



Iowa Department of Transportation

**SPECIAL PROVISIONS
FOR
FURNISH AND INSTALL ITS CONDUIT SYSTEM**

Woodbury County

IM-029-8(38)150--13-97

**Effective Date:
February 16, 2010**

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

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PART 1 GENERAL REQUIREMENTS

This part consists of the general provisions necessary when furnishing and installing the ITS Conduit System as described in the project plans and these special provisions.

1.1 Related Specifications and Standards

Unless otherwise specified in the project plans and special provisions, the fiber conduit system installed under this specification shall comply with:

- A. Iowa Department of Transportation's Standard Specifications for Highway and Bridge Construction, Series 2009
- B. Applied Supplemental Specifications
- C. Specifications of the Underwriter's Laboratories, Inc.
- D. National Electric Code
- E. Manual on Uniform Traffic Control Devices

1.2 Local Requirements

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

Take all reasonable precautions to avoid damaging to mitigation efforts and monitoring wells located near the northern Iowa DOT maintenance facility. Notify the Engineer immediately of any conflicts between the proposed work and the mitigation or monitoring efforts.

Coordinate all work with current and planned work by others in the area of I-29 and Riverside Boulevard. Provide the Engineer a minimum of five (5) business days notice before initiating work.

1.3 Contractor's Responsibility

1.3.1 General

Perform all work required and furnish all labor, materials, equipment, tools, transportation, supplies, and other items or activities necessary to complete the work in accordance with the project plans and specifications. Should any misunderstanding arise as to the intent or meaning of the plans or specifications, the decision of the Iowa DOT shall be final and conclusive.

The Contractor is specifically assigned full responsibility for all work and materials installed by the Contractor in the project area from the time that the Contractor begins work at a site until final acceptance. The work shall include, but not be limited to: conduit, handholes, pull cables, and tracer wiring, that the Contractor installs.

1.3.2 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 twenty four (24) of receiving notice that such locations are needed.

1.3.3 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. 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 Traffic Control

Comply with all work zone, lane and closure, and other traffic requirements and limitations as stated in the Plans. All traffic control required in the work areas shall follow the guidelines and standards prescribed in the Contract Documents and Section 6 of the Manual on Uniform Traffic Control Devices. The Engineer shall resolve all conflicts.

1.5 Coordination With Utilities

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. The Contractor shall contact Iowa One Call and any private entities prior to commencing work in any project area.

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.

1.6 Installations and Connections

All installations and connections shall comply with the Contract Documents and all generally accepted codes and standards. The Engineer shall resolve all conflicts.

Any damage to conduit, or other structures with galvanized surfaces shall be repaired with zinc rich paint acceptable to the Engineer.

1.7. Contractor Submissions

1.7.1 Materials List

The Engineer shall furnish a list of materials required for the project to each bidder with the proposal. Complete and submit five (5) copies of the materials list within 10 calendar days after award of the project contract. Include the name of the materials supplier and catalog number of each item listed. The Engineer shall provide approval before any materials are ordered.

1.7.2 Shop Drawings/Catalog Cuts

Prior to construction and after approval of the Materials List, submit five (5) paper copies and one (1) and electronic pdf file of the shop drawings or catalog cuts for the materials to the Iowa DOT for approval. The Engineer shall review the shop drawings/catalog cuts for the purpose of assuring general conformance with the project design concept and Contract Documents. Provide written notice of any deviations from the requirements of the plans or Contract Documents. 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.

1.7.3 Schedule of Unit Prices

Complete and forward five (5) copies of the list of unit costs for each item listed on the Summary of Quantities in the Plans before requesting any payment for work completed on this project. These unit costs are subject to approval of the Engineer before commencing the work and shall be used to develop progress payments and adjust for extra or deleted work. The Iowa DOT intends to process bi-weekly estimates of the work performed on the project.

1.7.4 GPS Locations & As-Builts

Before requesting progress payments, submit GPS locations of each installed handhole contained in the payment request. GPS data shall be submitted electronically in decimal degrees with ± 1 foot accuracy and in a format acceptable to Iowa DOT.

Before requesting final payment, prepare and submit as-built drawings to the Engineer. As-built drawings shall be hand-sketched or computer generated (Microstation CAD format) and shall clearly indicate all changes or deviations from the project plans. Prepare and submit for review and approval by the Engineer, an initial as-built drawing of at least the first 2 weeks of work with the first request for a progress payment.

1.7.5 Warranty

Transfer all required standard materials warranties on the date of final acceptance to the Iowa DOT.

PART II INSTALLATION REQUIREMENTS

This part consists of the installation details necessary during the construction of the ITS Conduit System, in place, as described in the project plans and these special provisions. 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.

2.1 Handholes

Install the type and size of handholes at the locations indicated in the Contract Documents. Set handholes flush with the surface when constructing in a sidewalk or driveway. Set handholes approximately one (1) inch above the finished surface of the surrounding ground with the top matching the surrounding ground slope when constructing in an earth embankment or non-paved surface. Install aggregate bedding below the handhole. Conduit shall enter the handhole from the bottom and extend conduit ends between four (4) and six (6) inches above the aggregate bedding. Side penetrations are not permitted. Plug all open conduit ends within the handhole in a manner acceptable to the Engineer. Rodent proof all handholes to the satisfaction of the Engineer.

2.3 Conduit

2.3.1 General

Follow all general guidelines covering the construction of buried conduit. Install conduit by trenching, plowing, jacking, pushing, boring, structure attachment or other approved methods within the public right of way and in a manner that minimizes atypical damage from construction operations. Unless specifically indicated, installation methods are at the Contractor's discretion subject to approval of the Engineer for all locations. At the discretion of the Engineer, verify the integrity of the conduit structure in a manner acceptable to the Engineer. Tunneling under the pavement or water jetting shall not be permitted. No excavations are permitted to cross any roadways or any other paved or other similarly improved areas. At these locations, install conduits by jacking, pushing, boring, or any other means necessary to place the conduit without cutting or removing pavement or disturbing surface improvements. Where indicated in the Contract Document and at all roadway and stream crossings, install conduit sections with external protection as specified herein. No direct-buried cable is allowed.

Unless otherwise indicated or directed by the Engineer, installation of Schedule 40 PVC conduit or approved alternative is allowed.

2.3.2 Pull Ropes

All conduits shall include one polypropylene pull rope with a minimum 2,670N proper tensile strength, cost incidental to the conduit. Install, splice, and test for continuity a 1c No. 12 tracer wire in all conduit installations where indicated. Terminate each tracer wire run at large Type II handholes in test stations. Maintain the continuity of the tracer wire through Type I and small Type II pulling handholes.

2.3.3 Installation Clearances

Install all conduits at a minimum depth of forty eight (48) inches below the finished grade unless otherwise directed by the Engineer. Unless otherwise indicated, install all conduit railroad crossings at a minimum depth of sixty (60) inches below the bottom of the railroad ballast material or forty eight (48) inches below any paralleling drainage ditch, whichever is greater. Maintain the minimum depth throughout the length of all conduit installations. Maintain a minimum of one (1) foot of separation when underground conduits parallel an existing facility. All splices shall be watertight.

2.3.4 Facilities Protection

The contractor is responsible for protecting and maintaining the conduit throughout construction and until final acceptance. 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. If more than forty eight (48) hours lag is expected behind a segment installation, install additional protective measures acceptable to the Engineer.

2.3.5 Exposed Installations

Use hot-dipped galvanized steel conduit for all exposed areas along the project. Support exposed conduit and place steel hangers at intervals indicated in the Contract Documents as directed by the Engineer. Accomplish attachments to steel bridges or structures using approved galvanized beam clamps and hangers. Install approved expansion joints at all bridge structure joints. Alterations to specific attachment methods or fastener designs are subject to approval of the Engineer before installation and any additional costs are incidental to the work performed.

2.3.6 Bends and Connections

Accomplish change in direction of steel conduit by bending or installing a junction box. Perform bending in a manner that does not injure or change the internal diameter of the conduit, with a uniform curvature. The minimum inside radius of curvature shall be 24 inches for 2 inch conduit and 48 inches for 3 inch conduit. Cut and thread steel conduit to eliminate exposed threads after completing connections. Tighten all couplings until the adjoining conduit ends meet to allow a continuous inner surface throughout the entire length of the conduit run. Remove all burrs and roughened surfaces from conduits and fittings. Ream, clean, and swab all conduit runs before installation. Use nipples to eliminate cutting and threading short lengths of conduit. Paint damaged galvanized finishing on conduits, poles, structures, or other galvanized surfaces using a zinc-rich paint acceptable to the Engineer. Use only galvanized steel fittings with rigid steel conduit.

Thread and cap with standard pipe caps all conduit ends until installing wiring. Replace caps with approved conduit bushing during and after wire installation. Seal conduit openings using an approved sealing compound (duct seal) all conduit openings at the junction boxes/handholes.

2.3.7 Backfilling

Backfill trenches and other excavations in lifts of six (6) inches or less in compacted depth. Compact each layer thoroughly before placing subsequent layers. Remove all cinders, broken concrete, or other hard or abrasive materials in the backfill material before commencing backfilling operations. Remove and dispose of surplus and unsuitable materials upon completion of the backfilling operations in the area.

Perform operations in a manner that minimizes soil erosion and employs appropriate storm water pollution prevention measures during all construction operations. Maintain work areas in a neat, clean, and orderly condition at all times. 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. Remove and dispose of rock and debris excavated and remaining after backfilling as directed by the Engineer. 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.

2.3.8 Plowing

Use equipment and construction methods subject to the approval of the Engineer that cause minimal displacement of the soil. Furnish competent supervision at all times at the site of plowing operations to assure compliance with the Contract Documents. The equipment shall be capable of extending the plow in order to maintain the required minimum depths under all terrain conditions. The reel carrier shall be of adequate size and be configured so that the reel sizes being used can be safely handled. Avoid damaging any paved surfaces, ditches, or other similar surface features. Immediately repair any damage to such features to the satisfaction of the Engineer.

Perform plowing using a prime mover with hydrostatic type steering and a static 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.

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.

Restore plow furrowed areas by driving over the plow furrow until the plowed area conforms to the surrounding terrain using a rubber tired tractor or heavy truck or a vibratory roller having a weight of three tons and a drum width between four (4) and six(6) feet or by other suitable means approved by the DOT.

To avoid unnecessary damage, comply with, and frequently review with operators, the following:

1. Slowly start the tractor. Gradually increase tractor speed only after all slack is removed from the delivery system.
2. Gradually change plow attitude and depth and only while plow is moving.
3. Excavate and pull slack at the rear of the feed chute to avoid kinking before raising the plow share to the surface when the plow is not moving. Only raise the plow share when the plow is not moving if necessary.
4. Do not use extreme forward rake angles unless the plow share is specifically designed for this purpose.
5. Re-route the conduit over the feed systems when rigging for off-set plowing.
6. Grade the plowing path before plowing to eliminate abrupt terrain changes. The Engineer shall approve of the method of grading.
7. Continually monitor the plowing operation for obstructions, proper feeding of conduit, maintaining proper depth, etc. Do not back the plow or move the share rearward with conduit in the chute.
8. Do not vertically or horizontally wobble the share to break through an obstruction.
9. Do not abruptly change the direction of the plowed in conduit.

2.3.9 Conduit in Trench

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. 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.

Promptly backfill trenches with suitable materials after completing installation of conduit other underground facilities except at splice locations. Compact backfill in accordance with the requirements of the Contract Documents and in compliance with local specifications. The Engineer shall resolve conflicts. Place and compact backfill in not more than six (6) inch lifts from the top of the installation to the ground line using a sheep or pad footed type roller. Place and carefully hand tamp backfill under and around the installation 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.

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. 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.

2.3.10 Bored Crossings

Bore all crossings beneath roadways, streets, other paved surfaces, and railroads in accordance with requirements and regulations of the authority having jurisdiction and at a depth greater than or equal to four (4) feet below finished grade at any location along the bored facility. Limit bore hole sizes to the outside diameter of the conduit being placed. Locate bore pits at least two (2) feet from the edge of pavement or shoulder unless otherwise directed by the Engineer.

PART III

MATERIAL REQUIREMENTS

This Section consists of the material requirements necessary for the construction of the ITS Conduit System installation complete, in-place per the Contract Documents.

3.1 General Material Requirements

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. 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.

3.2 Concrete

All concrete shall meet the requirements of Section 2403 of "Standard Specifications for Highway and Bridge Construction", Series 2009, Iowa Department of Transportation, and current supplements. Use Class C concrete for footings and all other non-paving concrete construction.

3.3 Handholes

Supply handholes constructed of epoxy or polyester resin mortar with woven glass fiber reinforcement and an appropriate aggregate. 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. 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. The handhole shall be functional without failure throughout a temperature range of -50 to 170 deg. F. 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 150 load. Handhole lid strength shall be 20,000 lbs. The Engineer shall provide approval prior to use of any alternative material handholes satisfying the Contract Documents requirements for structural, physical, and chemical properties.

3.4 Conduit

Rigid steel conduit shall be galvanized steel meeting the requirements of ANSI Standard Specification C80.1. All applicable requirements stated in Articles 2523.03, N and 4185.10 of the "Standard Specifications for Highway and Bridge Construction", Series 2009, Iowa Department of Transportation, and current supplements shall be met. Polyvinyl chloride (PVC) conduit shall be rigid (e.g. Schedule 40) polyvinyl chloride meeting the requirements of NEMA TC-2, Type 2, and applicable UL Standards. High Density Polyethylene (HDPE) conduit shall have a tensile strength of 4000 psi. Use smooth wall ORANGE for all fiber optic runs.

3.5 Test Stations

Supply Rhino part TVT11600 B5 or approved equivalent test stations at all large Type II handholes. Test Stations shall be 3 foot x 3 inch triangular flexible orange plastic marker with 5 separate access terminals and set screw to hold terminal concealment cap on. Place warning decals on all sides.

PART IV
METHOD OF MEASUREMENT & BASIS OF PAYMENT

4.1 FURNISH & INSTALL ITS CONDUIT SYSTEM

“Furnish & Install ITS Conduit System” shall be measured as completed and paid as a lump sum item once all of the following items have been installed, inspected, successfully acceptance tested, and accepted by the Engineer. It includes full compensation for all labor, equipment, tools, materials, shipping, transportation, storage, handling, mountings, and other items associated with the furnishing and installing all components of the proposed work identified in the Contract Documents.

4.1.1 Handholes

“Furnish & Install ITS Conduit System” includes furnishing and installation of all handholes and test stations per the Contract Documents. It includes surface excavations and repair or re-grading of any nearby areas, proper water/moisture drainage materials, and installation.

4.1.2 Conduit

“Furnish & Install ITS Conduit System” includes furnishing and installing all conduits per the Contract Documents. It shall include pull ropes used or provided, tracer wire, any surface excavations or surface preparation work, trenching, boring, and replacing/repairing disturbed areas to pre-construction conditions.

5.2 Equipment and Materials List

DESCRIPTION	UNITS	Manufacturer	Catalog Number
TYPE I HANDHOLE (RM-42)	EACH		
TYPE II HANDHOLE, LARGE	EACH		
TYPE II HANDHOLE, SMALL	EACH		
TEST STATION	EACH		
LOCKING DEVICE	EACH		
2 INCH CONDUIT	LIN FT		
3 INCH CONDUIT	LIN FT		
1C #10 TRACER	LIN FT		