SP-150226
(New)

SPECIAL PROVISIONS
FOR
FIBER OPTIC RELOCATION

Pottawattamie County
IMN-029-3(198)55--0E-78

Effective Date
February 21st, 2017

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

TABLE OF CONTENTS

PART I GENERAL REQUIREMENTS

This project involves furnishing and installing the handhole, conduit and tracer wire, and the splicing, terminating, and testing (by others) of the existing fiber optic cables at various locations as shown on the project plans. The Contractor shall perform all work necessary to meet the requirements for this fiber optic relocation project in accordance with these special provisions and the project plans. This part of the special provisions consists of the general provisions necessary when furnishing and installing the conduit and handholes and splicing the existing fiber optic cables required by this project.

The Contractor shall furnish and install conduit, handholes and tracer wire, and relocate and splice existing fiber optic cable and all necessary accessories to make the fiber optic cable systems fully functioning.

The Contractor shall not take advantage of any apparent error, discrepancy or omission in the plans or specifications. Upon discovery of such an error, discrepancy or omission, the Contractor shall notify the Engineer immediately. The Engineer will then make such corrections or interpretations as necessary to fulfill the intent of the plans and specifications.

Materials or work described in words which, so applied, have known technical or trade meaning shall be held to refer to such recognized standards.

Figured dimensions on the plans shall be taken as correct but shall be checked by the Contractor before starting construction. Any errors, omissions, or discrepancies shall be brought to the attention of the Engineer and the Engineer's decision thereon shall be final. Correction of errors or omissions on the drawings or specifications may be made by the Engineer when such correction is necessary for the proper execution of the work.

1.1 Related Specifications and Standards

A. General

The work as detailed on the plans shall be completed in accordance with the plans, special provisions and all other Contract Documents including the documents listed below. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete project.

1. Specifications of the Underwriter's Laboratories, Inc.
2. National Electric Code
3. Telecommunications Industry Association/Electronic Industries Alliance
4. Manual on Uniform Traffic Control Devices

1.2 Local Requirements

A. General

Comply with any special requirements and limitations identified in the plans.

B. Coordination of Work

The Contractor for this project shall assign a responsible staff member that will work with the Iowa DOT on decisions regarding order of work and scheduling as needed throughout the duration of this project. The Contractor shall coordinate all fiber optic work splicing and testing, including excavations, relocations and removals, with the Engineer. Fiber optic splicing and testing will be completed by others (by others). The Engineer must approve the cut-over request, schedule and method of procedures as outlined in this Special Provisions prior to completing work.

The Contractor shall provide the Engineer any requests to perform work during the dates of special events a minimum of 5 calendar days prior to the event. The decision of the Engineer

regarding a request will be final.

C. Building Facilities

All work in or around any building facility shall be coordinated with the Engineer and the Iowa DOT District staff. Provide a minimum of 48 hours notice to the Engineer before performing any work in the immediate vicinity of a building or surrounding parking area.

1.3 Contractor's Responsibility

A. Coordination with Utilities

1. The Contractor is responsible for determining the exact location and elevation of all public utilities in proximity to any construction work and shall conduct all activities to ensure that public utilities are not disturbed or damaged.

2. The Contractor is fully liable for all expenses incurred as a result of failing to obtain required clearances, location of utilities, and any damage to utilities caused by construction.

3. Utility companies whose facilities are shown on the plans or known to be within the construction limits shall be notified by the Contractor of the starting construction date.

B. One Call Locating

Until final acceptance, the Contractor shall provide all utility locates of the work performed under this contract when requested through One-Call services or by the Engineer. The Contractor shall perform any such locations within 48 hours of receiving notice that such locations are needed.

C. Material and Equipment Storage and Construction Site Access

1. Contractor shall secure a designated material storage area for this project. Any request to store material in the right-of-way in order to complete the current work activity shall be approved by the Engineer.

2. Construction equipment may be stored within the right-of-way during non-working hours if it is outside of the roadway clear zone, as far from the traveled way as practical and as approved by the Engineer. No equipment shall be stored at the toe of any roadway slope.

3. No worker vehicles will be allowed to park in, or access a job site directly from an Interstate or Freeway facility. Access to the job site for both workers and materials shall only be via interchanges or intersecting roadways unless otherwise approved by the Engineer. Worker vehicles shall be parked off-site or at a location acceptable to the Engineer

D. Finishing Activities

Upon completion of the work at each project area, thoroughly clean the site and restore it to a condition at least equal to that existing prior to construction. Project area is defined as the approximate area disturbed during a normal week of work. During and after completion, employ appropriate measures for erosion control, where applicable. Seed and fertilize work areas upon completion of work in accordance with the Contract Documents.

1.4 Disruption to Existing Fiber Networks

A. Planned Disruption

The Contractor shall ensure continuous operation of the existing fiber networks and systems during construction of the project. The Contractor shall be responsible for repairing, to Iowa DOT's

satisfaction and at no cost to Iowa DOT, any damage the Contractor causes to the existing fiber networks and systems during the life of the project.

The Contractor shall not work on splicing, disconnecting and/or in any way disrupting normal operation of the existing fiber networks or systems without approval from all affected parties. Parties include the Iowa DOT, the City of Council Bluffs and the Iowa Communications Network (ICN). The Contractor shall provide a method of procedure written request ("ICN Change Request/MOP") to the Iowa DOT and the respective parties for approval at least 10 calendar days before the existing fiber network or equipment is disrupted. A copy of the written request shall be submitted to the Engineer in all cases. In addition to the written request, the Contractor shall submit the work plan and schedule for approval by the Engineer. The work plan shall include all fiber strands and the parties being affected. A blank copy of the written request ("ICN Change Request/MOP") is provided as an Additional Bidding Attachment 4.2 ICN Change Request/MOP.

The Contractor shall restore the disrupted system upon completion of the Work within the allowable working hours. The Contractor shall remain on site until Iowa DOT notifies that the disrupted systems are fully operational. Failure of the Contractor to restore disrupted systems and equipment within the allowable working hours will constitute an unplanned disruption.

B. Allowable Working Hours

The Contractor shall only disrupt existing fiber according to the allowable working hours as follows.

1. Iowa DOT and ICN

Disruptions to the existing systems shall only occur between Midnight and 6:00 AM on working days unless otherwise approved by the Engineer.

2. City of Council Bluffs IT and City of Council Bluffs Traffic Signals

Disruptions to the existing systems shall only occur between Midnight and 6:00 AM on working days unless otherwise approved by the Engineer.

C. Unplanned Disruption

Any unplanned disruptions determined by the Engineer to be caused by the actions of the Contractor shall be corrected by the Contractor at no additional cost to Iowa DOT.

In the case of an unplanned disruption and subsequent notification by the Engineer, the Contractor shall immediately stop all other work in progress and shall expend all of its efforts to restore the disrupted system(s) or correct the problem causing the disruption. The Contractor will not be granted an extension of time for delays caused by repairing disrupted systems. Unplanned disruptions shall result in the assessment of liquidated damages.

D. Liquidated Damages

Unplanned disruptions to the existing fiber optic network will result in impacts to the traveling public, increase fuel consumption, vehicle operating costs, pollution, and time needed for Iowa DOT administration, engineering, inspection, and supervision, and other inconveniences and harm far in excess of those resulting from delay of most projects.

Accordingly, the Contractor agrees:

1. To pay $250.00 liquidated damages for each 15 minute period that the Contractor fails to restore the proper operation of an existing fiber optic network element following an unplanned disruption.

2. To authorize the Engineer to deduct these liquidated damages from any money due or coming due to the Contractor.

1.5 Contractor Submissions

A. Materials List

The Contractor shall complete and submit one electronic pdf file of the materials list within 7 calendar days after award of the contract. Include the name of the materials supplier and catalog number of each item listed.

B. Construction Schedule

1. Within 30 calendar days after award of contract, the Contractor shall submit to the Engineer one electronic pdf file of the detailed construction schedule including dates of commencement for each major work item, duration of each major work item and completion of each major work item on each segment and phase of the proposed construction.

2. Major items of work to be included on the schedule shall include, but is not limited to the following:

a. Duration of material procurement
b. Duration and location of site preparation and staging
c. Duration and location of handhole and conduit installation
d. Duration and location of fiber optic cable reinstallation
e. Duration and location of fiber splices
f. Submission of a fiber cut-over plan and schedule for connection to the existing fiber optic network and at each existing device locations including ITS, traffic signals, and fiber termination cabinets.
g. Duration and location of fiber cut-over

3. Fiber cut-over plan and schedule shall be submitted to the Engineer and all affected parties for approval at least 14 calendar days prior to the final cut-over.

4. The Engineer will review and accept or reject the schedule within 7 calendar days after the submission of the schedule. In the event of rejection, the Contractor shall re-submit the updated schedule within 7 calendar days of notification from the Engineer.

5. Upon acceptance of the schedule, the Contractor will be expected to adhere to these dates as proposed unless modified with the approval of the Engineer.

6. Submittal and approval of the proposed construction schedule by the Engineer is required before the Contractor can commence construction activities.

C. Shop Drawings/Catalog Cuts

1. Prior to construction and after approval of the Materials List, the Contractor shall submit one electronic pdf file of the shop drawings or catalog cuts for the materials to the Engineer for approval. An equipment and materials list is provided as an Additional Bidding Attachment 4.1 Equipment and Materials List.

2. The Engineer shall review the shop drawings/catalog cuts for the purpose of assuring general conformance with the project design concept and contract documents. The Engineer will provide approval or rejection of shop drawings within 14 calendar days of the Contractor's submission. The Contractor shall re-submit the shop drawings for approval within 7 days of the Engineer's rejection.

3. The Contractor shall provide written notice of any deviations from the requirements of the plans or contract documents.

4. Engineer's approval of shop drawings/catalog cuts does not relieve the Contractor of responsibility for providing satisfactory materials complying with the contract documents. Errors not detected during review do not authorize the Contractor to proceed in error.

D. Materials Procurement

1. Shop drawings, specification data, and samples for acceptance testing (when requested) shall be submitted to the Iowa DOT for approval and/or selection prior to the placing of orders for any equipment and materials.

2. The Contractor shall order all materials requiring production lead time greater than 4 weeks within 7 calendar days of receiving the approved shop drawing(s).

3. The Contractor shall submit to the Engineer proof of material purchase order in electronic pdf format.

E. Final Acceptance

1. The Contractor shall perform all the obligations under the contract before the final acceptance of the project by Iowa DOT. Completion of the work will be the date of approval and work acceptance on “Statement of Completion and Final Acceptance of Work” (Form 830435) by the Engineer. The Contractor shall perform all the obligations under the contract before the final acceptance of the project by Iowa DOT. Warranty begins on this date on the final acceptance form.

2. Final acceptance shall not constitute acceptance of any unauthorized or non-compliant Work or material. Iowa DOT shall not be barred from requiring the Contractor to remove, replace, repair, or dispose of any Work or material that is defective, unauthorized or that otherwise fails to comply with the contract documents or from recovering damages for any such Work or material.

3. Final acceptance shall not relieve the Contractor of any obligations and/or responsibilities relating to warranty requirements designated in the contract documents.

F. Warranty

1. The Contractor shall transfer all required standard materials warranties on the date of final acceptance to the Iowa DOT.

2. Materials warranty periods shall not commence prior to final acceptance of the project, and shall remain in effect until at least 1 year after the final acceptance for all cables and equipment furnished and installed for this project.

1.6 As-Built Documentation

A. General

1. As-built record drawings will be the responsibility of, and completed by, an on-site representative of the Engineer. As such, it will be the responsibility of the Engineer’s representative to coordinate directly with the Contractor to ensure that a master record set of the plans is maintained throughout construction to document all installations and any deviations from the design shown in the contract documents.

2. It is the responsibility of the Contractor to maintain written records of daily construction progress, areas worked and quantities installed to aid in the completeness of as- constructed

documentation by the Engineer's on-site representative.

B. GPS Data Recording Staking Assistance

1. The Engineer's on-site representative will be responsible for collecting GPS data of all installations including, but not limited to: conduit routing, handholes, device poles, device cabinets, and power supplies. All efforts will be made by the Engineer's on-site representative to coordinate with the Contractor and collect construction progress daily.

2. The Contractor shall be responsible to coordinate and assist the Engineer's on-site representative in this effort by staking, flagging or otherwise locating all installed features until such time that the GPS data can be collected.

PART II TECHNICAL PROVISIONS

This part consists of the material requirements, construction details, and methods of measurement and basis of payment necessary to complete construction of the fiber relocation project, in place, as described in the Contract Documents.

2.1 General

A. Supply only new materials from reputable suppliers and manufacturers approved by the Engineer. Provide any items, equipment, or materials not specifically addressed in the contract documents but required to provide a complete and functional installation. The level of quality shall be consistent with other specified items. All miscellaneous electrical equipment and materials shall be UL-approved. Securely store and protect all materials delivered to the project site. Provide appropriate material quantities for testing or verification at no additional cost when requested by the Engineer.

B. The Contractor shall expect some reasonable variation in location of the facilities shown due to unforeseen conflicts, changes in proposed work, installation difficulties, or other circumstances. The Engineer shall authorize any changes in location in writing before performing the installation. No additional compensation shall be provided for additional work associated with or resulting from unauthorized changes to the contract documents.

C. The Engineer shall authorize any changes in location in writing before performing the installation. No additional compensation shall be provided for additional work associated with or resulting from unauthorized changes to the contract documents.

2.2 Wire and Cable

A. Materials

1. Tracer Wire
Single conductor, solid copper, Type THHN, No. 12 AWG with UL approval and orange colored jacket.

B. Construction

1. General

a. All installations and connections shall comply with the contract documents and all generally accepted codes and standards.

b. Install cable connectors in accordance with Standard Road Plan RM-40 and the Contract Documents at the base of all breakaway poles, cabinets, or other installations for all non-low voltage installations unless otherwise directed by the Engineer. All costs associated with these connectors are incidental to the cost of the connected items of work.

c. The Engineer will resolve all conflicts.

2. Tracer Wire

a. Where existing tracer wire is found, the Contractor has the option to either pull new fiber optic cable over the existing tracer, or remove and reinstall the existing tracer. For either case, the Contractor shall perform continuity tests before and after the fiber installation to confirm that the tracer wire was not damaged, and submit test results to the Engineer

for approval. If damaged, the Contactor shall replace or repair as necessary at no cost to the Iowa DOT.

b. Where new tracer wire is installed:

- Terminate each tracer wire run at Type Fiber Vault handholes in test stations.
- Splicing tracer wires will not be allowed unless approved by the Engineer. Maintain solid, uncut wire continuity of the tracer wire through Type FOR27 pulling handholes. If Engineer approved, splice tracer wires only in handholes to form a continuous network using UL tested for wet location splice kits.
- Test all tracer wire for continuity. Submit test results to Engineer for approval.
- Prior to final acceptance, the Contractor shall meet with ICN and DOT to demonstrate the locate system is working properly throughout the entire locate system.

c. Labeling Requirement

- Place tags on all fiber optic cable identifying the owner and direction of the cable at each termination point and in every handhole, Fiber Vault, and cabinet.
- Tags shall clearly identify where each individual cable run originated and where it ends (handhole to handhole, handhole to cabinet, handhole to building, etc.)

C. Method of Measurement & Basis of Payment

1. Measurement and payment for all new tracer wire shall be paid for at the contract unit price per linear foot for Tracer Wire.

2. Payment is full compensation for:

- The furnishing, installation and testing of all wire and cable,
- Including the proper installation of the wire and cable into existing conduit and new conduit systems, supply and installation of splices and connectors, and slack, coiled, or stored wires or cables, and
- Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

2.3 Handholes

A. Materials

1. General

a. Supply handholes constructed of epoxy or polyester resin mortar with woven glass fiber reinforcement and an appropriate aggregate dimensioned as indicated in the contract documents.

b. Handhole materials shall not support combustion when tested in accordance with “Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position” ASTM D-635.

c. Water absorption shall not exceed 2% of the original weight of material under test conditions per “Standard Test Method for Water Absorption of Plastics” ASTM D-570.

d. The handhole shall be functional without failure throughout a temperature range of -50ºF to +170ºF.

e. The handhole walls shall not deflect more than 0.024 inches per foot of length of box when installed and subject to an ASTM C-857 TIER 22 load.

f. Handholes shall meet ANSI/SCTE 77 standards and be verified by a registered third party

and stamped by a registered Professional Engineer.

g. Handhole lid strength shall be tested to 22,500 pounds (Tier 15).

h. Handhole lids shall be labeled as indicated in the plans or as directed by the Engineer.

i. The Engineer shall provide approval prior to use of any handholes satisfying the contract documents requirements for structural, physical, and chemical properties.

2. Test Stations

a. Supply Rhino part TVTI78OB-EM9125-OR or approved alternate test stations at all Type Fiber Vault handholes and at locations indicated on the plans.

b. Test Stations shall be 78 inches tall (60 inches tall above grade, 18 inches driven into the ground) triangular flexible orange plastic marker with five separate access terminals and set screw to hold terminal concealment cap on.

c. Place custom warning decals on all sides, the Engineer shall provide prior approval of decals.

3. Fiber Markers

a. Supply Vulcan Inc. Part # 0303168 or approved equivalent markers at all FOR27 handhole locations.

b. Markers shall be 78 inch, orange, polyester resin with reinforcing fibers, and remain flexible from -40°F to +140°F.

c. Place custom warning decals on all sides, the Engineer shall provide prior approval of decals.

B. Construction

1. General

a. Install the type and size of handholes at the locations indicated in the contract documents.

b. Set Type FOR27 handholes approximately 12 inches below the finished surface of the surrounding ground when constructing in an earth embankment or non-paved surface.

c. Install fine aggregate bedding to a depth of 1 foot below the handhole.

d. Conduit shall enter the handhole from the bottom and extend conduit ends between 4 and 6 inches above the aggregate bedding.

e. Side penetrations of the handholes are not permitted.

f. Terminate each tracer wire run in test stations at Handhole, Type Fiber Vault locations.

g. Plug all open conduit ends within the handhole in a manner acceptable to the Engineer.

h. Rodent proof all handholes to the satisfaction of the Engineer.

C. Method of Measurement & Basis of Payment

1. Measurement and payment for all handholes and test stations shall be paid for at the contract unit price per each for Handhole, Type FOR27 and Test Station.

2. Payment is full compensation for:

- The furnishing and installation of all handholes,
- Including all surface excavations, repair or restoration of any nearby areas, concrete, proper water/moisture drainage materials, all necessary electric grounding materials and installation, and
- Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

2.4 Conduit

A. Materials

1. High Density Polyethylene (HDPE) conduit

a. High Density Polyethylene (HDPE) conduit shall be smooth wall ORANGE in color.

b. Comply with ASTM F 2160 (conduit) and ASTM D 3350 (HDPE material), minimum SDR 13.5, and NEMA TC-7 EPEC-B standards.
c. Sequential foot markings printed on HDPE.
d. A custom message of stated material specifications that product meets shall be printed a minimum of every 10 feet.
e. Continuous reel or straight pieces to minimize splicing.
f. For dissimilar conduit connections provide an adhesive compatible with both materials.

B. Construction

1. General

a. Follow all general guidelines covering the construction of buried conduit.
b. Install conduit by plowing, jacking, pushing, boring, or other approved methods within the public right of way and in a manner that minimizes atypical damage from construction operations.
c. The minimum bending radius of HDPE conduit shall be the larger of 20 times the outside diameter or the HDPE manufacturer's recommendations for minimum bending radius.
d. Unless shown in the plans, open trench installation is only permitted within 25 feet of any handhole, pole, structure, or other similar improvements, and any other requested locations approved by the Engineer.
e. At the discretion of the Engineer, verify the integrity of the conduit structure in a manner acceptable to the Engineer.
f. Tunneling under the pavement or water jetting shall not be permitted.
g. No excavations are permitted to cross any roadways or any other paved or other similarly improved areas. At these locations, install conduits by boring method unless otherwise directed or approved in writing by the Engineer. Where indicated in the contract document and at all roadway and stream crossings, install conduit sections with external protection as specified herein.
h. No direct-buried cable is allowed.
i. Unless otherwise indicated in the contract documents, installation of Schedule 40 PVC conduit or approved alternative is allowed only in open trench runs and when approved by the Engineer.
j. Seal all conduit openings using an approved sealing compound (duct seal) at all conduit openings at the junction boxes handholes, poles, cabinets, and building entrances.
k. Thread and cap with standard pipe caps all rigid steel conduit ends until installing wiring. Per Article 2523.03, N of the Standard Specifications replace caps with approved conduit bushing during and after wire installation.

2. Installation Clearances

a. Depth of all bores shall be a minimum of 48 inches unless otherwise specified in the plans.
b. Maintain the typical offsets from referenced locations as shown in the plans.
c. Maintain the minimum depth throughout the length of all conduit installations.
d. Maintain a minimum of 2 feet of separation when underground conduits parallel an existing facility.

3. Conduit Splicing

a. Conduit shall be installed in continuous runs between handholes, foundations, and structures unless otherwise directed by the Engineer.
b. Conduit splicing shall only be permitted at locations where conduit of differing materials must be joined.
c. All mechanically joined conduit splices shall use compression couplings designed for underground placement and blown-in fiber installation.
d. Butt fusion welding and solvent welding of conduits will not be allowed.
e. All conduit splices shall be watertight to 200 psi.
f. Conduit splicing is incidental to the connected items of work.

4. Facilities Protection

- **a.** The Contractor is responsible for protecting and maintaining the conduit throughout construction and until final acceptance.
- **b.** To avoid possible damage to buried conduit from exposure to traffic, livestock and other hazards, complete trenching of laterals, trenching around culverts, construction of aerial inserts and similar operations as soon as practicable behind all segment installations.
- **c.** If more than 48 hours lag is expected behind a segment installation, install additional protective measures acceptable to the Engineer.

5. Backfilling

- **a.** Backfill trenches and other excavations in lifts of 6 inches or less in compacted depth. Compact each layer thoroughly before placing subsequent layers.
- **b.** Remove all cinders, broken concrete, or other hard or abrasive materials in the backfill material before commencing backfilling operations.
- **c.** Remove and dispose of surplus and unsuitable materials upon completion of the backfilling operations in the area.
- **d.** Place and carefully hand tamp backfill under and around the structures in lifts not to exceed 4 inches in loose thickness. Use a suitably sized mechanical tamper for all areas inaccessible to rollers. Operate pneumatic or other mechanical tampers in accordance with the manufacturer's recommendations.
- **e.** Perform operations in a manner that minimizes soil erosion and employs appropriate storm water pollution prevention measures during all construction operations.
- **f.** Maintain work areas in a neat, clean, and orderly condition at all times.
- **g.** Upon completion of conduit/cable placing operations and any other work in an area, remove all debris, materials, tools, and equipment from the area and restore the disturbed area(s) to original or better condition within 24 hours or as soon as practicable as determined by the Engineer. Backfill all excavations and grade all disturbed areas during the restoration process.
- **h.** Remove and dispose of rock and debris excavated and remaining after backfilling as directed by the Engineer.
- **i.** Immediately repair or replace any unauthorized disturbance or damage. Replace improved landscaping, lawns, scrubs, and hedge removed or damaged during construction in a manner acceptable to the Engineer. Re-sod damaged lawns using like grasses.

6. Bored Crossings

- **a.** Use equipment and construction methods subject to the approval of the Engineer that cause minimal displacement of the soil.
- **b.** Bore all crossings beneath roadways, streets, other paved surfaces, railroads, or other structure in accordance with requirements and regulations of the authority having jurisdiction and as directed in the contract documents
- **c.** Limit bore hole sizes to the outside diameter of the conduit being placed.
- **d.** Locate bore pits a minimum of 2 feet from the edge of pavement or shoulder unless otherwise directed by the Engineer.

C. Method of Measurement & Basis of Payment

1. Measurement and payment for all conduit shall be paid for at the contract unit price per linear foot for 2 inch Conduit, Trench.

2. Payment is full compensation for:

- The furnishing and installation of all conduits per the contract documents,
- Including all surface excavations or surface preparation work, repair or restoration of any disturbed areas to pre-construction conditions, proper water/moisture drainage materials, and
- Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

2.5 Fiber Optic Cable

A. Materials

None

B. Construction

1. General

- **a.** Remove fiber optic cable from the reel in a manner acceptable to the Manufacturer and Engineer.
- **b.** Install fiber optic cable in existing conduit as indicated in the contract documents.
- **c.** Direct bury of fiber optic cable is not allowed.
- **d.** Do not twist or bend the fiber optic cable in excess of the limits recommended by the manufacturer.
- **e.** As the cable is fed into the duct and conduit system the Contractor shall use a manufacturer approved water-based cable lubricant for all fiber optic cable installations.
- **f.** Protect at all times all proposed cables, cable ends, and any exposed portions of fiber optic cable from damage including water intrusion.
- **g.** Any existing pull tape or tracer wire that is used as a pull rope for fiber optic cable installation shall be replaced in kind. The cost of any tracer wire or pull tape replacement shall be subsidiary to the fiber optic cable installation.

2. Cable Installation

- **a.** All fiber optic cable shall be installed in conduits.
- **b.** A suitable cable feeding method shall be used between the cable reel and the face of the duct and conduit to protect the cable and guide it into the duct.
- **c.** Dynamometers and breakaway pulling swings shall be used to ensure that the pulling line tension does not exceed 600 pounds.
- **d.** The mechanical stress placed on a cable during installation shall not be such that the cable is twisted or stretched. A pulling eye and swivel shall be attached to the cable and used to install the cable through the duct conduit system to prevent the cable from twisting.
- **e.** Cables shall not be forced around sharp corners and precautions shall be taken during installation to prevent the cable from being kinked or crushed.
- **f.** Minimum bending radius during installation shall not be less than 20 times the outside diameter of the cable or as recommended by the manufacturer, whichever is greater.
- **g.** Pulling of the cable shall be hand assisted.
- **h.** DOT approved installation methods include Pulling, High Air Speed Blowing, Air-Assist, Push/Pull Installation, and Air Blown Cable. Installation shall comply with all manufacturers' recommendations for cable installation including pulling tensions and bending radii.
- **i.** The cable shall be carefully inspected for jacket defects. If defects are noticed, the pulling operation shall be stopped immediately and the Engineer notified. The Engineer shall make a determination of acceptability or shall reject the cable.
- **j.** The fiber cable shall be installed in continuous runs as marked on the plans. End of reel splices or butt splices not shown in the plans shall be pre-approved by the Engineer and are incidental to the cost of the installation of the cable. If approved, the end of reel or butt splices shall be performed in existing splice vaults as shown on the plans. The cost associated with the end of reel or butt splices including splice closures, storage baskets, splice trays, protective sleeves, and all accessories shall be included in their respective items and shall not result in additional cost to Iowa DOT.
- **k.** No splices shall be allowed unless indicated by the plans or approved by the Iowa DOT.
- **l.** Seal all conduit openings using an approved sealing compound (duct seal) at all

conduit openings at the junction boxes handholes, poles, cabinets, and building entrances after cable installation.

3. **Facilities Protection**
   - **a.** In the event it is suspected that cable damage has occurred by the Engineer prior to final acceptance, Contractor shall test the cable with an OTDR within 72 hours after notification and submit a copy of the OTDR test to the Engineer upon completion.
   - **b.** Contractor shall replace or repair, as directed by the Engineer, any damage occurring before final acceptance at no additional cost to the Iowa DOT. Perform any repairs or replacements as soon as reasonably possible unless otherwise approved by the Engineer.
   - **c.** Contractor shall repair or replace any defect in the installed cable at no additional cost to the Iowa DOT. Consider a defect to be any condition resulting in a negative or adverse effect on current or future operations of the completed fiber optic communication system as determined by the Engineer.
   - **d.** Any existing wiring that is damaged during fiber optic cable installation shall be replaced or repaired, as directed by the Engineer, at no additional cost to the Iowa DOT.

4. **Slack Coils**
   - **a.** Sufficient slack shall be left at each end of the cable to allow proper cable splicing and termination. The minimum slack amount shall be as follows or as indicated in the plans:
     - Handhole, type FOR27 – 60 feet per cable without splicing
     - Handhole, type Fiber Vaults – 150 feet (75 feet per each end of the cable)
   - **b.** Storage of slack cable in cabinets and handholes shall be neatly coiled. The slack coils shall be bound at a minimum of three points around the coil perimeter. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames and terminals.
   - **c.** For storage purposes, the minimum bending radius shall not be less than ten times the outside diameter of the cable or as recommended by the manufacturer, whichever is greater.

5. **Cable Identification**
   - **a.** Place tags on all fiber optic cable identifying the owner and direction of the cable at each termination point and in every handhole, Fiber Vault, and cabinet.
   - **b.** Tags shall clearly identify where each individual cable run originated and where it ends (handhole to handhole, handhole to cabinet, handhole to building, etc.)
   - **c.** For fiber installations with joint Iowa DOT/other agency (or entity) use where the fiber will be owned by the other agency (or entity), install typical identifiers and/or markings for that fiber.

C. Method of Measurement & Basis of Payment

1. Measurement and payment for all fiber optic cable shall be paid for at the contract unit price per linear foot for Reinstall Existing 96 SM Fiber. Payment is full compensation for:
   - **a.** The furnishing and installation of all cables and wires per the contract documents,
   - **b.** Furnishing all materials, labor, tools, consumable items and other incidental items necessary to meet the requirements of the contract documents.

2.6 Removal Items

The Contractor shall remove, and relocate, items as indicated on the Plans. Unless otherwise specified on the plans, the removal items shall become the property of the Contractor. The Contractor is responsible for salvaging and/or disposal of the material. All costs incidental to the

removal of these items shall be included in the respective pay items.

A. Method of Measurement & Basis of Payment

1. Measurement and payment for all removal items shall be paid for at the contract unit price per units indicated in the tabulation of quantities in the plans for Relocate Existing 2 inch Conduit and Remove Existing 96 SM Fiber.

PART IV
ADDITIONAL BIDDING
ATTACHMENTS

3.1 Equipment and Materials List

Iowa DOT PROJECT NO. IMN-029-3(198)55--0E-78 IN COUNCIL BLUFFS, IOWA

DESCRIPTION	MANUFACTURER	CATALOG NUMBER
HANDHOLE, TYPE FOR27		
TRACER WIRE		
2” HDPE CONDUIT		
TEST STATION		
TEST STATION GROUND WIRE		

3.2 Written Request ICN Change Request/MOP

ICN Change Request/MOP - *email to ICNServiceDesk@Iowa.gov / **800.572.3940***

Brief Description of Change:

OSP will be performing the following activities for (project description).

This will impact Link(s) XXXX and the following splice locations:

Method of Procedure (MOP):

1. Technician on site for set up.
    a.
2. Technician to call ICN NOC before starting primary work (or taking down service- if Service Affecting).
    a.
3. Technician to perform the following activities:
    a.
4. Technician to call ICN NOC to verify all alarms clear.
5. Technician to complete clean up and splice closure work.
6. Technician to call ICN NOC when hands off and ready to leave site to verify no issues.

Tech and/or Contractor:

- Contractor, Contact Name, Contact Number
- FNS Technician required: yes/no?

Date: XXX
Planned Start Time: 00:01
Planned Finish Time: 06:00
Outage Duration: hours

Back out plan: Re-splice fibers as originally configured or re-splice fibers as shown on sheet N.XX.
Recovery time needed for back out plan: hours

Other Work Groups needed or people already coordinated. (List):

-

RFS / LOG Number or related Support Request /Problem:

-

CIs affected:

Equipment:

- ***(List CI's here)***

Equipment(s) connected to (List):

-

Customers affected (List):

-

Circuits (List):

-

Project is on the cable route: See description above and attached splice documentation. Attach working drawings and mark-ups if applicable