

CITY OF NORWICH
NORWICH PUBLIC UTILITIES

BID # 7303

INSTALL 12,000 FEET FIBER OPTIC CABLE

Sealed bids for Fiber Optic Cable Installation will be received at the Office of the Purchasing Agent at City Hall, 100 Broadway, Norwich, Connecticut 06360 until 2:00 P.M., on Friday, October 21, 2011 prevailing time, at which time they will be publicly opened and read aloud.

Bid surety in the form of cash, a certified check or bid bond in the amount of five percent 5% of this bid is required.

Copies of the Specifications may be obtained at the Purchasing Office at 100 Broadway, Norwich, CT or online at the State of Connecticut DAS Web Portal or at the City of Norwich web site www.norwichct.org by clicking on Public Bids/Proposals.

Questions regarding this bid should be directed to Ms. Tammy Petersen, Purchasing Supervisor, Norwich Public Utilities at tammypetersen@npumail.com.

Norwich Public Utilities reserves the right to reject any or all bids, in whole or in part, to award any item, group of items, or total bid, and to waive any informality in the bids received if it deems it to be in the best interest of the Department to do so.

No Bidder may withdraw their bid within 60 days after the actual date of bid opening thereof. Should there be reason why the contract cannot be awarded within the specific period, this time may be extended by mutual agreement between the City and the designated, qualified low Bidder.

All final awards of the bid subject to comply with Ordinance No. 1235 adopted December 3, 1991.

All bids must be submitted in a sealed envelope bearing the bidders name and bid number.

Responding bidders must ensure that employees and applicants for employment are not discriminated against because of their race, color, religion, age, handicap, familial status, sex, or national origin.

PURCHASING AGENT

NOTE: BIDDERS ARE HEREBY ADVISED THAT ONLY BID SURETIES FOR THE THREE LOWEST BIDDERS WILL BE HELD. ALL OTHERS WILL BE RELEASED WITHIN SEVEN DAYS.

NORWICH, CONNECTICUT

**NORWICH PUBLIC UTILITIES
FIBER TO TUNNEL
INFORMATION FOR BIDDERS
BID 7303**

SPECIFICATIONS SPECIAL PROVISIONS

BID PROPOSAL

For

FIBER OPTIC CABLE AND DEVICES, INSTALLATION AND ALTERATION

DESCRIPTION

The intent of this bid is to select a contractor to install 12,000 feet of fiber on NPU transmission lines.

- Field walk-outs with NPU staff prior to construction;
- Construction of new aerial facilities on transmission poles
- NPU will provide all fiber, strand, snowshoes, splice cases, pedestals, and necessary hardware;
- Fiber splicing at all locations;
- Fiber drop installation to each site;
- Optical time-domain reflectometer (OTDR) bi-directional testing of all fibers at 1310 and 1550 nm;
- Optical power meter testing and documentation at 1310 nm and 1550nm; and
- Documentation of the completed system must include as-built maps and OTDR tests.

COMPLETION DATE

All work on this contract shall be complete within 14 days after approval

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I. SCOPE OF WORK

This section provides information regarding the Norwich Public Utilities (NPU) fiber network construction testing project. Section 2 contains special provisions, Section 3 contains detailed construction requirements, Section 4 contains material requirements, Section 5 contains fiber test requirements, and Section 6 contains bid sheets.

1.1 Introduction

Norwich Public Utilities (NPU) is constructing fiber along its transmission right of way to connect two substations together. A lists of NPU provided materials is found in Section 4. Fiber cable will be installed by both non lashed and lashed construction methods of cable which will be install by the bidder.

1.2 Fiber Drops

Fiber drops to institutions are standardized using 12-count ADSS fiber to allow for future fiber usage. We estimate 250 feet of fiber for use in each institution. Specific building entry locations and interior cable locations will be required before installations are completed to institutions.

All fibers entering and exiting facilities shall be spliced in rack-mounted or wall-mounted splice enclosures and fiber patch panels. Each location shall have splice enclosures and patch panels to accommodate a minimum of 12 fusion splices. The recommended fiber connectors shall be SC-APC connectors. Each patch panel will be labeled to identify the termination point of the fiber.

1.3 NPU Scope of Work

Norwich Public Utilities will provide the following services.

1.3.1 Make-ready Engineering and Work

NPU will complete any make-ready construction as required by NPU standards.

1.3.2 Project Manager

NPU will provide a Project Manager to coordinate activities and assist with utility coordination,

1.3.3 Institutional Wiring

NPU or the operator of the I-Net site shall be responsible for indoor wiring. Each site shall be wired to provide an outside access point for 12 fibers within 30 feet of the power entrance point for the institution. This access point shall include a splice cabinet located on an outside wall or located in a pedestal splice enclosure at the base of the wall.

1.3.4 Approval of Construction and Changes

The *NPU project manager* shall be the central contact with the selected contractor. The *NPU project manager* or his designee shall approve of all construction and any modifications to the Network design and/or construction and assist the selected contractor to expedite any construction or permit issues.

1.4 Contractor Scope of Work

The selected contractor shall provide the following services.

1.4.1 Permitting

The selected contractor shall prepare permit applications for the State roads, railroad crossings, and new underground construction in Norwich. Completed applications shall be submitted to the NPU project manager in final form for submission to applicable authorities. Application fees shall be paid by NPU.

1.4.2 Traffic Control

The selected contractor shall provide all traffic control and signage required by Connecticut, Norwich, and NPU requirements in construction areas. This includes but is not limited to Connecticut DOT certified traffic control personnel or Police where required.

1.4.3 Aerial Plant Construction

Construction of New Aerial Plant

The selected contractor shall walk-out all aerial plant locations with NPU prior to construction, place new ADSS new fiber, strand where necessary, attachment hardware, risers, and splice cases. Construction methodology shall be in conformance with Corning SRP-005-038 (Installation of Solo ADSS Fiber Optic Cables).

1.5 Institutional Drop Construction

The selected contractor shall provide the drop construction for each institution. If there are existing aerial telephone and/or power drops that provide service to the site, the new fiber drop shall be installed aurally. The contractor shall provide to the NPU project manager plans illustrating all underground locations including distances, underground locations, excess fiber locations, and site access points prior to construction.

1.6 Fiber Splicing

The selected contractor shall splice all fiber. The selected contractor shall provide NPU with cut sheets and electronic documentation for each splice location.

1.7 Fiber Testing

The selected contractor shall provide end-to-end testing for each fiber.

1.8 As Built Maps and Documentation

The selected contractor shall provide as-built maps in a mutually agreeable format of actual plant locations, drop locations, excess fiber storage locations, and splice locations. In addition, fiber testing results and fiber cut sheets shall be provided to NPU.

II. SPECIAL PROVISIONS

2.1 Description

This contract provides for the installation of fiber optic cable throughout Norwich, Connecticut. Work will be coordinated with the NPU project manager.

There may be more than one construction project at the same time during the life of this contract. NPU may authorize work similar to that listed in this contract to be performed under a different contract when it is deemed to be in the best interest of NPU.

In all questions relating to this contract, the decision(s) of the NPU project manager for NPU shall be final.

Bid documents maybe obtained at the Office of the Purchasing Agent, City Hall, 100 Broadway, Room 105, Norwich, CT 06360.

2.2 General Contractor Requirements

2.2.1 Facilities

The contractor working under this contract shall maintain one or more local offices or equipment staging areas within Norwich, Connecticut. This is necessary to provide a 90-minute arrival time to ensure that the contractor is capable of serving emergency requests of NPU.

2.2.2 Experience of Company

The contractor must have experience in the installation of fiber optic cable in an outside plant environment during the past five years. The contractor shall provide in the bid at least one example of the company's experience on a project involving installation of single mode fiber optic cable. In addition, the contractor shall have or shall identify a subcontractor for the project that has a minimum of three (3) years experience in fusion splicing of single mode fibers.

The contractor must have experience in the installation of fiber optic cable on transmission poles.

2.2.3 Experience of Cable Installation Personnel

The contractor must supply cable installation crews who are experienced and adept at the installation of fiber optic cable in outside plant, and inside plant environment and certified to work in the power space. The foreman or lead installer on each crew shall have a minimum of five (5) years experience. Additionally, the majority of the individuals on each cable installation crew shall have a minimum of two (2) years of experience in the same environment described above. The above requirements for work experience shall be applied to each work crew individually. One well-experienced work crew cannot be used to offset the lack of experience of another crew. The contractor shall not use in-office staff, staff on other projects, or any other staff not assigned to this contract in calculating experience levels.

The contractor must demonstrate formalized training, certification, and years of experience of all proposed staff and receive approval from NPU for use of each employee prior to using that employee on this contract. The resume and relevant work experience of the cable installation foreman for the installation of fiber optic cable in the Norwich shall be supplied as part of the bid.

2.2.4 Experience of Splice Personnel

The contractor or subcontractor must supply splice crews who are experienced and adept at fusion splicing. The lead splicer on each crew shall have a minimum of five (5) years experience in the splicing of single mode fibers. Other individuals on a splice crew shall have a minimum of two (2) years of verifiable experience in the use of fusion splice equipment and in the use of Optical Time Domain Reflectometer (OTDR) test equipment. Personnel shall also be experienced in the use of light meters, fiber fault meters and hot fiber identifiers.

The contractor must demonstrate formalized training, certification, and years of experience of all proposed splicing staff and receive approval from NPU for use of each employee prior to using that employee on this contract. The resume and relevant work experience of the splice foreman or lead technician shall be supplied as part of the bid.

2.2.5 Contractor's Equipment

The contractor shall provide a complete list of the equipment and materials that will be available to perform the tasks outlined in this contract. Included in this list shall be the age of each piece of major equipment to be used. Inspections of vehicles and equipment may be conducted at any time by NPU safety staff and construction personnel to verify that the vehicles and equipment meet safety standards set forth by the State of Connecticut. The above notwithstanding, the contractor retains full responsibility for the proper maintenance, operation, and safety of all vehicles and equipment utilized by the contractor. Contractor shall provide magnetic signs on all contractor and contractor's agents' vehicles used in Norwich. These signs must identify the contractor, NPU, and a phone number for residents and/or interested parties to call for information and/or complaints. The approved contractor shall submit the proposed signage to the NPU project manager for approval before purchase of the signage.

2.2.6 Applicable Standards

All work performed under this contract shall comply with all applicable NPU, National Electrical Code, National Electric Safety Code and Bellcore standards. Construction methods and techniques used by the contractor shall be in accordance with the recommended practices and procedures published by leading industry manufacturers and trade associations, including but not limited to the following:

- NPU Construction Requirements;
- Bellcore Blue Book of Construction Practices;
- Siecor Recommended Procedures for Fiber Optic Cable Placing; and

- Society of Cable Telecommunications Engineers (SCTE) Recommended Practices for Optical Fiber Construction and Testing.

The contractor shall also follow all applicable local standards. The contractor shall be aware of all standards and their application within Connecticut. Ignorance or lack of knowledge shall not be an excuse for improper work to occur. Any work constructed in violation of any applicable code shall be corrected and re-installed properly at the contractor's expense.

2.3 Bidding Procedure and Contract Award

NPU of Norwich, Connecticut will accept bids on this contract. The award of the contract or contracts shall be based upon the lowest acceptable bid received for the contract.

2.4 Submission of Bids

Bidders must submit cost bids upon forms provided by NPU.

A bidder must bid on each and every item of the contract. The contract will be bid in its entirety as an itemized lump sum contract.

Bids shall be submitted in a separate envelope, and the envelope clearly marked "Bid for NPU Fiber in Transmission Right of Way – Norwich, Connecticut".

2.4.1 Right to Terminate the Contract

NPU reserves the right to terminate the contract for failure to meet the provisions of the contract. The contractor shall provide weekly written construction status reports to NPU. More frequent meetings may be scheduled if NPU feels they are warranted. An unsatisfactory performance rating is sufficient grounds for termination of the contract.

2.4.2 Subletting or Assignment of Contract

The contractor shall give his or her personal attention to the faithful prosecution of the work, shall keep the same under his or her personal control, and shall not assign by power of attorney or otherwise sublet the work or any part thereof without the previous written consent of NPU. The contractor shall not either legally or equitably assign any of the monies payable under this agreement or any claim thereto unless by and with written consent of NPU.

2.4.3 Prices Quoted

The prices quoted shall be those for which the work will be completed as specified and shall include all charges that may be imposed under this contract.

2.4.4 *Extra Work to be Included in Prices Quoted*

In all cases, where any additional work is made necessary by the removal or installation of any items of this contract and that work is not already described herein, it shall be deemed to have been included in the price bid for items to be used.

The furnishing of materials and the installation of materials are included in each and every item of the contract, as shown in the details and notes of the Plans, as described in these Special Provisions, as required to make an item functional, or as directed by the Inspector.

2.5 Construction Safety and Health Standards

It is a condition of this contract, and shall be made a condition of each subcontract entered into pursuant to this contract, that the contractor and any subcontractor shall not require any laborer or mechanic employed in performance of the contract to work under working conditions or in surroundings which are unsanitary, hazardous, or dangerous to the worker's health or safety, as determined under construction safety and health standards (Title 29, Code of Federal Regulations, Pat 1926, published in the Federal Register on December 16, 1972), as revised from time to time.

2.5.1 *Accident Reporting*

Any accident, including motor vehicle accidents, resulting in damage to property or causing personal injury within the limits of a work site shall be immediately reported to the appropriate police agency and the NPU project manager.

2.5.2 *Responsibility for Damage Claims*

The contractor shall save harmless NPU and all its representatives from all suits, actions, or claims of any character brought on account of any injuries or damage sustained by any person or property in consequence of any negligent act in safeguarding the work. The contractor shall be responsible for all damages or injury to persons or property of any character during the prosecution of the work resulting from any act, omission, neglect, or misconduct in the manner or method of executing the work.

2.5.3 *Utilities*

Contractors are hereby notified that within the limits of the work under this contract, both overhead and underground utility lines will be encountered.

Prior to the start of work at any work site upon the written authorization by the NPU project manager, the contractor shall contact the one call underground service (Call Before You Dig at

1-800-922-4455) to determine that there will be no damage or interference with other utilities, public service, or private utilities within the area.

The contractor shall notify NPU of any utility conflicts. NPU will take the measures necessary to eliminate the conflict at that time. No claims will be accepted for extra work caused by utility conflicts.

The contractor will be held totally responsible for preventing damage to any utility and will also be responsible for reimbursing the utility for the correction of any of the utilities' property disturbed during work, including but not limited to, the repair of any damage.

2.5.4 Workmanship

The contractor shall perform the work under this contract to a high standard of workmanship. It is specifically noted that the work herein directly affects the immediate public safety, and that care and workmanship commensurate with that responsibility are required. The National Electrical Code, National Electric Safety Code, and industry standards for quality of work to the extent not precluded by these specifications shall be applied.

In the event that any workmanship at three work sites is determined to be below industry or recognized standards for workmanship, NPU shall hold a formal hearing during which the contractor shall be required to show just cause why their contract should not be terminated.

2.5.5 Assignment of Work

Installation work in each institution will be assigned to the contractor on a site-by-site basis by the NPU project manager issuing a separate Notice to Proceed for each work site.

The decision to install or alter an installation and the extent of the alteration will be at the approval of the NPU project manager as deemed most practicable or economical to NPU.

The location of the work sites and the order in which the work sites are to be pursued shall be established by the NPU project manager. The contractor shall submit a written schedule to the NPU project manager by 2:00 P.M every Friday showing in detail by day what work is to be completed in the following week. The NPU project manager may revise the order up to two working days prior to the commencement of work at the work site. The value of any work done in a sequence not approved by the NPU project manager shall not be included in the calculation of required work completed under the terms of this contract.

2.6 Emergency Work & Out of Sequence Work

2.6.1 Required Services

Emergency services shall be available 24 hours per day 7 days per week without exception during the period of this contract in each area. Cellular telephone numbers, pagers, and other emergency contact information shall be provided in an acceptable format to the NPU project

manager. On a continuously available basis, the contractor shall have a work crew, fusion splicer, and a vehicle capable of lifting two workers and their tools to the working height of poles in the area. The contractor shall have under his control a reasonable inventory of materials normally supplied under the terms of this contract for immediate use under this provision.

2.6.2 Emergencies

Emergencies as declared by NPU may arise from, but not limited to, such things as accidents and natural disasters. For Emergency Work, in addition to the normal bid price for the items of work performed, NPU will consider claims for added costs to the contractor such as overtime rates based on current prevailing wage rates for this contract year.

2.6.3 Claims

A claim arising from Emergency Work shall be submitted to the NPU project manager in letter form within 10 working days after completion of the work. If NPU rules that the claim(s) is acceptable, a purchase order will be issued for the proper amount and NPU may be billed for the claim.

2.7 Inspection and Project Control

2.7.1 Work Site Procedure

The contractor is required to pursue the work in such a manner that all of the underground, overhead, and electrical work at a site will be completed at the same time whenever possible.

2.7.2 Unsatisfactory Operations

Should it be necessary to halt the work because of incorrect or unsatisfactory operations under the terms of this contract or because of the failure to follow safety standards applicable hereto, the contractor must take immediate steps to remedy the deficiencies. Should repair or correction of any safety defect or deficiency not be immediately undertaken, and should NPU be required to protect the site or make the repair or correction, the cost of such work shall be deducted from the monies due the contractor.

2.7.3 Inspection

During any inspection including, but not limited to, the final inspection of each work site, should it be found that non-concealed work is substandard, the burden of proof that the concealed work is up to standard is upon the contractor, who shall do such as is necessary, including exposing the concealed work, to clearly establish that the concealed work meets the specifications as outlined. Any and all items such as, but not limited to, improperly set couplings, and concrete or masonry work that is not up to the standard shall be removed and replaced at the contractor's expense.

2.7.4 Final Inspection of Work

The work site Supervisor shall notify the NPU project manager when he believes that the fiber is complete and is ready for inspection. Within 30 working days, the NPU project manager or his representatives shall review the fiber and test results. The Inspector shall determine and list any work remaining to be done. When the work is completed, and agreed upon by the Inspector and the NPU project manager, each shall sign the document and retain a copy. Until an agreed upon, signed document is in hand, the I-Net shall not be considered complete.

2.8 General Work Elements

The following elements apply to all work under this contract unless a specific exception is noted in the specifications for the individual item.

- A. Each item shall be installed in accordance with the design at locations as shown on the plans or as directed by the NPU project manager.
- B. Where the transport of materials or equipment to or from the work site is required, the materials or equipment shall be transported in a legal fashion and shall be protected from damage or loss.
- D. All holes and trenches shall be protected at the contractor's expense from accidental entry by vehicles and pedestrians through the use of steel plates or other approved materials as required by the NPU project manager. Should the contractor fail to provide adequate protection to the surroundings of a work site or should the operations be carried out in such a way as to allow or cause damage to any roadway, street, sidewalk, the property of any utility, or other private or public property, work may be stopped until deficiencies are corrected. Should the repair not be undertaken and should it be necessary for NPU to protect the area and/or make the repair, the cost shall be deducted from monies due the contractor.
- E. At the discretion of the NPU project manager, sod shall be removed either by the use of an approved sod cutter and then replaced, or topsoil and seed shall be placed. Care shall be taken to minimize the disturbance and the area shall be fully restored. A ditch witch or similar narrow trench device shall be used where digging is not done by hand. Where new pavement is to be placed or where reconstruction is taking place, the NPU project manager may omit this requirement.
- G. All fiber cable shall be transported by and unreeled from a cable trailer(s). The laying of reels on the ground and subsequent removal of fiber cable from this position is prohibited.

2.9 Materials Damaged

Any damage to or loss of any materials or equipment supplied by NPU to the contractor, which occurs from handling or transport, or from any other source or way, shall be the sole responsibility of the contractor and the value thereof shall be deducted from any monies due the contractor.

2.9.1 Materials Returned to NPU

Any materials returned to NPU shall be returned to a location in the Norwich, Connecticut as specified by the NPU project manager .

III. SPECIFIC WORK SPECIFICATIONS

3.1 Make-ready and Site Preparation Items

3.1.1 Guys and Anchors

A. Installation of Guy and Anchor

Description

This item consists of the installation of a bust anchor and a down guy or sidewalk guy between the screw anchor and a pole. This item shall include a down guy protector. The location of the anchor shall be in accordance with the appropriate cable installation practices.

Materials

Screw Anchors, Swamp Anchors or Expanding Anchors with Forged-Eye Anchor Rods: Rod diameter and length shall be selected based on strand weight to be guyed. Contractor shall install appropriate anchor for each installation.

Guy Clamps: Suitable for 1/4" or 7/16" stranded guy wire, six inches long with three 5/8" bolts.

Guy Attachments:

Machine Bolt: Rod diameter of 5/8" minimum, length to suit the pole it is to be used on.

Full Round and Half Round Guy Wire Protector: Seven feet in length, yellow plastic material.

Flat washer: 3" x 3" x 1/4" with an 11/16" hole for 5/8" bolt or flat washer 3" x 3" x 1/4" with or a 13/16" hole for 3/4" bolt, as appropriate.

Construction Methods

The installation of the anchor will consist of driving the anchor into firm and undisturbed ground to a point whereby no more than six inches of the rod including the eye is exposed above ground level. The down guy wire shall be attached to the pole at the appropriate location on the pole to provide guying for the cable installed for NPU's use. The guy shall be installed according to all applicable electrical and safety codes. A guy wire protector will be installed with the bottom at ground level and properly anchored to the guy wire.

B. Relocation of Down Guy

Description

This item shall consist of moving the location of a down guy or sidewalk guy. The guy shall remain associated with the same pole, but the location of the anchor shall change.

Materials

The contractor shall salvage as much of the existing guy as possible. Any additional materials shall be supplied as required to install a new anchor.

Construction Methods

Work shall be conducted in accordance with applicable standards.

C. Removal of Down Guy and Anchor

Description

This item consists of removing anchors, down guys or sidewalk guys, and guy wire protectors.

Materials

Provide materials as necessary to properly remove screw or expanding anchors and guys.

Construction Methods

The method of removal of the down guy is left to the discretion of the contractor. All salvaged material shall be coiled up and/or taped as appropriate and returned to NPU.

D. Installation of Overhead Guy

Description

This item shall provide for the installation of a pole-to-pole overhead guy.

Materials

Thimbleye Bolts or Machine Bolts and Thimbleye Nuts

Square Washers

Square Nuts

Construction Methods

The guy wire shall be attached to the pole at the appropriate location on the pole to provide guying for the cable installed for NPU's use. The guy shall be installed according to all applicable electrical and safety codes.

E. Relocation of Overhead Guy

Description

This item shall consist of moving the location of an overhead guy. The guy shall remain associated with the same pole, but the location of the attachment shall change.

Materials

The contractor shall salvage as much of the existing guy as possible.

Construction Methods

Work shall be performed in accordance with applicable standards.

F. Removal of Overhead Guy

Description

This item consists of removing overhead guys.

Materials

Provide all materials needed to properly remove overhead guys.

Construction Methods

The method of removal of the overhead guy is left to the discretion of the contractor. All salvaged material shall be coiled up and/or taped as appropriate and returned to NPU.

3.1.3 Installation of Ground Rod

Description

This item shall provide for installation of a grounding rod as well as a length of copper wire to bond to item to be grounded.

Materials

1 - 5/8" x 1-1/2" Galvanized Hex Bolts

1 - 5/8" acorn type ground clamp

30 feet of copper grounding wire

Construction Methods

A minimum of 8' of the ground rods shall be driven into undisturbed soil. The contractor shall supply up to 30 feet of copper grounding wire and shall cut the wire to the length as necessary. The grounding wire shall be properly bonded to the grounding rod.

3.2 Aerial Cable Installation

3.2.1 Install Strand

Description

This item consists of installing provided strand wire on poles.

3.2.2 Fiber Installation Methodology

Description

This item consists of installation of fiber optic cable.

Materials

Dynamometer, cable support blocks, tension limiting winch, swivel, fiber pulling grip, J Hooks, cable chain hoist, Vehicles, mounting devices

Construction Methods

The ADSS fiber supplied is not rated for the span distances involved in this project. To create adequate support the provided ADSS fiber is to be lashed to a messenger wire .

Stationary reel installation, and/or moving reel installation methodology may be used to place the ADSS fiber cable. Moving reel fiber installation is preferred to minimize installation cost and maximize installation efficiency.

3.2.3 Pole Mounting Hardware

Description

This item discusses tangent mounts and false dead end mounts for ADSS fiber optic cable.

Materials

Tangent mounts, dead end mounts, and stand-off arms

Construction Methods

Each pole requires a mount for the fiber to attach to the pole. For poles with a line offset of 0° to 20° (horizontal or vertical), a fiber optic tangent assembly is used. For poles where the line

offset is greater than 20°, false dead end shall be installed. False dead ends are required at each splice location and snowshoe excess fiber locations. At specific locations, a standoff arm may need to be installed to provide clearance from electrical conductors.

3.2.4 Splice Enclosures

Description

This item consists of placing aerial splice enclosures.

Materials

Splice enclosure

Construction Methods

Each splice location shall have an enough fiber slack to be accessible to the splicing vehicle. A minimum of 50' of fiber storage in the splice pedestal is required.

3.3 Fiber Splice and Termination Work

3.3.1 Installation of Fiber Optic Cable Storage Loop

Description

This item consists of installation of a double cable loop for storage of an extra length of fiber cable on the support strand of aerial plant, either with or without a splice.

Materials

4 Tap Brackets, steel or aluminum, for mounting storage loop brackets to the strand.

Fiber Optic Strand Storage Loop (snowshoes): Antec FOSS-2 with 12-inch minimum bend diameter.

Construction Methods

Shall be constructed in accordance with applicable standards.

3.3.2 Installation of New Splice Enclosure

Description

This item consists of preparing the cable ends for splicing, splicing, and installing the splice enclosure on aerial strand or in an underground pull box or vault.

Materials

Fiber Optic Splice Case.
Aerial Hanger Bracket Kit.

Construction Methods

Shall be constructed in accordance with applicable standards.

3.3.3 Reentry of Non-Encapsulated, Gasketed Splice Enclosure

Description

This item consists of reentering an existing non-encapsulated, gasketed type splice enclosure to make additional splices, installing a new gasket, and resealing the enclosure after the splice work has been completed.

Materials

Gaskets for Splice Case.

Construction Methods

Shall be conducted in accordance with applicable standards.

3.3.4 Splicing of Fiber

Description

This item consists of splicing single-mode fibers, placing them in the splice trays, and placing the trays in the cases, wall mount housings or rack units.

Materials

Single-mode splice trays.

Construction Methods

All fiber shall be fusion spliced. Splices shall have a loss of 0.3 db or better.

3.4 Labor and Equipment Hourly Rates

The following items are included for any work completed on a time and material basis. All time and material billing shall be **pre-approved** by the NPU project manager.

3.4.1 *Foreman*

Description

This item shall consist of providing a Foreman for a construction or installation crew at any location, as directed by the NPU project manager. The payment for the item shall be made at the contract unit price per hour bid for “Foreman,” which price and payment shall constitute full compensation for wages, transportation to and from the work site, Contractor’s allowable administrative costs and markup, and necessary incidentals.

3.4.2 *Technician*

Description

This item shall consist of providing a Technician for an installation crew at any location, as directed by the NPU project manager. The payment for the item shall be made at the contract unit price per hour bid for “Technician,” which price and payment shall constitute full compensation for wages, transportation to and from the work site, Contractor’s allowable administrative costs and markup, and necessary incidentals.

3.4.3 *Assistant*

Description

This item shall consist of providing a Helper or Assistant for a cable or splice installation crew at any location, as directed by the NPU project manager. The payment for the item shall be made at the contract unit price per hour bid for “Assistant,” which price and payment shall constitute full compensation for wages, transportation to and from the work site, Contractor’s allowable administrative costs and markup, and necessary incidentals.

3.4.4 *Traffic Control*

Description

This item shall consist of providing a Connecticut DOT certified traffic control person and required signage, as directed by the NPU project manager. The payment for the item shall be made at the contract unit price per hour bid for “Traffic Control,” which price and payment shall constitute full compensation for wages, transportation to and from the work site, Contractor’s allowable administrative costs and markup, signage, and necessary incidentals.

3.4.5 *Laborer*

Description

This item shall consist of providing a Laborer for a construction crew at any location, as directed by the NPU project manager. The payment for the item shall be made at the contract unit price per hour bid for “Laborer,” which price and payment shall constitute full compensation for wages, transportation to and from the work site, Contractor’s allowable administrative costs and markup, and necessary incidentals.

3.4.6 Supply of all terrain vehicle (ATV)

Description

This item shall consist of providing a ATV for workers to use in the right of ways. The use and payment of this item at any location shall be subject to approval of the NPU project manager.

IV. MATERIALS

4.1 Construction Materials

NPU will provide most necessary materials for construction. Bidders are to review design and verify quantities of materials and verify that all necessary materials are included in the bid. Contractor is to provide materials not provided by NPU. Bidders are to list and price and additional hardware that will be needed. Prices are to include all shipping costs. All materials supplied shall be new and unused and, where applicable, all materials and equipment supplied shall be UL-approved. The materials used on this contract and supplied by the contractor shall conform to the indicated sections of the standard specifications unless otherwise noted.

4.1.1 NPU supplied Materials

General	Part Number	Units / Footage
Strand 11.2M EHS Class "A" 5/16" Domestic 6000' Reels	11.2M ESH	15000
Strand Vise for 5/16" Strand At Dead Ends and Each end of Down Guy	5201.1	48
Strand Link Splice for 5/16"" Strand At end of Stand to tie two pieces together	5001	6
3 Bolt Lashed Cable Straight Clamp	J1096	24
3 Bolt Lashed Cable Curved Clamp	J7901	24
Aerial Support Spacer Tie 16"	TASA100LWS	48
Double Thimble Eye Corner Dead End Attachment	P294	24
Lashing Wire, made of Type 430 Stainless Steel 1200ft Coil	LASH0451	18
#6 Copper Ground Wire 315 ft Package	Bare-#6-SOL-stk	2
LASHING WIRE CLAMP D	4040-stk	48
Guy Grip Dead End Black for 5/16" Strand	GDE1106	24
5/8" Guy Hook	5060	14
#6 Solid Split-Bolt Bridge Connect	854	25
Flip-On Tap Clamp	438ALC	50
Lashed Cable Support Strap 16"	18922	50
12 Count ADSS fiber cable - Short span		15000

4.1.2 Supply of Fiber Optic Cable Storage Loop

Description

This item consists of supplying double cable loops for storage of extra fiber optic cable on the support strand of aerial plant.

Materials

Fiber Optic Strand Storage Loop (snowshoes): Preformed in-span type “NM”, or approved equivalent.

4.1.3 Supply of Splice Enclosure

- A. Case
- B. Spare gasket
- C. Cable addition kit

Description

This item consists of supplying fiber optic splice cases, aerial hanger kits for attaching splice cases to strand, spare gaskets to replace damaged or weathered gaskets after a case has been reentered, and cable addition kits to provide additional cable ports and space for extra trays.

Materials

- A. Fiber Optic Splice Case - 3m Type 2178-G, or Approved Equivalent.
- B. Gaskets For Splice Case - 3m Type 2178-Gskt, Or Approved Equivalent.
- C. Cable Addition Kit - 3m Type 2181-G, Or Approved Equivalent.

4.1.4 Supply of Splice Tray

Description

This item consists of supplying splice trays for use in the fiber optic splice cases, wall mount housings and rack units.

Materials

Single-mode splice trays - Siecor Type M67, or approved equivalent.

4.1.5 Supply of Hardware

Description

This item consists of supplying all required bolts, nuts, clamps, lashing wire, anchors, ground rods and wire, and guy guards. Typical hardware for construction use is listed below.

Materials

Screw Anchors, Swamp Anchors or Expanding Anchors with Forged-Eye Anchor Rods:
Rod diameter and length shall be selected based on strand weight to be guyed.
Contractor shall install appropriate anchor for each installation.

Guy Clamps:

Suitable for 1/4" stranded guy wire, six inches long with three 5/8" bolts.

Guy Attachments:

Machine Bolt:

Rod diameter of 5/8" minimum, length to suit the pole it is to be used on.

Full Round and Half Round Guy Wire Protector:

Seven feet in length, yellow plastic material.

Flat washers 3" x 3" x 1/4" with an 11/16" hole for 5/8" bolt or flat washer 3" x 3" x 1/4" with or a 13/16" hole for 3/4" bolt, as appropriate.

Thimbleye Bolts or Machine Bolts and Thimbleye Nuts.

Square Washers.

Square Nuts.

5/8" acorn type ground clamp.

5/8" ground rods 8' long.

V. FIBER OPTIC TESTING SPECIFICATIONS

5.1 Introduction

NPU is planning to build fiber connectivity between two designated sites. The Contractor selected will be responsible for end-to-end testing of each fiber from the site to the respective hub site. This section of the RFP provides the test plan to determine acceptable optical performance of the fiber links.

5.2 Testing Philosophy

This test procedure is designed to ensure that the fiber optic plant meets general industry standards, and is suitable to support connectivity to a range of potential I-Net fiber interface equipment. Testing shall be performed after construction is completed for each site. Each link shall be tested for continuity and to ensure that there are no unacceptable anomalies in the fiber optic cable. An optical time-domain reflectometer (OTDR) shall be used to measure and document splice and connector locations, and an optical power meter test set shall be used to determine end-to-end optical losses and fiber continuity.

5.3 Testing Criteria

The test shall be successfully completed and shall be conducted in the presence of NPU's designated observer. The test shall be deemed successfully completed if: (1) maximum fiber losses do not exceed 0.5 dB/km at 1310 nm; (2) individual splice losses do not exceed 0.3 dB; and (3) maximum mated connector losses do not exceed 0.75 dB. These standards are based on the Telecommunications Industry Association (TIA) and the Electronic Industries Alliance (EIA) Optical Fiber Cabling Components Standard (EIA/TIA 568-B.3) for outside plant. Testing will be performed by Contractor personnel, and may be observed by designated representatives of NPU. NPU personnel may request and perform additional testing.

5.4 OTDR Testing Procedure

An OTDR shall be used to measure and document splice losses and connector losses. To correctly identify abnormalities at a short range, a 100-meter or longer launch cable shall be used between the OTDR and the fiber under test. Bi-directional traces shall be acquired for each fiber. If the connection of the launch cable to the patch panel requires optimization by the operator, sampling acquisition will commence upon completion of the optimization.

Each fiber will be identified, and the results of the test for each fiber will be recorded as indicated below in the section "Test Data File Names." The test will be repeated for each of the fibers linking a particular site. All tests will be made at 1310 nm and 1550 nm.

5.4.1 OTDR Settings

Settings on the OTDR shall reflect the following:

- The Refractive Index shall be set for the actual fiber utilized (commonly-used Corning SMF-28 single mode fiber has a refractive index of 1.4677 at 1310 nm);
- Pulse width no greater than 100 ns (10m) for all fiber lengths;
- Scattering coefficient specified by the fiber manufacturer for each wavelength tested;
- A minimum of 10,000 sampling acquisitions (Averages);
- Maximum range set to no more than 10 km for all fiber length less than 10 km;
- Maximum range set to no more than 25 km for fiber lengths greater than 10 km; and
- Event threshold: 0.05 dB.

5.4.2 *Test Data File Names*

A uniform file-naming scheme for recorded data shall be used, complying with mutually agreed conventions by the NPU project manager and selected contractor:

5.4.3 *Test Documentation*

Installed optical fiber OTDR test documentation shall include:

- Total fiber length;
- Individual fiber traces for complete fiber length;
- Paper and/or computer disk records of all traces;
- Losses of individual splices and connectors;
- Losses of other anomalies;
- Wavelength tested and measurement directions;
- Manufacturer, model and serial number of the test equipment; and
- Name, signature, and company of the engineer performing the tests.

All data collected at each location during the tests shall be recorded at the time of the tests using electronic means.

5.5 Optical Power Meter Test Procedure

Optical power meter measurements shall be made at the same time as the OTDR tests to determine overall fiber loss and to ensure that fibers have appropriate end-to-end continuity (fibers not crossed).

5.5.1 *Calibration Procedure*

Calibration readings shall be taken at the beginning and end of a testing day.

1. Power on both fiber optic power meter and laser light source;
2. Allow each instrument a minimum 10-minute warm-up period;

3. Clean all connectors, in-line adapters, and the source and meter connections with alcohol, lint-free wipes, and compressed air;
4. Connect a jumper to the light source, and a second jumper to the meter. Connect the jumpers using a bulkhead;
5. Ensure that the wavelength setting on the light source and the power meter is 1310nm;
6. Set the power meter to record absolute (ABS) readings;
7. To ensure that the jumpers are functional and that a proper connection has been established, observe the power reference reading on the meter's main display;
8. Record the measurement on the display, ensuring that the meter is set to display absolute measurements (ABS); and
9. Power down the light source and the power meter. Disconnect the light source jumper at the bulkhead ONLY. Cap the free connectors on both jumpers.

5.5.2 *Test Procedures*

1. Take the meter to the test site. The jumper cable shall remain connected to the meter for the duration of the testing until a post-calibration measurement is performed;
2. Clean the connectors on both jumpers and both fiber termination points with alcohol, lint-free wipes, and compressed air. This shall be done before testing each fiber;
3. Connect the free end of the jumper connected to the light source to the fiber under test;
4. Connect the free end of the jumper connected to the power meter to the fiber under test;
5. Power on both the meter and light source;
6. Ensure that both the power meter and light source are set to 1310 nm. Relative measurements may be recorded if the power meter is selectable between absolute and relative measurements;
7. Observe the measurement on the main display of the power meter. Record the value shown after the reading stabilizes;
8. If inconsistent/erroneous readings are observed, re-clean the jumpers and fiber termination points and test again before recording final dB value;
9. Change the light source and power meter to 1550 nm and repeat tests;
10. Disconnect the jumpers from the fiber under test;

11. To test additional fibers, be sure to clean each connector and termination point with both alcohol and compressed air. This should be done before testing all fibers;
12. Connect the jumpers to the ends of the next fiber to be tested and observe the measurement on the main display;
13. The meter and light source should only be powered off when traveling to a new test site. At each new site, the meter and source must both be allowed a ten-minute warm up period. Follow steps 1-11 at each new site; and

VI. BID FORMS

All bids are to be submitted on the four attached bid forms. By submitting a bid the bidder affirms that he has read the RFP and agrees to the specifications and conditions specified. All footages and quantities of items are subject to change. Strand footage was increased by 10 percent to allow for down guys and non cable-bearing strand. Fiber footage was increased by 15 percent to allow for fiber storage loops. If the bidder is supplying different material than specified, each **equivalent** item shall be listed on bid form 3. Additionally, the bidder is to attach a specification sheet for each equivalent item. Additional lines are available on each bid sheet to list any items not included that the contractor deems necessary for completion of project. No additional work will be approved unless authorized by the NPU project manager. The following bid forms shall be submitted to be considered for the construction.

**BID FORM 1
CONTRACTOR LABOR UNIT PRICES,
CONTRACTOR MATERIAL UNIT PRICES**

**BID FORM 2
PROJECT CONSTRUCTION COSTS**

**BID FORM 3
EQUIVALENT MATERIAL PART NUMBERS AND MANUFACTURER**

**NPU NORWICH, CONNECTICUT
FIBER NETWORK**

BID FORM 1

BIDDER NAME: _____

BIDDER ADDRESS: _____

DATE: _____

UNIT CONSTRUCTION COSTS FOR LABOR

ITEM #	DESCRIPTION	UNIT	COST /UNIT
3.1.1A	INSTALLATION OF GUY AND ANCHOR	EACH	\$
3.1.1B	RELOCATION OF DOWN GUY	FEET	\$
3.1.1C	REMOVAL OF DOWN GUY AND ANCHOR	FEET	\$
3.1.1D	INSTALLATION OF OVERHEAD GUY	EACH	\$
3.1.1E	RELOCATION OF OVERHEAD GUY	EACH	\$
3.1.1F	REMOVAL OF OVERHEAD GUY	EACH	\$
3.1.2	INSTALLATION OF GROUND ROD	EACH	\$
3.2.1	INSTALLATION OF STRAND WIRE	FEET	\$
3.2.2	INSTALLATION/LASHING OF FIBER CABLE	FEET	
3.3.1	INSTALLATION OF FIBER OPTIC STORAGE LOOP	EACH	\$
3.3.2	INSTALLATION OF NEW SPLICE ENCLOSURE	EACH	\$
3.3.3	REENTRY OF FIBER SPLICE ENCLOSURE	EACH	\$
3.3.4	SPLICING OF FIBER (PER EACH FIBER)	EACH	\$
3.4.1	FOREMAN PER HOUR	HOUR	\$
3.4.2	TECHNICIAN PER HOUR	HOUR	\$
3.4.3	ASSISTANT PER HOUR	HOUR	\$
3.4.4	LABORER PER HOUR	HOUR	\$
3.4.7	ATV PER HOUR	HOUR	\$
5.4&5.5	FIBER TESTING	EACH	\$

UNIT CONSTRUCTION COSTS FOR MATERIAL

ITEM #	DESCRIPTION	UNIT	COST /UNIT
4.1.2	SUPPLY OF FIBER OPTIC CABLE STORAGE LOOPS	PAIR	\$
4.1.3	SUPPLY OF FIBER OPTIC SPLICE ENCLOSURE	EACH	\$
4.1.4	SUPPLY OF SLICE TRAY	EACH	\$
4.1.5	SUPPLY OF HARDWARE	EACH	\$
4.1.11	HARDWARE AND LASHING WIRE	FEET	\$

**NPU NORWICH, CONNECTICUT
FIBER NETWORK**

BID FORM 2

FIBER NETWORK CONSTRUCTION

ITEM #	DESCRIPTION	AMOUNT	COST /UNIT	TOTAL COST
	LABOR			
3.1.1A	INSTALLATION OF GUY AND ANCHOR	6	\$	\$
3.1.1D	INSTALLATION OF OVERHEAD GUY	2	\$	\$
3.1.2	INSTALLATION OF GROUND ROD	22	\$	\$
3.2.1	INSTALLATION OF STRAND WIRE	11,000	\$	\$
3.2.2	INSTALLATION/LASHING OF FIBER CABLE	12,000	\$	\$
3.3.1	INSTALLATION OF FIBER OPTIC STORAGE LOOP	3	\$	\$
3.3.3	REENTRY OF FIBER SPLICE ENCLOSURE	1	\$	\$
3.3.4	SPLICING OF FIBER (PER EACH FIBER)	4	\$	\$
5,4,5.5	TEST FIBER	4	\$	\$
	SUBTOTAL LABOR			\$
	MATERIALS			
4.1.2	SUPPLY OF FIBER OPTIC CABLE STORAGE LOOPS	3	\$	\$
	SUBTOTAL MATERIALS			\$
	MOBILIZE AND DEMOBILIZE CHARGE	1	\$	\$
	TOTAL			\$

The firm selected must, within ten (10) days from the date of acceptance of their proposal, file with the City of Norwich, Workmen's Compensation, Comprehensive General Liability, Comprehensive Auto Liability, Certificates of Insurance satisfactory to the City of Norwich, in compliance with the law, and in the following form and amount:

COMPREHENSIVE GENERAL LIABILITY

Premises – Operations – Products/ Completed Operations	
General Aggregate.....	\$2,000,000.00
Occurrence.....	\$1,000,000.00
Comprehensive Automobile Liability	
Combined Single Limit.....	\$500,000.00
Workman’s Compensation.....	Statutory
Employer’s Liability.....	\$100,000

If subcontractors are employed, same limits as named above shall apply and the certificate of insurance must be filed with the City.

No contract shall be binding upon the City of Norwich until such bond shall have been given and until Comprehensive General Liability, Comprehensive General Auto Liability and Workmen's Compensation policy certificates indicated above have been filed with the City and approved as to form and sufficiency by the Owner. The insurance policy certificate provided by the successful bidder and all subcontractors shall carry a statement by the insurance company that the City of Norwich will receive at least ten (10) days notice prior to cancellation of any portion of the policies or any modifications in the insurance coverage that may affect the City's interest. The cost of all insurance coverage shall be included in the price of the contract cost.

The insurance company must be licensed to do business in the State of Connecticut and must be satisfactory to the City of Norwich. THE CITY OF NORWICH MUST BE NAMED AS ADDITIONAL INSURED.

NOTE: The City reserves the right to set lower insurance limits should the selected firm be unable to obtain the limits described IF such action is deemed in the City’s best interest.