SP-150762
(New)

# SPECIAL PROVISIONS
# FOR
# ITS INFRASTRUCTURE INSTALLTION

**Linn County**
**IM-380-6(284)25--13-57**

**Effective Date**
**August 17, 2021**

**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.**

## 150762.01 DESCRIPTION.

**A.** This project involves removal, storage, and re-installation of the existing camera pole, power installed foundation, and device cabinet. This project also involves supplying and installing conduit, handholes, tracer wire, test station, and electrical power necessary for a complete ITS Infrastructure installation designed for use with future proposed ITS fiber installation, splicing, device deployments, and other uses planned by the Iowa DOT. The Iowa DOT plans to initiate separate contracts to install, splice, and terminate the fiber-optic cable and place it in service (light the fiber network). Separate contracts will also be initiated to supply and install the cameras, sensors, and other ancillary equipment in or on the cabinets and poles, as well as other items required to provide a complete and functioning network of ITS devices.

**B. Related Specifications and Standards.**
The work as detailed on the plans for the ITS Infrastructure Installation shall be completed in accordance with the contract documents and the documents listed below.

- NEC, latest edition adopted by the State of Iowa.
- Telecommunications Industry Association/Electronic Industries Association (TIA/EIA) latest editions.

**C. Contractor's Responsibility.**

**1. 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.

**2. Conduit Locations.**
Prior to final acceptance, the Contractor shall meet with the Engineer to demonstrate the locate system is working properly throughout the entire locate system.

**D. Disruption to Existing Fiber Networks.**

**1. Planned Work Near Existing Fiber Networks.**

**a.** The existing fiber lines serving the existing ITS camera pole, and the camera pole will be decommissioned and removed ahead of this project.

**b.** However, the Contractor shall ensure continuous operation of any other existing fiber networks and systems in the area during construction of the project.

**c.** 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, and the Iowa Communications Network (ICN). The Contractor shall provide a written request to the Iowa DOT and the respective parties for approval at least ten calendar days before work is done near an existing fiber network or equipment. 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 possibly affected.

**2. Unplanned Disruption.**

**a.** The Contractor shall be responsible for repairing, to ICN'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.

**b.** In the event of disruption, the contractor shall simultaneously notify the Engineer and affected parties and immediately stop all work in progress and shall expend all its efforts to restore the disrupted system(s) and/or correct the problem causing the disruption. The notice shall include the type of facility damaged and the extent of the damage.

**c.** The Contractor shall remain on site until the ICN confirms that the disrupted systems are fully operational. Unplanned disruptions shall result in the assessment of liquidated damages.

**d.** The Contractor will not be granted an extension of time for delays caused by repairing disrupted systems.

**3. Liquidated Damages.**

**a.** 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.

**b.** Accordingly, the Contractor agrees:

**1)** To pay $250.00 liquidated damages per 15 minutes, 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.

**E. Contractor Submissions.**

**1. Materials List.**

Complete and submit one electronic pdf file of the materials list within 14 calendar days after award of the project contract. Include the name of the materials, supplier and catalog number of each item listed.

**2. Construction Schedule.**

**a.** Within 30 days after award of contract or before the construction kickoff meeting, 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 of the proposed construction.

**b.** Major items of work to be included on the schedule are decommissioning of existing equipment, installation of conduit, handholes, building entrances, and fiber optic cable.
**c.** 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.
**d.** Submittal and approval of the proposed construction schedule by the Engineer is required before the Contractor can commence construction activities.

**3. Shop Drawings.**
**a.** After approval of the Materials List and before any items are ordered, the shop drawings shall be submitted for approval according to Article 1105.03 of the Standard Specifications.
**b.** The Engineer will review the shop drawings/catalog cuts for the purpose of assuring general conformance with the project design concept and contract documents.
**c.** Provide written notice of any deviations from the requirements of the contract documents or Special Provisions.
**d.** 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.

**4. Warranty.**
**a.** Transfer all required standard materials warranties on the date of final acceptance to the Iowa DOT.
**b.** Warranty periods shall not commence prior to final acceptance of the work.

**F. As-Built Documentation.**

**1. General.**
**a.** As-built record plans 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 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.
**b.** 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.

**2. GPS Data Recording Staking Assistance.**
**a.** The Engineer will be responsible for collecting GPS data of all installations including, but not limited to conduit routing and handholes. All efforts will be made by the Engineer to coordinate with the Contractor and collect daily construction progress.
**b.** The Contractor shall be responsible to coordinate and assist the Engineer in this effort by staking, flagging or otherwise locating all installed features until such time that the GPS data can be collected.

## 150762.02 MATERIALS.

**A. General.**

**1.** 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 listed for its specific application.

**2.** The Contractor shall stake per coordinates provided in the plans, all handholes and proposed conduit alignment a minimum of one week prior to construction and for approval by the Engineer. 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.

3. The Iowa DOT will stake all pole locations. Pole locations shall not be adjusted without approval by the Engineer. The Engineer shall authorize any changes in location in writing before installation by Contractor.

4. Notify the Engineer immediately if an obstruction conflicts with a foundation. The Engineer is responsible for relocating or determining another effective means of supporting the structure to eliminate the conflict. Payment shall not be made for re-work or extra work as the result of an unauthorized relocation of a foundation.

**B. ITS Construction Survey.**

1. **General.**
   ITS construction survey includes personnel, equipment, and supplies required for fiber optic line and ITS construction surveying and staking necessary for construction of the project as shown in the contract documents.

2. **Documentation.**
   Format the survey work documentation in a manner acceptable to the Engineer. Ensure documentation is sufficient to prove means and methods used to transfer design intent to construction stakes. Check tie-ins with existing roadways, structures, and utilities prior to staking; notify the Engineer if discrepancies are found.

3. **Qualifications.**
   Perform ITS construction survey directly by or under responsible charge of a Professional Land Surveyor licensed in the State of Iowa.

4. **Lath.**
   Provide wood lath that is approximately 3/8 inch thick by 1 1/2 inches wide by 48 inches long.

5. **Survey Equipment.**
   Utilize survey equipment with a level of accuracy that will result in less than 6 inches of error horizontally.

**C. ITS Pole / Foundation / Device Cabinet.**
Refer to Article 150762.03 for reinstallation details.

**D. Wire and Cable.**

1. **Tracer Wire.**
   **a.** Single conductor copper clad steel, No. 10 AWG with orange colored jacket.
   **b.** Contractor shall use a Tracer-Lock Connector (#TL-LUG-SS) or approved equivalent on all mainline and lateral connections.

2. **Grounding/Bonding.**
   Ground all installations using a No. 6 AWG copper, non-insulated wire bonded to copper clad metal, driven electrodes using an exothermic weld.

**E. Handholes**

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 two percent 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 -50°F to +170°F.
**e.** The handhole walls shall not deflect more than 0.24 inches per foot of length of box when installed and subject to an ASTM C-857 TIER 22 load.
**f.** Handholes shall meet or exceed ANSI/SCTE 77 “Specification for Underground Enclosure Integrity” requirements.
**g.** Handhole lid strength shall be tested to 33,750 pounds (Tier 22).
**h.** Handhole lids shall be labeled as indicated in the plans or as directed by the Engineer.

**2. Test Stations.**
**a.** Supply Rhino part TVTI78OB-EM9125-OR or approved equivalent test stations at all Type IV handholes.
**b.** Test Stations shall be 78 inch triangular flexible orange plastic marker with five separate access terminals, isolation lever, 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.

**F. High Density Polyethylene Conduit**

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

**2.** Comply with ASTM F 2160 (conduit) and ASTM D 3350 (HDPE material), minimum SDR 13.5 or 11 as specified on the construction drawings.

**3.** Sequential foot markings printed on HDPE.

**4.** Continuous reel or straight pieces to minimize splicing.

**5.** For dissimilar conduit connections provide an adhesive compatible with both materials.

**G. Power Connections**
Power connections shall comply with the requirements of the NEC, contract documents, electrical utility, and all generally accepted standards and requirements for the electrical components and power terminations in the individual power source.

**H. Pull Tape**

**1.** Pull tape shall be clearly marked with durable, sequential footage markings.

**2.** Pull tape shall have a minimum proper tensile strength of 600 pounds.

## 150762.03 CONSTRUCTION.

**A. General.**
The Contractor shall stake per coordinates provided in the plans, all handholes and proposed conduit alignment a minimum of 1 week prior to construction and for approval by the Engineer. 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.

**B. ITS Construction Survey.**

**1.** The Engineer will stake permanent ROW corners per Section 2526 of the Standard Specifications. Contractor shall fill the gaps along the permanent ROW between pins every 100 feet per Section 2526 of the Standard Specifications.

2. Place stakes at the following locations and label with item being staked:
   - Handholes
   - Conduit and/or cable alignment direction changes
   - Transitions from plow to bore or bore to plow
   - At locations requiring specific depths to avoid existing or future facilities
   - A minimum of 100 feet apart along plowed conduit
   - A minimum of 25 feet apart along bored conduit
   - At other locations as noted within the contract documents

3. On stakes marking bore locations, label with required minimum conduit depth below existing grade.

**C. Existing ITS Structure Removal.**

The Contractor shall be responsible for the removal, storage, and re-installation of the existing ITS pole, device cabinet, and power installed foundation. Refer to the plans.

1. Protect and maintain the operation of the existing ITS installation for as long as practicable to facilitate Iowa DOT traffic monitoring during the beginning of interchange construction.

2. Contact the Iowa DOT Traffic and Safety Bureau 3 weeks in advance of when the Contractor requires the removal of the existing ITS installation.

   Traffic and Safety Bureau contact:
   Jason Dale
   Office: 515-239-1995
   Mobile: 515-291-4675
   e-mail: Jason.Dale@iowadot.us

3. During this time, the Iowa DOT will have their ITS equipment maintenance contractor remove the camera, antenna, and other electronic components from the structure prior to removal of the ITS structure by the Contractor.

4. Notify the Engineer one day in advance of the actual removal of the structure.

5. On the scheduled date, remove the ITS pole, cabinet, and power installed foundation, and transport and store these components in a secure location. Store the device cabinet in a location out of the weather elements. Clean any earth debris from the foundation prior to storage.

6. After removal, coordinate with the electric utility to decommission the electric service to the existing meter pedestal. Once decommissioned, remove the meter pedestal and any conduit and wire necessary for commencement of the interchange construction. Salvage of the meter pedestal, conduit, and wire not property of the utility shall be to the Contractor.

**D. Foundation Re-installation.**

1. **General.**
   **a.** Install the power installed foundation in accordance with the contract documents.
   **b.** Contact the Engineer a minimum of 1 week in advance to arrange a field review prior to placing the power installed foundation.
   **c.** Notify the Engineer immediately if an obstruction conflicts with a proposed power installed foundation location. The Engineer is responsible for relocating or determining another effective means of supporting the structure to eliminate the conflict. Payment shall not be made for re-work or extra work as the result of an unauthorized relocation of a power installed foundation.

2. **Installation Details.**
   - **a.** Install foundation as located by the Engineer and set level and to the proper elevation.
   - **b.** Hand dig with shovel after power installed foundation is in place to install conduits into the provided conduit entrances.
   - **c.** Install the number of conduits sized as indicated in the contract documents. All conduits shall be located as indicated in the contract documents.

3. **Improper Construction.**
   Remove and reconstruct, at no additional cost to the Engineer, all power installed foundations improperly constructed or with improperly installed anchor bolts, conduit, or any other foundations components as determined by the Engineer.

**E. ITS Pole Re-installation.**

1. **General.**
   - **a.** If pole has structural damage do not erect and notify Engineer.
   - **b.** Repair any surface damage to galvanized components using a zinc-rich paint acceptable to the Engineer.

2. **Pole Erection.**
   - **a.** Erect pole and securely bolt to the power installed foundation base plate such that the pole is vertical to the centerline of the nearest adjacent major roadway.
   - **b.** Provide new anchor bolts, nuts, and washers of the size and type of the original ones.
   - **c.** Use leveling nuts on each anchor bolt installed below the pole flange. Adjust the pole's vertical position by adjusting both the upper and lower nuts.

**F. Device Cabinet Re-installation**

1. **General.**
   - **a.** Install cabinet in accordance with the contract documents.
   - **b.** Do not penetrate the top of cabinet without prior authorization by the Engineer.
   - **c.** All exterior connections shall be watertight.
   - **d.** Contact the Engineer a minimum of one week in advance to arrange a field review prior to placing the cabinet.

2. **Mounting.**
   - **a.** Orient cabinet as shown in the contract documents unless otherwise directed by the Engineer.
   - **b.** Ensure sufficient clamps, nuts, hardware, etc., as required for the mounting type, are furnished.
   - **c.** Seal all conduit openings in the device cabinet using ETCO duct plugs or as directed by the Engineer.

3. **Electrical Service.**
   - **a.** Install electrical power feed circuit as shown in the contract documents, energize, and test for proper voltage.
   - **b.** Install grounding as shown in the contract documents.

**G. Wire and Cable.**

1. **General.**
   - **a.** All installations and connections shall comply with the contract documents and all generally accepted codes and standards.
   - **b.** The Engineer shall resolve all conflicts.

2. **Tracer Wire.**

**a.** Install, splice, and test for continuity tracer wire in all conduit installations as indicated on the contract documents.
**b.** Where new tracer wire is installed:
- Splice tracer wire only in handholes to form a continuous network using splice kits listed for wet locations.
- Leave 50 foot coil of tracer wire in all Type IV handholes to be terminated at the test station.
- Test all tracer wire for continuity, with approval by the Engineer prior to final acceptance.

**c. Labeling Requirement.**
- Place tags on all tracer wire identifying the direction of the tracer wire at every test station.
- Tracer wire tags shall be self-laminating polyester material.
- Tracer wire tags shall have black text with a white background.
- Tracer wire tags shall be Panduit part number S075X150YAJ or approved equal.
- See plan sheet U.04 for labeling details.

**3. Grounding/Bonding.**
**a.** Ground all installations as indicated in the contract documents.
**b.** Installation of grounds is incidental to the cost of the connected items of work.
**c.** Ground all installations in accordance with the requirements of NEC. Supply and install additional grounding rods and equipment as necessary to satisfy such requirements at no additional cost to the Contracting Authority.

## H. Handholes.

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

**2.** Set top of all handholes to depths as indicated in the contract documents for different handhole types and installation locations.

**3.** Install coarse aggregate bedding below the handhole as identified in the contract documents.

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

**5.** Side penetrations of the handholes are not permitted.

**6.** Terminate each tracer wire run in test stations at Handhole, Type IV locations.

**7.** Install ground rods at all Type IV handholes and as indicated in the contract documents.

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

**9.** Rodent proof all handholes to the satisfaction of the Engineer.

**10.** Conduit entrance into junction boxes shall be through slip holes. Conduit shall fasten to the box using sealing type locknuts.

## I. Conduit.

**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.** Open trench installation is only permitted within 25 feet of any handhole, 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 documents 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 or when approved by the Engineer.
**j.** Seal all conduit openings using ETCO duct plugs or approved equal, or as directed by the Engineer, at all conduit openings at the junction boxes, handholes, and building entrances.
**k.** Thread and cap all rigid steel conduit ends with standard conduit caps until wiring is installed. Before wiring is installed, replace caps with threaded insulating bushing in accordance with Article 2523.03, N of the Standard Specifications.

**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.
**e.** Maintain a minimum of 2 feet vertical separation when crossing existing utilities.

**3. Conduit Splicing.**
**a.** Conduit shall be installed with minimal splices between handholes and structures as shown on contract documents.
**b.** All mechanically joined conduit splices shall use compression couplings designed for underground placement and blown-in fiber installation.
**c.** Butt fusion welding and solvent welding of conduits will not be allowed.
**d.** All conduit splices shall be designed to be watertight to 200 psi.
**e.** 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.
**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.

**6. Surface Restoration.**
**a.** Replace or reconstruct features removed as a part of the work, such as sidewalks, driveways, curbs, roadway pavement, unpaved areas, or any other items.
**b.** 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.
**c.** Complete restoration according to the applicable sections of the Standard Specifications.

**7. Multiple Duct Installation.**
Install multiple ducts, in continuity, at locations indicated in the contract documents unless authorized in writing by the Engineer.

**8. Plowing.**
**a.** Use equipment and construction methods subject to the approval of the Engineer that cause minimal displacement of the soil.
**b.** Furnish competent supervision at all times at the site of plowing operations to assure compliance with the contract documents.
**c.** The equipment shall be capable of extending the plow in order to maintain the required minimum depths under all terrain conditions.
**d.** The reel carrier shall be of adequate size and be configured so that the reel sizes being used can be safely handled.
**e.** Avoid damaging any paved surfaces, ditches, or other similar surface features. Immediately repair any damage to such features to the satisfaction of the Engineer.
**f.** Perform plowing in accordance with standard industry practices using a prime mover with hydrostatic type steering and a vibratory plow. The design of the plowshare shall be such that the buried conduit passing through the plow shall not bind and shall not be bent in a radius less than 20 times the outside diameter of the conduit and maintains the structural integrity of the conduit. The feed chute shall have a removable gate for the purpose of inspection and to allow the conduit to be removed from or inserted into the feed chute at any intermediate point between splice locations. The conduit path inside the feed chute shall have low friction surfaces and be free of burrs and sharp edges to prevent damage to the conduit as it passes through. Smooth any welds before use. Internal guide rollers shall not be used. Exercise care during the plowing operation to avoid conduit damage. Feed the conduit into the ground through the plow loose and at no tension.
**g.** Excavate as needed start and finish pits and pits at points of intersection in advance of plowing. Expose ends of casings and crossings of foreign utilities before the start of plowing operations for a conduit segment. Exercise care in the use of trenching and excavating tools and equipment to avoid damaging installed and intersecting conduits or other facilities.
**h.** Restore plow furrowed areas to conform to the surrounding terrain using a rubber-tired tractor or heavy truck or a vibratory roller having a weight of 3 tons and a drum width between 4 and 6 feet or by other suitable means approved by the Iowa DOT.

**9. Conduit in Trench.**

- **a.** Use equipment and construction methods subject to the approval of the Engineer that cause minimal displacement of the soil.
- **b.** Excavate open trench straight as practicable. Shape the trench to be smooth, free from any sharp edges, and clear of debris and loose rock. Excavate only gradual grade changes.
- **c.** Do not leave trenches unattended at any time or open during non-working hours unless approved in writing by the Engineer. Install barriers or other protective measures to prevent livestock or persons from falling into an open trench when appropriate.
- **d.** Notify the Engineer immediately if solid rock is encountered at any location. Excavate rock trenches using a rock saw or other suitable equipment. The excavation, backfill, and road crossings in solid rock areas shall conform to the requirements stated above unless specifically exempted in this section.
- **e.** Rock excavation shall be considered extra work and shall be paid as a separate cost item. Obtain approval from the Engineer before commencing any rock excavation.

**10. 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.

**J. Power Connections.**

**1.** Install power connections in accordance with the contract documents, NEC, and all requirements of local electrical utility.

**2.** Coordinate installations in advance as noted on the contract documents.

**3.** Provide all conduit, breaker enclosures, circuit breakers, wiring and accessories, neutral bars and accessories, ground bars and accessories, terminations, and grounding in the power source.

**4.** Unless otherwise directed by the Engineer, install the power connections as illustrated in the contract documents.

**5.** The Contractor is responsible for coordinating and scheduling all locally required inspections of electrical work prior to putting a location into service.

**6.** Coordinate with the Engineer and power provider to request that electrical service at a device location be initiated.

**K. Pull Tape.**

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

**2.** Install pull tape in continuous runs between handholes, foundations, and structures as shown on contract documents.

## 150762.04 METHOD OF MEASUREMENT.

**A. ITS Construction Survey.**
Lump sum item, no measurement will be made.

**B. Device Cabinets.**
Measurement and payment for removal / re-installation of device cabinets shall be paid for at the contract unit price per each for the pay item ITS Device Cabinet, Pole Mount, Remove and Re-Install.

**C. Power Installed Foundation.**
Measurement and payment for installation of power installed foundations shall be paid for at the contract unit price per each for the pay item ITS Power Installed Foundation, Remove and Re-Install.

**D. Poles.**
Measurement and payment for installation of steel poles shall be paid for at the contract unit price per each for the pay item ITS Camera Pole, Remove and Re-Install.

**E. Handholes.**
Measurement and payment for all handholes shall be paid for at the contract unit price per each for the pay items Handhole, 24 Inch by 36 Inch by 36 Inch; and Handhole, Type IV.

**F. Conduit.**

**1.** Measurement and payment for all conduit shall be paid for at the contract unit price per linear foot for the pay items 2 Inch HDPE Conduit, Plowed and 2 Inch HDPE Conduit, Bored.

**2.** Conduit length is calculated from plan dimensions as the linear, one-way length of new conduits. No allowance has been added to this quantity.

**G. Pull Tape.**
Provision and installation of pull tape shall be incidental to the contract unit price per linear foot for the pay item Conduit.

## 150762.04 BASIS OF PAYMENT.

**A. ITS Construction Survey.**
Payment will be at the lump sum price for ITS Construction Survey. Payment is full compensation for staking and re-staking.

**B. Device Cabinets.**
Payment is full compensation for the removal of the existing device cabinet, protection and storage, and re-installation of the cabinet including replacement of any unusable mounting hardware components.

**C. Power Installed Foundation.**
Payment is full compensation for the removal of the existing power installed foundation, cleaning, protection and storage, and re-installation of the foundation including all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**D. Poles.**
Payment is full compensation for the removal of the existing pole, protection and storage, and re-installation of the pole including all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**E. Handholes.**
Payment is full compensation for:

1. The furnishing and installation of all handholes.

2. Including all surface excavations, repair or restoration of any nearby areas, concrete, proper water/moisture drainage materials, all necessary electric grounding materials and installation.

3. Furnishing and installing all test stations at Handhole, Type IV locations.

4. Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

**F. Conduit.**

Payment is full compensation for:

1. The furnishing and installation of all conduits per the contract documents.

2. Including all surface excavations or surface preparation work, repair, or restoration of any disturbed areas to pre-construction conditions, proper water/moisture drainage materials.

3. Conduit mounting on new or existing infrastructure.

4. Furnishing all materials, labor, equipment, and other incidental items necessary to meet the requirements of the contract documents.

# Equipment and Materials List for Submittal Requirements.

| DESCRIPTION | MANUFACTURER | CATALOG NUMBER |
|---|---|---|
| HANDHOLE, 24”x36”x36” | | |
| HANDHOLE, TYPE IV | | |
| TEST STATION | | |
| GROUND ROD | | |
| EXOTHERMIC WELDING KIT | | |
| HDPE CONDUIT | | |
| RIGID STEEL CONDUIT AND FITTINGS | | |
| DUCT PLUGS | | |
| DUCT SEAL | | |
| 1C #10 TRACER WIRE | | |
| TRACER WIRE SPLICE KIT | | |
| PULL TAPE | | |
| | | |

**Iowa DOT PROJECT NO. IM-380-6(284)25--13-57**