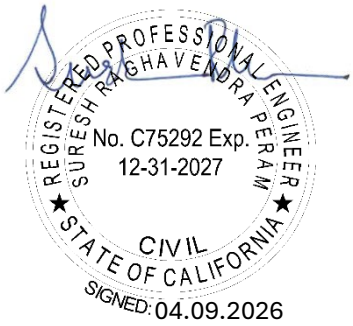
COLORADO RIVER INDIAN TRIBES

CPUC Broadband Deployment Phase II

Blythe Fiber to the Premise

Construction Specifications



Final

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1.0 GENERAL

LOCATION OF WORK

The project is located in the State of California within Riverside County along approximately 6 miles on 6th Avenue, Wells Road, Quail Run Road, and various residential streets.

PROPOSED WORK

The work on this project includes the installation of aerial fiber optic cable, messenger strand, downguys, show-shoes, and grounding units as well as underground handholes, conduit, fiber, passive optical network (PON) pedestals, and splicing activities to provide highspeed broadband connectivity to grant funded premise points.

CONTRACT TIME

The Contractor shall prepare a project schedule and complete construction activities within the duration approved by Colorado River Indian Tribes (CRIT), no more than **120 days**. This includes time to secure necessary materials for the project, as well as splicing and testing of the fiber. If additional time is needed based on ordering delays or shortage of materials, the Contractor shall request additional time and submit a revised project schedule to complete the project. Revised schedules need to be approved by CRIT or the Engineer.

SPECIFICATIONS HIERARCHY

All construction related to the installation of the fiber optic equipment shall be done in accordance with the following documents:

1. Construction Addenda
2. These Construction Specifications
3. Project Plans
4. Rural Utility Service (RUS) (applicable specifications as they apply)

NOMENCLATURE

Any and all reference to the term “Engineer” shall refer to the Field Representative assigned by CRIT.

INTERPRETATION OF QUANTITIES IN PROPOSAL

The quantities appearing in the proposal are approximate only and are to be used for the comparison of bids. Payment to the Contractor will be made only for the actual quantities of work performed and accepted or materials furnished in accordance with the contract at the unit bid price in the proposal.

After the contract is awarded the quantities of work listed by any pay item, or all pay items, may be increased or decreased by a reasonable amount at the discretion of CRIT, without in any way invalidating the unit bid price.

EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE WORK

The bidder shall examine the site of the proposed work and all documents pertaining to the work. It is mutually agreed that the submission of a proposal shall be considered prima facie evidence that the bidder has made such examination and is familiar with the character, quality and quantity of the work to be performed and material to be furnished.

The field conditions set forth shall not constitute a representation or warranty expressed or implied that such conditions are existent. Bidders shall make their own investigations and form their own estimates of the site conditions.

After the submission of the proposal, no complaint or claim that there was any misunderstanding as to the quantities, conditions or nature of the work will be entertained.

WITHDRAWAL OR REVISION OF PROPOSAL

Any bidder may withdraw or revise a proposal after it has been deposited with CRIT, provided such request is received by CRIT, in writing, before the time specified for opening proposals or as stipulated herein.

AWARD OF CONTRACT

Once acceptance of a proposal is delivered to the successful bidder within the times noted above, or at any time thereafter before such proposal has been withdrawn, the bidder shall execute and deliver a contract in the prescribed CRIT template form, within 10 days after receipt of such notice. Concurrently with the contract, the Contractor shall submit all documentation required to enable the agency to execute the contract. The CRIT contract template will be issued to the awarded bidder upon notice of award.

CANCELLATION OF AWARD

CRIT reserves the right to cancel the award of any contract at any time before the execution of said contract by all parties, without any liability against CRIT.

PLANS AND SHOP DRAWINGS

The Contractor shall submit, for review, a proposed schedule of shop drawings and product data submittals. The schedule will show the needed response date for each submittal and will indicate the relationship of the submittal to the project construction schedule.

The Contractor shall submit five (5) hard copies of each shop drawing OR digital copy to the Engineer for review. Each submittal shall be numbered sequentially and shall be submitted in accordance with the schedule established in conjunction with CRIT so as to cause no delay in the work schedule. The Contractor shall certify, by stamp or letter, that he has reviewed and approved the submittal and that it conforms to the

requirements of the contract documents. If this certification is not included, the submittal will be returned without action.

At the time of each submittal, the Contractor shall define and delineate in writing, separate from the certification, any deviations from the contract documents. If the Engineer accepts this deviation, he will authorize the deviation by issuing a change order or if the deviation is minor by endorsement to the letter.

The Engineer will review and return the submittals in accordance with the previously established response date. The review will be only for conformance with the design concept of the work and for compliance with the information contained in the contract documents. The review of a specified item, as such, will not indicate review of the assembly in which the item functions. Review by the Engineer will not relieve the Contractor from responsibility for any errors or omissions in the submittals nor from his responsibility for complying with the contract documents. The only exception is deviations accepted in accordance with the preceding paragraph.

If the submittal is acceptable, one (1) copy with each page stamped “Furnish as Submitted” will be returned to the Contractor. The Contractor shall submit additional copies (as required) to the Engineer.

If the Engineer determines that the submittal requires corrections or is to be rejected, one (1) copy stamped “Furnish as Noted” or “Revise and Resubmit” will be returned to the Contractor. The Contractor will submit five (5) corrected or new copies.

The copy stamped “Furnish as Submitted,” returned to the Contractor, will become a part of the contract documents and will be kept at the job site. Any work done prior to the receipt of this review will be at the Contractor’s risk and expense.

CONFORMITY WITH PLANS AND SPECIFICATIONS

All work performed and all materials furnished shall be in conformity with the plans or indicated in the specifications.

In the event the Engineer finds the materials or the finished product in which the materials are used not in conformity with the plans and specifications, but that reasonably acceptable work has been produced, he shall then make a determination if the work shall be accepted and remain in place. In this event, the Engineer will document the basis of acceptance by contract modification, which will provide for an appropriate adjustment in the contract price for such work or materials, as he deems necessary to conform to his determination based on engineering judgment.

In the event the Engineer finds the materials or the finished product in which the materials are used or the work performed are not in conformity with the plans and specifications and have resulted in an inferior or unsatisfactory product, the work or materials shall be removed and replaced or otherwise corrected by the Contractor at no additional cost to CRIT.

In all instances wherein the items and/or specifications require installation or construction in accordance with either manufacturers’ or suppliers’ recommendations and/or instructions, said recommendations and/or

instructions shall be submitted with the applicable portion clearly marked for approval prior to the commencement of work on that item or portions of the contract.

COORDINATION OF PLANS AND SPECIFICATIONS

The Contractor shall take no advantage of any apparent error or omission in the plans or specifications. In the event the Contractor discovers such an error or omission, he shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and specifications.

COOPERATION WITH UTILITIES

The Contractor shall contact California 811 at least 48 hours in advance and notify interested utility owners prior to start of construction activities so that the utility company has an opportunity to field mark exact location of the underground facilities. The Contractor shall resolve all problems with the utility owners concerned.

Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners at their expense except as otherwise provided for in the construction specifications or as noted on the plans. In the event an existing service is found to be in a materially different location than shown on the plans and requires additional or more costly work on the part of the Contractor, the Contractor shall notify the Engineer immediately for resolution.

It is understood and agreed that the Contractor has considered in his proposal all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans and that no additional compensation will be allowed for any delays, inconvenience, or damage sustained by him due to any interference from the said utility appurtenance or the operation of moving them. If delays are encountered because utility owners have not relocated or adjusted their facilities, the Contractor shall notify the Engineer and the contract time may be adjusted.

It shall be the responsibility of the Contractor to ascertain the need for bracing or shoring of utility poles during the construction of the project and no additional compensation will be allowed for such bracing or shoring.

In general, the contract will indicate various utility items, certain of which are to be relocated or adjusted by the utility owner and others by the Contractor. Any work performed by the Contractor for any utility company, separate from the contract shall be paid for by the utility company and will not be a part of the agency contract.

In the event of any damage to or dislocation of any underground facility, the Contractor responsible for the excavation operation shall immediately notify the owner of such facility and shall not attempt to repair any facility, except those intended for the conveyance or storage of water and sewage. The excavation shall be

left open until the arrival of representatives of the owner. The owner will dispatch its representative promptly to examine the underground facility and, if necessary, make repairs.

If any utility service is interrupted as a result of accidental breakage, the Contractor shall promptly notify the proper authority and shall cooperate with the said authority in the restoration of service. No work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority. The Contractor shall expose all underground utilities and structures, which might interfere with the construction of the project, in order to permit survey location prior to construction.

The Contractor shall assume full responsibility for damages to any underground facility/utility as a result of failing to obtain information as to its location, failing to excavate in a careful and prudent manner or failing to take measures for protection of the facilities/utilities. The Contractor is liable to the owner of the underground facility/utility for the total cost of the repair.

During the design phase, California 811 was contacted to identify entities that have facilities present within project area. The facilities below with contact representatives were identified to be present in the project area. No relocations or adjustments to existing utilities are anticipated as part of the project.

Utility Company	Contact Name	Phone/Email	Utility
ATT Transmission	Joseph Forkert	714-963-7964	Telecommunications
City of Blythe	City Engineer	760-922-6111	Water/Sewer
El Paso Natural Gas (Kinder Morgan)	Nicole Rodriguez	713-420-6387	Gas
Ex El Pipeline Services, LLC	Richard Partin	602-376-8972	
Metropolitan Water Dist.	Substructures Team	213-217-7663	Irrigation
Palo Verde Irrigation District	Jonathan Crowe	760-922-3144	Irrigation
SoCalGas Distribution - Blythe	Geary Ambers	909-335-7955	Gas
Cogent Communications	Jeff York	213-943-9831	Telecommunications
Suddenlink Comm. - Blythe	Sanford Yazzie	928-266-0672	Telecommunications
Southern California Edison (SCE)	Jessica Vibbert	626-658-5746	
Frontier	Bin Liang	BIN.LIANG@FTR.COM	Telecommunications
Conterra Broadband Services	Chris Harris	704-936-1819	Telecommunications
Supplemental Utility Coordination in Close Proximity as Applicable			
Big River Development Enterprises-Water Company	Curtis Martin	Curtis.martin@crit-nsn.gov	Water
Bureau of Indian Affairs-Colorado River Agency Electrical Services	James Crum	James.crum@bia.gov	Electric
Western Area Power Authority			Electric

ATT Transmission: ATT provided facility maps within the project area and those facilities have been added into the plans.

City Of Blythe: A public records request has been submitted to obtain facility maps within the project area. Awaiting response as of 3/17/26.

El Paso Natural Gas (Kinder Morgan): El Paso Natural Gas (Kinder Morgan) provided facility maps within the project area and those facilities have been added into the plans.

Ex El Pipeline Services LLC: Engineer contacted Richard Partin. Richard provided facility maps added into plans as of 12/1/26.

Metropolitan Water District: Engineer contacted Substructures Team**.** Substructures team emailed a conflict clearance stating no objections or pipelines in the proposed area. Provided the project stays within public right away however if appropriate rights are needed for metropolitan right away, an application must be filled out and must contact Kevin Webb at kwebb@mwdh2o.com regarding the process. Metropolitan also requested that a stipulation be added to notify Randy Smith at (760) 305-6619 two days prior to starting any work in the vicinity of their facilities this statement was received as of 12/3/26

Palo Verde Irrigation District: Plans submitted to PVID to review and identify crossings. Crossing information added to PVID Canal Crossing Agreement and in review with CRIT Legal as if 3/17/26.

SoCalGas Distribution: Engineer contacted Geary Ambers. Engineer still in active coordination to receive facility maps as of 3/18/26.

Cogent Communications: Sprint-Cogent provided facility maps within the project area and those facilities have been added into the plans. The following supplemental information has been provided:

- 5-day notice to field locate.
- Pothole and daylighting required to cross.
- No mechanized excavation within two feet of facilities.
- 2 foot horizontal and vertical clearance required.
- Requests to review plans and attend pre con meetings.

Suddenlink: Engineer contacted Sanford in November and again in March regarding obtaining facility maps to draft on plans. Still waiting on response as of 3/17/26.

Southern California Edison (SCE): Engineer contacted Jessica Vibbert. Jessica provided GIS data for overhead conductors and underground. Engineer put data into plans as of 3/4/26.

Frontier: Engineer contacted Bin Liang. Engineer still in active correspondence to receive facility maps as of 3/18/26.

Conterra Broadband Services: Engineer contacted Chris Hrris. Engineer still in active correspondence to receive facility maps as of 3/18/26.

PERMIT CORDINATION

It is the duty of the Contractor to determine that all necessary permits have been obtained. The Contractor shall, at the Contractor’s own expense, obtain all the required permits, which have not been furnished. The Contractor shall comply with all permit requirements until the contract is completed or the permit is closed out or transferred. The Contractor shall be responsible to close out all permits except those authorized by an applicable special provision to be transferred.

In all cases, the Contractor or the person supervising the authorized work shall notify the appropriate permit agency so as to ensure proper inspection by the agency concerned.

The agencies that require permit coordination are as follows:

1) Riverside County
2) City of Blythe
3) Southern California Edison
4) Palo Verde Irrigation District

WORK HOURS

The Contractor shall conduct the work at all times in such a manner and sequence that will assure the least interference with traffic and inconvenience to the public. The Engineer may require the Contractor to finish a section on which work is in progress before work is started on any additional sections if the opening of such section is essential to public convenience.

Working hours are considered **Monday through Friday 8am to 5pm**. Except in emergencies endangering life or property, written permission shall be obtained from the Engineer to perform any work after regular working hours, on weekends, or legal holidays. Prior to the start of such work, the Contractor shall arrange with the Engineer for the continuous or periodical inspection of the work, surveys and tests of materials, when necessary.

2.0 CONSTRUCTION RECORD DRAWINGS AND CERTIFICATION

CONSTRUCTION RECORD DRAWINGS

The Contractor shall prepare and maintain a set of working record drawings that are continuously updated to reflect any and all field adjustments, changes, additions, deletions, etc. as they occur during the course of constructing the project.

The record drawings will be prepared from a complete full size (22 x 34 inch) set of construction drawings, printed on white opaque-bond paper.

The record drawings shall clearly show all differences between the contract work as designed, and as installed, as well as work added to or deleted from the contract.

The Contractor shall maintain one full size set of record drawings at the job site. These shall be kept legible and shall be available for inspection by CRIT or it's representative at all times. All changes in the contract work, or work added, shall be shown in red. The words "RECORD DRAWINGS" with the date shall appear in the lower right area of each sheet.

The record drawings shall contain lateral offset of installed conduit and handholes from back of curb and shall indicate location of all splice points. If curb does not exist, the lateral offset shall be from the edge of pavement. For aerial installations, the record drawings shall contain the actual length of cable attached between poles to the nearest foot.

The Contractor shall submit the record drawings to CRIT for review on a monthly basis and CRIT or its representative shall be the sole judge of the acceptability of the record drawings. Updated record drawings showing all updated construction information shall accompany each progress payment submittal.

Upon completion of the project, the Contractor shall submit final record drawings to CRIT for review approval. Final acceptance of the project will not be given until all such information is submitted.

No measurement or payment shall be made for the preparation of the record drawings, the cost of which shall be included in the contract price.

CERTIFICATION

The Contractor shall submit to the Engineer an original or copy of either a Certificate of Compliance or a Certificate of Analysis, as required, prior to the use of any materials or manufactured assemblies for which the specifications require that such a certificate be furnished.

Certificates shall be specifically identified as either a "Certificate of Compliance" or a "Certificate of Analysis".

The Engineer, CRIT, or its representative may permit the use of certain materials or manufactured assemblies prior to, or without, sampling and testing if accompanied by a Certificate of Compliance or Certificate of Analysis, as herein specified. Materials or manufactured assemblies for which a certificate is

furnished may be sampled and tested at any time, and, if found not in conformity with the requirements of the plans and the specifications, will be subject to rejection, whether in place or not.

Certificates of Compliance and Certificates of Analysis shall comply with the requirements specified herein.

A) Certificate of Compliance:

A Certificate of Compliance shall be submitted on the manufacturers or supplier's official letterhead, and shall contain the following information:

(1) The current name, address, and phone number of the manufacturer or supplier of the material.

(2) A description of the material supplied.

(3) Quantity of material represented by the certificate.

(4) Means of material identification, such as label, lot number, or marking.

(5) A statement that the material complies in all respects with the requirements of the cited specifications. Certificates shall state compliance with the cited specification, such as AASHTO M 320, ASTM C 494; or these Specifications. Certificates may cite both, if applicable.

(6) A statement that the individual identified in item seven below has the legal authority to bind the manufacturer or the supplier of the material.

(7) The name, title, and signature of the responsible individual. The date of the signature shall also be given.

Each of the first seven items specified above shall be completed prior to the signing of the certificate as defined in item seven. No certificate will be accepted that has been altered, added to, or changed in any way after the authorized signature has been affixed to the original certificate. However, notations of a clarifying nature, such as project number, Contractor, or quantity shipped are acceptable, provided the basic requirements of the certificate are not affected.

A copy or facsimile reproduction of the original certificate will be acceptable; however, the original certificate shall be made available upon request.

B) Certificate of Analysis:

A Certificate of Analysis shall include all the information required for a Certificate of Compliance and, in addition, shall include the results of all tests required by these Specifications.

3.0 TRAFFIC CONTROL

Description:

Traffic Control includes all traffic control devices and personnel including, but not limited to vertical panels, temporary signs, message boards, flagmen, uniformed off-duty law enforcement officers, pilot cars with drivers, and flagmen as required by the permitting agency and the approved traffic control plans during construction activities.

Construction:

Traffic control shall be performed as indicated on the approved traffic control plans. Where approved traffic control plans do not exist, or if Contractor deviates from the approved plans, Contractor shall submit new traffic control plans prepared per the Manual on Uniform Traffic Control Devices (current version) and any applicable agency standard to the permitting agency for review and approval prior to commencing work. The Contractor shall allow a minimum of 14 days for the permitting agency to review and approve the traffic control plans for the inventory.

Measurement:

All traffic control items as described above shall be measured on a lump sum basis. No separate measurements shall be made for the preparation of traffic control plans, which shall be considered incidental to the item.

Payment:

Traffic Control will be paid for at the contract lump sum price, which price shall be full compensation for the work complete in place.

4.0 CONSTRUCTION SPECIFICATIONS FOR UNDERGROUND PLANT

Bid Items Used for this Section

Item Number	Item Description
BFO-1	Place 1 Strand Fiber in Conduit
BFO-24	Place 24 Strand Fiber in Conduit
BFO-48	Place 48 Strand Fiber in Conduit
BFO-96	Place 96 Strand Fiber in Conduit

1.0 DESCRIPTION

The Contractor shall furnish and install single mode fiber optic (SMFO) communication cable, for each fiber optic cable as shown on the project plans.

2.0 MATERIALS

A. General Requirements

The SMFO cable shall meet the following industry standards for design and manufacture:

a) Telcordia Generic Requirements of Optical Fiber and Optical Fiber Cable (GR-20)

b) International Telecommunication Union, Characteristics of a bending-loss insensitive single mode optical fiber and cable (ITU-T G.657)

Unless otherwise stated, all fiber optic cable shall be SMFO cables that are of gel-filled buffer tube construction or powder-filled buffer tube construction, with carbon black polyethylene jacket material, and constructed by a certified ISO 9001 or 9002 manufacturer. The Contractor shall provide certification that the cables furnished and installed are in conformance with the manufacturer specifications. This certification shall be in two parts:

a) The Contractor shall secure a certification from the cable manufacturer that the cable is in conformance with the Rural Electrification Administration (REA) Bulletin 1753F-601 (PE-90a), where applicable, and these Specifications.

b) The Contractor shall submit a Certificate of Compliance demonstrating that the communication cable subsystem has been installed and spliced in accordance with the fiber optic cable and fiber optic splice closure manufacturer's recommendations, standard industry practice, and the project plans and specifications.

B. Warranty

Each item of the communication cable subsystem shall be warranted by the Contractor against all defects in material and workmanship.

C. Fiber Optic Cable Performance and Specifications:

The SMFO cable furnished and installed by the Contractor shall meet the following requirements:

Fibers per cable:	1, 24, 48, and 96-strand Cable
Coating diameter:	245 ±10 µm
Cladding diameter:	125 ± 1 µm
Core to cladding offset	≤ 0.8 µm
Cladding non-circularity:	≤ 1.0%
Mode field diameter:	9.2 µm nominal
Maximum attenuation:	≤ 0.4 dB/km at 1310 nm; ≤ 0.3 dB/km at 1550 nm
Minimum storage temperature range:	- 30 to + 70 degree C
Minimum installation temperature range:	- 10 to + 40 degree C
Minimum operating temperature range:	- 30 to + 70 degree C
Wavelength:	1310/1550 nm
Cable construction:	Gel-Filled Buffer Tube or Powder-Filled Buffer Tube
Outer jacket:	Carbon Black Polyethylene
Bending radius storage:	10-inch minimum
Bending radius Installation:	6-inch minimum
Tensile Strength Installation:	600 lbf for pulling standard outside plant (OSP). Between 100-300 lbf for jetting fiber.
Rated life:	Certify a 20-year life expectancy when installed to manufacturer's specifications

D. Tensile Strength Members:

Underground fiber optic cable shall withstand a 600 lb tensile load applied per EIA-455-33 where the change in attenuation does not exceed 0.2 dB during loading and 0.1 dB after loading. Use cable rated for an installed tensile service load of 200 lbs or more.

E. Environmental:

The fiber optic cable shall be capable of withstanding the following conditions without damage or decrease in function:

- Cable operating temperature per EIA/TIA-455-03;
- Total immersion in water with natural mineral and salt contents;

- Salt spray or salt water immersion for extended periods.

F. Cable Length and Shipping:

The Contractor shall base the length of each fiber optic cable on field measurements. The Contractor shall include in the measurement, the required amount of slack cable at splice points, inside handholes, and running up and down the utility poles as applicable.

Stencil, letter, or provide the following information on a weatherproof tag firmly attached to the reel:

- Factory order number;
- Job number;
- Ship date;
- Manufacturer's cable code;
- Type of cable (single mode, outdoor, indoor);
- Beginning and ending length markings;
- Direction;
- Measured length and attenuation; and
- “Index of Refraction” from Acceptance Test and the wavelength it was tested at.

G. Cable Markings

The color of the outer jacket shall be black. The completed cables shall have sequential length markers in a contrasting color to the cable jacket, at regular intervals of three feet along the outside of the jacket. Printed on the jacket shall be the cable code to identify the number and type of fibers, the manufacturer’s name, manufacture’s part number, the year of manufacture and the sequential length markings. The marking shall be readable and proportionate in height to the cable and must be permanent and weatherproof.

H. Color Coding

The single mode trunk cable “buffer tube” outer jackets and fiber jackets shall be colored in accordance with TIA-598, Revision D.

3.0 CONSTRUCTION REQUIREMENTS

1) General Requirements

The single mode fiber optic cable shall be a continuous cable of sufficient length to permit the associated runs shown on the plans to be made without full cable splices between specified splice locations unless approved by the Engineer. The cable shall be wound on the reel in such a manner as to provide access to both ends of the cable to enable testing to be performed while the cable is on the reel.

The Contractor shall furnish the Engineer with the cable manufacturer's recommended procedures, maximum pulling and jetting tensions as applicable, a list of the cable manufacturer's approved lubricants, and the lubricant manufacturer’s procedures for use. The Contractor shall adhere to manufacturer's

installation procedures when installing fiber optic cable. The Contractor shall use lubricants in quantities and in accordance with the procedures recommended by the lubricant manufacturer.

Where cable is installed through an intermediate handhole, the Contractor shall ensure that the cable is protected from sharp edges and excessive bends. The cable shall not be crushed or kinked. Each fiber optic cable shall be coiled at a minimum radius of 20 times the outer diameter of the fiber cable in handholes. For example, if the cable has a diameter of 0.5 inches, the minimum radius shall be no less than 10 inches. The Contractor shall not cause the cable to violate the minimum bending radius for which the cable was designed. If the Contractor violates the bending radius, the entire length of cable from the previous splice point shall be removed from the project and a new cable shall be pulled at no additional cost.

Cables shall be pulled in the conduit with a split mesh cable grip designed to provide a firm hold on the exterior covering of the cable. Cable shall not drag on the ground or pavement during installation. The Contractor shall ensure that the tensile load on the cable does not exceed the allowed maximum by using a system that includes a means of alerting the installer when the pulling tension approaches the limit and displays the actual tension on the cable. The Contractor shall supplement this procedure with a breakaway tension limiter set below the recommended tensile limit of the cable being pulled.

During pulling, the cable shall be lubricated at each handhole and as it is pulled from the reel. The Contractor shall use a pre-lubrication or continuous lubrication method. The lubricant used shall be compatible with the cable jacket as recommended by the cable manufacturer. Liquid detergent shall not be used. The Contractor shall supply documentation identifying either the manufacturer recommendation or a published standard recommending the maximum pulling tension and speeds and these values shall not be exceeded. The Contractor shall have this documentation on site during each pull. If the Contractor fails to continuously lubricate the cable, the work shall be stopped until the terms of this specification are being met to the satisfaction of the Engineer. No compensation for the work stoppage shall be given.

Where cables are to be installed in conduit with existing cables or wires that shall remain, the Contractor shall not damage the existing cables or wires. The Contractor shall disconnect, remove, reinstall, and reconnect the existing cables and wires as necessary to facilitate the installation of the new cable. The Contractor shall be responsible for any damage to the existing cables or wires caused by this operation. New and existing conductors shall be terminated and labeling reconciled. No additional payment will be made as this work shall be considered incidental to the associated items. A uniformed police officer shall be required if the traffic signal is turned off to pull cable or wire.

Cable shall not be installed in any conduit until the associated handholes are installed. The Contractor shall install the fiber optic cable in the conduit. When installing the cable in a multi-duct product, the Contractor shall install the cable in the orange-colored duct unless indicated otherwise in the plans.

2) Underground Fiber Optic Cable

The Contractor shall provide a minimum of 100 feet of slack cable in each handhole and 12-24 ft slack cable in each pedestal. When two separate cables are meeting in a handhole for a full splice, there shall be 50 feet of cable slack coiled in the box for each cable entry.

At no time will any fiber optic cable be direct buried throughout the project limits unless specifically approved by the Engineer. Care shall be exercised during cable installation through conduit bends and looping in

junction boxes. Cable slack needs to be coiled evenly and secured using cable ties at every location. In the event the minimum fiber optic radius cannot be maintained during the installation, the Contractor shall submit alternative solutions to the Engineer for review and approval.

To minimize the possibility of damage to the outer jacket of the fiber optic cable, protective measures shall be used when the cable is installed. The requirements herein shall be followed but do not limit the installation to only those identified. The purpose of the installation specifications is to ensure protection of the fiber optic cable when it is installed. Other protective measures, not specified herein, may be taken during installation if it ensures protection of the cable. Repair of cable jacket will not be permitted. Jacket damage will require a new cable run, at no additional cost.

Each cable slack coil should be labeled with a Fiber ID tag. The Fiber ID tag should clearly state 4 items: the cable ID number, the cable type, the direction the cable is heading, and the total number of fiber strands within the cable. The Fiber ID tag is to be secured to the cable slack coil with cable-ties. Each cable slack coil should be attached to the cable racks with cable-ties immediately upon entering the box. Cables should be looped independently of one another. Cable-ties shall contain the cable loops of one cable. Cable-ties should be tightened so that they prevent cable slippage but do not deform or damage the cable sheath. Cable-ties shall be used as necessary to neatly and independently rack the cables.

3) Testing Requirements

All Fiber optic cable shall meet the following certification, factory and stand-alone test requirements set forth by ANSI/TIA-568.3-D.

(1) Design Approval Tests (DAT):

Submit certification or test results for all required factory testing of fiber optic cable. Submittal of RUS certification will satisfy this requirement for the tests that are required by RUS 1755.900.

(II) Factory Acceptance Tests (FAT):

Test all fiber optic cable in the factory to demonstrate compliance with specification requirements. Submit a copy of the certification results of factory tests to the Engineer.

(III) Test Requirements for Fiber Optic Cable:

- As per ANSI/TIA-568.3-D, all new fiber optic cable shall be Tier 1 tested for Optical Loss at 1310 nm and 1550 nm using an Optical Loss Test Set (OLTS). Tier 1 testing consists of link attenuation testing, link length, and a polarity check. Tests shall be conducted 3 times at each wavelength, averaged, and then the difference between the Power Meter reference and the average shall be recorded as the actual dB Loss for the installed cable.

- All new fiber optic cable shall be Tier 2 tested using an Optical Time Domain Reflectometer (OTDR) in accordance with EIA/TIA-568.3-D. Tier 2 testing produces an OTDR trace for every fiber tested which includes dB loss, ORL, fault locations, and system length. All fibers are to be tested at 1310 nm and 1550 nm Bi-directionally. Splices testing greater than 0.1 dB

or mated-pair connections testing greater than 0.75dB shall be remade. If any fibers are out of specification, the entire SMFO cable run shall be replaced at no additional cost.

The Contractor shall submit both Tier 1 and Tier 2 testing documentation which demonstrates the format in which test data is recorded to the Engineer for approval a minimum of 14-days prior to the commencement of any testing activity.

Following completion of all testing and approval by the Engineer, Contractor shall compile and submit organized test notebook(s) that include all required Optical Loss Test Reports, OTDR test results and traces, summary tables, and electronically saved test data. Test notebook(s) shall at a minimum, include the following:

- Identification of each fiber by number (as it is identified in the field), cable, buffer tube, and color ID as appropriate;
- Actual Index of Refraction that OTDR was set at after FAT;
- A summary sheet with each submittal that clearly illustrates length and measured loss versus budgeted loss for each fiber or connected fiber string as appropriate; and
- Calculations and notations for each fiber and wavelength that includes total loss, measured dB/km loss, the number of connectors/terminations, pigtails, and jumper cables and any anomalies over 0.1 dB.

These test notebook(s) shall be made available to the Engineer during the project and delivered to the Engineer prior to final project inspection and acceptance.

4) Warranty Requirements:

The Contractor shall repair or replace defective fiber optic cable and equipment for a period of two years following final acceptance of the system.

4.0 METHOD OF MEASUREMENT

The SMFO cable will be measured by linear foot for each cable type and strand count furnished, installed and tested after splicing at each location. It will be measured horizontally along the route. Additional cable length of minimum slack in each box and riser up and down the poles have been measured and accounted for on the plans. All cable that is below ground in vertical conduit stub-ups shall not be measured and shall be included in the unit price. Splicing, testing, pull wire, and lubricant shall be included in the cable unit price. All other materials required to complete the installation of fiber optic cables shall be included in cable unit price.

The BFO-1 will be measured as a unit for each terminal furnished (by port count and pre-terminated length), installed and tested after splicing at each location.

5.0 BASIS OF PAYMENT

The accepted quantities of the fiber optic cable shall be measured as provided above, will be paid for at the contract unit price, which shall be full compensation for the work, complete in place and successfully tested.

Bid Items Used for this Section

Item Number	Item Description
BHF (24”x36”x36” Deep)	Buried Fiber Optic Handhole (24”x36”x36” Deep)

1.0 DESCRIPTION

The work under this section shall consist of furnishing, installing, and testing for integrity of proposed handholes.

2.0 MATERIALS

A) Fiber Optic Handholes

Handholes shall be compliant with the test provisions of ANSI/SCTE 77: Specification for Underground Enclosure Integrity and shall be rated for AASHTO Tier 22 loading when installed behind a curb or travel way and shall be rated for AASHTO H-20 loading when indicated as such on the plans.

Nominal minimal handhole dimensions shall be 24 inches by 36 inches by 36 inches deep, unless approved by the Engineer or specified differently on the project plans. The box shall have embedded racking which allows the splice case and cable slack coil to be attached to the side of the box, and off the ground inside the box. The box shall also have an open bottom allowing for conduit to enter through the bottom of the box.

B) Fiber Optic Handhole Covers

Handhole covers shall be compliant with the test provisions of ANSI/SCTE 77: Specification for Underground Enclosure Integrity and shall be rated for AASHTO Tier 22 loading when installed behind a curb or travel way and shall be rated for AASHTO H-20 loading when indicated as such on the plans.

Handhole covers shall be equipped with pull slots with a minimum width of 1/2 inch.

Handhole covers shall have four locking bolts on each corner with a washer. Locking bolts can be Hex (9/16 inch) or Penta (7/8 inch).

Handhole covers shall be slip resistant and clearly marked with “CRIT COMMUNICATIONS” and shall be visible to a technician while present at the box to easily identify the ownership of the box.

C) Marking Post

Marking posts shall be plastic or fiber glass material.

3.0 CONSTRUCTION

A) Fiber Optic Handholes

Handholes of the type specified above shall be furnished and installed at the locations shown on plans. Prior to installation, handholes shall be field located to avoid utilities and other obstructions. Handholes shall be installed where the elevation of the top of the box is flush against adjacent sidewalk or curb elevation. Where sidewalk or curb is not present, the box shall be installed where the top of the box elevation is one inch above adjacent grade.

Handholes that do not have a solid concrete bottom shall have the bottom 3 inches of the box filled with stone/gravel aggregate of a size no larger than 1" after conduit has been pulled into place. This is to prevent moisture buildup and damage to junction box lids.

All handholes shall be left free of dirt and debris upon completion of the work. The conduit bell ends inside the handhole shall be raised minimum 6 inches above the ground level inside the handhole to prevent ingress of dirt, debris or rocks in the conduit.

Handholes shall be installed with support crossbar at the top of the box to prevent the sides from caving in and maintain the integrity of the handhole shape where the lid rests.

(A) Fiber Optic Handhole Covers

All handhole covers shall be secured with the required bolts and washers, per manufacturer's recommendations before final acceptance of the project.

4.0 METHOD OF MEASUREMENT

Handholes shall be measured as a unit for each handhole fully installed, leveled, and the adjacent ground returned to its original grade and condition. All incidentals necessary to complete the work including, but not limited to, reconstruction of conduit sweeps, handhole covers, cover identification, hardware, marking posts, and aggregate shall not be measured separately and shall be included as part of each handhole.

5.0 BASIS OF PAYMENT

Accepted quantities of each handhole shall be paid as measured above for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
BD5	BD5 Pedestal

1.0 DESCRIPTION

The work under this section consists of furnishing and installing a BD5 pedestal at the locations shown on the plans, complete with base, cover, hardware, and all accessories required for a fully functional installation. Work includes placement, leveling, securing, and coordination with conduits and wiring systems entering the pedestal.

2.0 MATERIALS

BD5 pedestals shall be constructed of high-density polyethylene (HDPE) or polymer composite suitable for OSP environments. The exterior of the pedestal shall be UV-stabilized for long-term outdoor exposure. The pedestal color shall be green or almond, as approved by the Engineer. The pedestals shall be direct buried as shown on the plans. Pedestals shall have an internal grounding bar with factory-installed mounting brackets for splice trays or terminal blocks. There shall be an open-bottom base for conduit entry. BD5 Pedestals shall comply with Telcordia GR-13 CORE for pedestal enclosures and RUS PE-91 for OSP pedestal requirements.

BD5 pedestals shall adhere to an operating temperature between -40 degrees Celsius to +60 degrees Celsius. The cabinet shall withstand wind loading between 90-120 mph and shall be NEMA 3R weather resistant.

BD5 pedestals shall support up to two fiber splice trays or small terminal blocks with a capacity of storing a minimum of 100 ft of cable slack. The pedestal shall include a two-piece dome or hinged cover with telco-standard 216-tool access hardware, or hex-head bolt. Covers shall interlock with the base to prevent uplift or deformation.

3.0 CONSTRUCTION

BD5 pedestals shall be furnished and installed at the locations shown on plans. Prior to installation, pedestals shall be field located to avoid utilities and other obstructions. Pedestal base shall be installed where the elevation of the top of the base is flush against adjacent sidewalk or curb elevation. Where sidewalk or curb is not present, the pedestal base shall be installed where the top of the box elevation is one inch above adjacent grade.

Conduits shall enter through the base as shown on the plans. The conduit bell ends inside the pedestal base shall be raised minimum 6 inches above the ground level inside the base to prevent ingress of dirt, debris or rocks in the conduit. All pedestals shall be left free of dirt and debris upon completion of the work.

Pedestals shall have the bottom 3 inches of the box filled with stone/gravel aggregate of a size no larger than 1” after conduit has been pulled into place. This is to prevent moisture buildup and damage to junction box lids.

4.0 METHOD OF MEASUREMENT

BD5 pedestals will be measured as a unit of each, fully installed in place, including all labor, materials, equipment, and incidentals necessary to complete the work.

5.0 BASIS OF PAYMENT

Accepted quantities of BD5 pedestals will be paid at the contract unit price per each, complete in place. Payment includes excavation, base preparation, pedestal installation, conduit coordination, backfilling, hardware, and all incidental work required for a complete installation.

Bid Items Used for this Section

Item Number	Item Description
BM2 (5/8)(8)	Ground Rod

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing a 5/8 inch diameter, 8-foot long ground rod in each handhole.

2.0 MATERIALS

Ground rods shall be a one-piece solid rod of the copper weld type or approved equal and shall be a minimum 5/8 inches in diameter and 8 feet long.

3.0 CONSTRUCTION

Ground rods shall be driven vertically into the ground to a minimum 7 feet below the surface of the handholes. If the ground rod cannot be driven vertically it shall be installed in accordance with article 250-83 of the NEC. Ground rods shall be installed in the corners of the handholes.

4.0 METHOD OF MEASUREMENT

Ground rod will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAYMENT

Accepted quantities of ground rods will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
HBFO (M) BURIED FOSC 450B	Place Medium Fiber Optic Splice Closure in Handhole

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing splice closures, including sufficient splice trays to accommodate all fiber optic strands within the trunk cable. All splice closures shall be capable of storing the minimum number of fusion splices in splice trays as indicated in the plans or specified by the Engineer.

2.0 MATERIALS

The splice closures shall be cylindrical, butt-end-style, gel sealed, corrosion resistant, water-tight and meet the requirements of GR-771-CORE, GR-769-CORE and be compatible with the fiber to be installed. Splice closures shall be gel sealed, bonded, anchored, and provide efficient routing, storage, organization and protection for fiber optic cable and splices. The fiber optic splice closure shall be provided with a minimum of two express ports for entry and exit of uncut trunk line cable and a minimum of four additional ports for branch cables. The splice trays shall meet ANSI/EIA/TIA-568, Revision D and TIA-606, Revision C and be compatible with the fiber to be installed.

3.0 CONSTRUCTION

Splicing shall be done by the fusion splicing technique. All splices shall be prepared in accordance with the recommendations of cable manufacturers or splice manufacturers and shall introduce less than or equal to 0.1 dB attenuation. Splices found to exceed 0.1 dB attenuation shall be re-spliced, at no additional cost, until this requirement is met. All splices shall be protected and stored in splice closures for outdoor installations.

4.0 METHOD OF MEASUREMENT

Fiber Optic Splice closures will be measured for each unit furnished and installed. Splice trays, splicing of fiber and testing of fiber will not be measured separately, but will be included as part of splice closure.

5.0 BASIS OF PAYMENT

Accepted quantities of splice closures will be paid as measured for each type of splice closure for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
V(3)1.25”	Place three 1.25” Conduits
V(2)1.25”	Place two 1.25” Conduits

1.0 DESCRIPTION

The work under this section shall consist of furnishing, installing, and testing for integrity of fiber optic conduit, multi-duct, pull tape, fittings, and end caps.

2.0 MATERIALS

(A) Fiber Optic Conduit

All conduit and conduit fittings shall be listed by UL and conform to NEC standards. Conduit to be installed shall be either polyvinyl chloride (PVC) rigid nonmetallic type conforming to the requirements of UL 651 for Rigid Nonmetallic Conduit or High-Density Polyethylene (HDPE) conduit. PVC conduit and conduit fittings shall be Schedule 40, heavy wall, manufactured from high impact material and shall be rated for use at 90 degrees C. For HDPE Conduit, the HDPE formulations used by the manufacturer must be specifically intended for conduit applications in accordance with ASTM F2160: Solid Wall High Density Polyethylene Conduit based on controlled outside diameter. The HDPE conduit shall be SDR 11 or better and marked with the ASTM F2160 and UL 651A designation on the outside. It shall have a cell classification of PE334470C (for black conduit) and PE334470E (for colored conduit) in accordance with ASTM 3350: Standard Specification for Polyethylene Pipe and Fittings Materials. The polyethylene base resin shall meet the density requirement and melt index properties described herein. The density shall not be less than 0.940 and not more than 0.955 g/CM3 in accordance with ASTM D 1505: Standard Test Method for Density of Plastics by the Density-Gradient Technique. The range for the melt index shall be between 0.05 to 0.5g/10 minutes in accordance with ASTM D 1238: Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer. The HDPE conduit shall have a minimum Flexural Modulus, of 80,000 psi, in accordance with ASTM D 790 and a minimum tensile strength at yield of 3,000 psi, in accordance with ASTM D-638. Additives to the base resin shall be included to provide heat stabilization, oxidation prevention and ultraviolet (UV) protection. It shall utilize carbon black in the range of 2 to 3 percent for long-term protection against UV degradation. The minimum protection period shall be one year from date of manufacture in unprotected, outdoor storage conditions.

Bends used for fiber optic conduit runs shall be at a minimum:

Conduit Size	Min. Radius
2-inch or smaller	24-inch
2½-inch	30-inch
3-inch	36-inch
4-inch	48-inch

(B) Fiber Optic Multi-Duct

Multi-duct conduit is described as one of the following:

- A manufactured and connectable system consisting of a pre-assembled outer duct with a predetermined number of innerducts, or

- A manufactured and connectable system consisting of a predetermined number of conduits as shown on the plans with spacers for direct bury without an outer duct.

The innerducts shall be HDPE conduit with a Standard Dimensional Ratio (SDR) of 11 or better. Innerducts shall be fabricated using HDPE or Schedule 40 PVC for straight sections, and HDPE for bends. Innerducts shall contain, or be factory treated with, a friction reducing material that is dry-to-the-touch. Innerducts shall meet the requirements of Telcordia GR-356-CORE (also known as Bellcore GR-356). Bends used for fiber optic multi-duct runs shall be at a minimum of the manufacturer recommended minimum bend radius.

(C) Conduit and Innerduct Plugs

Conduit plugs, caps, or sealing fittings for sealing empty conduit and occupied conduit shall be durable, easily removable, reusable, and produce a watertight seal. Plugs, caps, and sealing fittings shall be designed for the diameter of the conduit and cable, shall cause no damage to the cable when installed, and shall have a rope tie on the inside end for connection of a pull rope. Plugs, caps, or sealing fittings used for fiber optic conduit shall provide a watertight and airtight seal of at least 20 psi. Plugs that seal conduits containing fiber optic cable shall be of the 'split' type to allow installation and removal around in-place cables. Plugs, caps, or sealing fittings shall be approved by the Engineer.

(D) Fiber Optic Conduit Warning Tape

Fiber optic conduit warning tape shall be a four (4) mil inert plastic film specially formulated for prolonged use underground and shall be a minimum of 3 inches wide. All tape shall be highly resistant to alkalis, acids, and other destructive agents found in the soil. Tape shall have a continuous printed message warning that will bear the words "CAUTION FIBER OPTIC" in black letters on an orange background, or approved equivalent. Fiber optic conduit warning tape shall connect into handholes.

(E) Pull Tape and Tracer Wire

Along each run, a pull tape shall be installed with a minimum pulling capacity of 2500 lbs. One #12 AWG Green tracer wire shall also be installed in the same conduit. Where there is a duct bank with more than one conduit, only a single pull tape and #12 AWG tracer wire shall be installed. Both the #12 AWG tracer wire and the pull tape shall be installed in the same duct. The other ducts shall be left empty for future use. Pull tape shall be NETPCO MULETAPE WP2500P or approved equal.

3.0 CONSTRUCTION

A) General Requirements

Single conduit and multi-duct configurations shall be furnished and installed at the locations and of the sizes shown on the plans. Unless changes are necessary to avoid underground obstructions, all underground conduit shall be installed in a straight line from handhole to handhole, handhole to pole, handhole to pedestal, and pedestal to pedestal and shall be of one continuous size, material, and configuration. Any change in conduit routing must be approved by the Engineer and documented by the Contractor on the record drawings. Conduits should enter the handhole through the bottom of the box or pedestal using minimum bend radius as specified in these specifications.

All PVC conduit shall be stored and handled in an approved manner to minimize ultraviolet deterioration by exposure to sunlight.

The PVC conduit shall be cut square and trimmed to remove all rough edges. PVC conduit connections shall be of the solvent weld type. Purple primer conforming to the requirements of ASTM F 656 shall be applied to the joined surfaces prior to use of cement. The joint cement shall be the gray PVC cement conforming to the requirements of ASTM D 2564.

Field PVC conduit bends shall be made without crimping or flattening, using the longest radius practical but not less than 12 times the diameter in inches. Collapsed conduit, no matter how small, is not acceptable. When obstructions are encountered during installation and fiber optic conduit cannot be economically located elsewhere, the obstruction shall be bypassed by deflecting the conduit at a rate of at least 10:1. Minimum 4-foot radius, maximum 45-degree bends may be used to avoid obstructions at locations where 10:1 deflection is not possible. Flexible bends may be utilized when needed to facilitate proper location of the fiber optic conduit, only at locations approved by the Engineer. The number of bends between conduit runs shall not contain more than equivalent of two quarter bends (180 degrees, total), including the bends at the handholes, unless authorized by the Engineer.

Conduit entering through the bottom of a handhole shall be located near the sides and ends and extend no more than 4 inches above the bottom of the box, measured from the bottom of the conduit, including the length of the conduit bell end in order to leave the major interior portion clear. At all outlets, conduits shall enter from the direction of the run and allow for expansion and contraction.

A #12 AWG tracer wire shall be installed within a single conduit of each duct run. Where a locating wire is manufactured as part of a multi-duct configuration, a #12 AWG tracer wire will not be required. Pull tape shall be installed in a single conduit of each duct run.

The pull tape shall extend 24 inches beyond each end of the conduit run and shall be attached to the plug, cap, or sealing fitting on each end of the conduit. The pull tape shall be coiled and inserted into the conduit so as to be easily recovered from either end. Conduit ends shall be capped with conduit end cap fittings after the pull tape is installed. All conduits shall be sealed with a cap or plug at each end. Conduit end cap shall remain in place until wiring is started. When end caps are removed, ends shall be provided with an approved conduit end bell. End bells shall be installed prior to the installation of the conductors.

No more than one week prior to installation of any cable, all new and existing empty PVC conduit runs in which cable is to be installed, shall be cleared/cleaned by pulling through a metal-disc mandrel of diameter 10% smaller than the inside diameter of the conduit, or brushed, or swabbed, as the situation requires. For HDPE conduit, a ball mandrel with an outer diameter not less than 80 percent of the conduit's inside diameter shall be pulled through the conduit. Prior to pulling the mandrel through the conduit, the conduit

shall be brushed or swabbed if required by the Engineer. No measurement or separate payment shall be made for this activity. Metal-disc or ball mandrel shall not be pulled through conduit containing existing cables.

During shipping and while on the job site, the open ends of all conduit shall be sealed with removable caps, plugs, or sealing fittings to prevent the entry of rodents, dirt, sand and other foreign materials. These caps, plugs, or sealing fittings shall be removed only when the Contractor is in the act of joining sections together, testing, or pulling cable. The open ends shall be immediately recapped or resealed after completion of these activities. This requirement shall be met for all empty or occupied conduit located anywhere on the project site, including but not limited to those at handholes.

Where conduit is to be installed under existing roadway pavement by drilling methods, the drilling pits shall be kept 2 feet clear of the edge of the pavement. The Contractor shall perform utility potholes at all locations where the conduit will cross utilities.

All conduit installed by means of directional drilling shall be HDPE with SDR 11. All conduit to be installed by trenching or plowing can be either Schedule 40 PVC or HDPE with SDR 11.

HDPE to PVC coupling shall not be done unless approved by the Engineer.

B) Depth Requirement

Fiber optic conduit shall be installed at a minimum depth of 48 inches to the top of the conduit except at handhole and pedestal locations.

C) Conduit Directional Drilling, Boring, Trenching, Backfilling, and Compaction

Conduit shall be installed by horizontal directional drilling underneath the paved roadway. After installation of conduits, the ground surface shall be returned to its original grade and condition. Any disturbed landscaping including trees, shrubs, monument signs, and sidewalk shall be replaced to restore original conditions.

4.0 METHOD OF MEASUREMENT

Fiber optic conduit shall be measured by the linear foot for each type and configuration of conduit installed. Linear measurement of Fiber Optic Conduit item shall include all elements of installation such as directional drilling, conduit, pull tape, conduit bends, tracer wire, couplings, vertical conduits, and conduit in handholes. Utility potholing shall be included as part of conduit installation and shall not be measured separately. Restoration of landscape to original condition will not be measured separately. Replacement of pavement or sidewalk impacted by potholing or bore pits will not be measured separately, unless indicated on the plans. These items will be considered as an integral part of new conduit installation.

5.0 BASIS OF PAYMENT

The accepted quantities of conduit will be paid as measured for the work done, which price shall be full compensation for the item, complete in place, including any excavating, backfilling and landscaping necessary to complete the work.

Bid Items Used for this Section

Item Number	Item Description
PON Cabinet (288-Port)	288-Port PON Cabinet

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing a PON Cabinet installed in place, at location and size as specified on the plans. Work includes cabinet placement, mounting, grounding, splitter installation, fiber management, and all incidentals required for a complete and operation PON distribution cabinet.

2.0 MATERIALS

The PON cabinet shall be constructed of stainless steel or power-coated aluminum suitable for OSP environments. The exterior shall be powder-coated for corrosion resistance and shall be almond or green for outdoor aesthetics, or approved equal. The cabinet shall be installed with a grounding bar and internal mounting frame for splitters and other distribution modules. The cabinet shall be pad-mounted or vault mounted and have an open bottom for conduit access. The base of the cabinet shall provide space for a large splice kit and a minimum of 300 feet of cable slack.

The cabinet shall comply with Telcordia GR-487 CORE (outdoor enclosures), Telcordia GR-20 (fiber cable management), and RUS PE-90 / PE-91 (OSP cabinets and pedestals). Cabinets shall be UV protected for long term outdoor exposure and shall adhere to an operating temperature between -40 degrees Celsius to +65 degrees Celsius. The cabinet shall withstand wind loading between 90-120 mph and shall be NEMA 3R weather resistant.

The PON cabinet shall have a minimum port density of 288 distribution ports and 12 feeder ports to serve up to 288 homes. The cabinet shall be able to support a minimum of five 1:64 splitters with a minimum of 24 13-port polimod cassettes. Polimod cassettes shall be SC or LC style connectors as approved by the Engineer. Cassettes shall have the minimum capacity of 12 splices per cassette. The cabinet shall have minimum 30 mm bend-radius protection throughout with stainless steel or composite cable retention brackets.

The cabinet shall have a dual-door access (feeder side and distribution side) with telco-standard 216-tool access hardware. Cabinets shall have gasketed doors for weather sealing.

3.0 CONSTRUCTION REQUIREMENTS

Cabinets of the type specified above shall be furnished and installed at the locations shown on plans. Prior to installation, cabinets shall be field located to avoid utilities and other obstructions. Cabinet base shall be installed where the elevation of the top of the box is flush against adjacent sidewalk or curb elevation. Where sidewalk or curb is not present, the base shall be installed where the top of the box elevation is one inch above adjacent grade.

Conduits shall enter through the cabinet base as shown on the plans. The conduit bell ends inside the base shall be raised minimum 6 inches above the ground level inside the base to prevent ingress of dirt, debris

or rocks in the conduit. All cabinets and bases shall be left free of dirt and debris upon completion of the work.

Cabinets shall have the bottom 3 inches of the box filled with stone/gravel aggregate of a size no larger than 1” after conduit has been pulled into place. This is to prevent moisture buildup and damage to junction box lids.

Cabinets shall be installed with support crossbar at the top of the handhole cover to prevent the sides from caving in and maintain the integrity of the pedestal base where the lid rests.

Pigtails shall be pre-terminated to match the number of input and output ports on the panel and connected to the panel ports. For example, for a 288-port panel, the output cable shall be two 144-strand cables or one 288-strand cable pre-terminated in the panel and coiled in the base of the cabinet. For the input side, a 12 or 24-strand cable shall be pre-terminated in the panel and coiled in the base of the cabinet based on the size of the feeder panel. All slack shall be neatly coiled and secured inside the cabinet.

4.0 METHOD OF MEASUREMENT

PON cabinets shall be measured as a unit for each handhole fully installed, leveled, and the adjacent ground returned to its original grade and condition. All incidentals necessary to complete the work including, but not limited to, reconstruction of conduit sweeps, handhole covers, cover identification, hardware, marking posts, pre-terminated input and output cables, cassettes, and aggregate shall not be measured separately and shall be included as part each PON cabinet.

5.0 BASIS OF PAYMENT

Accepted quantities of each PON cabinet shall be paid as measured above for the work done, complete in place, which price shall be full compensation for work and materials.

5.0 CONSTRUCTION SPECIFICATIONS FOR AERIAL PLANT

Bid Items Used for this Section

Item Number	Item Description
CO-1	Attachment 1 Strand Fiber to Poles.
CO-2	Attachment 2 Strand Fiber to Poles.
CO-24	Attachment 24 Strand Fiber to Poles.
CO-48	Attachment 48 Strand Fiber to Poles.
CO-96	Attachment 96 Strand Fiber to Poles.

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing fiber optic cable and misc. hardware.

2.0 MATERIALS

Fiber Optic Cable shall comply with the requirements of Section 4.0 Construction Specifications for Underground Plant.

The Contractor shall furnish and install lashing wire, nuts, bolts, washers, clamps, and mounting brackets as recommended by the manufacturer for aerial fiber optic installation.

A) Fiber Optic Cable:

Fiber Optic Cable shall comply with the requirements of Section 4.0 Construction Specifications for Underground Plant.

B) Misc. Attachment Hardware:

- **Bolt Hardware:** The cross-arm bolt shall be 5/8-inch galvanized steel. Strength and dimensions shall meet the requirements per ANSI/IEEE C135.1 with a minimum tensile strength of 12400 pounds. The bolt shall have a 5/8-11UNC-2A threading. The bolt shall have a finish of hot dip galvanized per ASTM A153.

- **Cable Clamp:** The cable clamp shall be capable of supporting a cable with a diameter ranging between 6M Strand and a 3/8-inch support strand under normal operations. Cable clamp shall have serpentine grooves in the mounting plates to provide superior holding strength of the strand. The cable clamp shall accommodate a 5/8-inch diameter mounting bolt with two 5/8-inch track bolts with square nuts. The clamp and bolts shall be ductile iron per ASTM A536, Galvanized per ASTM A153. The clamp shall meet Telecordia GR-3174-CORE and Bellcore Specification AT-8261.

3.0 CONSTRUCTION REQUIREMENTS

A) Fiber Optic Cable

Cable shall be strapped to the support strand using flexible metal lashing wires strapped throughout the length of the support strand. Care shall be taken to reduce the pulling of the cable beyond the maximum pulling tensile strength. If the cable is damaged during installation, Contractor shall replace the entire reel of cable at no cost.

The Contractor shall provide a minimum of 100 feet of slack cable at specific utility pole spans designated on the project plans. Where the plans do not indicate location of the slack cable, the Contractor shall provide the minimum slack at approximate intervals of 2,500 feet.

B) Misc. Attachment Hardware

Pole attachment brackets, clamps, and bolt heads shall be installed flush to the pole per manufacturer recommendations.

4.0 METHOD OF MEASUREMENT

A) Fiber Optic Cable

The fiber optic cable will be measured by linear foot for each cable type and strand count installed and tested after splicing at each location. It will be measured horizontally along the route. All other materials required to complete the installation of fiber optic cables shall be included in cable unit price including mounting hardware.

B) Misc. Attachment Hardware

Pole attachment brackets, clamps, and bolt heads will not be measured separately. Attachment hardware shall be included as part of the associated item above.

5.0 BASIS OF PAYMENT

Accepted quantities of fiber optic cable will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
2 HST 250’	Multi-Port Service Terminal (Two-Port, 250 ft Length)
4 H100’	Multi-Port Service Terminal (Four-Port, 100 ft Length)

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing factory terminated multi-port service terminal patch panels with integrated single mode fiber optic cables to be used as drop cables from connecting the main distribution cables to the premise points, as shown on the plans.

2.0 MATERIALS

The multi-port service terminals in the field shall be factory terminated and have protective covers for all unused connectors. Connector ports shall be manufactured with SC-type connectors required to match pre-installed connectors on jumper fiber optic cables. Branch cable shall be pre-installed on the patch panel by manufacturer and have the specified length and cable count as indicated on the plans. Branch cable shall be supplied with the splicing end protected by the manufacturer with secure dust-proof cap ready to be spliced into each splice closure.

3.0 CONSTRUCTION REQUIREMENTS

The multi-port service terminals shall be lashed to the support strands at utility pole locations shown on the plans. They will be secured to support strand with port orientation facing downward so as to avoid water, dust entry or accidental damage to the branch fiber optic cable. Branch fiber optic cable shall directly connect into the service terminals and shall be factory installed on the terminals. All connectors on patch panels shall be factory tested and labeled to ensure proper installation. All unused connectors shall be sealed by the manufacturer supplied plugs.

4.0 METHOD OF MEASUREMENT

The multi-port service terminals will be measured as a unit for each terminal furnished (by port count and pre-terminated length), installed and tested after splicing at each location.

5.0 BASIS OF PAYMENT

The accepted quantities of the multi-port service terminal measured as provided above, will be paid for at the contract unit price, which shall be full compensation for the work, complete in place and successfully tested.

Bid Items Used for this Section

Item Number	Item Description
HAPO(M): AERIAL FOSC 450B	Aerial Splice Case Size Medium
HAPO(L): AERIAL FOSC 450D	Aerial Splice Case Size Large

1.0 DESCRIPTION

The work under this section shall consist of furnishing and install splice closures, including sufficient splice trays to accommodate all fiber optic strands within the trunk cable. All splice closures shall be capable of storing the minimum number of fusion splices in splice trays as indicated in the plans or specified by the Engineer.

2.0 MATERIALS

The splice closures shall be cylindrical, butt-end-style, gel sealed, corrosion resistant, water-tight and meet the requirements of GR-771-CORE, GR-769-CORE and be compatible with the fiber to be installed. Splice closures shall be gel sealed, bonded, anchored, and provide efficient routing, storage, organization and protection for fiber optic cable and splices. The fiber optic splice closure shall be provided with a minimum of two express ports for entry and exit of uncut trunk line cable and a minimum of four additional ports for branch cables. The splice trays shall meet ANSI/EIA/TIA-568, Revision D and TIA-606, Revision C and be compatible with the fiber to be installed.

3.0 CONSTRUCTION

Splicing shall be done by the fusion splicing technique. All splices shall be prepared in accordance with the recommendations of cable manufacturers or splice manufacturers and shall introduce less than or equal to 0.1 dB attenuation. Splices found to exceed 0.1 dB attenuation shall be re-spliced, at no additional cost, until this requirement is met. All splices shall be protected and stored in splice closures for outdoor installations. Splice case shall be securely attached to the support strand adjacent to the utility pole attachment.

4.0 METHOD OF MEASUREMENT

Fiber Optic Splice closures will be measured for each unit furnished and installed. Splice trays, splicing of fiber and testing of fiber will not be measured separately, but will be included as part of splice closure.

5.0 BASIS OF PAYMENT

Accepted quantities of splice closures will be paid as measured for each type of splice closure for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
SNOW-SHOE	Aerial Fiber Storage and Expansion Loops

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing snow-shoe cable and expansion loops and associated hardware.

2.0 MATERIALS

The snow-shoes shall be 24-inch adjustable and capable of storing 100 ft minimum of up to 288-strand single mode fiber optic cable.

3.0 CONSTRUCTION REQUIREMENTS

The Contractor shall provide expansion loops for the fiber optic cable at locations shown on the plans. The expansion loops shall be of a minimum length of 4 feet and allow for a minimum depth of 2 feet. The length of the expansion loop shall be at least twice its depth. The expansion loops shall not result in the bending of the fiber-optic cable beyond the minimum bend radius of 6-inches or 15 x outer diameter of fiber-optic cable, whichever is larger. The Contractor may choose alternate methods for expansion loops with the approval of the Engineer. The Contractor shall adhere to all the clearance requirements from existing transmission and distribution

4.0 METHOD OF MEASUREMENT

Snow-shoe cable storage and expansion loops will be measured as a unit of each fully installed snow-shoes, including all incidentals necessary to complete the work.

5.0 BASIS OF PAYMENT

Accepted quantities of snow-shoes will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
10M STRAND	Attachment 10M Strand to Poles. Includes all necessary hardware.

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing support strands and associated hardware.

2.0 MATERIALS

Support strand shall be at minimum 10M galvanized steel strand with a minimum rated strength of the strand of 10,000 pounds.

3.0 CONSTRUCTION REQUIREMENTS

The Contractor shall attach the strand at the attachment heights as specified on the plans. If conflicts arise at the specified attachment heights during construction, the Contractor shall adjust the attachment height to avoid the conflict and ensure that the cable maintains vertical clearances at the attachment points and at the midspan heights per NESC vertical clearance requirements. Strand SAG shall match the electrical conductors attached to the poles. Where no electrical conductors are on the existing poles, support strand shall be tensioned such that the mid span SAG shall be roughly 0.8% to 1.2% of the span distance (no greater than 1.5% of the span SAG). The Contractor shall ensure that the mid span SAG meets vertical clearances as specified in the NESC. The tension of the support strand shall not exceed 50% of the rated breaking strength. The support strand shall be grounded as specified in the NESC C2-2017, Section 092. (C) – Messenger Wires and Guys. Suggested locations of grounding units are shown in the plans.

4.0 METHOD OF MEASUREMENT

Support strand will be measured by linear foot for each strand type furnished and installed. It will be measured horizontally along the route. All other materials required to complete the installation of the strand shall be included in the unit price including mounting hardware.

5.0 BASIS OF PAYMENT

Accepted quantities of support cable will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
BM82 HDPE Riser	Build Riser up pole. Includes conduit and riser materials.

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing pole risers and associated hardware.

2.0 MATERIALS

The pole riser guards shall be HDPE capable of covering at least 4 fiber optic cables.

3.0 CONSTRUCTION REQUIREMENTS

The Contractor shall install pole risers guards per manufacturer recommendations. Riser guard shall be accompanied by manufacturer recommended riser guard boot. Riser guard shall extend from the base of the pole where the riser guard is installed to the top of the pole where the cable will exit and lash to the support strand. There shall be no more than 1 ft maximum distance of exposed cable when the cable exits the riser guard, where looping and lashing to the support strand occurs.

4.0 METHOD OF MEASUREMENT

Riser guards will be measured as a unit of each fully installed riser guards, including all incidentals necessary to complete the work. Riser guard boots will be included as part of the riser guards and will not be measured separately.

5.0 BASIS OF PAYMENT

Accepted quantities of riser guards will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
PE1-3	Down Guy for 10M Strand

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing guy wires (down guys, span guys) on unbalanced loads imposed on the poles by dead ending or changes in direction.

2.0 MATERIALS

The Down Guy and overhead Span Guys wires shall be galvanized steel strand and be sized to the next larger strand size as compared to the support strand, with a minimum size of 10M. The guy wires shall be rated for a minimum breaking strength of 10,000 lbs or greater.

3.0 CONSTRUCTION REQUIREMENTS

The Contractor shall install all guying prior to the installation of the communication cable facility at locations shown on the plans. New guy anchors shall be located to provide a minimum 1:1 Guy Lead-to-Guy Attachment height ratio and shall not exceed 0.9 times the rated strand breaking strength of the guy wire.

If new anchors are required, the Contractor shall maintain a minimum of 5 feet clearance from any existing anchors used for down guys for the transmission or distribution facilities.

4.0 METHOD OF MEASUREMENT

Down Guys will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAVEMENT

Accepted quantities of down guys will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
PF1-5	Expanding Anchor (10,000 Pounds)

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing ground anchors on unbalanced loads imposed on the poles by dead ending or changes in direction.

2.0 MATERIALS

The anchors shall be rated for a minimum holding power of 10,000 lbs or greater installed in Class 5 soil.

3.0 CONSTRUCTION REQUIREMENTS

Anchor assembly units shall be installed at locations designated on the construction plans. All anchors and rods shall be in line with the load and shall be so installed that the eye of the rod is above grade. Not more than 6 inches of rod shall remain out of the ground after the load is applied.

When the expansion anchor is installed, the anchor shall be fully expanded and shall be expanded into undisturbed earth before backfilling the anchor hole. Backfill shall be thoroughly tamped the full depth of all anchor holes.

4.0 METHOD OF MEASUREMENT

Expanding anchors will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAVEMENT

Accepted quantities of expanding anchors will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
PM11	Guy Guard

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing guy guards and associated hardware.

2.0 MATERIALS

Guy guards shall be Manufactured from HDPE and UV resistant yellow for long lasting color. Nominal size of guy guard shall be 1.5” round outside diameter before installation with a wall thickness of .070”.

3.0 CONSTRUCTION REQUIREMENTS

Guy guards shall be installed immediately after the down guys have been installed and fully tensioned. Guy guards shall extend upwardly on the guy wire for 96 inches. Stainless steel bolt and clamps shall be used to attach the guy guard to the down guy wire per the manufacturer’s instructions.

4.0 METHOD OF MEASUREMENT

Guy guards will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAVEMENT

Accepted quantities of guy guards will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
PM2A Ground	Ground Wire Assembly

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing ground wire assembly.

2.0 MATERIALS

Ground wire assembly shall be made from aluminum with a cast malleable base.

3.0 CONSTRUCTION REQUIREMENTS

Ground wire shall be connected to the vertical pole ground wire of the multi-grounded power system neutral or to the pole ground assembly. If a multi-grounded power system neutral is present on the pole but there is no vertical pole ground wire, a sufficient length of bare #6 AWG copper wire shall be left coiled and taped to permit it to be extended up the pole and connected to the multi-grounded neutral by a representative of the power company.

Contractor shall carefully remove the insulation from the support wire or the strand to permit connection of the ground wire to the support wire or the strand by means of a grounding connector. Where the insulation is required to be restored, refer to RUS Guide Drawing 360 for restoration details.

4.0 METHOD OF MEASUREMENT

Ground wire assembly will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAVEMENT

Accepted quantities of ground wire assemblies will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
Fiber Glass Extension Arm	Fiber Glass Extension Arm to Raise the Fiber

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing fiber glass extension arms at the locations indicated on the plans **or as needed during construction based on field conditions**.

2.0 MATERIALS

Fiber glass extension arms shall be 12 inches in length, have a 15-degree offset angle from attachment, and have a diameter of 1.5 inches. The rod shall be fiber glass with MPS gray UV-protective coating. The base shall be made of ductile iron, hot dip galvanized. The end fitting shall be aluminum. The mounting hardware shall be capable of accepting 5/8 inch bolts. End fitting studs shall be 5/8 inch x 2 inch, with cleats integrated to prevent rotation on the wood poles. The minimum ultimate load ratings shall be approximately 1200 pounds for vertical load, 1500 pounds for horizontal load, and 1200 pounds for longitudinal load.

3.0 CONSTRUCTION REQUIREMENTS

The fiber glass extension arm shall be bolted flush against the pole and shall maintain required separation from adjacent attachments per the NESC.

4.0 METHOD OF MEASUREMENT

Fiber glass extension arms will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAVEMENT

Accepted quantities of fiber glass extension arms will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

6.0 CONSTRUCTION SPECIFICATIONS FOR ACCESS EQUIPMENT

Bid Items Used for this Section

Item Number	Item Description
NID	Network Interface Device at the Premise

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing a Network Interface Device (NID) installed in place, with necessary hardware and jumpers connected.

2.0 MATERIALS

The NID shall be UV-resistant ABS or PC thermoplastic and shall be light gray or neutral tones for outdoor aesthetics. The NID size shall be roughly 10-inch x 8-inch x 2-inch deep or comparable size and shall be approved by the Engineer before purchasing. NID's must be able to withstand rain, dust, and UV exposure for long term outdoor performance. NID's shall be rated for an outside temperature between -40 degrees Celsius to +80 degrees Celsius. NID's shall have a minimum of 2 entry ports with weather tight grommets that support up to a one-inch conduit each and shall have the capability to store up to 50 ft of fiber slack. NID's shall include an SC/SC or SC/LC adapter to connect OSP and ISP cables.

3.0 CONSTRUCTION REQUIREMENTS

The NID shall be located as directed by the Engineer, with input from the premise owner. In general, the NID shall be installed on a flat surfaced wall adjacent to where the exterior conduit extends from the ground. The NID shall be installed 2-3 feet above the ground level for accessibility and protection from the adjacent splash zone. Mounting screws and anchors shall be corrosion resistant and be oriented where the cable ports face downward for water drainage

For conduit installation to the premise point, conduit shall be extended 1-2 inches into the NID via the bottom grommet and sealed to maintain weather proofing.

For aerial drops, fiber shall be secured to the house using a strain-relief bracket before entering the NID.

The adaptor connections shall be clean before connecting the two ends of the fiber.

The Contractor shall work with the CRIT broadband operator and be responsible for obtaining written permission from the home-owner prior to installing the NID at the premise point. If the homeowner chooses to not have the NID installed at the premise point, then the Contractor shall solicit concurrence from the Engineer to eliminate the need to install the drop cable and NID to the premise.

4.0 METHOD OF MEASUREMENT

NID's will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAYMENT

Accepted quantities of NID's will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.

Bid Items Used for this Section

Item Number	Item Description
1:64 splitter	1:64 Splitter

1.0 DESCRIPTION

The work under this section shall consist of furnishing and installing fiber optic splitters installed in place, at locations and size as specified on the plans.

2.0 MATERIALS

Fiber splitters shall be of a planar Lightwave circuit splitter with a split ratio of 1x64 (one input, 64 outputs). The fibers shall be single mode with an SC or LC style connectors as approved by the Engineer. The splitter shall be capable of being installed in the PON cabinet by connecting to the rack or mounting on the side panel of PON cabinet. Fiber pigtails shall be generally 1 to 1.5 m in length. The splitter shall operate using wavelengths of 1260-1650 nm, capable of operating using XGS-PON headend equipment. The splitter shall have the following optical performances:

- Insertion-loss requirements:
  - Typical: ≤ 20.5 dB with connectors
  - Premium Grade: ≤ 19.3 dB with connectors
- Loss Uniformity: ≤ 2.0 dB across all output ports
- Return Lost: ≥ 55 dB (SC/APC) connectors)
- Polarization Dependent Loss (PDL): ≤ 0.3 - 0.4 dB
- Directivity: ≥ 55 dB
- Wavelength dependent Loss: ≤ 0.5 dB

The splitter shall have an operating and storage temperature between -40 degrees Celsius to +85 degrees Celsius and comply with Telcordia GR-1209 and GR-1221 standards.

3.0 CONSTRUCTION REQUIREMENTS

Fiber splitters shall be mounted to the PON by installing directly to the input panel if applicable or bolted to the side panel of the PON cabinet. The output cables shall be coiled and connected to the cabinet if not in use. The pigtails that are activated shall be connected to the respective ports using an SC or LC style connector as approved by the Engineer.

4.0 METHOD OF MEASUREMENT

Fiber optic splitters will be measured as a unit of each fully installed, including all incidentals necessary to complete the work.

5.0 BASIS OF PAYMENT

Accepted quantities of fiber optic splitters will be paid as measured for the work done, complete in place, which price shall be full compensation for work and materials.