STATEMENT OF WORK (SOW)

New Fiber Optic Cable (FOC) from Information Transfer Building (ITB) 910 to ITB1365

Luke AFB AZ

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1.0 SCOPE.

This SOW defines the requirement for the Contractor to engineer, furnish, install and test (EFI&T) 36 Strands (St) Single Mode (SM) FOC from ITB910 to ITB1365. The work will be performed by using new and existing Manhole/Handhole Duct System at Luke AFB AZ. 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 equipment, supplies, or materials provided shall be new and not refurbished. No equipment, supplies, and material will be provided by the government except for handheld radios identified in SOW para 2.1.2.3, which will be loaned to the contractor by the government. All materials used in this SOW must be rust-proof and corrosion-resistant, due to the nature of the environment.

2.0 REQUIREMENTS.

2.1 GENERAL REQUIREMENTS.

2.1.1 Safety Requirements.

The contractor shall remain in compliance with all Federal, State, county, and base security and safety laws, regulations, policies, and requirements.

2.1.2 Site Coordination.

The Contractor shall meet with the base Safety Officer during the Pre-Construction kick-off meeting to obtain all safety regulations/requirements that apply to this effort.

2.1.2.1 Confined Space.

The Contractors and Sub-contractors entering spaces on Luke AFB AZ are responsible for the safety of their personnel and for their own permit space program as outlined in local, state, federal (OSHA CFR 29 Part 1910-268) compliance standards and Air Force Manual (AFMAN) 91-203. The primary Contractor is responsible for all Sub-contractor confined space operations. The Contractor shall receive a “confined space” and safety requirements briefing from Base Safety Office before entering any maintenance hole

2.1.2.2 Accident/Incident Reporting and Investigation.

The Contractor shall call 911 for all life-threatening emergencies; record all available facts relating to each instance of injury; report the accident/incident to the Contracting Officer. The Contractor shall secure the scene of any accident and wreckage until released by the accident investigative authority through the 56 CS/SCXP PM. If the Government elects to investigate the incident, the Contractor shall cooperate fully and assist the Government personnel until the investigation is completed.

2.1.2.3 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 site 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. The contractor shall coordinate with the 56CS/SCXP to ensure that any locking manhole covers are put back in place at the end of each workday. Government reserves the right to inspect work areas throughout the project; contractor will coordinate with 56 CS/SCXP for inspection requirements.

Work performed in the flight line area: Under no circumstances shall any equipment or materials be left unattended within the designated Luke AFB AZ Controlled Movement Area (CMA). The Contractor’s designated on-site project manager shall always maintain two-way radio contact with the Luke AFB AZ Air Traffic Control (ATC) Tower during construction work within the CMA. Two-way radios/LMRs will be provided by the government.

2.1.2.4 Traffic control.

In the event base vehicular traffic is to be disrupted by trenching or horizontal directional boring, the Contractor shall notify the 56CS/SCXP PM NLT 10 calendar days in advance to inform base Security Forces and Emergency Services personnel of the planned disruptions.

2.1.2.5 Airfield Driving.

Any person operating a motor vehicle inside the airfield fence on Luke AFB AZ shall coordinate with airfield management to obtain the required training/certifications IAW local procedures.

2.1.3 Security Requirements.

Contractor shall provide Contracting Office and 56 CS/SCXP with a list of names identifying personnel assigned to this project. Personnel assigned will need to obtain a base pass from 56 Security Forces (SFS). Personnel will need to provide a Real ID compliant document and give the South Gate Visitor Center their social security number to initiate a limited scope background check when they first arrive at Luke AFB. Contractor shall coordinate initial arrival date and time with 56 CONS who will sponsor base passes for individuals assigned to this effort.

2.1.3.1 Security Clearances.

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

2.1.3.2 Network Infrastructure Drawings and Protections

Network infrastructure drawings (MHDS, MH/HH locations, fiber paths, etc.) will be provided upon contract award as requested by the Contractor. These drawings are on the 56 CS/SCXP Critical Information List and must be protected. The Contractor shall take appropriate measures to protect detailed information pertaining to the EFI&T effort, to ensure limited distribution of documents and schematics/drawings to only those individuals with a valid need to know ~~and will need to have, at a minimum, Cybersecurity Maturity Model Certification (CMMC) Level 2 (Certified) to receive, process, and store these drawings~~. IAW AFI 10-701, OPSEC Considerations, the contractor shall develop an OPSEC plan to ensure the protection of data either furnished by the government or produced by the contractor. The contractor's OPSEC plan provided in the RFP shall be incorporated into the SOW in accordance with (IAW) CDRL A007.

2.1.4 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 Contractors are responsible to know and follow all applicable Federal, State, Local and Air Force regulations for environmental protection, including waste disposal, sewer discharge, air emissions, and storm water requirements. The contractor shall maintain an awareness of changing environmental regulatory requirements to avoid environmental deficiencies for activities on Luke AFB AZ. The Prime Contractor shall ensure that their subcontractors (if any) comply with these specifications.

2.1.5 Permits.

The Contractor shall be responsible to coordinate, complete and process all permits required to complete the installation prior to any trenching, horizontal directional boring or modifications to a facility, maintenance hole (MH) or hand-hole (HH). For example:

- Digging permit, AF Form 103 shall be submitted through BCE 21 calendar days in advance of digging activities. The Contractor is responsible for maintaining all markings and for ensuring AF Form 103 remains current.
- Confine space entry permit, AF Form 1024 shall be coordinated through base safety office. The Contractor shall be prepared to provide proof of their Confined Space Training Program along with the AF Form 1024 to base safety.
- Base Civil Engineering Work Clearance Request, AF Form 332 shall be submitted through BCE 30 calendar days in advance of planned work. This form only applied when building required modification (like installing pull box).
- The Contractor shall trench, excavate, and mark and barricade open trenches IAW OSHA Standards.

All utility markings, flags, etc. shall be maintained by the contractor after the responsible work center/shop identifies/locates them and ensure that the AF Form 103 remains current. The contractor shall take precautions to protect existing infrastructure. 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.

2.1.6 Integrated Process Team (IPT).

The Contractor shall chair a weekly IPT meeting that includes Contractor representatives, the Government Contracting Officer (CO), the System Engineer(s), the Government Project Manager, and other base personnel as required. The Contractor shall provide an agenda NLT 1 working day prior to the scheduled meetings. The Contractor shall provide 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 NLT 1 working day after each meeting (CDRL A004).

2.1.7 Quality Assurance.

The Contractor shall provide Quality Assurance Support for the entire 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).

2.1.8 Contractor Personnel.

2.1.8.1 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.

2.1.8.2 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 for the duration of the project, up to and until final acceptance by the Government PM 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.

2.1.8.3 Personnel Requirements.

The Project Manager, Site POC, and respective alternate(s) shall be able to read, write, speak, and understand English and shall be on site to coordinate permits, clearances, and receive shipments/material related to the contract

2.1.8.4 Minimum Contractor Experience.

All work shall be performed by an experienced Telecommunications Contractor. The Contractor's key personnel shall have a minimum of 3 years of experience in Telecommunications Systems installations.

2.1.9 Warranty

The Contractor shall provide a warranty that shall be, at a minimum, IAW the NETCENTS standard or equivalent. 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.

2.1.10 Manuals and Practices.

The Contractor shall provide the latest version of operation, installation, and maintenance manuals and practices/users guide for each system installed as provided by the original manufacturer with all new equipment.

2.2 SPECIFIC REQUIREMENTS.

The contractor EFI&T the following task:

- Approximately 13,500 feet of 36-St SM FOC from ITB910 to ITB1365.
- Approximately 1300 feet of new conduit.
- Approximately 6500 feet Geo-textile fabric type innerducts.

- One new full-size Network (NW) cabinet with associated power and grounding in ITB1365. Government will remove/relocate an existing storage cabinet currently occupying the space where the new NW cabinet will be installed by the contractor.
- Install two (2) new 36 port FODPs at ITB910 and ITB1365.
- Terminate the new cable at the new FODPs at each building.
- Test the new FOC from ITB910 to ITB1365.

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. The Contractor shall comply with the current TIA telecommunication installation and testing commercial standard and base installation standards. All equipment, supplies, and materials provided shall be new and not refurbished. No equipment, supplies, and material will be provided by the government. All materials used in this SOW must be rust-proof and corrosion-resistant, due to the nature of the environment.

2.2.1 Equipment Cabinets.

All new equipment cabinets shall be lockable and compatible with existing lockable cabinets. Coordinate with the 56CS/SCXP to ensure a common lock/key in all cabinets matching existing locks/keys. Equipment cabinets shall have sufficient ventilation, cable pathway access, and space to allow for maintenance and operation of the equipment. Consideration must be given to wall mounted cabinets to ensure the long-term ability of the cabinet to be mounted, to stay attached to the wall and for the required clearances to service all cabling and equipment installed with the cabinet. Rail settings within cabinets must be secured, be in a level condition and be positioned so all installed hardware and cables interfacing the hardware do not obstruct the closing of doors when door is in its final position. Existing/previously installed cabinets shall be re-used to the maximum extent possible.

2.2.1.1 Grounding and Bonding.

All new and existing racks/cabinets housing equipment for this project, as well as all ladder rack/and cable tray shall be bonded and grounded to the Equipotential Ground Plane IAW TIA-607-B. All Equipment racks and cabinet rails shall be Telecommunications style rails that are unpainted and have drilled and tapped mounting holes IAW DISN Implementation Standards, Ch. 2.7.20 to 2.7.26. Equipment cabinets shall be capable of containing any standard equipment shelves for communications equipment per the current revision of EIA/ECA-310. The Contractor shall test any new or extended ground at the cabinet/rack and at the new grounding/bonding points. The government reserves the right to test and validate newly installed grounds to ensure they meet compliance.

2.2.1.2 Bushings.

All penetrations into the rack/cabinet must be reamed, filed, and have an installed bushing or grommet material. No exposed metal edges shall encounter telecommunication cabling.

2.2.2 Outside Plant Requirements.

2.2.2.1 Existing Maintenance Holes.

The Contractor shall be responsible for pumping out maintenance holes/handholes. Water from maintenance holes/handholes shall be pumped into the storm drain system unless it is not available; then it may be pumped out onto the surrounding ground, if there is no impact to roads, driveways, or vehicle traffic. Mud and debris shall be disposed of IAW base requirements. If Contractor comes across a manhole with contaminated water, the Contractor shall coordinate with the environmental office in Base CE.

2.2.2.2 Measurements.

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

2.2.2.3 Underground Utilities Markings.

The Contractor shall coordinate with base agencies to ensure markings are placed over existing base infrastructure prior to digging or horizontal directional boring and shall take precautions to protect existing infrastructure. The Contractor is responsible for repair of any damage caused during installation when the infrastructure is clearly marked. The Contractor is responsible for maintaining all markings and for ensuring AF Form 103 (Dig Permit) remains current.

2.2.2.4 Closures for Cable Splicing in Maintenance Holes.

2.2.2.4.1 Fiber Optic Splices.

Intermediate cable splices shall be minimized and consist of fusion splices in a high quality re-enterable splice case. Only splice closures intended for underground applications shall be used in the underground system. The Contractor shall use standard re-enterable fiber splice closures. The closures shall have adequate strength to protect the splice and maintain cable shield electrical continuity in the below ground environment. The Government quality inspector shall have the opportunity to inspect the inside of the splice case before closure pressure testing and encapsulation is performed. A coil of 25 feet of cable shall be provided on each cable entering and leaving a splice case in a MH or HH.

2.2.2.5 Splice Connectors.

All splicing shall be performed in accordance with RUS Bulletin 1735F-401, Standards for Splicing Fiber Cable. The Core Alignment fusion splice method shall be used for all splicing and terminations of fiber optic cable.

2.2.2.6 Labeling.

The Contractor shall label all equipment and cables they install, and cables identified for re-use in accordance with TIA-606-B and as directed by the 56CS/SCXP.

2.2.2.6.1 Cable Tags.

All tags shall be permanently labeled, easily visible and corrosion resistant. Install cable tags in all maintenance holes/hand-holes, 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. Tagging and labeling of new cables shall be IAW the following:

- **Fiber Optic Tags:**

A36L8.3F
FO B1365-910, 1-36

Line One: A = Armored Sheath (otherwise leave blank) 36 = Fiber Count. L = Loose Tube Buffer or (T) Tight Tube Buffer. 8.3 = Single Mode. F = Filled core (otherwise leave blank).

Lines Two and three: 1365-910 = From-To Building numbers. 1-36 = Cable/strand Count.

2.2.2.6.2 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-B910
FO B910-B1365, 1-36

2.2.2.6.3 New Ducts.

New ducts shall be permanently labeled on the wall of each building/Maintenance Hole (MH)/Handhole (HH) indicating the connecting building/Maintenance hole/Handhole at the other end of the duct (for example, “To MH-306H”). The same information shall appear on the Contractor’s completed as-built-drawings.

2.2.2.7 Cable Terminations.

2.2.2.7.1 Fiber Optic Terminations.

Newly installed fiber optic cables shall be terminated on new fiber optic distribution panels using fusion spliced pigtails with LC (per UFC 3-580-01) connectors or LC fusion splice direct connectors. Distribution panels shall be designed for rack mounting in 19-in (48 cm) racks or wall mounted as required. Panels shall be sized accordingly to cable and method of termination.

2.2.2.7.2 Grounding and Bonding.

In the Equipment room/Mechanical room in which the cable is to be terminated, there is either a telecommunications main grounding busbar (TMGB) or a telecommunications grounding busbar (TGB). As required, if a grounding busbar doesn't exist in the equipment room/mechanical room, then the Contractor shall provide it and bond it to the electrical service equipment (power) ground. The grounding conductor shall be tagged with a nonmetallic tag as close as practicable to the point of termination in a readable position. The information on the tag shall contain the following information "If this connector or wire is loose or must be removed, please call Base Communications Office" or some similar wording. Although it is not anticipated that any splicing will be required in a Maintenance hole, should there be some practical reason that a splice be made, the cable shield (armor) shall be bonded and continuous throughout the cable length. As required and in addition, the splice case shall be bonded to the Maintenance hole bonding ribbon, if it exists. 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 TIA 607.

2.2.2.8 FOC Maintenance Loop.

The Contractor shall install a minimum of a 50-foot fiber optic cable maintenance loop at the first MH from the building, at each splice point MH location and at every third manhole. The maintenance loop shall be properly labeled and securely supported by two cable hooks. Cable hooks are to be positioned so the highest one supports the underside of the top of the coil and the bottom hook supports the underside of the bottom of the coil. The maintenance loop shall have a cable tag. The same information shall appear on the Contractor's completed as-built-drawings.

2.2.2.9 Maintenance Holes/Hand-holes.

2.2.2.9.1 Cable Racks and Cable Rack Supports.

Cable racks shall be installed in maintenance holes and hand holes as required - this includes existing MHs/HHs. Splices shall not be supported by the cables that enter each end of the splice case. The splices shall be supported by cable hooks under the splice case. 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.

2.2.2.10 Underground Conduit System.

The Contractor shall be responsible for any required trenching and/or boring necessary to lay the duct system. Contractor is also responsible for backfilling ditch lines and compaction of fill materials with appropriate compaction tools. Provide a minimum of 36" cover of clean fill above the conduit. Backfill material shall be clean and free from all organic material, clay, marl or unstable materials, debris, lumps, or broken paving. No rocks or stones larger than 3 inches in diameter shall be allowed in backfill. Material for backfill may be material resulting from excavation if it meets the above requirements. Directional drilling will be used for major road crossings. 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.

2.2.2.10.1 Composition.

The ducts shall be corrosion resistant and 4-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. For unique situations the ducts shall be EPC-80-PVC (Schedule 80) IAW NEMA TC-2, high density polyethylene (HDPE) SDR 11.5, Galvanized Iron Pipe (GIP) or "thickwall" stainless steel. Schedule 80 PVC shall be limited to risers. High density polyethylene (HDPE) SDR 11.5 shall be used when directional boring is used. GIP or stainless steel shall be used under 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.

2.2.2.10.2 Installation.

Installation of underground conduits/ducts shall be IAW RUS Bulletin 1751F-643 and RUS Bulletin 1753F-151. Ducts installed beneath roads, sidewalks, parking areas, other paved surfaces, or areas to be paved, etc. shall be installed a minimum of 36" below grade. Ducts installed beneath roads and parking areas shall be protected IAW Para 2.2.3.11.10. It is understood that in some locations, especially at paved surface crossings, the Contractor may bore and substitute 4-inch I.D. HDPE conduit (Roll pipe, suitable for the application) for 4-inch PVC conduit. This substitution is acceptable. However, do not terminate the HDPE directly in a MH/HH but instead install 4-inch I.D. PVC stub out(s), a minimum of 5-10 feet out of the manhole and couple the HDPE to the PVC. Also, if HDPE is used, it shall be SIDR 11.5 so that the inside diameter of the HDPE will match the inside diameter of the PVC. All ducts did not install a crossroads, sidewalks, parking areas, or areas to be paved, etc. shall have a minimum of 36 inches ground cover, where possible. The Contractor shall provide other protective measures, concrete cap, etc., in those areas where the minimum ground cover cannot be achieved. Grading of ducts and drain slope of ducts shall be accomplished IAW BICSI "Outside Plant Design Reference Manual" (OSPDRM) and RUS Bulletin 1751F-643.

2.2.2.10.3 Bends and Sealing.

All bends between MHs/HHs shall be a minimum of ten times (10X) the diameter of the duct size (i.e, 4-inch duct = 40 inches) with the sum of bends in all directions not exceeding a total of 90 degrees where practical. Coordinate with 56CS/SCXP if runs have bent that total more than 90 degrees is required. Ducts shall have bell ends and enter a MH/HH perpendicular to the surface of the wall through which it is entering. All ducts/inner-ducts entering MH/HH shall be sealed. Universal duct plugs or removable putty sealants may be used. Upon completion of conduit sections, a rigid test mandrel ¼" (6.4mm) smaller than the inside diameter of the conduit shall be pulled through two diagonally opposite ducts to ensure proper alignment. In addition, all ducts shall be cleared of loose materials such as concrete, mud, dirt, stones, etc.

2.2.2.10.4 Utility Separation.

When communications ducts cross either power duct or buried power cable, maintain a minimum separation of 3 inches of concrete or 12 inches of well-tamped earth between the two or 12 inches of well tamped earth when parallel; for pipes (e.g., gas, water, oil) maintain 6 inches when crossing or 12 inches when parallel.

2.2.2.10.5 Spacers and Tracer Wire.

Along the length of the duct run, if the ducts are installed by trenching, spacers shall be placed at five (5) foot intervals. At least one duct or roll pipe shall have tracer wire or be otherwise locatable from the surface. All new tracer wire installed for this project needs to have a wire nut and label installed at all wire ends, and those wire ends secured but not connected to grounds. The tracer wire shall be exposed; free from the conduit and capped (insulated). The tracer shall be secured and routed to the maintenance hole or hand-hole neck to a point where maintenance personnel may access the wire without having to enter the maintenance hole/hand-hole and tagged with a label so indicating it as a "Duct Tracer Wire to xxx – Do Not Remove (where xxx is the other end of the wire)." Tracer wires shall not be connected to any grounding system. Tracer wire shall be pulled back from building entrances until it is underground to prevent lightning damage.

2.2.2.10.6 Warning Tape.

Cable warning tape shall be buried one (1) foot below the surface and shall follow the duct route. The tape shall be a minimum of three inches wide and orange in color with the appropriate warning message.

2.2.2.10.7 Entrance Conduits into Existing Maintenance Holes.

When new entrance conduits/ducts or sleeves are required, the Contractor shall bore and install the necessary holes and install the ducts or sleeves, if knockout doesn't exist. Penetration shall not be in such a location through the wall as to block use of existing ducts in the maintenance hole. New ducts will be a minimum of 18 inches from either the floor or ceiling of the maintenance hole if practical. Ducts shall have bell ends and enter the maintenance hole perpendicular to the surface of the wall through which it is entering and shall be installed flush with the interior wall of the maintenance hole. Ducts and openings around ducts shall be sealed to prevent moisture from entering the maintenance holes. Recommend using foam, no more than 2 inches to seal the conduit. The use of hardening foam is prohibited.

2.2.2.10.8 Excavation/Building Penetrations.

All wall penetrations, including inside buildings, shall be restored to meet the required base fire ratings.

2.2.2.10.9 Conduit Protection.

The Contactor shall install the appropriate physical protection required [(concrete encasement, steel tube (casing)] for buried PVC conduits or HDPE Roll pipe, consistent with commonly accepted telecommunications industry practices relative to the task and to the environment in which they are installed and the loads (H-5, H-10, H-20, railroads, flight line, etc.) to which they are expected to be exposed. Type of protection may be dependent upon the specific application and shall be IAW applicable federal, state, or local (Luke AFB AZ Civil Engineering construction requirements) procedures. However, at a minimum, nonmetallic conduits shall be encased in concrete of minimum 3000 lb. /in^2 compressive strength where vehicular traffic is above the pathway. The encasement shall be concrete of a wet type of mix and shall be placed in such a manner as to ensure the concrete surrounds all conduits and no air voids are trapped in the mix a bend or sweep is placed in PVC nonmetallic duct bank between maintenance holes, the duct bank must be encased in concrete with a minimum compressive strength of 3000 pounds per square inch (psi).

2.2.2.10.10 Pull Tape.

All newly installed ducts left vacant shall be provided with a pull tape 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.

2.2.3 New Outside Plant Installation.

This section describes the underground maintenance hole/conduit system, flexible geotextile multiple cell fabric inner-duct and copper and fiber optic cable installation requirements. The Contractor shall design and install Customer-Owned "Outside Plant Telecommunications Infrastructure" in according with TIA-758-B. Each cable installation should be coordinated with the 56CS/SCXP so that the impact on the building users is properly coordinated. The sequence of installation is at the Contractor's discretion.

See Project Sketches below for reference and estimated distances of existing and proposed infrastructure and cables routes. This is only a proposed solution. The Contractor is free to make any recommendations pertaining to the accomplishment of this requirement in their proposal.
The Contractor shall install underground outside plant infrastructure as described below.

2.2.3.1 Infrastructure Installation.

The contractor shall install the following new infrastructure. All new locations and distances are approximate. (See Project Sketches for reference).

2.2.3.1.1 Duct bank Infrastructure.

The contractor shall install a new one (1), 4-Inch PVC conduit and 1 (one), 3-Inch, 3-cell (total of 3) Geotextile Fabric Innerduct (inside new conduit) IAW the following table. *Distances (Dist.) are approximate and shown in feet.*

From	To	Dist.	Sketch	Comment
HH-44-A2	HH-44-A1	390	7, 8	None.
HH-44-A1	HH-44-A3	575	8	None.
MH-44-C	NEMA Box (B1365)	70	8,10	Note-2
NEMA Box (B1365)	New Cabinet location (Inside B1365)	200	8,9,10	Note-1

Note:

1. *The contractor is required to install the new 1, 4-inch conduit (indoor rated) inside B1365 from the new NEMA box (outside wall, note-2). The conduit must penetrate inside the building with by core drill to the wall.*
2. *The new NEMA box will be at the same Height as the existing NEMA box. The exposed conduit on the outside wall must be SCHD 80. The conduit and the NEMA box must be painted to match the wall color. Refer to sketch 8 and 10. Coordinate 56CS/SCXP for additional information.*

2.2.3.1.2 Geo-textile Type Innerduct.

The contractor shall install new 1 (one), 3-Inch, 3-cell Geotextile Fabric Innerduct (inside existing conduit) as shown at the following table.

Each new 3-cell will have separate thread color, and one cell shall be detectable. Distances (Dist.) are approximate and shown in feet. When installing new geotextile innerduct, the installer is required to pull the geotextile innerduct to the nearest step on the side wall and tie off. If no step is available, the installer is required to install new step as required.

From	To	Dist. (ft).	Sketch
MH-32	MH-33	410	1, 2
MH-33	MH-33-1	240	2
MH-33-1	MH-143	275	2
MH-143	HH-144	305	2
HH-144	HH-145	425	2
HH-145	MH-32-C	205	2
MH-44-A3	MH-44-C	260	8
HH-32-D	MH-200	335	2, 3
MH-200	HH-201-C	40	3
HH-201-C	HH-201-B	135	3
HH-201-B	HH-201-A	380	3
HH-201-A	HH-202	385	3
HH-202	HH-203	525	3, 4
HH-203	HH-203-1	480	4
HH-203-1	HH-204	445	4
HH-208-1	HH-209	280	7
HH-209	HH-210	520	7
HH-210	HH-44-A2	495	7

Note:

At some location (conduit between MHs/HHs) the new Geo-textile Innerduct will be installed with existing Innerduct and/or cable.

2.2.3.1.3 New Network (NW) Cabinet Installation.

The contractor shall install a new full size NW cabinet (compliant with ANSI/EIA-310-D). in ITB1365 in a location occupied by an existing storage cabinet. The government is responsible for removing/relocating the existing storage cabinet. See Sketch 10 for more information. The Contractor shall install a new 20Amp breaker and install 2 outlets with 20V 120VAC inside the new cabinet, as well as one rack mounted PDU; suggested PDU is a Great Lakes GLPDU19-815HV Basic Power Distribution Unit, or equivalent. Coordinate 56CS/SCXP for the final location for the new cabinet placement ~~and the removal/disposal of the existing cabinet~~.

2.2.3.1.4 New FODP Installation.

The contractor shall install a new 36-port FODP at each ITB910 (in the existing cabinet) and ITB1365 (in the new cabinet). See Sketch-9 and 10 for additional information. Coordinate 56CS/SCXP for the final location for the new FODP.

2.2.3.1.5 Fiber Optic Cable Installation.

The Contractor shall install single mode (SM), loose buffer tube, water blocked, outside plant (OSP) cable suitable for underground 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 regarding manufacturers' cable marking, jacket, rip cords, water blocking, fiber color coding, jacketing materials, etc. In addition, the fibers shall comply with industry standards regarding mode field diameter, core cladding concentricity, attenuation, and dispersion characteristics at 1310 nm and 1550nm. The fiber optic cable shall be on reel tested prior to installation.

All fiber optic cables shall be installed in new (installed under this project) or existing geo-textile type innerduct/innerduct.

Install new 36-St SM FOC IAW the following table. Distances are approximate and shown in feet.

From	To	Dist.	Sketch
B910 (Vault)	MH-21	310	1
MH-21	MH-22	195	1
MH-22	MH-31	420	1
MH-31	MH-32	335	1
MH-32	MH-33	410	1, 2
MH-33	MH-33-1	240	2
MH-33-1	MH-143	275	2
MH-143	MH-144	305	2
MH-144	MH-145	425	2
MH-145	MH-32-C	205	2
MH-32-C	HH-32-D	295	2
HH-32-D	MH-200	335	2, 3
MH-200	HH-201-C	40	3
HH-201-C	HH-201-B	135	3
HH-201-B	HH-201-A	380	3
HH-201-A	HH-202	385	3
HH-202	HH-203	525	3, 4
HH-203	HH-203-1	480	4
HH-203-1	HH-204	445	4
HH-204	HH-205	505	4, 5
HH-205	HH-205-1	870	5
HH-205-1	HH-206	600	5
HH-206	HH-207	795	5. 6
HH-207	HH-208	810	6
HH-208	HH-208-1	845	6, 7
HH-208-1	HH-209	280	7
HH-209	HH-210	520	7
HH-210	HH-44-A2	495	7
HH-44-A2	HH-44-A1	390	7, 8
HH-44-A1	HH-44-A3	575	8
HH-44-A3	HH-44-C	260	8
MH-44-C	NEMA Box (B1365)	70	8, 10
NEMA Box (B1365)	New FODP location (Inside B1365)	200	

2.2.3.1.6 Fiber Optic Cable Termination.

The Contractor shall terminate the new 36 SM FOC at the new FODP (each ITB910 and ITB1365) by providing new LC connectors. The contractor shall test (Para 2.2.13.1.1) the new FOC between ITB910 and ITB1365 and provide the test result to 56CS/SCXP PM.

2.2.4 Project Residue.

All residue from this project shall be disposed of off base and in accordance with Federal, State, local and base environmental laws, and regulations. All residue produced by horizontal directional boring operations (i.e., slurry) shall be disposed of off base on the same day the residue is produced, at an appropriate disposal facility at the contractor's expense, IAW federal and state environmental laws and regulations. Under no circumstances will the contractor stage or store boring residue in slurry ponds or other containment areas on Luke AFB AZ.

2.2.5 Site Restoration.

The Contractor shall restore all disturbed grounds to the "as found" condition or better after installation. The Contractor shall comply with all base ground's restoration requirements. Common use areas shall be restored with sod.

2.2.6 Service 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 that are properly identified. The Contractor shall coordinate planned outages with the site POC at least 14 calendar days in advance of the outage if the implementation necessitates disruption of service, (e.g., communications, electrical, or other utilities).

2.2.7 National Pollution Discharge Elimination System (NPDES).

If required by Base Civil Engineer (BCE), the Contractor shall obtain approvals for NPDES at State and/or Federal level [in some locations this may be called the Storm Water Pollution Prevention Plan (SWPPP)]. The storm water/environmental plan is the sole responsibility of the Contractor. Base Civil Engineering/CEV will review and advise to ensure minimum standards and storm water controls/BMPs are in place to ensure compliance; this is a compulsory item in the SOW and contract. The Contractor shall implement storm water controls/BMPs to ensure sediment, because of storm water runoff, does not enter storm drainage channels and/or inlets.

The Contractor shall conduct an initial meeting within 10 days of the Contractor site survey with the base environmental office to identify NPDES preparations and/or the storm water/environmental plan.

The Contractor shall review the NPDES requirements applicable to the base; develop a plan to comply with the NPDES; obtain approval of the NPDES plan from all appropriate government agencies; and comply with any other applicable state requirements for construction.

2.2.8 Identification/Marking.

The Contractor shall clearly mark all Contractor-Furnished Property and Equipment (CFP/CFE) with their company's name. The Contractor shall place an easily read, very visible, sign (minimum 8.5" x 11") on large containers, construction equipment, or un-manned rental vehicles while on the Government installation indicating the company name and both the Contractor and Site POC's names and local telephone numbers.

2.2.9 Installation Schedules.

The Contractor shall provide a complete milestone schedule that denotes project activities to include time-phased start and completion dates for the project and sub-projects associated with the installation of the components and system. A project schedule is required NLT 10 calendar days after the Notice to Proceed (NTP) is given via PDF format(CDRL A002).

2.2.10 Weekly Status Reports.

The Contractor shall prepare a bi-weekly Status Report and distribute to the Government Contracting Officer (CO), the System Engineer(s), the Government Project Manager, and other base personnel as required. The purpose of the report is to inform IPT members of project progress, problems being encountered, and other topics necessary/beneficial to ensure success and timely completion of the contract requirements (CDRL A003).

2.2.11 Drawings.

2.2.11.1 As-Built Drawings.

The 56CS/SCXP shall supply existing system drawings, and the Contractor shall provide updated drawings in Visio for building and rack elevation; Visio and .pdf for OSP. These drawings shall depict the entire pathway and details of the installation, including but not limited to labeling, cables, innerducts and maintenance holes/handholes, conduits, maintenance loops, distances, bores, trenches, building entrances. Detailed butterfly drawings will also be required. If the existing cable diagram or butterfly drawings are not available; the contractor shall create the missing cable diagram/ butterfly drawings to include all the components used in this project. The Contractor shall record/deliver geospatial data of new outside plant distribution system (CDRL A001).

2.2.11.2 Butterfly Drawings.

The Contractor shall record and submit butterfly, cable path and building penetration drawing information for all new installations including butterfly drawings for all maintenance holes and pull boxes that contain new or reused FOC. Drawings shall record the path and arrangement of new and reused fiber optic cables, splices, and the arrangement duct banks, ducts, inner-duct and shall show maintenance hole orientation with respect to geodetic north. Drawings shall be submitted in an easily read electronic format such as pdf. Scanned data sheets or legible sketches are acceptable.

2.2.11.3 Geospatial Deliverables.

The Contractor shall collect and record geospatial data and provide as-built documentation (shape files) of all new installed maintenance hole/duct system components and new cable components (including metadata) compatible with the Cyberspace Infrastructure Planning System (CIPS) Visualization Component (CVC) drawing system. Data points shall be recorded at the center of each manhole/hand-hole lid and at intervals not to exceed 25 feet along cable routes. Sufficient data points shall be recorded to capture any change in direction along the route. All GPS coordinates shall have +/- 3 feet accuracy for all readings. The government will review the shape files and transcribe the information to the CVC system. Provide geospatial data via CD as Environmental Systems Research Institute (ESRI) Shape files. Shape files shall be delivered within 30 days of project completion (CDRL A001).

2.2.12 Test and Acceptance/Installation Test Plan.

The Contractor shall provide a test plan as to how the system shall be pre-tested, in-progress-tested, and post-tested. Draft Cut-over Test Plan shall be submitted NLT 10 calendar days after Notice to Proceed (NTP). Government comments will be provided after review of the draft. A final plan will be submitted 30 calendar days before the actual cut-over date. The Contractor shall test the system to demonstrate to the Government quality assurance representative that the system is fully operational and meets or exceeds the specified requirements and that the system is fully ready to be placed into service. These tests shall be accomplished prior to the system being placed into service (CDRL A005).

2.2.12.1 Testing.

The Contractor shall furnish all test equipment and personnel required to conduct testing. The Contractor shall record all inspections and tests as they are accomplished and make all test sheets/inspection results available to 56 CONS via AF Form 3000 for 56 CS/SCXP representative review and acceptance.

The Contractor shall notify the 56 CS/SCXP at least 5 calendar days prior to any testing. All testing will be IAW accepted telecommunications industry standards for the type of test being conducted. The Contractor shall provide test reports in electronic .pdf format to the government within 10 calendar days of completing the testing. Test results shall be organized in sequential order and provided in summary and detail formats. Test reports shall be in summary and detail formats. Contractor is required to locate/repair any testing irregularities if caused by the installation.

Any splicer's errors detected shall be corrected in the splice in which they were made. It is assumed that the cable is delivered fault free from the manufacturer. No cable faults or splicer's errors are allowed in the new cable. Contractor is required to locate and repair cable faults or splicer's errors if caused by the installation.

The Contractor shall provide on-site support during the acceptance testing. The Contractor shall participate with the Government in testing the complete communications system. When any system, subsystem, component, or requirement test fails to meet the requirements of the test, Government acceptance will be withheld until such time as the cause of the failure is corrected to the Government's satisfaction. After appropriate corrective action has been taken, all tests including those previously completed, related to the failed test and the corrective action shall be repeated and successfully completed prior to Government acceptance.

2.2.12.1.1 Fiber Optic Tests.

All strands of all fiber optic cables shall be tested IAW TIA 526-7 Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant, or equivalent. As a minimum, the following tests shall be performed. Both Optical Time Domain Reflectometer (OTDR) and Optical Power Meter tests will be used for all end-to-end circuits. Between FODPs, bi-directional testing at 1310 nm and 1550 nm is required. NOTE: Testing of the Fiber Optic Cables on the reel shall be provided to the 56 CONS on AF Form 3000 for 56 CS/SCXP review/acceptance prior to installation.

2.2.12.1.1.1 Optical Attenuation.

End to end attenuation tests shall be conducted on all fiber optic cable strands. Tests shall be accomplished to ensure the installed cable is within the specified commercial industry parameters.

2.2.12.1.1.2 Distance.

Test to determine the installed cable length between optical patch panels. All strands of all fiber optic cables shall be tested.

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 NLT 10 calendar days after Government Witness Testing is complete (CDRL A006).

2.4 Final Acceptance.

The Contractor shall schedule a final project walk-through with the Base POC when all physical work has been completed.

2.5 Deliverable Summary.

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

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
A006	Test Report	DI-QCIC-80512
A007	OPSEC Plan	DI-MGMT-80934B

3.0 GENERAL INFORMATION.

3.1 Period of Performance.

The period of performance for the project shall not exceed 180 calendar days from the Notice to Proceed (NTP).

3.2 Place of Performance.

The place of performance is Luke AFB AZ.

3.3 Hours of Operation.

The Contractor shall routinely work during normal duty hours of the site, which are Mon – Fri 7:30 am to 4:30 pm, excluding federal holidays. 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 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 base POC.

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.

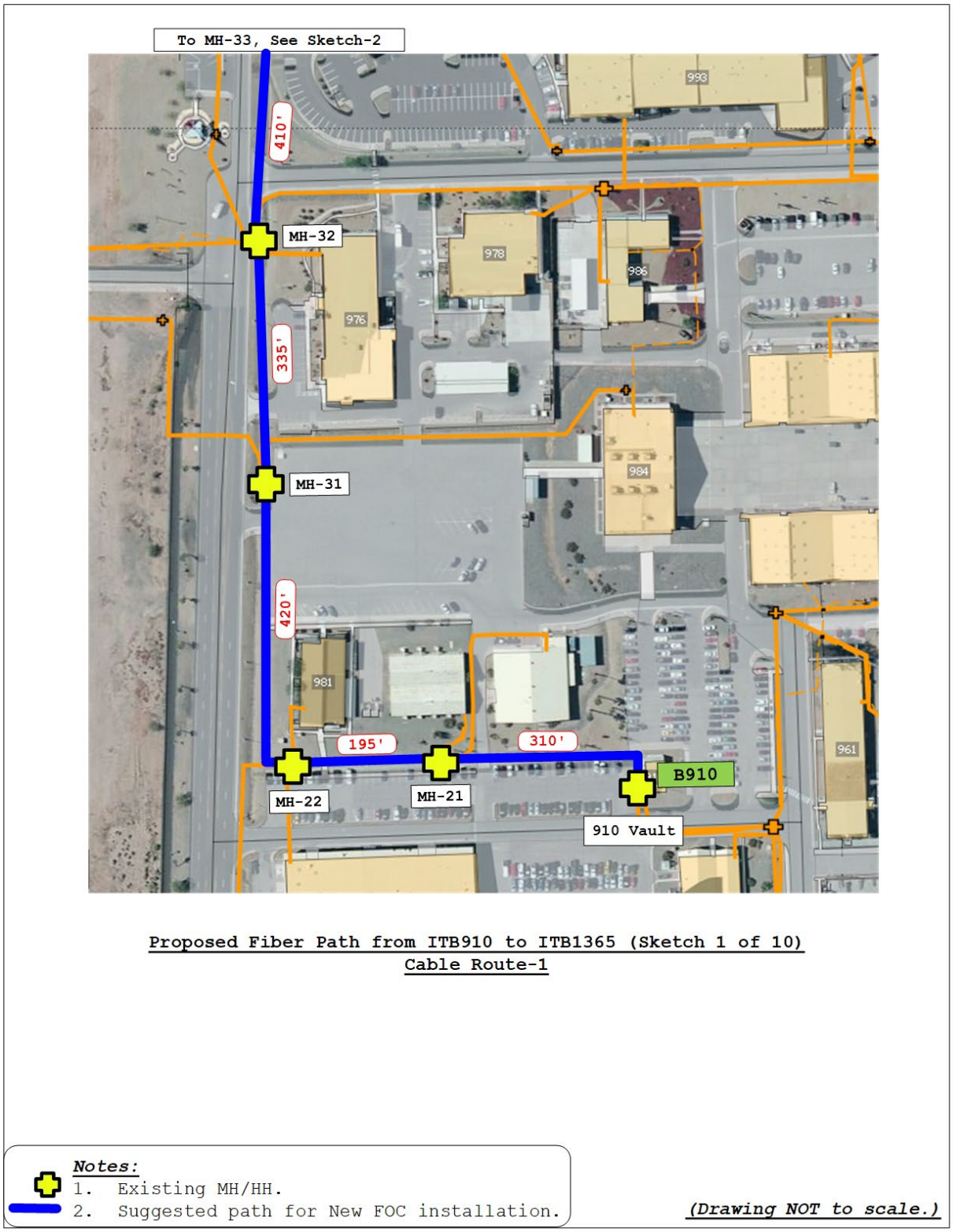
4.0 APPENDICES.

4.1 Appendix A: APPLICABLE STANDARDS.

The following list is not all-exclusive. The Contractor shall comply with applicable commercial code and standards.
AFMAN 91-203 – Air Force Occupational Safety Fire and Health Standards (Attached)
OSHA CFR 29 Part 1910-268 – Telecommunications
NEMA TC 2- Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
TIA-606-B Administration Standard for Telecommunications Infrastructure
TIA-568-C.0 - Generic Telecommunications Cabling for Customer Premises
TIA-568-C.1 - Commercial Building Telecommunications Cabling Standard
TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standard
TIA-568-C.3 - Optical Fiber Cabling Components Standard
TIA-607-B Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
TIA-526-7- Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant
TIA-569-B - Commercial Building Standard for Telecommunications Pathways and Spaces
TIA-570-B –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 345-65 (PE-33) – Specification for Shield Bonding Connectors
RUS Bulletin 1735F-401, Standards for Splicing Copper and Fiber Cable
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
RUS Bulletin 1753F-201 (PC-4) – RUS Standard for Acceptance Tests and Measurements of Telecommunications Plant
RUS Bulletin 1753F-207 (PE-87) – REA Specification for Terminating Cables
NFPA 70 - National Electric Code
Unified Facilities Criteria 3-260-01 – Airfield and Heliport Planning and Design
Unified Facilities Criteria 3-580-01 – Information and Communications Technology Infrastructure Planning and Design
FGDC-STD-007.3-1998 - Geospatial Positioning Accuracy Standards Part 3: National Standard for Spatial Data Accuracy

AETC First 400 Feet Guidance with Luke Supplement (Attached)
Luke AFB Master Specifications (Attached)

5.0 Project Sketches.



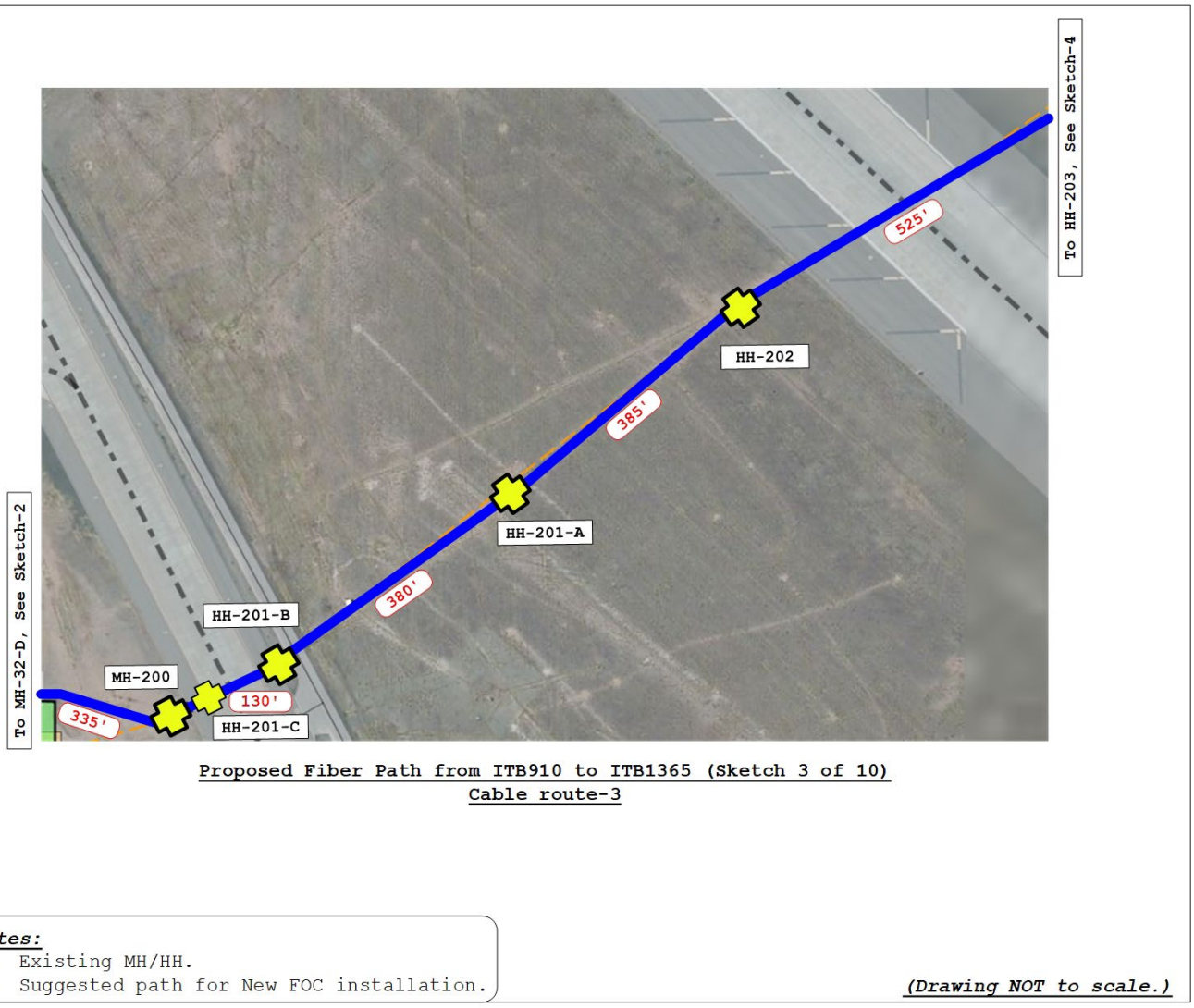
Sketch-1 (Cable Route-1)

Proposed Fiber Path from ITB910 to ITB1365 (Sketch 2 of 10)
Cable Route-2

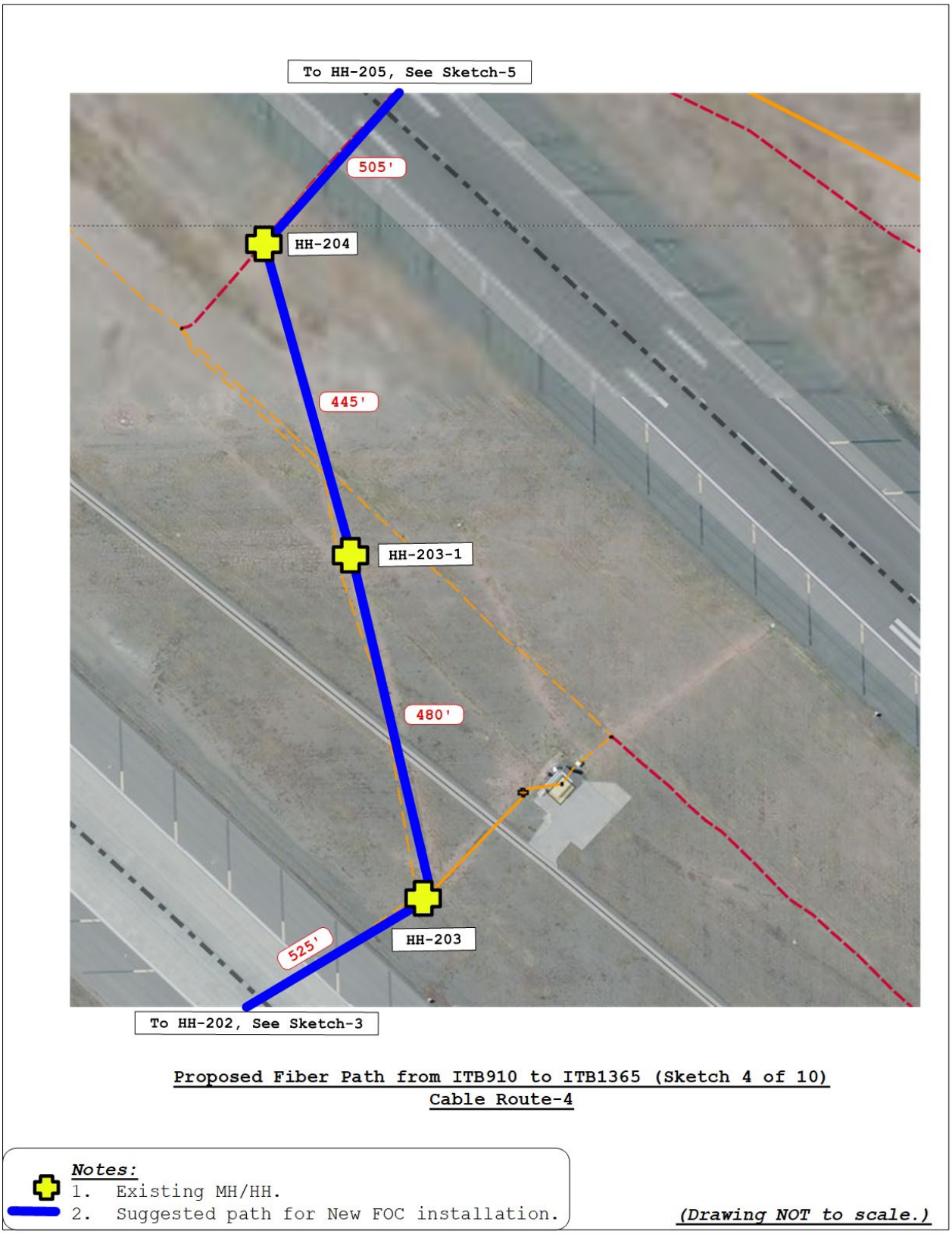
Notes:
1. Existing MH/HH.
2. Suggested path for New FOC installation.

(Drawing NOT to scale.)

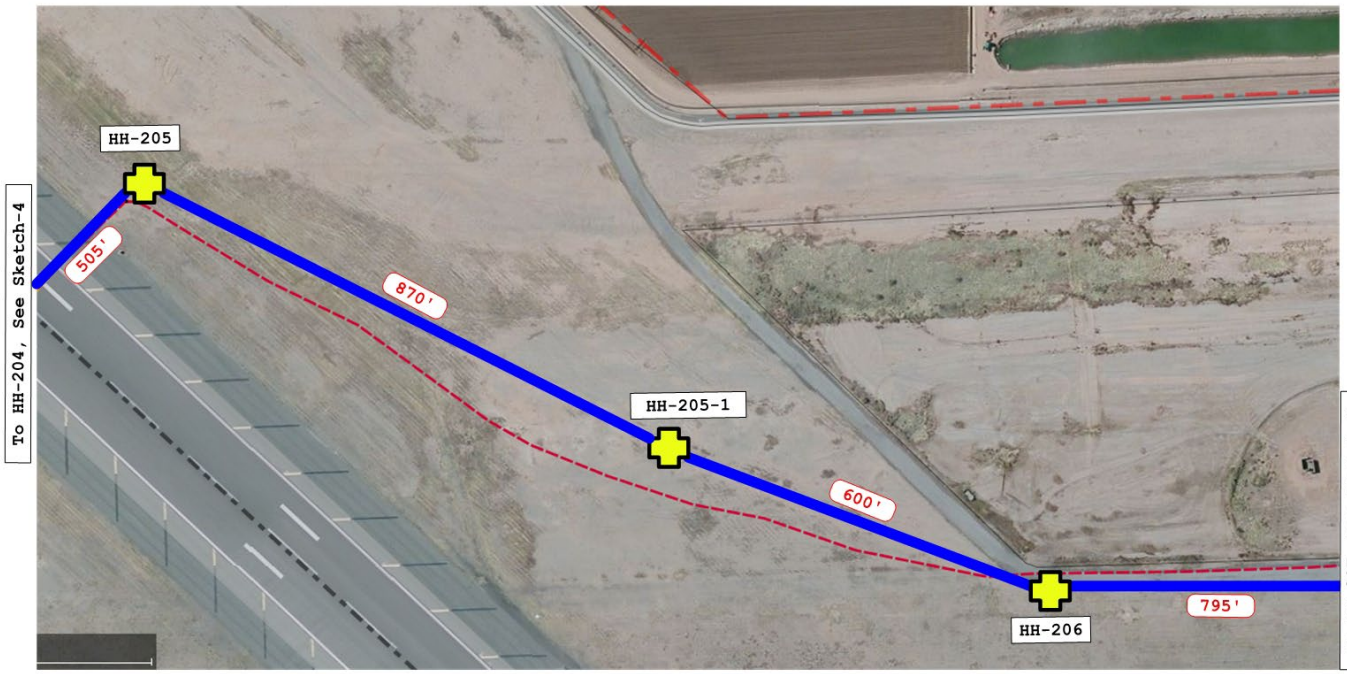
Sketch-2 (Cable Route-2)



Sketch-3 (Cable Route-3)



Sketch-4 (Cable Route-4)

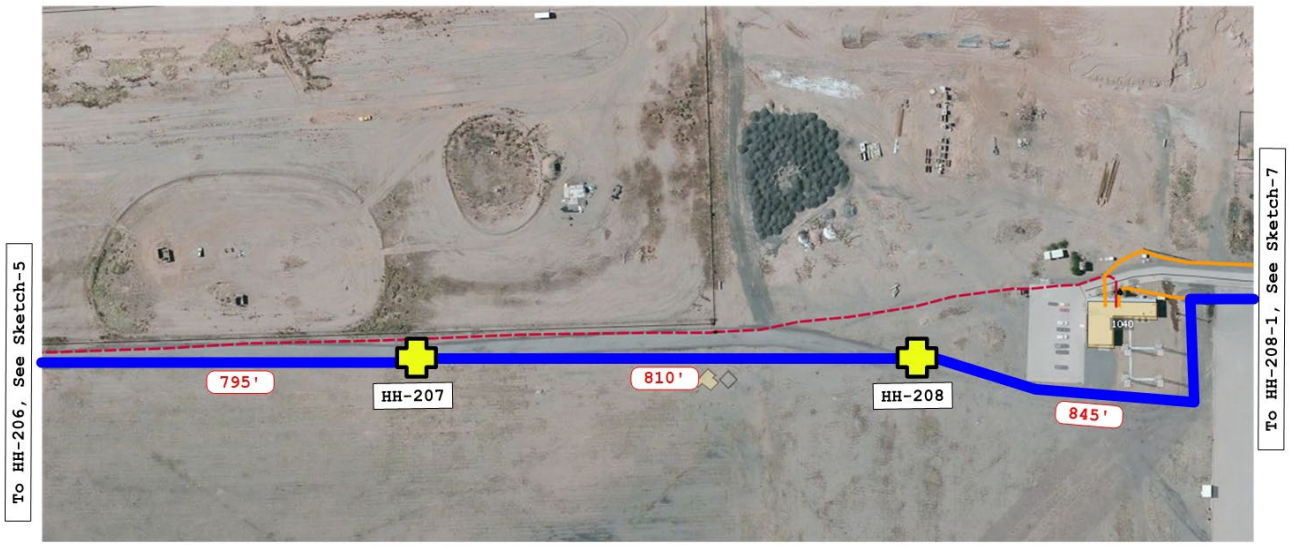


Proposed Fiber Path from ITB910 to ITB1365 (Sketch 5 of 10)
Cable Route-5

Notes:
1. Existing MH/HH.
2. Suggested path for New FOC installation.

(Drawing NOT to scale.)

Sketch-5 (Cable Route-5)

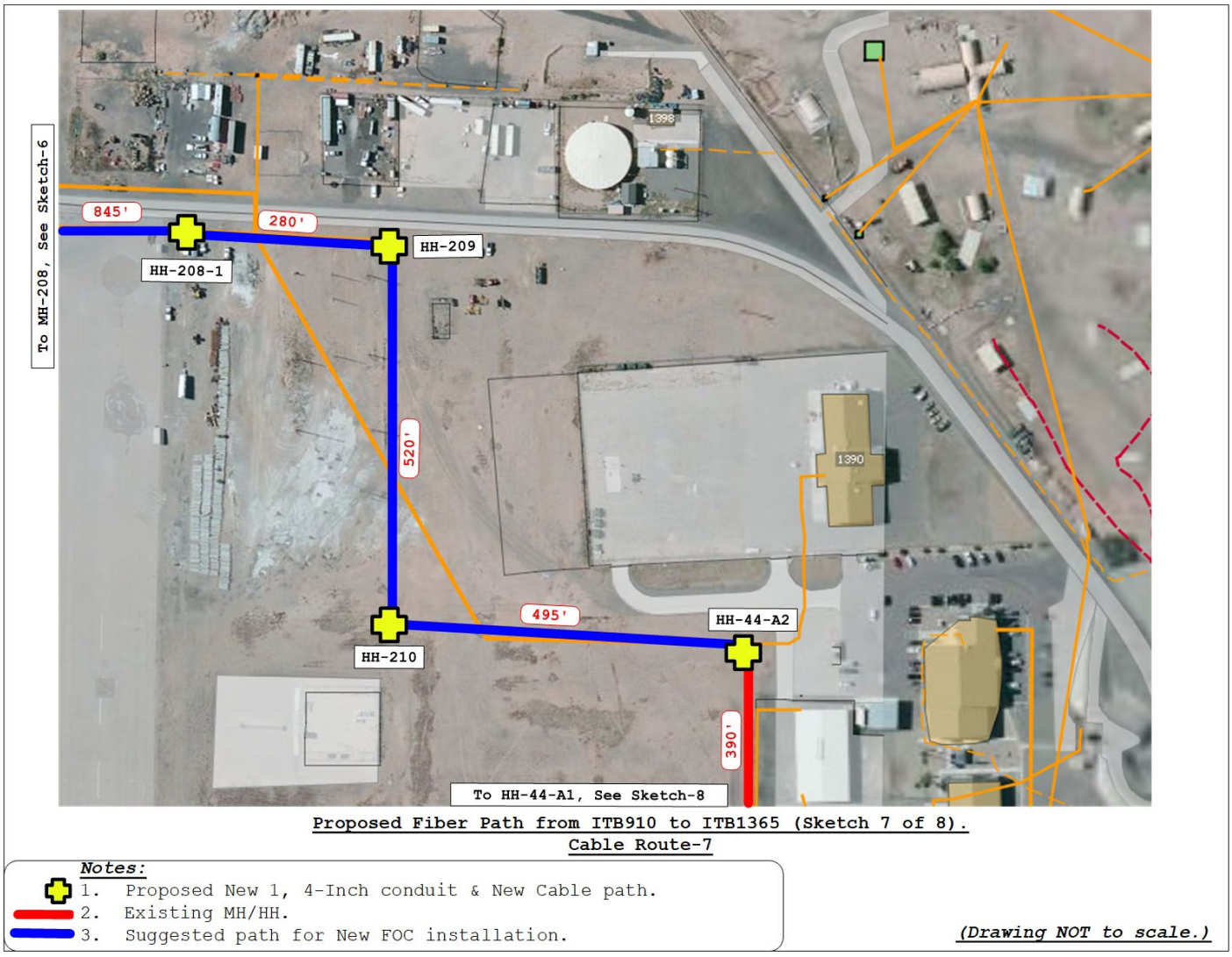


Proposed Fiber Path from ITB910 to ITB1365 (Sketch 6 of 10)
Cable Route-6

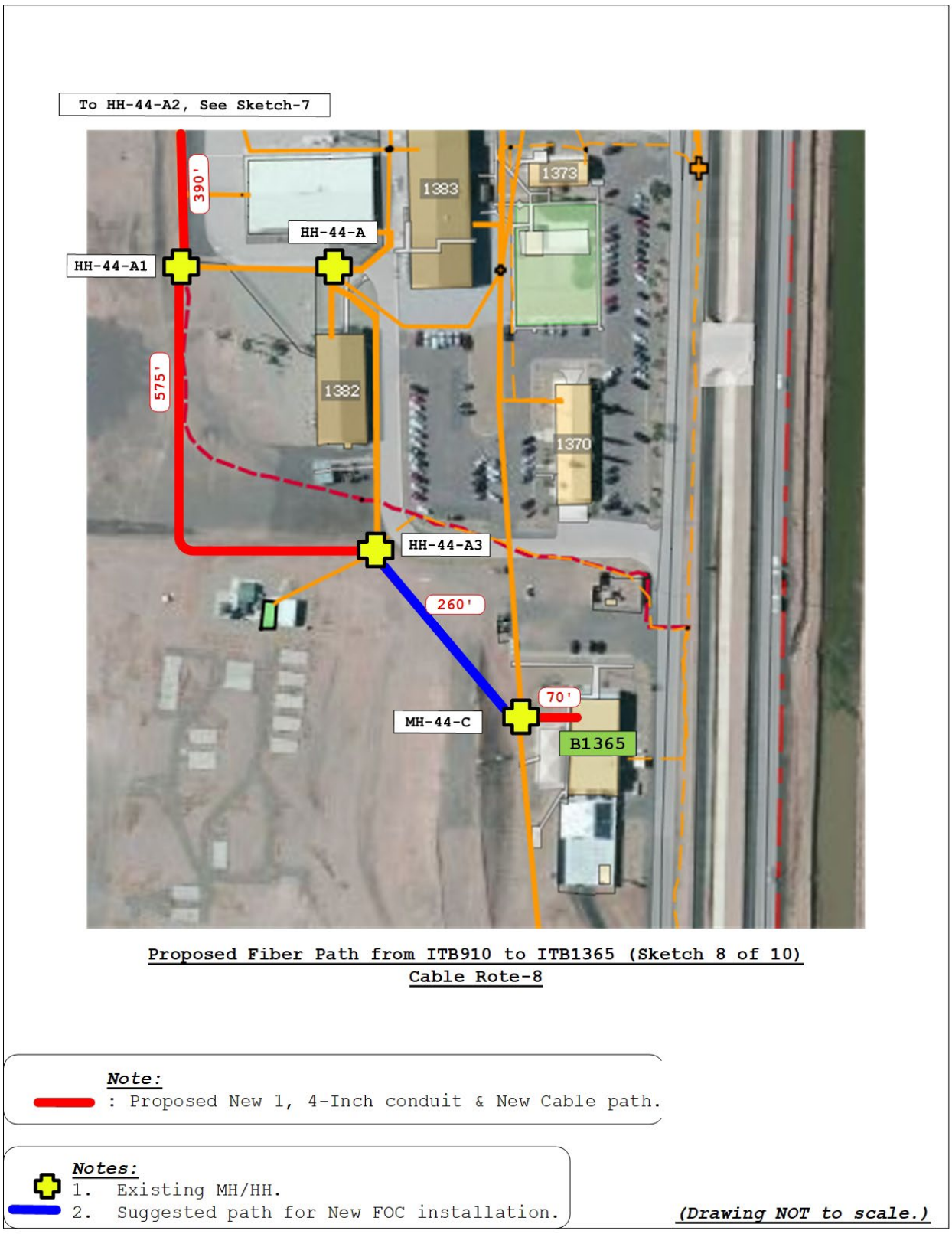
Notes:
1. Existing MH/HH.
2. Suggested path for New FOC installation.

(Drawing NOT to scale.)

Sketch-6 (Cable Route-6)

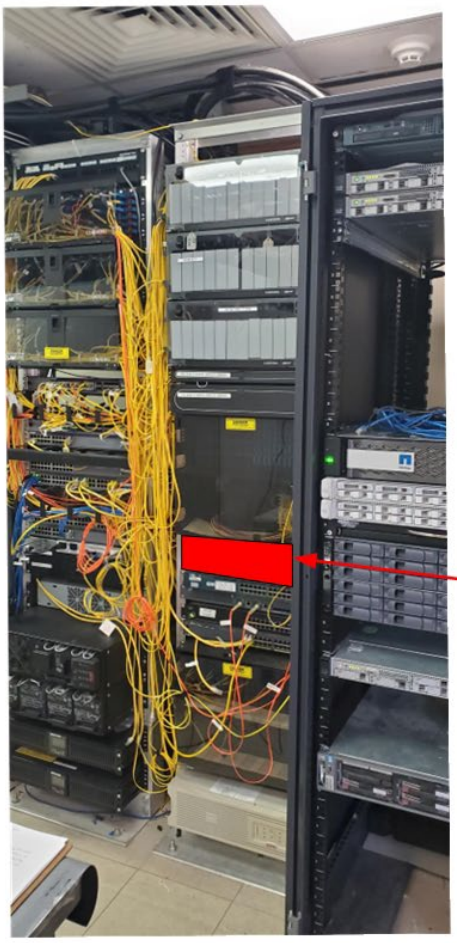


Sketch-7 (Cable Route-7)



Proposed Fiber Path from ITB910 to ITB1365 (Sketch 8 of 10)
Cable Rote-8

Sketch-8 (Cable Route-8)

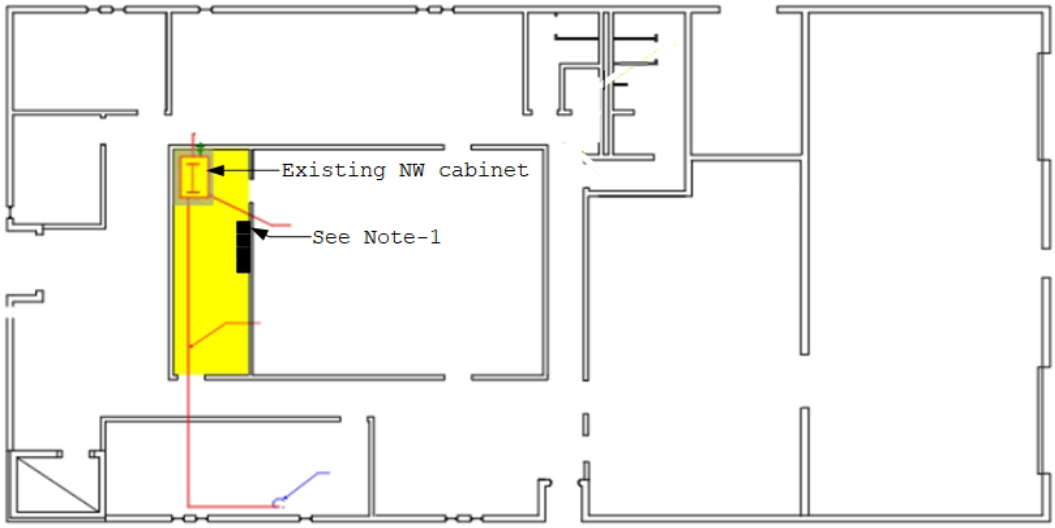


(Existing Cabinets)

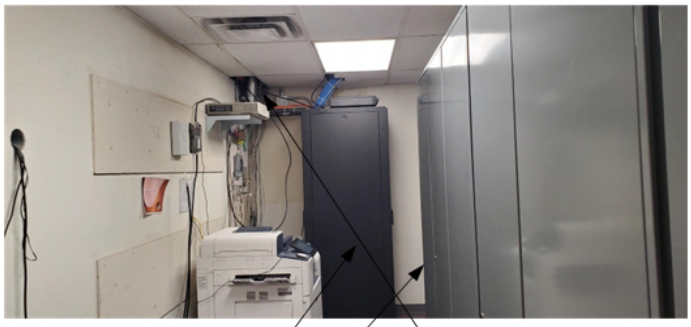
ITB910

(Drawing is NOT to scale.)

Sketch-9 (ITB-910)



ITB1365 (Top View)



Outside Cable Entrance from from HH 44C

Notes:

1. Government will remove/relocate the existing cabinet. Contractor will install the new NW cabinet in the base approval location.
2. Existing cable entrance through false ceiling. The new cable will follow the existing cable route and terminate at the new cabinet by installing new FODP.
3. New conduit run (Inside B1365). The new run will be installed next to the existing conduit.
4. The location of the new installation is for suggestion only. The contractor should design their own installation/path and verified/approved by 56CS/SCXP.

ITB1365

(Drawing is NOT to scale.)

Sketch-10 (ITB-1365)

6.0 Examples of deliverables (drawings and others):

Figure 1 Sectional Grid Drawing Example. (This Example from CITS TSIP Template is included for layout reference purposes only.)

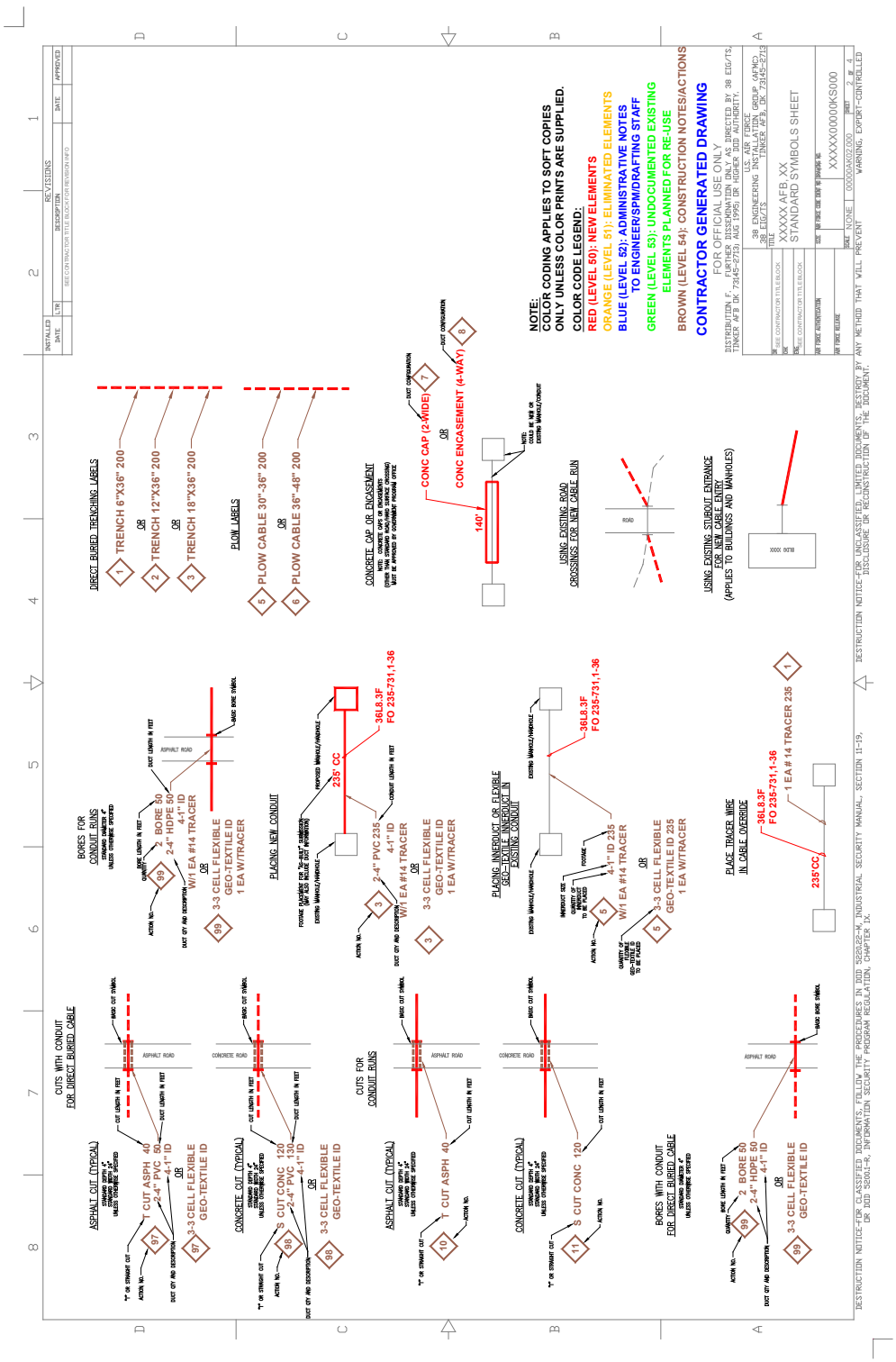


Figure 2 Typical Sectional Symbols Sheet 1(from CITS TSIP Template)

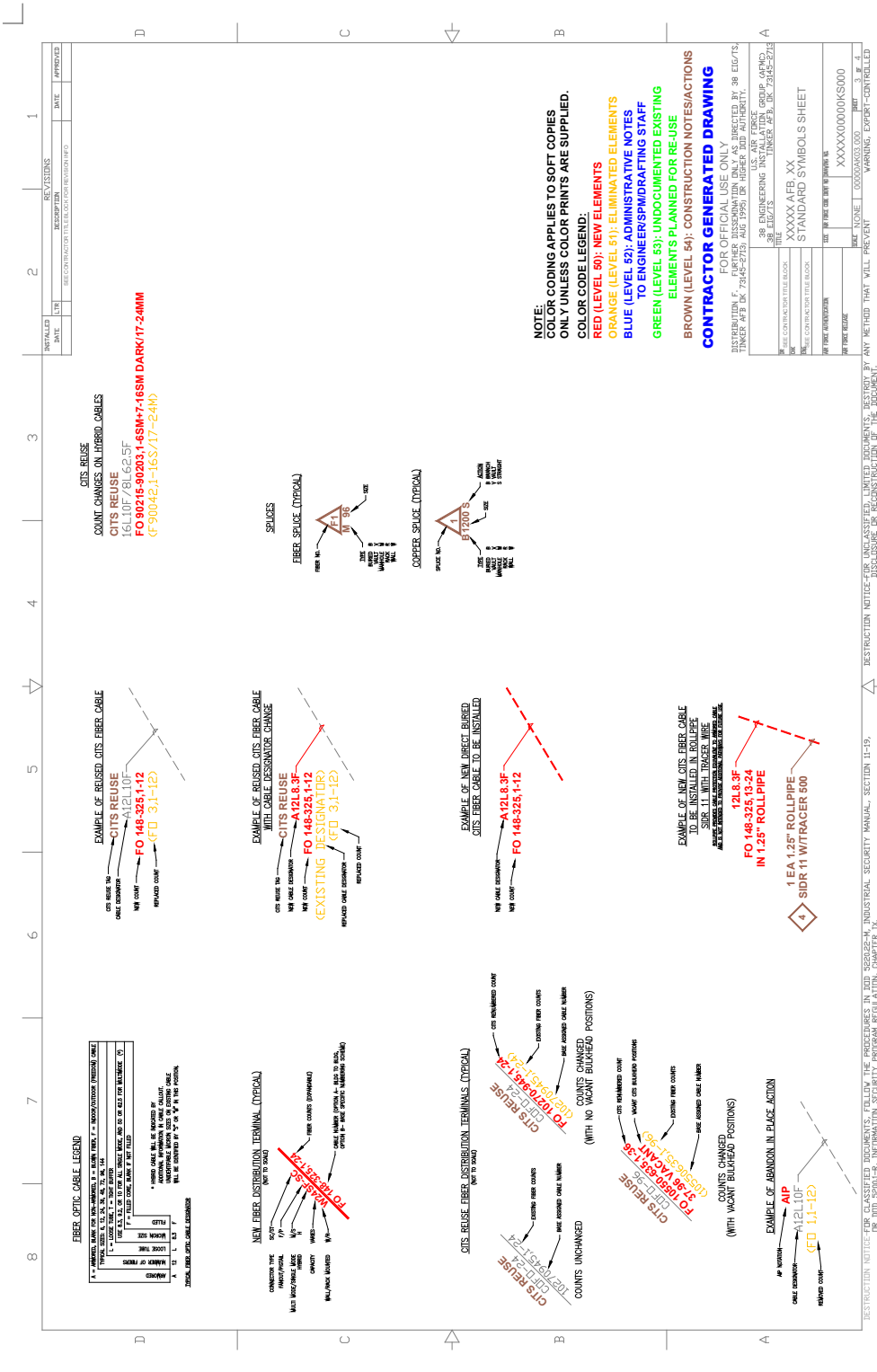


Figure 3 Typical Sectional Symbols Sheet 2(from CITS TSIP Template)

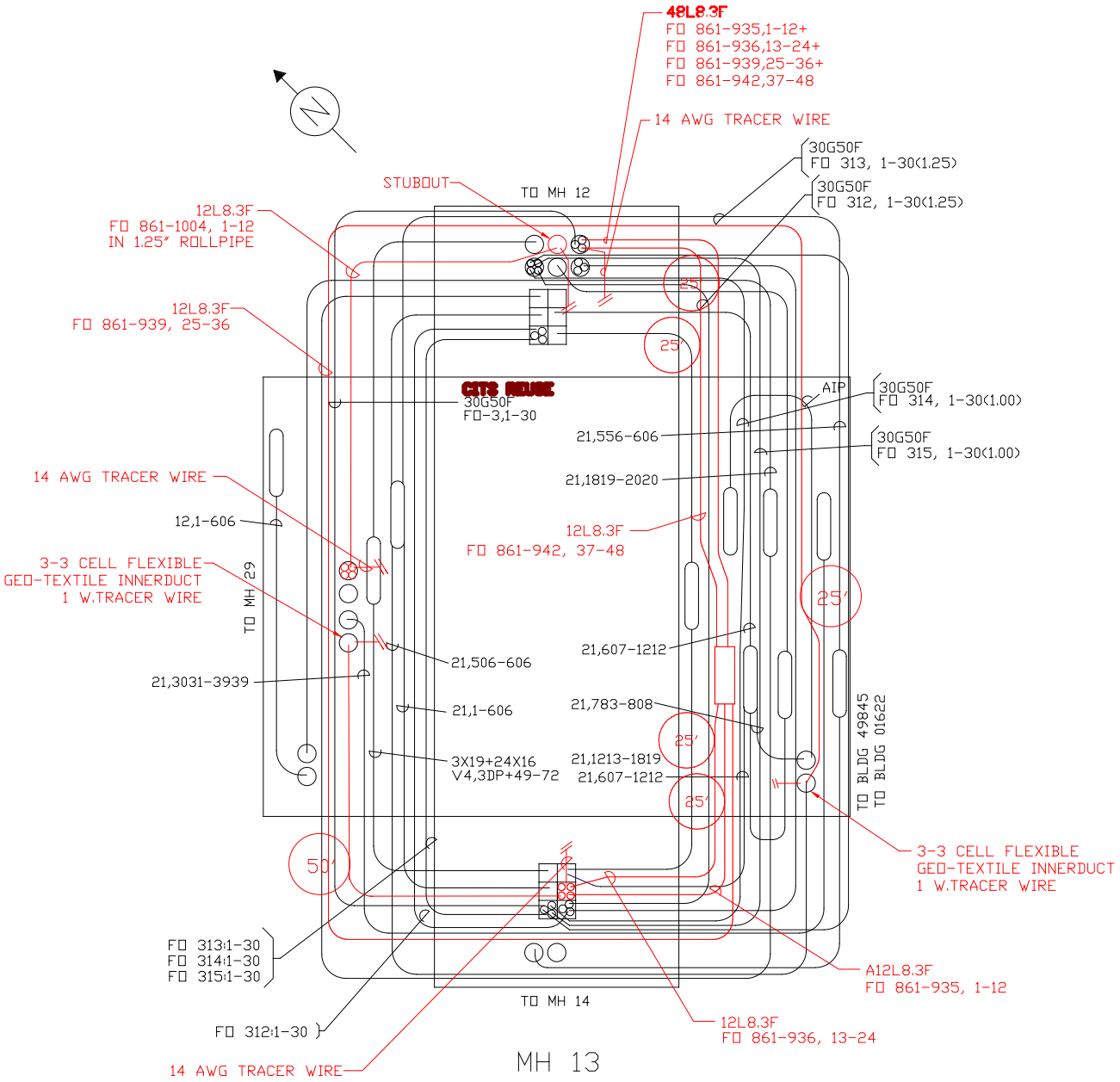


Figure 4 Typical Manhole Butterfly Drawing (from CITS TSIP Template)

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 pull box). 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
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 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 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
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 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 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 Ductbank, 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 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 type

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 TYPES	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	_	_