STATEMENT OF WORK (SOW)

For

Luke AFB Aux Airfield Modernization

at

Luke AFB, Az

01 April 2026

Prepared By

38 ES/ENPC

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Tinker AFB OK

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1.0 SCOPE

Luke AFB desires the replacement of existing non-supportable channel banks and installation of fiber optic cable at Luke Auxiliary Airfield. This system shall support existing Air Traffic Control (ATC) equipment at Luke Aux and provide IP connectivity back to Luke AFB proper for transport of ATC data.

This SOW defines the requirement for the Contractor to engineer, furnish, install and test (EFI&T) the System. The Contractor shall provide all equipment, tools, materials, supplies, transportation, labor, supervision, management, and other incidentals necessary to meet the requirements as stated in this SOW. All electronics equipment, supplies, and materials to be installed shall be new and not refurbished.

2.0 REQUIREMENTS

2.1 GENERAL REQUIREMENTS

2.1.1 Safety Requirements

2.1.1.1 Site Coordination

The Contractor shall meet with the base safety officer immediately upon arrival on site for review of the specific safety requirements prior to installation.

2.1.1.2 Confined Space

The Contractors entering spaces on Luke AFB are responsible for the safety of their personnel and for their own confined spaces permit program as outlined in AFI 91-203. All confined space operations must be coordinated with the Base Safety Office prior to start of work.

2.1.1.3 Accident/Incident Reporting and Investigation

The Contractor shall record and report all available facts relating to each instance of injury to the Base Safety Office. The Contractor shall secure the scene of any accident and wreckage until released by the accident investigative authority through the Base POC. If the Government elects to investigate ~~the~~ incident, the Contractor shall cooperate fully and assist the Government personnel until the investigation is completed.

2.1.1.4 Work Area(s)

At day's end, the Contractor shall remove all debris and surplus materials from the workplace. Safety barriers shall be in place to protect unfinished work sites at the end of the day. All open holes or trenches shall be completely enclosed by flexible orange construction safety fencing, or other safety barriers, at the end of the workday. Equipment and materials required to complete the work effort may remain on site if they are organized/stored in a manner that does not cause a safety hazard. <u>The contractor is responsible for the physical security of equipment and materials remaining at Aux Field for duration of this project as the site is unmanned 24 hours a day, 7 days a week, if they opt to leave items there.</u>

2.1.1.5 Traffic control

In the event base vehicular traffic is to be disrupted by trenching or horizontal directional boring, the Contractor shall make appropriate notifications NLT 10 calendar days in advance to 56 CS/SCXP of the planned disruptions.

2.1.2 Security Requirements

The Contractor shall process and provide a Site Visit Request Letter to 56 CS/SCX within 5 calendar days after contract award. This spreadsheet shall identify the names (as shown on the driver's license), driver's license numbers and state of issue, and birth date of the personnel who will be performing work under this SOW, company name, address, phone number and contract number, start date and end date. This information is required to perform a background check and grant access to the base. A real-ID compliant document is required to access Luke AFB and Luke Aux Field. If required by the base, the Contractor shall provide identification badges for their employees. All Contractor personnel shall wear these badges while on duty on the Government site. The badges shall identify the individual, company name, and be clearly and distinctly marked as Contractor and be in accordance with base regulations.

2.1.2.1 Security Clearances

Stated work and associated products shall be performed at the UNCLASSIFIED level. However, some of this work will take place in secure areas where Contractor employees must be escorted at all times. The Contractor must coordinate access to secure areas at least <u>five (5) working days</u> ahead of time. It is the Government's responsibility to provide escorts.

2.1.3 Environmental Compliance

The Contractor shall comply with the most stringent environmental federal, state, and local laws and regulations; and Air Force policies, instructions, and plans. The federal Government is not exempt from compliance with environmental regulations. The contractor shall maintain an awareness of changing environmental regulatory requirements to avoid environmental deficiencies for activities on Luke AFB.

2.1.4 Permits

The Contractor shall complete and process all permits required to complete the installation prior to any trenching, or modifications to a facility, maintenance hole or hand hole; for example, the Base Civil Engineering Work Clearance Request, a digging permit, (AF Form 103) and Base Civil Engineer Work Request (AF Form 332). AF Form 103 and AF Form 332 {and any other required permits (as determined by Base Civil Engineering (BCE) and 56 CS/SCXP)} shall be submitted at IAW local procedures. All utility markings, flags, etc. shall be maintained by the contractor after the responsible work center/shop identifies/locates them. If a utility is severed or damaged due to neglect or if attributed to the fault of the contractor, then the contractor shall repair and return the utility back to the same condition it was in prior to the damage. The form(s)/permits shall be submitted within 10 calendar days after award.

2.1.5 Integrated Process Team (IPT)

The Contractor shall chair a weekly IPT meeting that includes Contractor representatives, the 56 CONS Contracting Officer (CO), the 38 ES System Engineer (SE), 38 ES Project Manager, the 56 CS/SCXP Project Manager (PM), and other base personnel as required. The Contractor shall provide an agenda and a worldwide "Meet Me" teleconference capability for the duration of the

project. The purpose of the IPT meeting is to discuss project progress, problems being encountered, and other information necessary/beneficial to ensure success and timely completion of contract requirements. The Contractor shall record meeting minutes and distribute to the attendees. (CDRL A004)

2.1.6 Quality Assurance

The Contractor shall provide Quality Assurance Support for the life of the project. The Contractor's quality assurance evaluator shall assist the Government representative in performing random spot checks and system acceptance tests. The Contractor shall be responsible for identifying system and outside plant deficiencies and /or discrepancies throughout the life of the project. A weekly report (soft copy) shall be submitted indicating progress/status and listing any deficiencies/discrepancies found and actions to correct them. (CDRL A003)

2.1.7 Contractor Personnel

2.1.7.1 Project Management

The Contractor shall provide a Project Manager (PM) and alternate(s) responsible for contract performance and continuity. The Contractor shall identify the Project Manager's or alternate's range of authority to act for the Contractor relating to daily contract operation.

2.1.7.2 Site Point of Contact (POC)

The Contractor shall designate the Contractor's on-site team leader and alternate(s) as the Site POC for individual projects in their Site Visit Request Letter. The Site POC or alternate(s) shall be on site during duty hours until project completion and shall oversee all facets of the installation tasks. The Site POC shall be the interface for all work site communications with the Government, including quality, safety, and discrepancy matters.

2.1.7.3 Personnel Requirements

The Project Manager, Site POC, and respective alternate(s) shall be able to read, write, speak, and understand English. All reporting and documentation shall be in English.

2.1.8 Warranty

The Contractor shall provide a one-year warranty or manufacturer's standard commercial warranty, whichever is longer. This warranty shall include a one-year workmanship warranty. The warranty period shall start from the date of system and/or project acceptance. The Contractor shall provide written procedures and required information for warranty services at or prior to site acceptance.

2.2 SPECIFIC REQUIREMENTS

The Contractor shall EFI&T a System comprised of two parts. Part One is an Outside Plant (OSP) 12 strand direct bury single mode double armored fiber connecting two (2) buildings on Luke Aux Field. Part Two is a Fiber Optic Transport System (FOTS) consisting of TCComm equipment. The FOTS shall connect Glideslope (GS) and Localizer (LOC) on Luke Aux Field to contractor furnished, contractor installed FOTS at Luke AFB. IP transport between Luke Aux Field and Luke AFB will be by Government Provided Ethernet. The ISP edge device will be in

the Localizer. Use of Handholes or pull boxes is at the installers' discretion but shall be coordinated with the government Project Manager and Contracting Officer.

2.2.1 Outside Plant Fiber

2.2.1.1 Maintenance Holes (MHs) and Handholes (HHs)

The Contractor shall pump out water as required. Water shall be drained IAW BCE and base environmental requirements.

2.2.1.2 Measurements

Any distances provided in this SOW are approximated and should NOT be used for ordering materials or determining duct lengths.

2.2.1.3 Splice Conductors

All fiber termination splicing shall be performed in accordance with RUS Bulletin 1735F-401, Standards for Splicing Copper and Fiber Cable. Fiber optic cable shall be one continuous piece without any splice(s) between localizer and glideslope. Fiber optic cables shall be terminated via fusion splice to pigtails with LC connectors.

2.2.1.4 Cable Racks and Cable Rack Supports

Cable racks shall be installed in maintenance holes and handholes as required – this includes new and existing MHs/HHs. Telecommunications industry standard cable hooks of the appropriate length shall be provided to support cables and splice cases. The cable hooks shall be secured using cable rack locking clips. All cables shall be supported using racking clips, cable racks, and cable hooks.

2.2.1.5 Labeling

The Contractor shall label all equipment and cables they install and cables identified for re-use IAW TIA-606-B-2012 and as directed by the base communications organization. New ducts shall be permanently labeled on the wall of each building/maintenance hole indicating the connecting building/maintenance hole at the other end of the duct (for example, "To MH-200"). Tagging and labeling of new cables shall be IAW the following:

A48L8.3F
FO 1234-5678, 1-12

Line One: A = Armored Sheath (otherwise leave blank) 48 = Fiber Count. L = Loose Tube Buffer or T = Tight Tube Buffer. 8.3 = Single Mode. F = Filled core (otherwise leave blank).
Line Two: 1234-5678 = From-To Building numbers. 1-12 = Cable/strand Count.

2.2.1.5.1 Cable Tags

All tags shall be permanently labeled, easily visible and corrosion resistant. Install cable tags in all maintenance holes/handholes, cable vaults, pull boxes and building entrance terminal locations. When cables pass through a maintenance hole, put a tag on the cable, approximately 2 feet from each duct entrance. Information on the cable tag shall identify cable by size, type, cable number and count. See Para 2.2.1.5 (above) for nomenclature for tagging.

2.2.1.5.2 Fiber Optic Distribution Panel (FODP) Marking

Each FODP shall be stenciled/marked with black ink or paint or adhesive backed decals in letters and numbers. The cover of all new fiber optic distributions (FODPs) shall be labeled to conform to the system used by local maintenance personnel to identify FODPs that terminate fiber. If the manufacturer has not identified the sequence in which ports on FODPs (pigtail modules) are counted, the Contractor shall provide designation labels/strips to identify the sequence in which they are counted. Each splice tray shall be marked to identify the fiber count contained in the splice tray. The marking shall identify the FODP by number (building number), cable number, and count.

FODP-B3
FO B3-B1038, 1-12
FO B3-B1400, 13-24

2.2.1.6 Pulling Tape

All newly installed ducts left vacant shall be provided with a waterproof, corrosion resistant, pre-lubricated flat woven polyester pull tape with sequential footage markings (1250 lb. pulling strength) for future cable installations. The pull tape shall extend into the maintenance holes/handholes and be secured to a cable rack or pulling iron, etc.

2.2.1.7 Cable Terminations

Fiber optic cables shall be terminated at a contractor provided FODP via fusion splice to pigtails with LC connectors. The pigtails shall be sized the same as the OSP fiber they are spliced to, i.e., 125/8.3 micron to 125/8.3 micron. The pigtails shall be duplex unless otherwise agreed to by 56 CS/SCXP.

2.2.1.8 FOC Maintenance Loop(s)

The Contractor shall install a minimum of a 25ft fiber optic cable maintenance loop at the first MH or HH from the building (or if no MH/HH exists, at the entry/FODP) and at every 3rd HH in the route. The maintenance loop slack shall be properly labeled, securely supported to the cable ladder and off the HH floor.

2.2.1.9 New Maintenance Holes/Handholes

Maintenance holes (MHs) installed under this contract shall have an American Association of State Highway and Transportation Officials (AASHTO) rating of H-20 or equivalent. As stated in this SOW, MHs shall have minimum interior dimensions of 6 feet W x 12 feet L x 7 feet H (Width, Length, Height). MHs shall be furnished with a lockable MH cover, ladder, cable racks hardware, pulling irons, a sump, water resistance gaskets, bonding ribbon and a grounding system. MH shall meet the requirements of TIA-758-A, paragraph 4.2.1. Prefabricated MHs are preferred. Unless otherwise stated, HHs shall have a minimum interior dimension of 4 feet W x 4 feet L x 4 feet H. HHs shall be furnished with cable racks and a grounding system. HHs shall meet the requirements of TIA -758A, paragraph 4.2.2. Prefabricated HHs are preferred. MH/HH covers shall be labeled with 1/8 inch raised letters stating “COMMUNICATIONS”. All MHs and/or HHs shall be of concrete construction –polymer concrete (i.e., Quazite) construction is NOT authorized. Coordinate numbering/labeling of new MH/HHs with 56 CS/SCXP.

2.2.1.10 Grounding

Grounding hardware such as corrosion resistant wire, bonding ribbon, clamps, ground rod, etc. necessary to properly bond/ground the cable in MHs/HHs shall be provided by the Contractor. Reference ANSI/TIA 607.

2.2.1.11 Underground Conduit System

The Contractor shall be responsible for any required trenching and/or boring necessary to lay the duct system. The Contractor is also responsible for backfilling ditch lines and compaction of fill materials with appropriate compaction tools. Directional drilling shall be used for major road crossings, taxiways, runways, etc. Otherwise, crossing of paved surfaces may be performed by pavement cuts and resurfacing with appropriate matching road material. This does not prevent the Contractor from using directional drilling if it is more cost effective. Ducts will be appropriately protected when placed under paved surfaces.

2.2.1.11.1 Composition

2.2.1.11.1.1 Typical Situations

The ducts shall be 2-inch inside diameter (I.D.) round or metric equivalent. The ducts shall be made of EPC-40 Polyvinyl Chloride (PVC) (Schedule 40) IAW NEMA TC-2. The ducts shall be appropriately labeled indicating the composition material. Ducts shall have a sleeve or bell-end type coupling and shall be watertight when assembled. In addition, the Contractor shall adhere to any additional Host Base/site specific requirements.

2.2.1.11.1.2 Unique/Site Specific Situations

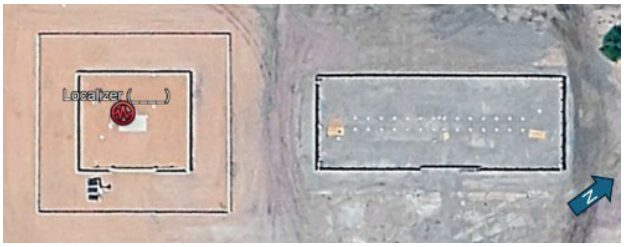
The ducts shall be 2-inch inside diameter (I.D.) round or metric equivalent. The ducts shall be made of EPC-80-PVC (Schedule 80) IAW NEMA TC-2; high density polyethylene (HDPE) SIDR 13.5, Galvanized Iron Pipe (GIP) or “thickwall” stainless steel. Schedule 80 PVC shall be limited to risers, all above ground conduit and under the roadway/parking pavement. High density polyethylene (HDPE) SIDR 13.5 shall be used when directional boring is used. GIP or stainless steel shall be used under major roadways, taxiways, and runways. The ducts shall be appropriately labeled indicating the composition material. Ducts shall have a sleeve or bell-end type coupling and shall be watertight when assembled. In addition, the Contractor shall adhere to any additional Host Base/site specific requirements.

2.2.1.12 Shelter Locations

Shelters on Luke Aux are located on the south side of the runway.

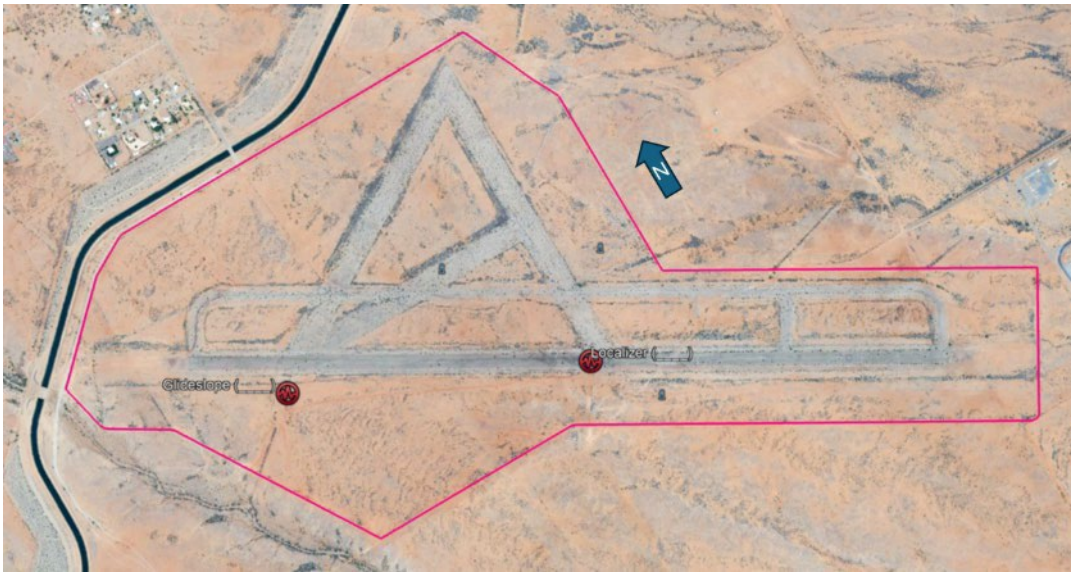
Glideslope

33°43'0.06"N 112°32'11.87"W



Localizer

33°42'45.62"N 112°31'34.00"W



Luke Aux Field

2.2.1.13 New Fiber Optic Cable Installation

The Contractor shall install 12 strand single mode (SM), loose buffer tube, water blocked, outside plant (OSP) double armored cable suitable for direct bury applications. The intent is to install the cable in one continuous length, to the extent that it is practical. The cable shall meet RUS 7 CFR 1755.900 criteria; shall comply with industry standards with regard to manufacturers' cable marking, jacket, rip cords, water blocking, fiber color coding, jacketing materials, etc. In addition, the fibers shall comply with industry standards with regard to mode field diameter, core cladding concentricity, attenuation, and dispersion characteristics at 1310 nm and 1550nm.

The contractor shall install detectable buried fiber optic warning tape along entire route and leave exposed at each end for future direct bury fiber optic cable locates. The tape shall be one continuous piece with no breaks and 12-inches below grade. The contractor shall install a tracer wire inside underground conduit system if they opt to install conduit.

NOTE: A Medium Voltage (MV) power run exists between these two structures at 3ft below grade. Adjacent to that is a 25 Pair copper cable at 18in below grade. Estimated cable distance between shelters is 3,643 ft including maintenance loops. Contact CE for information on location of buried utilities.

<u>Site sketches and photos are attached at the end of this document.</u>

2.2.1.14 FODP Installation, cable termination and Installation

Localizer: The contractor shall install a new 12-Port FODP in the shelter. An existing 2ft x 2ft wallboard will be available for both FODP and FOTS equipment. The contractor shall use existing penetrations, no new penetrations are permitted without Government authorization. Terminate the new FOC at the new FODP by providing new LC connectors and all other materials necessary.

Glideslope: The contractor shall install a new 12-Port FODP in the shelter. An existing 2ft x 2ft wallboard will be available for both FODP and FOTS equipment. The contractor shall use existing penetrations, no new penetrations are permitted without Government authorization. Terminate the new FOC at the new FODP by providing new LC connectors and all other materials necessary.

2.2.2 Fiber Optic Transport System (FOTS)

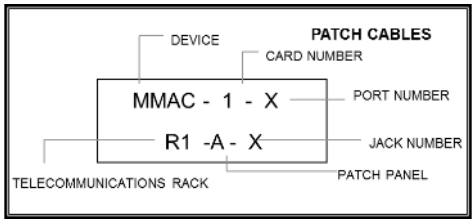
The Instrument Landing System (ILS) system consists of the Localizer (Loc) and Glideslope (GS) at Luke Aux Field. The distant end termination point is at the RAPCON (Building 979) on Luke AFB.

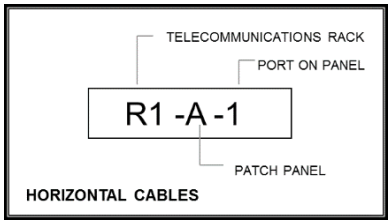
The following information is provided to assist the contractor in preparing responses to this solicitation and is for reference only. The contractor is responsible for verifying information during the pre-proposal conference.

Facility	Building	Requirements
Loc		FXS and E&M (2W, 600Ω)
GS		FXS and E&M (2W, 600Ω)
RAPCON (Luke)	979	FXS and E&M (2W, 600Ω)

2.2.2.1 Labeling

The Contractor shall label all equipment and cables they install in accordance with ANSI/TIA/EIA-606-A-2002, ANSI/TIA-568-C.3 Optical Fiber Cabling Components Standards, and as directed by the GR.





2.2.2.2 Outages

The Contractor shall be responsible for preventing any unscheduled (i.e. cutting or disabling any in-service cables or equipment). Contractor-caused, interruptions of communications capabilities shall be immediately identified to the government Project Manager and Contracting Officer. Such outages shall be worked until corrected by liable parties after an investigation determines who is liable. The Contractor shall coordinate planned outages with the government Project Manager and Contracting Officer at least 10 calendar days in advance of the outage if the implementation necessitates disruption of service, (e.g., communications, electrical, or other utilities).

2.2.2.3 ILS Locations

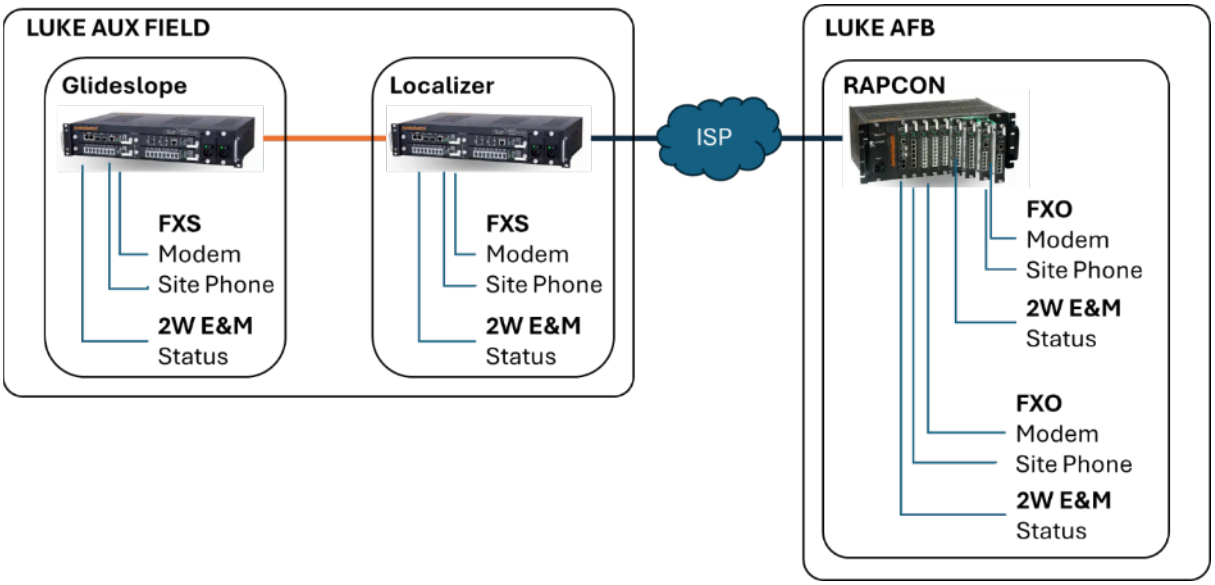
This shall include all ILS shelter locations consisting of one Localizer and one Glideslope on Luke Aux Field. The shelters on Luke Aux Field shall be connected back to the RAPCON on Luke AFB. The FOTS shall provide

interface for each circuit indicated below. For these locations, as stated above, the Contractor shall EFI&T FOTS equipment, UPS, Cables, etc.

Location	Function	Ckt Type	Port Qty	Interface	Notes
Luke Aux	Localizer	Dial Line	2	FXS	Site Phone, LOC Modem
		Modem	1	2W E&M	Status to RCSU
Luke Aux	Glideslope	Dial Line	4	FXS	Flight Check (Voice, Modem), Site Phone, GS Modem
		Modem	1	2W E&M	Status to RCSU
Luke AFB	RAPCON	Dial Line	6	FXO	(LOC, GS)
		Modem	2	2W E&M	(LOC, GS)

ILS Circuit Interfaces.

ILS connectivity to RAPCON.



Note: Connection for Flight-Check radio not shown.
If flight-check radio is not installed, contractor shall identify/tag the relevant ports at both Glideslope and RAPCON.

ILS locations have Phone lines, dial up modems, and 2 Wire duplex modems called "STATUS and CONTROL" lines. The dial up modems and phone lines which shall be interfaced with Foreign Exchange Subscriber (FXS) modules. The STATUS and CONTROL lines are a 2W Duplex Modem Tip and Ring interface that is open communications with no signaling. These may be interfaced with 2 Wire E&M modules. In the RAPCON, the matching FOTS phone line Analog Modules shall be Foreign Exchange Office (FXO) modules. The matching STATUS and CONTROL line modules shall be 2 Wire E&M Modem modules respectively. The Contractor shall EFI&T these modules in their respective FOTS. Dial tone and ringing for the ILS Shelter's dial up modems and phone lines shall be provided by connecting to the Government demarc at 979. All analog interfaces shall be terminated with Contractor EFI&T 24 AWG communications cables to match existing GFE cabling. The Contractor shall EFI&T their analog cables from the respective FOTS to each location's Wallboards and terminate to Contractor EFI&T 66 Blocks. All Contractor FOTS equipment shall interface to the GFE FODPs by Contractor EFI&T Fiber Optic patch cords.

2.2.2.4 Glideslope

The Contractor shall EFI&T their FOTS and associated cabling on GFE Wallboard, to include grounding of the FOTS equipment. If adequate wallboard is not available, contractor shall coordinate with Luke CS to locate and install a properly sized wallboard in the shelter. All GFE SM fibers are terminated to GFE FODPs with LC connectors. Note: Glideslope will be provisioned to house a Flight Check Radio (two FXS circuits). At Luke Aux, the glideslope connects back to the localizer using fiber installed under this project. The Contractor shall EFI&T a 1 KVA 110 VAC, 50 Hz UPS under/on the wallboard.

2.2.2.5 Localizer

The Contractor shall EFI&T their FOTS and associated cabling on GFE Rack, to include grounding of the FOTS equipment. The Contractor shall EFI&T a 1 KVA 110 VAC, 50 Hz UPS under/on the wallboard.

2.2.2.6 RAPCON (Luke) B979

This is the termination point for Luke Aux Glideslope and Localizer. The matching FOTS shall be installed in a new Contractor provided rack. The Contractor shall EFI&T a 2 KVA UPS in the bottom of this rack. Contractor shall coordinate with Luke CS and base CE to ensure power is available. The Contractor shall EFI&T a 10 outlet PDU at 2U above the UPS for FOTS power connections. PDU shall have no integrated on/off switch. Note: This PDU will support FOTS for both ILS on Luke AFB and Luke Aux Field. Contractor shall ground the contractor provided and installed equipment rack and all contractor provided and installed equipment.

This rack shall contain demarcations for copper and fiber connection: Notional rack layout is included at the end of this document. Contractor shall coordinate rack layout with the government Project Manager.

- Contractor Furnished/ Contractor Installed (CF/CI) 24 Strand SM LC FODP in the rack connected to corresponding CFCI 24 Strand SM LC FODP mounted in the Telecom room.
- One 25 pair copper cable between RJ-11 patch panel in the rack and corresponding 66 block in the Telecom Room above the telephone demarc.

- One 25 pair copper cable between RJ-11 patch panel in the rack and corresponding 66 block on the wallboard in the Equipment Room, supporting RAPCON equipment.

The government Project Manager shall assist with identification of the rack location and required Cross Connections, but the Contractor is responsible for EFI&T of all cabling and cross connections. The Contractor shall EFI&T the required Fiber Optic jumpers from their FODP to the Government FODP.

NOTE: Floor tile and mastic at this location contains asbestos. Contractor shall follow OSHA guidance when drilling to anchor cabinet.

2.2.3 Acceptance/Installation Test Report

The Contractor shall provide an installation test report of the results of the testing accomplished under the installation test plan IAW CDRL A006.

2.2.4 As-Built Drawings

The government shall supply existing system drawings, and the Contractor shall provide updated drawings in Bentley MicroStation v8.1, Visio (for Rack Elevations) and .pdf (for all drawings, to include rack elevations). The contractor shall use the templates in figures 3, Typical Sectional Symbols Sheet1, and 4, Typical Sectional Symbols Sheet2, as part of the .pdf as-builts that they apply to. The contractor shall perform a complete audit of all the HHs/MHs that are used in this project and provide detailed GPS shape files (see Table A). These files shall depict the entire pathway and details of the installation, including but not limited to: labeling, cables, innerducts and maintenance holes/handholes, racks, grounding, conduits, maintenance loops, distances, bores, trenches, building entrances. Detailed butterfly drawings will also be required; see figure 5 for example. If the existing cable diagram or butterfly drawings are not available; the contractor shall create the complete and entire missing cable diagram/ butterfly drawings as well as, add the components used in this project. The Contractor shall record/deliver geospatial data of new outside plant distribution system (CDRL A001).

2.2.5 Final Acceptance

The Contractor shall schedule a final project walk-through with the Base POC. This should be scheduled 5 calendar days prior to acceptance.

2.2.6 Training Plan N/A

3.0 GENERAL INFORMATION

3.1 Period of Performance

The period of performance for the project shall be 180 calendar days after the Notice to Proceed.

3.2 Place of Performance

The place of performance is Luke AFB, AZ and Luke Auxiliary Field.

3.3 Hours of Operation

The Contractor shall routinely work during normal duty hours of the site. However, mission requirements may necessitate work outside normal hours (nights and/or weekends), especially if existing service must be interrupted. Any site work requested by the Contractor to be performed outside of normal duty hours shall be coordinated with the 56 CS/SCXP Project Manager and approved by the Contracting Officer at least 10 calendar days in advance.

3.4 Holidays/Down Days

The Contractor shall not perform under this contract on federal holidays or site-unique down-days unless expressly authorized by the CO and coordinated with the 56 CS/SCXP Project Manager.

3.5 Base Support

The Contractor shall identify any base support requirements (for example, laydown and storage areas) necessary to complete this project in their proposal. The contractor shall return all government furnished lay-down and storage areas to their original condition upon completion of the project.

4.0 APPENDICES

4.1 Appendix A: APPLICABLE STANDARDS

The following list is not all-exclusive. The Contractor shall comply with applicable commercial code and standards

AFI 91-203 – Air Force Consolidated Occupational Safety Instruction

OSHA CFR 29 Part 1910-268 – Telecommunications

NEMA TC 2- Electrical Polyvinyl Chloride (PVC) Tubing and Conduit

ANSI/TIA-606-B Administration Standard for Telecommunications Infrastructure

TIA-568-C Commercial Building Telecommunications (568C.1, 568C.2, 568C.3) Cabling Standard

ANSI/TIA-607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

TIA-569-C - Commercial Building Standard for Telecommunications Pathways and Spaces

TIA-570-C –Residential Telecommunications Infrastructure Standard

TIA-758 B - Customer-owned Outside Plant Telecommunication Infrastructure Standard

BICSI TDM Manual - Building Industries Consulting Services International Telecommunications Distribution Methods (TDM) Manual

BICSI – Outside Plan Design Reference Manual

RUS Bulletin 1751F-643 - Underground Plant Design

RUS Bulletin 1751F-644 - Underground Plant Construction Telecommunications Engineering Shield Continuity and Construction Manual (TE&CM) 451.2

RUS Bulletin 1751F-801 – Electrical Protection Fundamentals

RUS Bulletin 1753F-151 (515b) - Specifications and Drawings for Underground Cable Installation

NFPA 70 - National Electric Code

FGDC-STD-007.3-1998 - Geospatial Positioning Accuracy Standards Part 3: National Standard for Spatial Data Accuracy

Unified Facilities Criteria 3-260-01

Unified Facilities Criteria 3-580-01

4.2 Appendix B: LIST OF DELIVERABLES

All deliverables are subject to Government acceptance and approval. They shall meet professional standards and the requirements set forth in this SOW. All deliverables shall be produced using recommended software tools/versions as accepted by the Government. The Contractor shall submit the following deliverables:

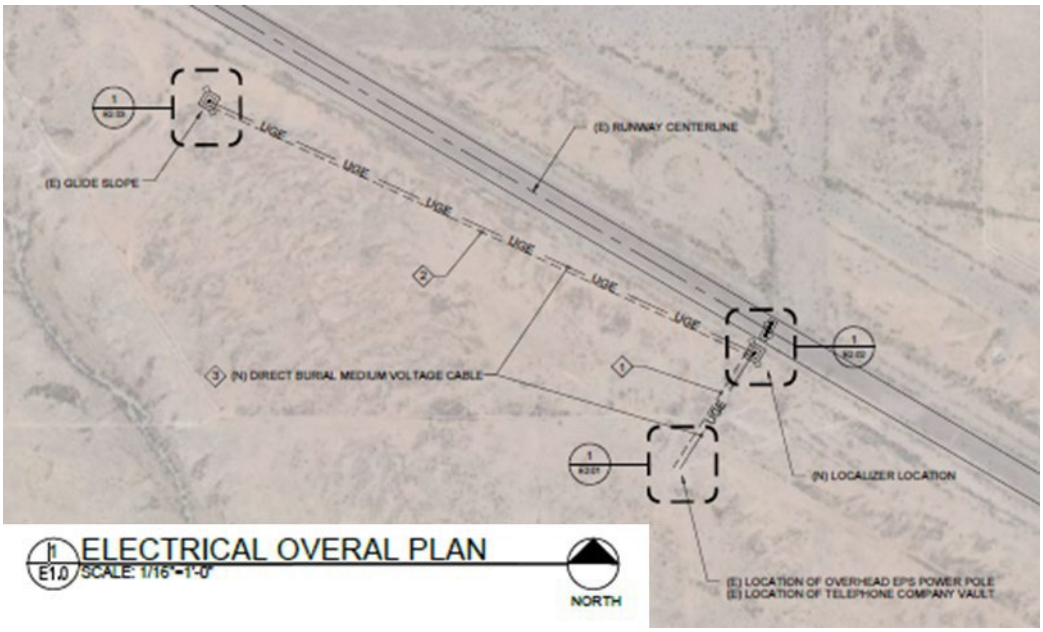
CDRL	Data Item Title	**Data Item Title**
A001	As Built	DI-DRPR-80151A/T
A002	Work Schedule	DI-MISC-81382/T
A003	Status Report	DI-MGMT-80368A
A004	Meeting Minutes	DI-ADMIN-81505/T
A005	Test Plan	DI-NDTI-80566A/T
A006	Test Report	DI-QCIC-80512

4.3 Appendix C: LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AFM	Airfield Management (BaseOPS)
Approx	Approximately
ATC	Air Traffic Control Tower
ATCALS	Air Traffic Control and Landing Systems
BCE	Base Civil Engineering
CDRL	Contract Deliverable
CFE	Contractor-Furnished Equipment
CFP	Contractor-Furnished Property
CIP	Common Installation Picture
CIPS	Cyberspace Infrastructure Planning System
CMA	Controlled Movement Area
CMHDS	Communications Maintenance Hole Duct System
CO	Contracting Officer
Comm	Communications
CS	Communications Squadron
CSI-B	Cyberspace Integrator-Base
CVC	CIPS Visualization Component
ECMRA	Contractor Manpower Reporting Application
EFI&T	Engineer, Furnish, Install and Test
FOC	Fiber Optic Cable
FODP	Fiber Optic Distribution Panels
FOUO	For Official Use Only
GS	Glideslope
HDPE	High Density Polyethylene
HH	Hand Hole
IAW	In Accordance With
ID	Inside Diameter
ILS	Instrument Landing System
IPT	Integrated Process Team
LOC	Localizer
MH	Maintenance Hole
MHDS	Maintenance Hole Duct System
NLT	No Later Than
NPDES	National Pollution Discharge Elimination System
OEM	Original Equipment Manufacturer
OPSEC	Operational Security
OSHA	Occupational Safety & Health Administration
OSP	Outside Plant

OSS	Operations Support Squadron
OTDR	Optical Time Domain Reflectometer
PDF	Portable Document Format
PM	Project Manager
POC	Point Of Contact
Prime	Prime Contractor
PSI	Pounds per Square Inch
PVC	Polyvinyl Chloride
QAE	Quality Assurance Evaluator
QCM	Quality Control Manager
Qty	Quantity
RUS	Rural Utilities Service Bulletin
SCOW	Supply Chain Operations Wing
SCX	Scheduler Planner
SE	System Engineer
SM	Single Mode
SOW	Statement of Work
Sub	Sub-Contractor
TIA	Telecommunications Industry Association
TMGB	Telecommunication Main Ground Bus-Bar
TRD	Technical Requirements Document

Site Layout and images:



Buried copper cable and Medium Voltage (MV) electrical as shown.

Note: Drawing for Glide Slope doesn't match with surveyed installation.

Transformer pad is in the West corner, behind the pad.

Notional Rack Layout:

Includes reserved space for follow-on project.

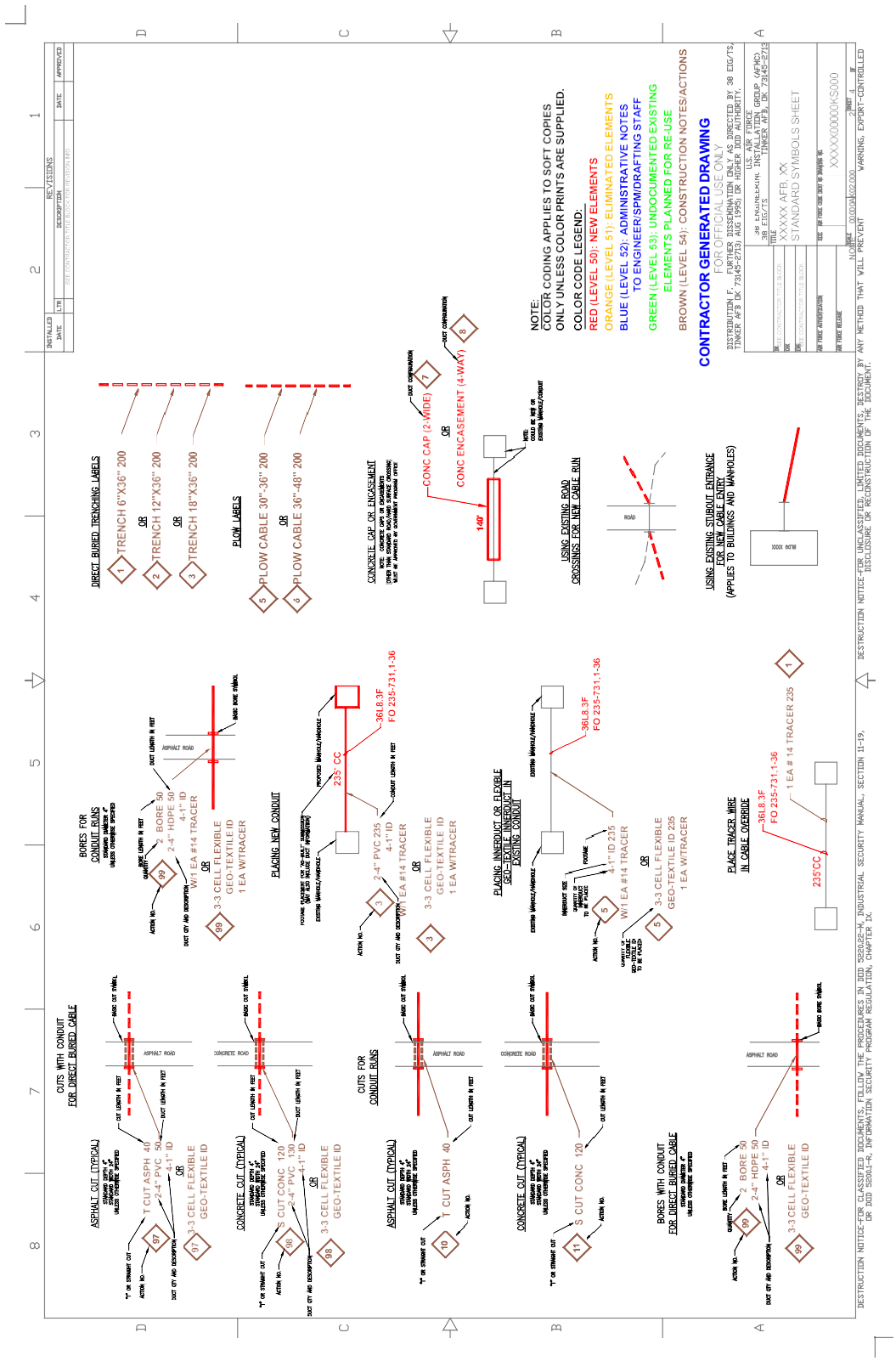


Figure 3 Typical Sectional Symbols Sheet 1 (from CITS TSIP Template)

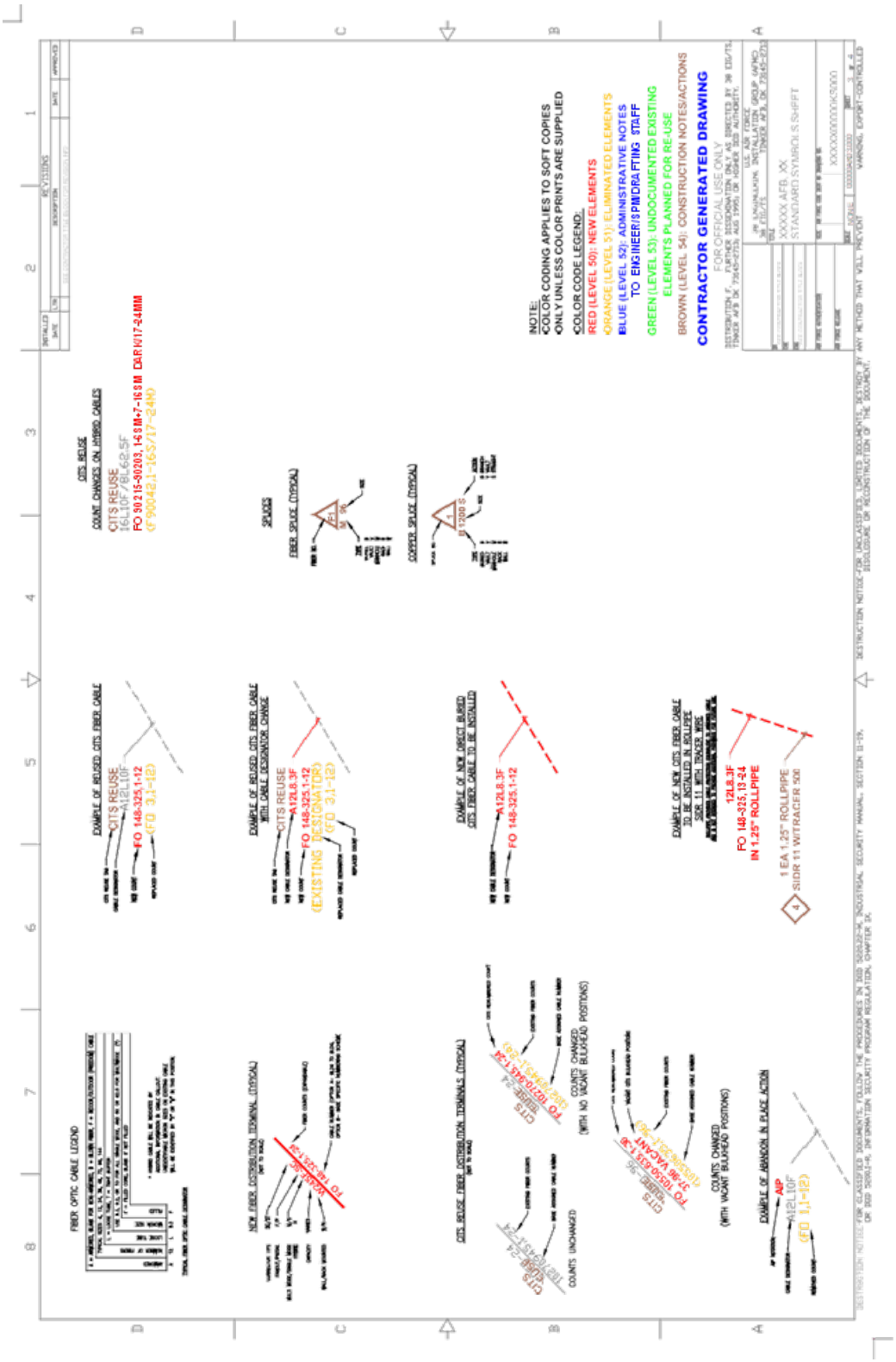


Figure 4 Typical Sectional Symbols Sheet 2(from CITS TSIP Template)

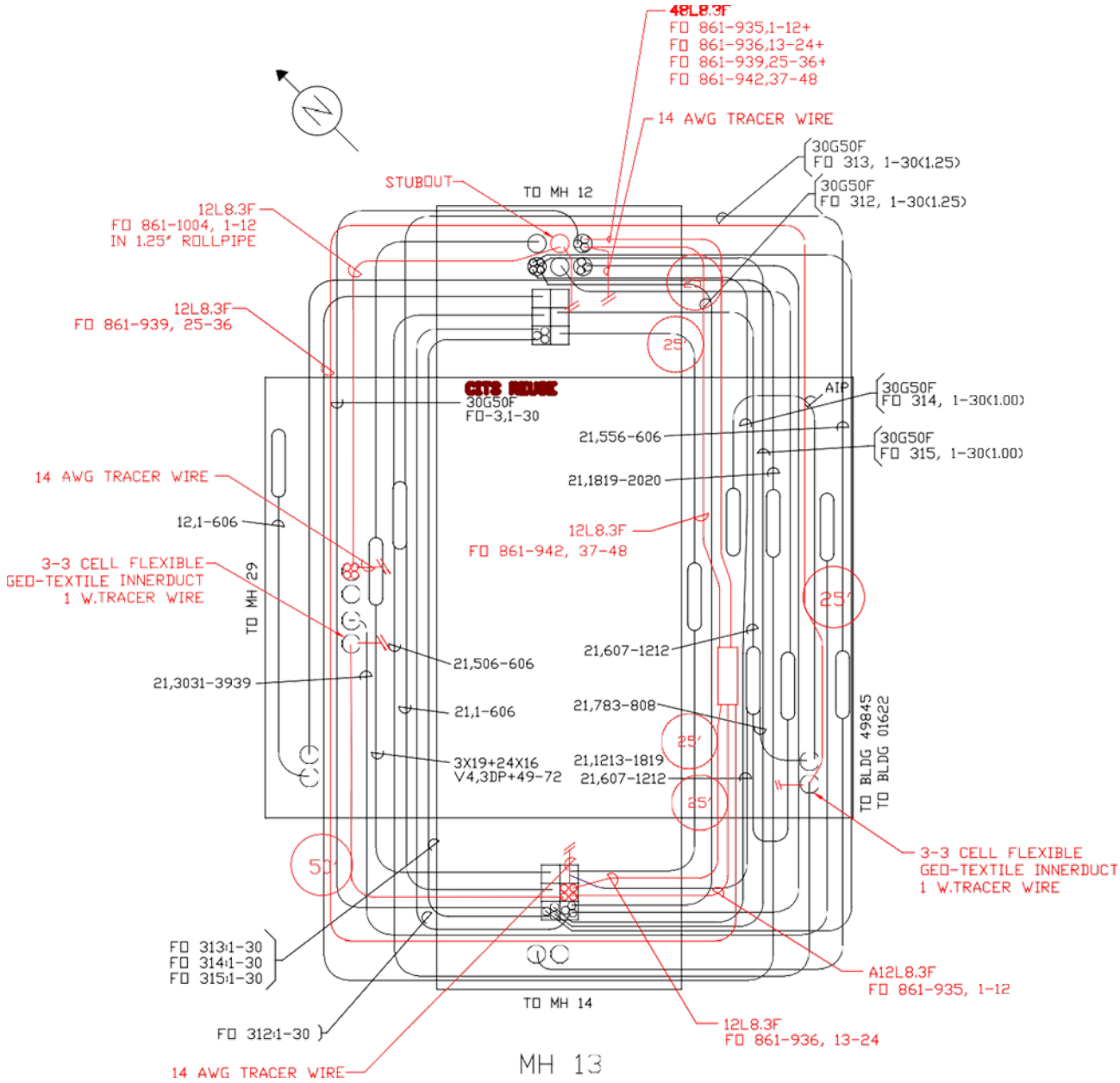


Figure 5 Typical Manhole Butterfly Drawing (from CITS TSIP Template)

TABLE A

Entities, Attributes, and Domain Values for Recording Required Communication Feature Data

(BASIC COMM PATH TEMPLATE)

A.1 Feature Attributes for Comm-Path Entities.

A.1.1 GPS_MANHOLE

A.1.1.1 **Definition.** An enclosed structure (manhole, handhole and pullbox). A butterfly layout is used that shows the floor and walls flattened out so that duct openings can be drawn on the walls. This must be represented as one polygon (one row in the table). The point is used to show the center of the manhole/handhole cover.

A.1.1.2 **Geometry type.** Site (Point).

A.1.1.3 **Attributes.**

Column Name	SDSFIE Common Name	Description	Data Type	Use	Domain Table
NAME	Identifier Name	The standard identifier name (e.g. MH-19).	Char(20)	Required	
MH_TYPE_D		A description for the type of manhole.	Char(16	Required Recommended	D_MHTYP
MH_MAT_D		Discriminator References D_COSTRM table. Used to describe the material composition of the manhole.	Char(16)	Required	D_COSTRM
FLOOR_ELEV	Floor Elevation Dimension	The height (or depth) of the bottom of the manhole measured from grade. (inches)	Real	Required	
RIM_ELEV	Rim Elevation Dimension	The height of the top of the rim of the manhole measured from grade.(inches)	Real	Required	
DISPOSTN_D	Disposition Code	The status of the subject item (e.g., permanent, temporary, proposed, abandoned, etc.), from lists or entered from field inspections.	Char(16)	Required	D_DPOBJ

Column Name	SDSFIE Common Name	Description	Data Type	Use	Domain Table
MAPSRC_D	Map Source Discriminator	DISCRIMINATOR - Used to indicate the source of data for the spatial position of this graphic.	Char(16)	Required	D_DATSRC
MAPACU	Spatial Accuracy in Meters	Describes the spatial accuracy of mapsrc_d. in meters, +/- of where the feature may actually be. For example, if you are using GPS and it's only accurate to 1 meter, put a 1 in this field.	Real	Required	

A.1.2 GPS_VAULT

A.1.2.1 **Definition.** An enclosed structure in a facility used for cable entrance.

A.1.2.2 **Geometry type.** Site (Point).

A.1.2.3 **Attributes.**

Column Name	SDSFIE Common Name	Description	Data Type	Use	Domain Table
NAME	Identifier Name	The standard identifier name (I.e. V-19).	Char(20)	Required	
VLT_MAT_D	Vault Material Code	Discriminator References D_COSTRM table. Used to describe the material composition of the vault.	Char(16)	Required	D_COSTRM
DISPOSTN_D	Disposition Code	The status of the subject item (e.g., permanent, temporary, proposed, abandoned, etc.), from lists or entered from field inspections.	Char(16)	Required	D_DPOBJ
MAPSRC_D	Map Source Discriminator	DISCRIMINATOR - Used to indicate the source of data for the spatial position of this graphic.	Char(16)	Required	D_DATSRC
MAPACU	Spatial Accuracy in Meters	Describes the spatial accuracy of mapsrc_d. in meters, +/- of where the feature may actually be. For example, if you are using GPS and it's only accurate to 1 meter, put a 1 in this field.	Real	Required	

A.1.3 GPS_PEDESTAL

A.1.3.1 **Definition.** **A**n aboveground, enclosed structure that provides access to buried plant and a place to house splices, terminals, etc.

A.1.3.2 **Geometry type.** Site (Point).

A.1.3.3 **Attributes:**

Column Name	SDSFIE Common Name	Description	Data Type	Use	Domain Table
NAME	Identifier Name	The standard identifier name (i.e. PED-19).	Char(20)	Required	
TYPE_D	Type Code	A description for the type of pedestal.	Char(16)	Required	D_COPED
Column Name	**SDSFIE Common Name**	**Description**	**Data Type**	**Use**	**Domain Table**
MODEL_NO		The model number of the pedestal	Char(16)	Required	
TERMINAL_D	Terminal Existence Code	A Boolean indicating the presence of a terminal (Y/N).	Char(16)	Required	D_BOOLEN
BONDED_D	Bonded Code	A Boolean indicating whether the pedestal is bonded. (Y/N).	Char(16)	Required	D_BOOLEN
DISPOSTN_D	Disposition Code	The status of the subject item (e.g., permanent, temporary, proposed, abandoned, etc.), from lists or entered from field inspections.	Char(16)	Required	D_DPOBJ
MAPSRC_D	Map Source Discriminator	DISCRIMINATOR - Used to indicate the source of data for the spatial position of this graphic.	Char(16)	Required	D_DATSRC
MAPACU	Spatial Accuracy in Meters	Describes the spatial accuracy of mapsrc_d. in meters, +/- of where the feature may actually be. For example, if you are using GPS and it's only accurate to 1 meter, put a 1 in this field.	Real	Required	

A.1.4 GPS_DBSPLICE

A.1.4.1 **Definition.** An enclosed structure that represents a splice case (aerial or buried).

A.1.4.2 **Geometry type.** Site (Point).

A.1.4.3 **Attributes:**

Column Name	SDSFIE Common Name	Description	Data Type	Use	Domain Table
NAME	Identifier Name	The standard identifier name (e.g. DBS01.1-1200_1-900).	Char(20)	Required if splice case is exposed or if the location is marked	
CAS_MAT_D	Case Material Code	Used to describe the material composition of the splice case.	Char(16)	Required if splice case is exposed or if the location is marked.	D_SPCMAT
CAS_TYP_D	Case Type Code	Used to describe the type of splice case.	Char(16)	Required if splice case is exposed or if the location is marked	D_SPCCAS
MAPSRC_D	Map Source Discriminator	DISCRIMINATOR - Used to indicate the source of data for the spatial position of this graphic.	Char(16)	Required if splice case is exposed or if the location is marked	D_DATSRC
MAPACU	Spatial Accuracy in Meters	Describes the spatial accuracy of mapsrc_d. in meters, +/- of where the feature may actually be. For example, if you are using GPS and it's only accurate to 1 meter, put a 1 in this field.	Real	Required if splice case is exposed or if the location is marked	

A.1.5 GPS_PATH_SEGMENT

A.1.5.1 **Definition.** Link that represents an enclosure path of comm. items outside of a building, manhole, pedestal, or other enclosed structure. For ductbanks, comm-path segment can represent the virtual path, ductbank, duct, and innerducts. For ducts, comm-path segment can represent the virtual path, duct, and innerducts. For direct-buried cables at road-crossings, comm-path segment can represent the virtual path, road-crossing casing, and direct-buried cables. It can also represent the path of aerial cable, cable-bridges, and cable-troughs.

A.1.5.2 **Geometry type.** Polyline.

A.1.5.3 **Attributes:**

‘Column Name	SDSFIE Common Name	Description	Data Type	Use	Domain Table
PATH_TYP_D	Comm-Path Type Code	A discriminator field that describes what type of communications path this segment is representing.	Char(16)	Required	D_COPTHT
COVERDEPTH		The minimum depth of this part of the path from grade, in inches. This is mainly used for digging permits	Real	Required when cover depth can be determined without excavating.	
MAPSRC_D	Map Source Discriminator	DISCRIMINATOR - Used to indicate the source of data for the spatial position of this graphic.	Char(16)	Required	D_DATSRC
MAPACU	Spatial Accuracy in Meters	Describes the spatial accuracy of mapsrc_d. in meters, +/- of where the feature may actually be. For example, if you are using GPS and it’s only accurate to 1 meter, put a 1 in this field.	Real	Required	

A.2 Domain Values for Attributes of Comm-Path Feature Entities.

2.1 D_BOOLEN: type list.

A.2.1.1 What it does. A table of Boolean data types YES and NO. Use for selecting the existence or non-existence of a value, condition, or feature.

A.2.1.2 Referenced by GPS_PEDESTAL

A.2.1.3 Attributes.

Lookup Value	Long Description
YES	The condition is true or the feature does exist
NO	The condition is not true or the feature does not exist

A.2.2 D_COPED: communications - pedestal type.

A.2.2.1 What it does. This table contains information about various communications pedestal types.

A.2.2.2 Referenced by GPS_PEDESTAL.

A.2.2.3 Attributes.

Lookup Value	Long Description
BD	BD - Buried Distribution Closure, size unknown
BOX	BOX - Rectangular box type enclosure, accessed by removing a cover panel
CAB	CAB - Cabinet enclosure, accessed through a hinged door
CAD	CAD - Controlled Access Distribution Closure
PED4	4 inch pedestal
PED6	6 inch pedestal
PED8	8 inch pedestal
PED12	12 inch pedestal
OTHER	Other
TBD	To Be Determined
UNKNOWN	Unknown

A.2.3 D_COPTHT: communications - comm path type.

A.2.3.1 What it does. This table contains information about various communications path types.

A.2.3.2 Referenced by GPS_PATH_SEGMENT.

A.2.3.3 Attributes.

Lookup Value	**Long Description**
AERIAL	Above ground path between, poles, towers or buildings
CABLE_BRIDGE	Bridge only used for cables
CABLE_TROUGH	Pathway on top of ground for cables
DIRECT_BURIED	Below ground path where soil has direct contact with cable
DUCT	Single communications duct
DUCTBANK	A container for multiple ducts
STUB-OUT	Short duct used with manholes and vaults
SURFACE	Path directly on the surface
UNDER_ROAD	A duct for cables, usually under a road
UNKNOWN	Faulty Source Data

A.2.4 D_COSTRM: structure – material.

A.2.4.1 What it does. This table contains information about various structure materials.

A.2.4.2 Referenced by GPS_MANHOLE, GPS VAULT.

A.2.4.3 Attributes.

Lookup Value	Long Description
AL	Aluminum
CIS	Concrete Cast inSitu/Cast in Place
COMBINATION	Combination of materials
FIBERGLASS	Fiberglass
PLASTIC	Plastic
PRECAST	Pre-Cast Concrete
STEEL	Steel

UNKNOWN	Unknown

A.2.5 D_DATSRC: source list – data.

A.2.5.1 What it does. Allowable input values for data sources.

A.2.5.2 Referenced by GPS_DBSPLICE, GPS_MANHOLE, GPS_PATH_SEGMENT, GPS_PEDESTAL, GPS_VAULT.

A.2.5.3. Attributes.

Lookup Value	**Long Description**
AER_PHOTO	Aerial photography
AS_BUILT	As-built drawings
CSIR	CSIR - Communications System Installation Record
FLDLOC_SURVEY	Field location survey
GPS_FLDLOC	GPS field located and verified data
HAND_DRAFT	Hand-drafted map
MAP_TAB	Tab Map series
NGS	National Geodetic Survey data
SATELLITE	Satellite imagery
UNKNOWN	Unknown

A.2.6 D_DPOBJ: disposition list – object.

A.2.6.1 What it does. Allowable input for the disposition of an object.

A.2.6.2 Referenced by, GPS_MANHOLE, GPS_PEDESTAL, GPS_VAULT.

A.2.6.3. Attributes.

Lookup Value	**Long Description**
ABANDONED	Abandoned in place (not in use)
TEMPORARY	Temporary
PROPOSED	Proposed
IN_SERVICE	In service and being used.
COLLAPSED	An unserviceable item
UNKNOWN	Unknown
TBD	To Be Determined

A.2.7 D_MHTYP: type list - comm manhole.

A.2.7.1 What it does. The type of manhole.

A.2.7.2 Referenced by GPS_MANHOLE.

A.2.7.3 Attributes.

Lookup Value	Long Description
1T1	1T1
4T1	4T1
5T1	5T1
6T1	6T1
6T2	6T2
8T1	8T1
A	A Type
CEMH	Controlled Environment Manhole
HH_Type_A	Handhole Type A
J3	J3 Manhole
J4	J4 Manhole
JC9C	JC9C (2450mm x 1750mm x 1450mm)
L	L Manhole
R2A	R2A Manhole
T	T Manhole
V	V Manhole
OTHER	Other

UNKNOWN	Unknown

A.2.8 D_SPCCAS: communications - splice case typ

A.2.8.1 What it does. Allowable values for the type of splice case

A.2.8.2 Referenced **by** GPS_DBSPLICE

A.2.8.3 Attributes

Lookup Value	Long Description
12.5SS	12.5 Inch Stainless Steel
2 TYPE	2 Type
3BB	3 Inch Better Buried
3RS	3 Inch ReddiSeal
3SS	3 Inch Stainless Steel
4BB	4 Inch Better Buried
4RS	4 Inch ReddiSeal
4SS	4 Inch Stainless Steel
6.5BB	6.5 Inch Better Buried
6.5RS	6.5 Inch ReddiSeal
6.5SS	6.5 Inch Stainless Steel
9.5BB	9.5 Inch Better Buried
9.5RS	9.5 Inch ReddiSeal
9.5SS	9.5 Inch Stainless Steel
FOSC_100_B_H	Raychem FOSC-100 B/H
HS	Heat Shrink
KBV	K&B Vault
LEAD	Lead
OTHER	Other

READY_ACCESS	Ready Access

UC_6_9	Siemens UC 6-9
UCN_7_10	Siemens UCN 7-10
UNKNOWN	Unknown

A.2.9 D_SPCMAT: communications - splice case mat

A.2.9.1 What it does. Allowable input values for the material of the communications splice case

A.2.9.2 Referenced by GPS_DBSPLICE

A.2.9.3 Attributes

Lookup Value	Long Description
AL	Aluminum
EVA	Ethylene Vinyl Acetate (Heat Shrinkable Tubing)
FIBER	Fiberglass
LEAD	LEAD
PE	PE - Polyethylene
PP	PP - Polypropylene
PVC	PVC - PolyVinyl Chloride
SS	SS - Stainless Steel
OTHER	Other
UNKNOWN	Unknown

Table B

Numbers GPS Data Collector Setup Properties

FOR ALL FEATURE TYPES	PDOP (Position Dilution of Precision)	HDOP (Horizontal Dilution of Precision)	Correction Status	Receiver Type	Date Recorded	Time Recorded	Update Status
	Feature Name	Data File Name	Total Positions	Filtered Positions	GPS Week	GPS Second	–
IN ADDITION FOR LINE FEATURES	Length (2D)	Length (3D)	Average Vertical Precision	Average Horizontal Precision	Worst Vertical Precision	Worst Horizontal Precision	Line ID
IN ADDITION FOR POINT FEATURES	Height	Vertical Precision	Horizontal Precision	Standard Deviation	Point ID	–	–