4.0 SPECIFIC REQUIREMENTS

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

4.1 Outside Plant Requirements

This section describes the underground MH / conduit system, flexible geotextile multiple cell fabric inner-duct and fiber optic cable installation requirements. The Contractor shall install Customer-Owned "Outside Plant Telecommunications Infrastructure" IAW UFC 03-580-01, 21-010 USAISEC Outside Plant Design Criteria, BICSI OSPDRM, and 758B Customer-Owned Outside Plant Telecommunications Infrastructure Standard. Each cable installation shall be coordinated with the PM so that the impact on the building users is properly coordinated. The sequence of installation is at the Contractor's discretion.

ONLY DIRECTIONAL BORING IS ALLOWED FOR THIS REQUIREMENT.

See Project Sketches **in section 8.0 Drawings/Diagrams** 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.

4.1.1 Requirement

Fiber Optic Cable Installation to B4188, B4189, B4190, B4191 & B4192

The Contractor shall install the following new infrastructure; approximately 7,110 feet of 12-strand Single Mode (SM) fiber optic cable (FOC) and associated terminating equipment to the four facilities identified in Figure 1 of this SOW. Additionally, the contractor will EFI&T one maintenance hole (MH), 2,210 feet of 4inches conduit, and 2,360 feet of 3x3 inches Geo-textile fabric. Coordinate exact locations with PM.

Note: A maintenance loop/coil of 75 feet shall be left available at the first MH from the building; at each splice point MH location; every change of direction; and at every third MH. 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.

4.1.2 Outside Plant Installation

This section describes the underground cables, flexible geotextile multiple cell fabric, innerduct and MH/HH plus conduit system installation requirements. The Contractor shall design and install Customer-Owned Outside Plant Telecommunications Infrastructure in accordance with ANSI/TIA-758-A. Each cable installation shall be coordinated with PM so that the impact on the building users is properly coordinated. The sequence of installation is at the Contractor's discretion.

4.1.2.1 Conduit Systems and Inner-ducts Installation

4.1.2.1.1 Maintenance Hole / Hand Hole

Maintenance holes installed under this SOW shall have an American Association of State Highway and Transportation Officials (AASHTO) rating of H-20. Unless otherwise stated, MHs shall have minimum interior dimensions of 6'W x 8'L x 7'H (Width, Length, Height); HHs shall have a minimum interior dimension of 3'W x 5'L x 4'H or 4'W x 4'L x 4'H (Width, Length, Height). New hand-holes shall have a self-latching torsion assisted full-opening diamond plate stainless steel 2-piece lid. Maintenance holes/Hand holes shall be furnished with cable rack hardware, pulling irons, a sump, water resistance gaskets, bonding ribbon and a grounding system; predrilled duct entry holes [sealed with knockouts configured for splayed entry in the end walls)] with duct terminators to accept 4-inch I.D. schedule 40 conduit. It is understood that some Maintenance Holes are precast with bonding ribbons or some similar connection, to the manhole rebar and therefore do not require a ground rod. This method of grounding in lieu of a ground rod is satisfactory if the achieved impedance to ground is twenty-five (25) ohms or less. MHs/HHs shall be of concrete construction and meet the requirements of TIA -758, paragraphs 5.2.1 and/or 5.2.2. Polymer concrete (i.e., Quazite) construction is NOT authorized.

Prefabricated MHs/HHs are preferred. MH/HH shall be installed so that they are reasonably level on a gravel bed of 6 inches to allow drainage of water from the walls. The gravel bed should extend 8 inches to 12 inches beyond the outer edges of the MH/HH. MH/HH covers shall be lockable and labeled with 1/8 inches raised letters stating "COMMUNICATIONS".

4.1.2.1.2 Duct Bank Infrastructure

The Contractor shall EF&I six 4" Schedule 40 PVC and/or HDPE SIDR 11.5 conduit approximately 2,210 feet per the table below. Distances are approximate and shown in feet.

Buildings 4188, 4189, 4191, 4192 will require building penetrations and installation of 12"x12" NEMA rated pull box. Refer to section **2.4.4 Asbestos** for guidance.

Install one (1) new 4-Inch Inside Diameter (ID) PVC Duct			
From	**To**	**Dist.**	**Comment**
MH 422-1	B4192	170'	See Note 1 & 2
MH 422-1	B4191	170'	See Note 1 & 2
MH 422-2	New MH	450'	See Note 1 & 2
New MH	MH 417-6	550'	See Note 1 & 2
New MH	B4189	550'	See Note 1 & 2

MH 417-4	B4188	320’	See Note 1 & 2

Note-1. Recommend Paved surfaces to be bored.

Note-2. Building entry: Stub up into a 12”x12” NEMA rated wall mounted pull box and penetrate the building. Size of the NEMA box will be determined by the installed depending on the number/size of the entry conduit. Coordinate with 502CS/SCXP for additional Information.

4.1.2.1.3 New Metallic Conduit Infrastructure (Not Applicable)

The Contractor shall EF&I

4.1.2.1.4 Geo- textile Fabric Installation

The contractor shall EF&I (3” X 3) Detectable Geotextile Fabric Innerducts (AKA Maxcell or equivalent) inside the new 4-inch conduit. Each new 3-cell shall have a separate thread color. Distance and approximate and shown in feet in the following Table:

Install the following 3” 3-cell Geotextile fabric Inner-ducts				
From	**To**	**Quantity**	**Distance**	**Comment**
MH 422-1	B4191	3	170’	See Note 1, 2, and 3
MH 422-1	B4192	3	170’	See Note 1, 2, and 3
MH 422-2	New MH	3	600’	See Note 1, 2, and 3
New MH	MH 417-6	3	550’	See Note 1, 2, and 3
New MH	B4189	3	550’	See Note 1, 2, and 3
MH 417-4	B4188	3	320’	See Note 1, 2, and 3

Installation Notes:

Note-1: Distances are approximate. The Contractor shall measure and verify all distances prior to installation. The Contractor shall provide a minimum of 3 business days’ notice to the Contracting Office and PM prior to working in all maintenance holes and ITBs/EBs. The 3 business days’ notice allows for scheduling of necessary escorts. Failure to provide the minimum time required could result in project delay at the Contractor’s expense.

Note-2: Recommend paved surfaces to be bored.

Note-3: Building Entry: Stub up into a NEMAs box rated wall mounted pull box and penetrate the building. Size of the NEMS box will be determined by the installed depending on the number/size of the entry conduit. Coordinate with PM for additional information.

4.1.3 Fiber Optic Cable Installation

The Contractor shall EFI&T single mode (SM), loose buffer tube, water blocked, outside plant (OSP)/Inside Plant (ISP) cable suitable for underground applications and indoor application. 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.

4.1.3.1 MH 422

At MH 422, the contractor shall identify the strands (12 each) of FOC (LG-230) feeding/serving Bldgs.: 4188, 4189, 4191 & 4192. After identifying the strands (12) the contractor shall splice the identified strands to the new 12 SM FOC from each building inside the same splice case. The contractor is required to keep 12 SM cable designed for B4190.

4.1.3.2 B4188 to MH 422

The Contractor shall install approximately 3,520' of new 12-strand SM FOC from the existing data cabinet at this location (FODP) to MH 422 via Cros Warehouse (one side of the warehouse to the other side of the warehouse), MH417-4, MH417-5, MH417-6, New MH, MH 422-2 and MH 422-1. Inside the warehouse (from building entry location to the final FODP location) the contractor may follow the existing aerial cable path/route (inside orange corrugated innerduct). Inside the building/warehouse the new FOC must be installed inside the new Planum rated/fire retardant innerduct.

4.1.3.3 B4189 to MH 422

The Contractor shall install approximately 2,340 feet of new 12-strand SM FOC from the existing data cabinet located in the breakroom at this location (new 12-port FODP) to MH 422 via Cros Warehouse (one side of the warehouse to the other side of the warehouse), New MH, MH 422-2 and MH 422-1. Inside the warehouse (from building entry location to the final FODP location) the contractor may follow the existing aerial cable path/route (inside orange corrugated innerduct). Inside the building/warehouse the new FOC must be installed inside the new Planum rated/fire retardant innerduct.

4.1.3.4 B4191 to MH 422

The Contractor shall install approximately 760 feet of new 12-strand SM FOC from this location (new 12-port FODP) to MH 422 via Cros Warehouse (one side of the warehouse to the other side of the warehouse) and MH 422-1. Inside the warehouse (from building entry location to the final FOPD location) the contractor may follow the existing aerial cable path/route (inside orange corrugated innerduct). Inside the building/warehouse the new FOC must be installed inside the new Planum rated/fire retardant innerduct.

4.1.3.5 B4192 to MH422

The Contractor shall install approximately 760 feet of new 12-strand SM FOC from this location (new 12-port FODP) to MH 422 via Cros Warehouse (one side of the warehouse to the other side of the warehouse) and MH 422-1. Inside the warehouse (from building entry location to the final FOPD location) the contractor may follow the existing aerial cable path/route (inside orange corrugated innerduct). Inside the building/warehouse the new FOC must be installed inside the new Planum rated/fire retardant innerduct.

Installation Notes:

1. All fiber optic cables shall be installed in new or existing geotextile innerduct/innerduct between the MHs.
2. Inside the Warehouse the FOC will be installed inside new Planum rated/fire retardant innerducts.
3. From the entry point into the warehouse to the final termination location (FODP), it is recommended to follow the existing FOC (Aerial) path.
4. Inside the warehouse the new FOC must secure to the building infrastructure.
5. The contractor is required to test (before and after installation) all the FOC to each Bldgs.: 4188, 4189, 4190, 4191 & 4192 from CN2500 and provide the test result to 52CS/PM.
6. The contractor shall coordinate/verify with PM the final location for new FODP at each warehouse/building.
7. The contractor is required to coordinate closely with PM to verify the strand count for each building and before performing any splicing. Also, the contractor is required working with PM to arrange downtime for each building/warehouse.

4.1.4 Building Termination

The Contractor shall install a total of FODPs at the following locations. Coordinate with PM for location:

4.1.4.1 B4188

The Contractor shall install one 12-port FODP in the existing data cabinet. Terminate the new 12-strand SM (indoor/outdoor rated AKA Freedom) FOC inside the new 12-port FODP using fusion spliced CCH Pigtailed Splice Cassettes, **12 F, LC UPC duplex, Single-mode (OS2), single-fiber (250 µm).** Verify the locations of the data cabinet and FODP with the 502d CS PM.

4.1.4.2 B4189

The Contractor shall install one 12-port FODP in the existing data cabinet. Terminate the new 12-strand SM (indoor/outdoor rated AKA Freedom) FOC inside the new 12-port FODP using fusion spliced CCH Pigtailed Splice Cassettes, **12 F, LC UPC duplex, Single-mode (OS2), single-fiber (250 µm).** Verify the locations of the data cabinet and FODP with the 502d CS PM.

4.1.4.3 B4191

The Contractor shall install one 12-port FODP in the existing data cabinet. Terminate the new 12-strand SM (indoor/outdoor rated AKA Freedom) FOC inside the new 12-port FODP using fusion spliced CCH Pigtailed Splice Cassettes, **12 F, LC UPC duplex, Single-mode (OS2), single-fiber (250 µm).** Verify the locations of the data cabinet and FODP with the 502d CS PM.

4.1.4.4 B4192

The Contractor shall install one 12-port FODP in the existing data cabinet. Terminate the new 12-strand SM (indoor/outdoor rated AKA Freedom) FOC inside the new 12-port FODP using fusion spliced CCH Pigtailed Splice Cassettes, **12 F, LC UPC duplex, Single-mode (OS2), single-fiber (250 µm).** Verify the locations of the data cabinet and FODP with the 502d CS PM.

7.0 DRAWING/DIAGRAMS

7.1 Figure 1: Fiber Optic Cable Routes

Notes:

1. Existing MH/HH.
2. New MH.
3. Install new cable in Existing Conduits.
4. Install new cable in new conduit.

(Drawing NOT to Scale & Distances are Approximate)