenum rated cable may be used whenever cable is installed and exposed within air circulation areas.

14.4.1 Telecommunication outlets must be mounted 18" above the finished floor, to the centerline of the cover plate, unless noted otherwise.

14.4.2 Place phone/data/Local Area Network (LAN) outlet jacks along every wall or one every 8 feet apart or for every 40 square feet; whichever provides a higher outlet density. All other locations must be provided with an outlet density as determined and approved by 377 MSG/SCXP.

14.4.3 Outlet Jacks must be labeled in accordance with Figure 1 to provide critical information for maintenance actions.

Figure 1. Four-Gang Wall Plate Numbering



Starting from the supplying TR/TC, use the TR/TC room number, followed by Rack number, followed by PP (for Patch Panel) or FDU (for Fiber Distribution Unit), and ending with the ascending numeric port number for each CAT 6 / Fiber outlet.

(TR #)-(Rack #)-(PP or FDU Number)-(Port #s)

In the CAT 6 example above, outlet 34 is supplied from TR/TC room #138, and is patched in Rack 3, Patch Panel 2.

15. Other Considerations

15.1 Security

15.1.1 See section 9.5.4 for information specific to TR security.

15.1.2 Classified requirements may vary and shall be taken on a case-by-case basis.

15.1.3 Special attention will be given to the space, security, ability to inspect conduit containing comm wiring and separation required for placement of classified systems to ensure security countermeasures are met.

15.1.4 For customers requiring a Protected Distribution System (PDS), they must coordinate with the 377 ABW Information Protection Office (377 ABW/ IP).

15.2 Critical End Buildings

15.2.1 Critical End Buildings, or CEBs supporting the highest priority missions require a CEB designation by the 377 MSG/SC Director. Customers must submit a ECSRD 3215 outlining their requirement for CEB designation and provide a mission brief for the 377 MSG/SC Director.

15.2.2 CEBs require multiple design considerations. CEBs shall be designed in accordance with the latest Base Information Transport Infrastructure (BITI) Wired Base Area Network (BAN) Technical Requirements Document (TRD) which outlines all USAF expectations.

15.3 Geospatial Mapping/ Surveying

15.3.1 Geospatial Mapping/Surveying data is required to be submitted for all work outside the bounds of footprints of buildings. This includes all outside plant infrastructure features and communications pathways that are installed/modified.

15.3.2 Example of Outside Plant features include manholes, vaults, pedestals, underground cables, marked direct buried splices, terminals etc.

15.3.3 Examples of communications pathways include duct routes, direct-buried cable, and communication pathway entry points on building exterior walls that lead to interior building entry terminals, etc.

15.3.4 Geospatial Mapping / Surveying must be accomplished in accordance with Appendix B - GUIDANCE FOR GEOSPATIAL DATA

15.4 Classified Systems (Secure Internet Protocol Router Network (SIPERNET) and Defense Red Switch Network (DRSN))

15.4.1 Customers must assign a supply custodian (CA/CRL) for all unit cryptographic devices used in support of their secure systems.

15.4.2. Customers must identify classified message traffic or telephone requirements and coordinate all requirements with the 377 MSG/SC Plans and the Information Assurance Flights to ensure proper compliance measures are attained.

15.5 Modular Furniture

15.5.1. Telecommunications jacks must be direct run without intermediate connections. There should only be one CAT 6 jack between the TR and the customer's equipment.

15.5.2. Each Modular Furniture cubicle must have a four-gang jack configuration for standard CAT6 RJ-45 jacks. Label these jacks under the same standard as wall jacks (See Figure 1).

15.5.3. Suitable patch cords for user end equipment must be provided by the installer.

15.6 Periodic, Final Inspections, Testing and Documentation

15.6.1. All telecommunications cable must be certified and tested utilizing test equipment in accordance with TIA/EIA standards with Microsoft compatible soft-copy test result to be provided to the 377 MSG/SC. Certified testing equipment is required to complete testing, with calibration of testing equipment to have been completed within five calendar years prior to date of testing. Project acceptance is contingent upon “pass” of testing. Where deficiencies of any type are discovered upon testing, the contractor must make all necessary repairs, including replacement, if necessary, at no cost to the government.

15.6.2 Two groups of acceptable digital records must be provided to 377 MSG/SC prior to final acceptance: (1) cable certification records (2) revised drawings which reflect the actual “as built” conditions.

15.6.3 All communications drawings must be geospatially referenced and include the conduit, innerduct, cable types, cable count, cable size, and length. All manholes and pull boxes must have complete butterfly details to include geospatially referenced location, entry points, grounding, bonding, racks/ladders, or other equipment installed. See Appendix B for more information on GPS survey requirements.

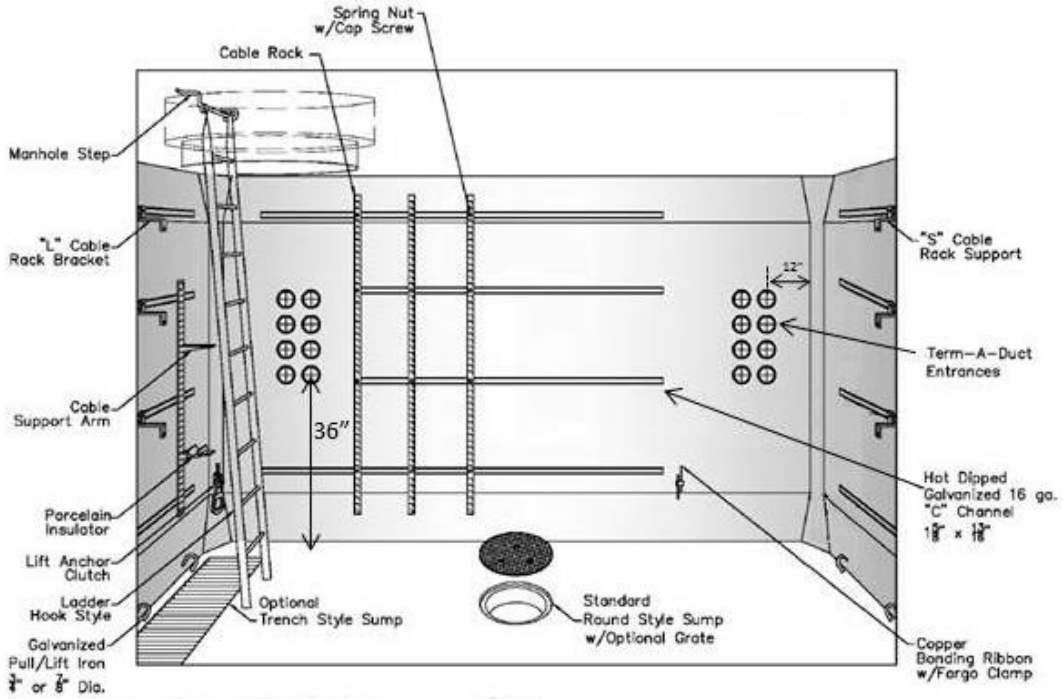
15.6.4 377 MSG/SC personnel will conduct in-progress inspections during construction. The general contractor performing the work is solely responsible for scheduling inspections and providing response to the government for inspection findings. These inspections must be scheduled with 377 MSG/SC before backfilling or installation of walls. Trenches may be inspected to verify conduit size, quantity, cable type, earth cover compliance, and updated "red line" cable record or contract drawings.

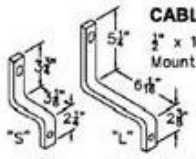
15.6.5 All installed cables must be tested by the installer and may be in the presence of 377 MSG/SC personnel or its representatives. Baseline test records must be provided to the 377 MSG/SC in printed and digital format.

15.6.6. The Communications Division shall not assume maintenance responsibility until AFTO form 747 is signed by all parties.

Appendix A – Example Manhole & Neck/Lid Specifications

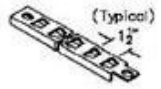
Any reference obtained from this document to a specific product, process, or service does not constitute or imply anendorsement by the 377 ABW, the US Air Force, or the United States Government of the product, process, or





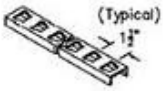
CABLE RACK BRACKETS
½" x 1" Galvanized Steel, with Mounting Slot for ½" Bolts

SPRING NUT AND BOLT
½" Nut, ½" x 1¼" Plated Cap Screw



RACKING WITH TAB
Mounting Slots at Each End Interlock so that Racks May be Combined, 15", 24" and 30" Lengths

MANHOLE STEP BOLT-ON
¾" Galvanized Rebar, 16" Wide



CUT RACKING
Lengths:
8 Hole – 11¾"
21 Hole – 31¼"
37 Hole – 55¼"
47 Hole – 70¼"
51 Hole – 76¼"
65 Hole – 97¼"

LIFT ANCHOR CLUTCH
2-Ton, 4-Ton or 8-Ton Used for Vault Lifting and Cable Pulling

MANHOLE STEP
¾" Galvanized Rebar, 16" Wide

HOOK LADDER
¾" Dia. x 12" Rungs, Side Rails are ⅜" x 1½" Flatbar, Galvanized

Scale: 1" = 1'-0"

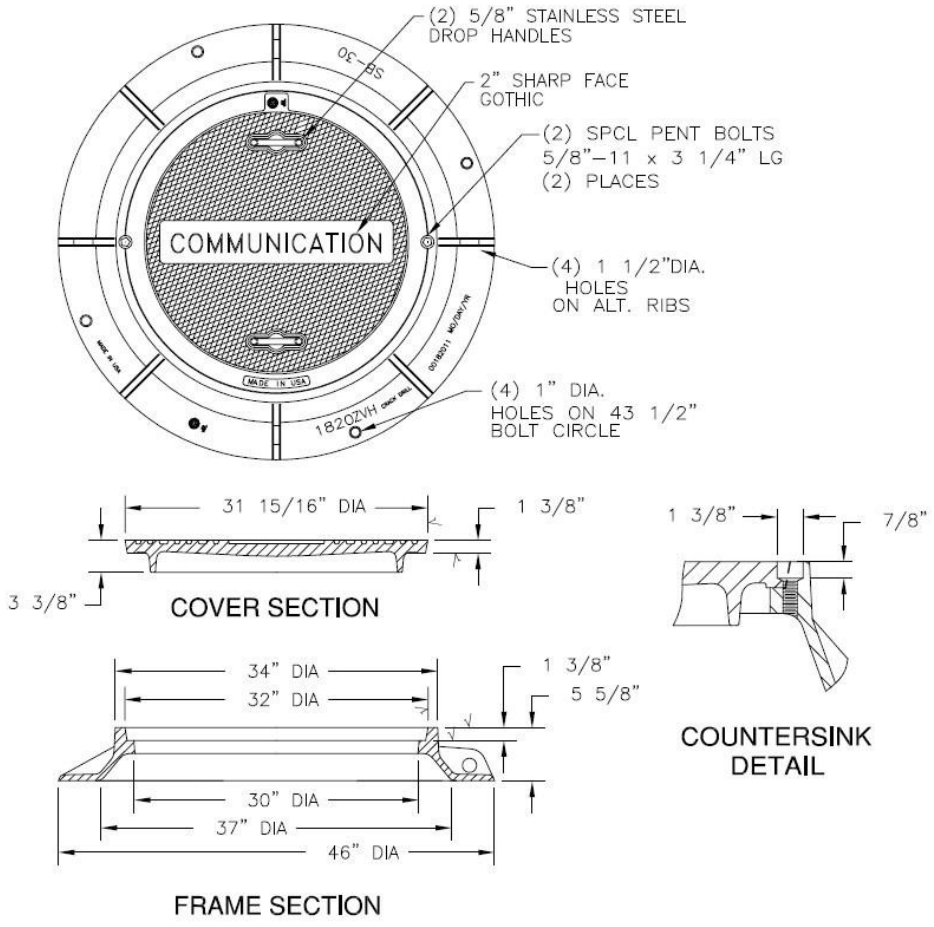
Oldcastle Precast® PO Box 323, Wilsonville, Oregon 97070-0323 Tel: (503) 682-2844 Fax: (503) 682-2657	**RACKING/HARDWARE** File Name: 020UAARCK-HRD *(Modified)* Issue Date: 2011 *(2014)* oldcastleprecast.com/wilsonville	

161.0

service, or its producer or provider. All product and company names are trademarks™ or registered® trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement by them.

Neck/Lid Specifications

1810A2VH 1820ZVH Assembly



Product Number
00182027

Design Features
-Materials
Cover
Gray Iron (CL35B)
Frame
Gray Iron (CL35B)

-Design Load
Heavy Duty
-Open Area
n/a
-Coating
Undipped
-√ Designates Machined Surface

Certification
-
-ASTM A48
-
-Country of Origin: USA

Major Components
00180925
00182011

Drawing Revision
06/10/2005 Designer: HCB
10/23/2014 Revised By: MAH

Disclaimer
Weights (lbs./kg) dimensions (inches/mm) and drawings provided for your guidance. We reserve the right to modify specifications without prior notice.

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Contact
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ejco.com

Appendix B – Guidance for Geospatial Data

Geospatial/mapping data is required to be submitted for all work outside the bounds of footprints of buildings and structures. Contract deliverables that involve maps or other geospatial data must be delivered in a geo-referenced GIS (Geographic Information System) format. For vector data, this will be an ESRI personal geodatabase format (10.x) unless otherwise approved by the IGI&S (Installation Geospatial Information and Services). For raster data, this must be an ESRI compatible format.

All contract deliverables listed below that involve mapping or other geospatial data must meet the following requirements:

These deliverables include, but are not limited to:

- Site plans
- Record drawings
- Engineering designs, plans or surveys
- Topographic surveys or studies
- Boundary or Cadastral surveys
- Master Plan drawings
- Utility (water, sewer, power, storm, etc.) designs, plans, surveys and studies
- Pavement, Grading, or Excavation plans
- Soil/Geology studies or surveys
- Environmental assessments, surveys, studies, or plans
- Historical or Archaeological surveys, studies, or plans

A. SDSFIE Data Standards/Structure

All geospatial and associated data must comply with the latest version of Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) available from the CADD/GIS Technology Center at http://tsc.wes.army.mil/products/TSSDS-TSFMS/tssds/html/. These data must be organized using the most recent SDSFIE specifications for entity naming conventions, attribute fields, domain names, and topology.

B. Data Structure (GIS ESRI format)

1) The Contractor must provide a quality control (QC) report that must state whether all inconsistencies in the data generated were corrected, or it must detail the remaining errors by

case. The Contractor must utilize topology ArcGIS 10.X or later to assure that there are no overshoots or undershoots in the line work, slivers or dangles in polygons. The quality report must identify the software (name and version) and satisfy these conditions:

a. The edges of all digitized vector data or raster imagery must exactly match digitally with those of all adjacent maps.

b. The digital representation of the common boundaries for all graphic features must be exactly the same, regardless of feature layer. Each feature within a theme must be represented by a single graphic element (e.g., polygon, line).

c. Lines, which represent the same graphic element, must be continuous (i.e., not broken or segmented), unless that segmentation reflects a specific visual line type. Lines representing the same type of data must not cross except at intersections.

d. Polygons must be closed (i.e., the first x- and y-coordinates must exactly match the last x- and y-coordinates). Polygons of the same layer must not overlap and must cover the area of interest completely (i.e., have no gaps in coverage).

e. Straight lines must be represented by only the beginning and ending x- and y-coordinate points. Line strings must not cross back on themselves or be of zero length.

f. All symbol libraries, font libraries, text size, text format, and text placement must be prepared in accordance with and conform to the Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) Release 3.0.

g. The Contractor must not develop new libraries without prior written approval from the Government.

2) Survey

Global Position Systems (GPS) or comparable traditional survey methods will be used to collect geospatial data (e.g., northing, easting, and elevation above or below the Earth's surface) for all contract activities where geospatial data is involved. For construction purposes this data must be obtained at the time of construction and prior to burial in the case of underground utilities. Survey methods must meet accuracy standards for actual results.

3) Accuracy

Information must be collected at no less than 1:1200 scale (1”=100ft) for base areas and 1:4800 (1”=400ft) for areas outside of the base boundary. All data must be collected within submeter accuracy, except for utilities underground data, which must be collected at survey grade accuracy of 1 foot or less. This data must meet or exceed National Map Accuracy Standards at the corresponding scales. Delivered data must meet these accuracy standards at no less than 95%.

4) Projection/Coordinate System

Geospatial data must be delivered in a georeferenced GIS (Geographic Information System) format. All geospatial data must be delivered in the WGS_1984_UTM_Zone_13N coordinate System in Feet.

5) Related Tables

All associated attribute data must be delivered to the installation in a format as defined by the IGI&S (Installation Geospatial Information and Services). This format is ESRI Geodatabase unless otherwise specified. These related tables must include one-to-one cardinality between spatial records and attribute records. Relationships between spatial records and attribute records must be defined in the geodatabase.

Feature Attributes: The Contractor must identify the classification, type, size, location, ID number, and any other necessary attributes (specified by the Government) for all surveyed, mapped, designed, or proposed features.

6) Database Design/Topology

The database design must be reviewed, approved and provided before data capture begins. The utility data must have topology, with defined relationships between features and be a true network. Linear features must be connected.

7) Metadata

All deliverable data (geospatial and textual data) must be accompanied by metadata using Federal Geographic Data Committee (FGDC) Content Standards for Digital Geospatial Metadata (CSDGM) for organization. Content will accompany all submissions.

C. Delivery Format

Note: No deviations from the Government's established standards will be permitted unless prior written approval of such deviation has been issued by the Contracting Officer. All linkages of non-graphical data with graphic elements, relationships between data objects and attributes, and report formats must be maintained.

All data deliverables (plans, surveys, studies, imagery, designs, etc.) must be in a digital (electronic information) format and must be delivered in a format that is directly compatible with the CADD/GIS Technology Center’s Spatial Data Standards version 2.100 (or latest version available).

The following procedures must be performed before a file is placed on the delivery media:

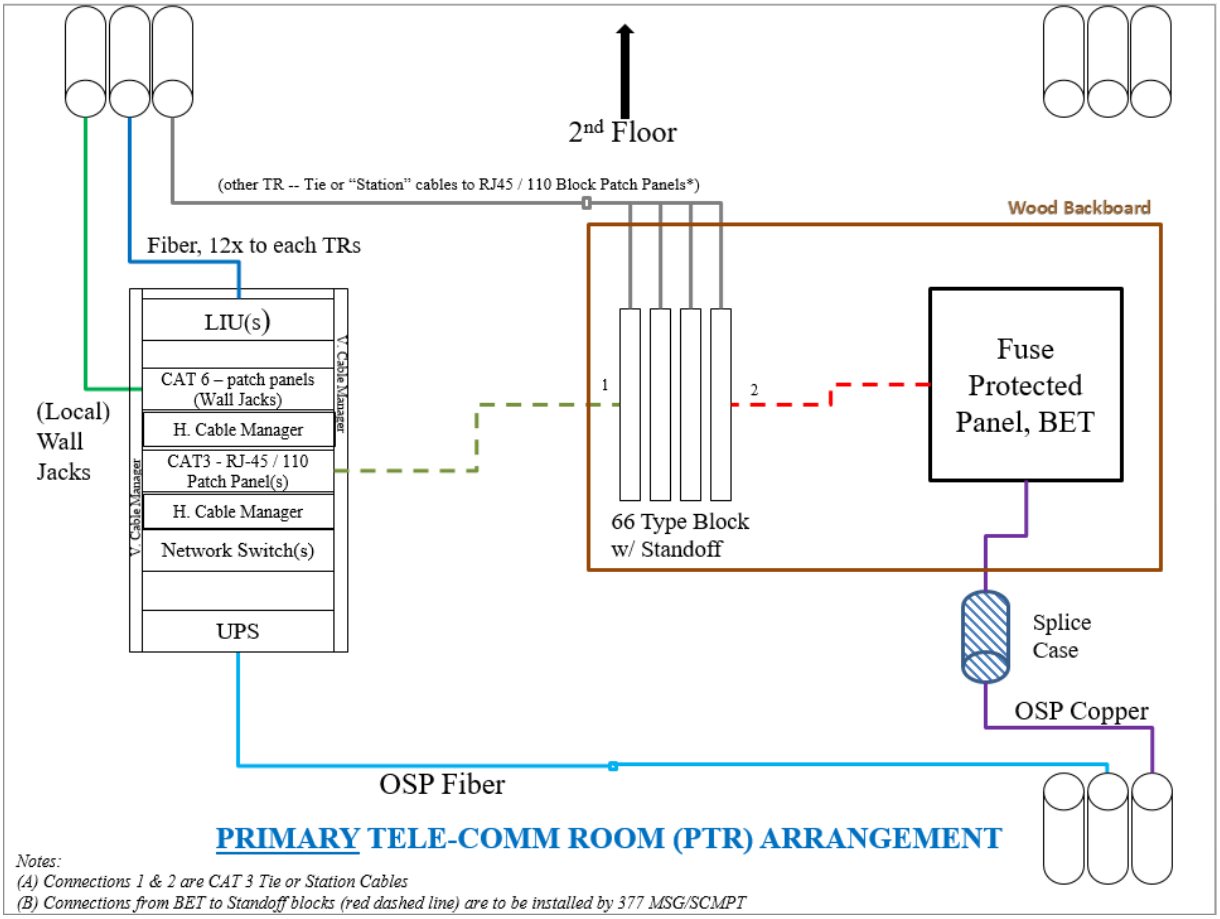
1. Include all files, both graphic and non-graphic, required for the project. Make sure all files are in the same directory, and that references to those files do not include device or directory specifications.

2. Ensure all reference (external reference) files are attached and without device or directory specifications.

3. Remove all extraneous graphics/text outside the project border area, and set the active parameters to a standard setting (or the setting contained in the seed or prototype file).

4. Include any standards sheets (abbreviations, symbols libraries, font libraries, color tables, pen tables, plot configuration files, user command files, etc.) necessary for a complete project.

Appendix C – Typical PTR Arrangement



Appendix D – Example Vault Closure End-Plate Designs

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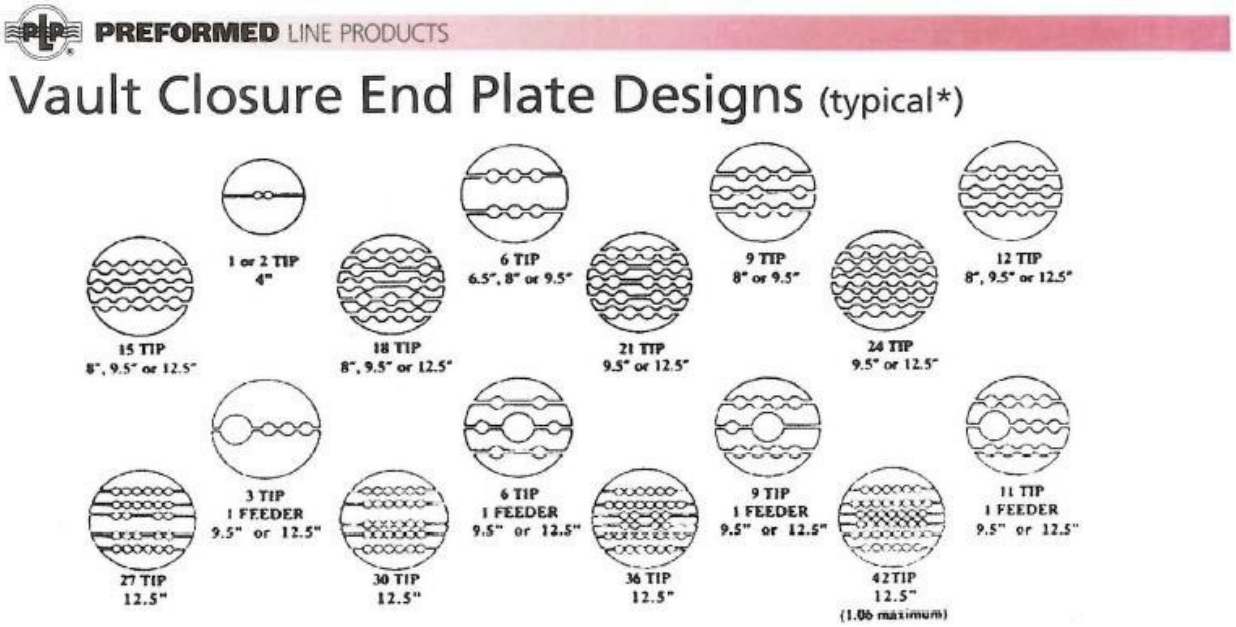

*NOTE: These are custom-drilled End Plates. Only the most common combinations are shown. Since the End Plates are custom-drilled, almost any combination is possible. Just contact the sales office at: 440-461-5200.

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Appendix E - Glossary

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 32-1065, Grounding Systems, 01 October 1998
AFI 91-203, Air Force Consolidated Occupational Safety Instruction, 19 August 2014 AFMAN 33-363, Management of Records, 01 March 2008
AFSSI 7010, Emissions Security Assessment
AFSSM 7011, Emissions Security Countermeasures Review
ANSI C62.61-1993, American National Standard for Gas Tube Surge Arresters on Wire Line Telephone Circuits
BICSI, Telecommunications Distribution Methods Manual, 13th Edition
BITI, Base Information Transport Infrastructure (BITI) Wired Base Area Network (BAN) Technical Requirements Document (TRD) dated August 2014 version 1.5
DISA STIG IA-12.02.01 (Switches and Hubs)
DISA STIG PH-03.02.01
(Physical Protection of Unclassified Key System Devices/Computer Rooms in Large Processing Facilities)
DISA STIG Traditional Security Checklist STIG V-31267 TIA/EIA 568-C, Commercial Building Wiring
TIA/EIA 569-C, Pathways and Spaces
TIA/EIA 607-B, Grounding & Bonding Digital Systems
FGDC-STD-007.4-2002, Geospatial Positioning Accuracy Standards Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facilities Management
IEEE 802.1Q, Media Access Control (MAC) Bridges and Virtual Bridge Local Area Networks
IEEE 802.1X, Port Based Network Access Control
IEEE 802.3AT, DTE Power Enhancements
MIL-STD-188-124B, DOD Interface Standard Grounding, Bonding, and Shielding for Common Long Haul/Tactical Communication Systems
National Electrical Manufacturers Association (NEMA)
National Fire Protection Association (NFPA) 70, National Electrical Code, 2014 PE-39, (REA Bulletin 1753F-205), Specifications for Filled Telephone Cable PE-80, (REA Bulletin 345-83), Specifications for Gas Tube Surge Arrestors
PE-89, (REA 1753F-208), Specifications for Filled Telephone Cable with Expanded Insulation
UFC-3-580-01, Telecommunications Building Cabling Systems Planning & Design, 22 June 2007
UL 497, Standard for Protectors for Paired-Conductor Communications Circuits

Prescribed Forms

None

Adopted Forms

AF 847, Recommendation for Change of Publication, 22 September 2009 AFTO 747, XXXXX

Abbreviations and Acronyms

377 MSG/CE--Base Civil Engineering
377 MSG/SC--Director of the Communications Division
377 MSG/SCO- Communications Division Operations
377 MSG/SCXP--Plans and Programs
377ABW/IP—Information Protection Office
AF--Air Force
AFI--Air Force Instruction
AFMAN--Air Force Manual
AFMC--Air Force Material Command
AFRC--Air Force Reserve Command
AFRIMS--Air Force Records Information Management System
ANG--Air National Guard
ANSI--American National Standards Institute
AWG--American Wire Gauge
BCE--Base Civil Engineer
BCSO--Base Communications Systems Officer
BDF--Base Distribution Frame
BET--Building Entrance Terminal
BISCI--Building Industry Consulting Service International
C--Celsius
CAT--Category
CATV--Community Access (cable) Television
C-CS--Communication-Computer Systems
CD--Communication Division
CIPS--Cyberspace Infrastructure Planning System
COMSEC--Communications Security
CSI-B--Cyberspace System Integrator-Base
CSIR--Computer System Installation Records
CSO--Communications-Computer Systems Officer
CSO--Communications Information and Systems Officer
CSRD--Communications-Computer Systems Requirement Document
CVC--CIPS Visualization Component
DoD--Department of Defense
DREN--Defense Research Engineering Network
DRSN--Defense Red Switch Network
EB--End Building
ECSRD--Electronic Communications & Computer Systems Requirement Document
EIA--Electronic Industries Alliance
EMSEC—Emissions Security
EMT--Electrical Metal Tubing
ETL--Engineering Technical Letter
F--Fahrenheit
FOC--Fiber Optic Cable
Gbps--Gigabits per Second
GPS--Global Positioning System
Hz--Hertz

IAW--In Accordance With
ICCS--Inter-building Communications Conduit System
IDF--Intermediate Distribution Frame
IEEE--Institute of Electrical and Electronic Engineers
IPv6--Internet Protocol version 6
ITB--Information Transfer Building
JWICS--Joint Worldwide Intelligence Communications System
KAFB--Kirtland Air Force Base
kV--Kilovolt
LAN--Local Area Network
Lbs—Pounds
LIU – Light Interface Unit
Lux--A contraction of luminance and flux
M--Meter
Mbps--Million Bits Per Second
MHz--Mega-Hertz
MIL—Military
NCC--Network Control Center
NEC--National Electrical Code
NEMA-- National Electrical Manufacturer's Association
NFPA--National Fire Protection Association
NIPRNET / NIPR--Non-Secure Internet Protocol Router Network
OPR--Office of Primary Responsibility
PDS--Protected Distribution System
PDU--Power Distribution Unit
PE--Polyolefin Encased PoE--Power over Ethernet
PVC--Polyvinyl Chloride
REA--Rural Electrical Association
RFP--Request for Purchase
RJ--Registered Jack
SIPRNET--Secure Internet Protocol Router Network SLC--Single Line (instrument) Concept
SM--Single Mode
SNMPv3--Signaling Network Management Protocol version 3
STD -- Standard
STIG -- Security Technical Implementation Guide
STEM--B-Base System Telecommunications Engineering Manager
TGBB--Telecommunications Grounding Bus Bar
TMGB--Telecommunications Main Grounding Bus Bar
T.O.--Technical Orders
TIA--Telecommunications Industry Standard
TP--Twisted Pair
TR--Telecommunications Room
UL--Underwriters Laboratories
UPS--Uninterrupted Power Supply
USACE--U.S. Army Corps of Engineers
USAF--United States Air Force
V--Volt
WO--Word Order