

**SP-090119
(New)**



**SPECIAL PROVISIONS
FOR
ITS INFRASTRUCTURE**

**Scott County
IM-074-1(191)1--13-82**

**Effective Date:
March 15, 2011**

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 I. GENERAL REQUIREMENTS

This part consists of the general provisions necessary when salvaging, furnishing and installing the conduit cabinet and pole systems as described in the project plans and these special provisions.

This project involves supplying and installing cables, power supplies, poles, handholes, cabinets and deemed necessary for a complete removal and installation of proposed ITS devices. The DOT plans to initiate a lighting contract linked to the other construction plans needed to reconstruct the Interstate 74 (I-74) and 53rd Street interchange. Under this contract, it is the responsibility of the Contractor to remove, salvage, furnish, install, test, and certify that poles, power and terminations are free of damage and operating within the requirements of these specifications.

More specifically, this contract will provide for the removal of an existing camera located on the 53rd Street and I-74 bridge and furnishing and installing a new pole and cabinet with power as shown in the contract documents. The Contractor is expected to coordinate the removal of the camera and wireless communication with the Iowa DOT Statewide ITS Maintenance Vendor. The Contractor for this project shall be required to remove the pole mounted cabinet and supporting hardware to be salvaged to the Iowa DOT Maintenance Yard as directed by the Engineer. The Contractor for this project will furnish and install a new camera pole as described in the contract documents and these special provisions. The Contractor shall furnish and install a pad mounted cabinet as described in the contract document and these special provisions. The cabinet will be powered from the traffic signal cabinet as shown in the plan set. The Contractor shall furnish and install all necessary breakers, wiring, conduits and handholes to establish power in the ITS cabinet. The contractor will furnish and install all wiring, conduits, handholes to establish communications and power to the reinstalled camera and wireless communications at the location on 53rd Street Bridge as shown in the contract documents. The Contractor for this project shall furnish and install power over Ethernet from the ITS Cabinet to the camera and to the wireless communications on the pole. The salvaged camera and wireless communication devices shall be reinstalled by the Iowa DOT Statewide ITS Maintenance Vendor. The Contractor for this project shall coordinate the schedule and be present when the Iowa DOT Statewide ITS Maintenance Vendor is on site to remove and reinstall the camera and wireless communication devices.

The Contractor for this project shall coordinate work with the Contractor(s) working on the other 53rd Street Interchange planned contract(s). The DOT will assist in the coordination and scheduling of work. The Contractor for this project shall assign a responsible staff member that will work with the DOT on decisions regarding order of work and scheduling as needed throughout the duration of this project.

1.1. Related Specifications and Standards

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

- A. Latest series of the Standard Specifications of the Iowa Department of Transportation
- B. Latest published Supplements to Standard Specifications
- C. Specifications of the Underwriter's Laboratories, Inc.
- D. National Electric Code
- E. Manual on Uniform Traffic Control Devices

1.2. Local Requirements

All poles along the I-74 corridor will be required to meet the aesthetic requirements prepared in the I-74 design aesthetics document. For the purpose of the lighting contractor, the "New Camera Pole" shall be painted to the same color specifications as the lighting poles provided with this contract. The pole manufacturer shall document to the Engineer, the process to meet the paint requirements and warranty. The paint and pole adhesion shall be warranted for 5 years from failure or substantial deterioration of the paint. The Contractor shall provide a list of all materials and equipment prior to the start of work. All costs

associated with painting or coloring any such materials or equipment will be the responsibility of the contractor.

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, poles, cabinets, handholes, cable/wiring, and hangers 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 24 hours 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.

Supply and use only DOT-approved traffic control plans and traffic control devices supplied by a DOT-approved traffic control equipment supplier before commencing any work in a project area. Maintain all equipment to prescribed standards during the life of their use on the project. Use appropriate lighting for nighttime work that allows proper work area and work zone device visibility.

The Engineer shall provide any required detour routes and detour route signage at no cost to the Contractor. All lane, ramp, and roadway closures are subject the limitations stated in the Contract Documents and the approval of the Engineer. Request any such closures a minimum of 5 days prior to the desired closure date. The decision of the Engineer regarding a request shall be final. Closures of convenience will not be permitted.

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.

All cables and conductors entering cabinets, poles, or other structures mounted on breakaway bases or pedestals shall include a breakaway connector complying with Standard Road Plan RM-40 and acceptable to the Engineer.

Any damage to conduit, poles, 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 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 5 paper copies and 1 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 5 copies of the list of unit costs for each item listed on the Summary of Quantities in the Plans within 20 calendar days following the award of the contract and before commencing any work on the 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, vault, pole, or other structure 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 computer generated (Microstation[®] CAD format or approved alternative) 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 Infrastructure, 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. Footings

Footings shall conform to the Contract Documents. Prepare and submit design plans and details for all pole footings and non-standard footings not addressed in the Contract Documents at no additional cost to the Engineer. Such plans and details shall be sealed by a professional engineer licensed in the State of Iowa. Securely rest all footings on firm undisturbed ground and set level and to the proper elevation and offset indicated. Notify the Engineer immediately if an obstruction conflicts with a footing. 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 footing.

Form the upper portion of all footings and for all instances where the excavation is irregular in shape to provide the proper dimensions. Forming materials shall be level and braced to avoid displacement, warping, or deflection from the specified pattern during construction and curing. Install and secure anchor bolts, conduits, and reinforcement before concrete placement. Use a rigid template to position anchor bolts in accordance with the appropriate pattern. The center of the template and the center of the concrete base shall coincide unless otherwise directed by the DOT Engineer. Install a sufficient number of conduits sized as indicated in the Contract Documents. Install an extra 2 inch conduit through each pole and pedestal footing. All conduits shall be located as indicated in the Contract Documents. Place all concrete within 90 minutes of batching and consolidate using a high-frequency vibrator during construction. Modification of a footing after construction is not allowed. Cover all anchor bolts to protect them against damage and to protect the public from possible injury until erecting poles. Allow a minimum of 7 calendar days curing of concrete footings before erecting poles.

Remove and reconstruct, at no additional cost to the Engineer, all footings improperly constructed or with improperly installed anchor bolts, conduit, or any other footing components as determined by the Engineer.

2.2. 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 1 inch above the finished surface of the surrounding ground 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 4 and 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 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. Open trench installation is permitted within 25 feet of any handhole, pole, structure, or other similar improvements, and for other locations only when approved by the Engineer. 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 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. 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 only in open trench runs of 50 feet or less.

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 other copper conductors available for use as a tracer are not present. Terminate each tracer wire run at Type III handholes in test stations. Maintain the continuity of the tracer wire through Type II pulling handholes.

2.3.3. Installation Clearances

Install all conduits at a minimum depth of 48 inches below the finished grade unless otherwise directed by the Engineer. Maintain the minimum depth throughout the length of all conduit installations except as necessary to transition to and from bridge approaches. Maintain a minimum of 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 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. Flexible steel conduit is allowed for cabinet connections when approved by the Engineer. Support exposed conduit and place steel hangers at intervals indicated in the Contract Documents are 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, and an inside radius of curvature complying with fiber optic cable bending specifications. 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 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 DOT. 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 4 and 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 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. The Engineer shall resolve conflicts. Place and compact backfill in not more than 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.

2.4. Cable Pulling

Comply with all manufacturers' recommendations for cable pulling including pulling tensions and bending radii. Use a break-away swivel along with a Slip Clutch Capstan Winch with a dynamometer reading for all pulling.

2.5. Grounding/Bonding

Ground all metal conduits using a No. 6 AWG copper, non-insulated wire bonded to copper-clad metal, driven electrodes using a Caldwell or other means acceptable to the Engineer. Installation of grounds is incidental to the cost of the connected items of work.

Ground all installations in accordance with the requirements of NEC and at a minimum as indicated in the Contract Documents. Supply and install additional grounding rods and equipment as necessary to satisfy such requirements at no additional cost to the Owner.

2.6. Pole Erection

Erect poles (including camera mounting system and poles) and securely bolt to the footings such that the pole is vertical to the centerline of the nearest adjacent major roadway. 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.

2.7. Transformer and Disconnect Enclosures

Mount cabinet-mounted transformer and disconnect enclosures on the exterior of cabinets in a location acceptable to the Engineer in accordance with the manufacturer's recommendations.

2.8. Cabinet Installations and Connections

Install cabinets in accordance with the Contract Documents and the manufacturer's recommendations. Do not penetrate the top of any cabinets without prior authorization by the Engineer. All connections shall be watertight. Orientate cabinets as directed by the Engineer. Contact the Engineer a minimum of 1 week to arrange a field review prior to placing the cabinets or installing fiber into the cabinets.

2.9. Cable Connectors and Splices

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.

PART III. MATERIAL REQUIREMENTS

This Section consists of the material requirements necessary for the construction of the ITS Infrastructure installation complete, in-place per the Plans.

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. 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.

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

Handholes shall be provided and installed as shown in the contract documents. Handholes shall meet or exceed the Iowa DOT specification Section 2525 for Traffic Signalization. All ITS installations shall have furnished covers with the words "FIBER OPTIC". Handhole sizes are distinguished in the contract document by TYPE. Any change to the TYPE shown in the plan will require approval of Iowa DOT Research and Technology Division.

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. 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°F to 170°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.

This project is designed to furnish and install:

- Type I - Handhole
- Type II - Handhole
- Type III - Handhole

See Section V for a summary of quantities for these items.

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.

This project is designed to furnish and install:

4 inch conduits – HDPE

2 inch conduits – HDPE

3.5. Cabinets

3.5.1. General

Supply camera and/or sensor cabinets, clean-cut in design and appearance, designed to house the control equipment required for the planned ITS system, and having the following minimum dimensions:

<u>TYPE</u>	<u>DEPTH</u>	<u>WIDTH</u>	<u>HEIGHT</u>
ITS Cabinet (Pole Mounted)	15 inches	20 inches	36 inches
ITS Cabinet (Pad Mounted)	30 inches	24 inches	67 inches

Cabinets shall be new, corrosion resistant, UL-50 approved, NEMA Type 3R compliant, constructed of welded sheet aluminum with a minimum thickness of 0.1 inch, complete with all internal components, back and side panels, terminal strips, and mounting hardware. Cabinets shall meet the requirements of ASTM B-209 for 5052-H32 aluminum sheet. The aluminum shall be smooth and the exterior shall be left in its unpainted natural color. The cabinet structure shall be effectively sealed to prevent the entry of rain, dust, and dirt. All exterior seams for cabinet and doors shall be continuously welded. All edges shall be filed to a radius of 1/32 inch minimum. Submit cabinet design and equipment layout details to the Engineer for review and approval prior to fabrication.

This project is designed to provide:

ITS Cabinet (Pad Mounted)

See Section VI for a summary of quantities for this item.

3.5.2. Cabinet Doors

The cabinet door shall be sturdy, torsionally rigid, and attached by a minimum of two hinges. The door shall substantially cover the full area of the front of the cabinet. The cabinet door shall be provided with a catch mechanism to hold the door open at two positions – 90 degrees, plus or minus 10 degrees, and 180 degrees plus or minus 10 degrees. Both the door and door stop mechanism shall be of sufficient strength to withstand a simulated wind load of five pounds per square foot of door area applied to both inside and outside surfaces.

A gasket shall be provided to act as a permanent and weather resistant seal at the cabinet door facing. The gasket material shall be of a non-absorbent material and shall maintain its resiliency after long term exposure to the outdoor environment. The gasket shall have a minimum thickness of 1/3 inch. The gasket shall be located in a channel provided for this purpose either on the cabinet or on the door. An “L” bracket is acceptable in lieu of this channel if the gasket is fitted snugly against the bracket to insure a uniformly dust and weather resistant seal around the entire door facing.

Each cabinet door shall be provided with a high quality, heavy duty tumbler-type lock. Two keys for each tumbler lock shall be provided for each cabinet. All locks for the project shall be keyed identically in the key pattern identified by the Engineer. Keys shall be given to the Engineer. Do not attach keys to the exterior of the cabinet at any time during storage or installation.

3.5.3. Components

Provide cabinets with fully wired back panels, circuit breakers, surge protection, terminal strips (electrical), fiber termination enclosure sized as required, dual convenience outlets, cabinet light (incandescent) on door switch, cabinet vent with air filter, DIN rails, and all the necessary terminal boards, wiring, harnesses, connectors and attachment hardware for each cabinet location. Place all terminals and panel facilities on the lower portion of the cabinet walls.

All conductors used on the cabinet wiring shall be No. 16 AWG or larger with a minimum of 19 strands. Conductors shall conform to MIL SPEC MIL-W-168780, Type B or D. The insulation shall have a minimum thickness of 10 MILS. All wiring containing line voltage shall be a minimum size of No. 14 AWG.

3.5.4. Grounding

The cabinet internal ground shall consist of one or more ground bus-bars permanently affixed to the cabinet and connected to the grounding electrode. Use bare stranded No. 6 AWG copper wire between bus-bars and between the bus-bar and grounding electrode. Each copper ground bus-bar shall have a minimum of 20 connector points. Each connector point shall be capable of securing at least one #10 AWG conductor. AC neutral and equipment ground wiring shall return to the bus-bars.

3.5.5. ITS Cabinet (Pad Mounted) Footing

ITS Cabinet Footing for pad mounted installations shall comply to the contract documents. All material shall conform to the Iowa DOT specifications. Cabinets shall conform to the cabinet manufacturer's requirements for ground mounting. Footing aprons as show in the contract documents shall be included at each pad mounted cabinet.

3.6. Poles

Poles for ITS Infrastructure installations shall utilize sway-reducing pole dampeners acceptable to the Engineer and compatible with the pole supplied. Dampeners are not required for sensor-only installations. Repair any surface damage to galvanized components using a zinc rich paint acceptable to the Engineer. Supply poles with slip joint or transformer bases as indicated in the Contract Documents.

3.7. Camera Pole – 45 Foot

3.7.1. General

The camera pole will be the typical ITS camera pole as shown in the contract documents.

The pole shall be designed shall be in accordance with the 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." Minimum Loading requirements shall be based on an isotach wind velocity for the area of installation according to 1994 AASHTO isotach wind chart with a 1.3 gust factor. Calculations and detailed drawings shall be submitted demonstrating compliance with the AASHTO specification. All materials and products shall be manufactured in the United States of America, and comply with ASTM or AASHTO specifications. Mill certifications shall be supplied as proof of compliance with the specifications. The Fabricator shall be certified under Category I, "Conventional Steel Structures" as set forth by the American Institute of Steel Construction Quality Certification Program. Proof of this certification will be required to ensure that the fabricator has the personnel, organization, experience, procedures, knowledge, equipment, capability and commitment to fabricate quality pole structures. All welding shall be in accordance with Sections 1 through 8 of the American Welding Society (AWS) D1.1 Structural Welding Code. Tackers and welders shall be qualified in accordance with the code. Tube longitudinal seam

welds shall be free of cracks and excessive undercut, performed with automatic processes, and be visually inspected. Longitudinal welds suspected to contain defects shall be magnetic particle inspected. All circumferential butt-welded pole and arm splices shall be ultrasonically or radiographically inspected.

The pole shall be designed to support the specified camera and accessories. The pole top deflection shall not exceed 1 inch in a 30-mph (non-gust) wind. The calculations shall include a pole, base plate, and anchor bolt analysis. The pole calculations shall be analyzed at the pole base, at 5-foot pole intervals/segments and at any other critical pole section. At each of these locations, the following information shall be given:

- The pole's diameter, thickness, section modulus, moment of inertia, and cross sectional area.
- The centroid, weight, projected area, drag coefficient, velocity pressure, and wind force of each pole segment.
- The axial force, shear force, primary moment, total moment, axial stress, bending stress, allowable axial stress, allowable bending stress, and combined stress ratio (CSR).
- The pole's angular and linear deflection.

The pole shaft shall conform to ASTM A595 Grade A with a minimum yield strength of 55 ksi or ASTM A572 with a minimum yield strength of 65 ksi. The shaft shall be round, 12-sided or 16 sided with a four inch corner radius, have a constant linear taper of 0.14 inches per foot, and contain only one longitudinal seam weld. Circumferential welded tube butt splices and laminated tubes are not permitted. Longitudinal seam welds within 6 inches of complete penetration pole to base plate welds shall be complete penetration welds. The shaft shall be hot dip galvanized per the requirements of the contract documents.

Base plates shall conform to ASTM A36 or A572 Grade 42. Plates shall be integrally welded to the tubes with a telescopic welded joint or a full penetration butt weld with backup bar. Plates shall be hot dip galvanized per the requirements of the contract documents.

Anchor bolts shall conform to the requirements of ASTM F1554 Grade 55. The upper 12 inches of the bolts shall be hot dip galvanized per ASTM A153. Each anchor bolt shall be supplied with two hex nuts and two flat washers. The strength of the nuts shall equal or exceed the proof load of the bolts.

The pole shall have a custom plate mounted tenon that allows the field modification of the arm/camera orientation up to 360 degrees. With this design the DOT engineer can make slight orientation modifications to the camera mount to allow optimum viewing in case of future road development, change in terrain or a change in the viewing needs priority. For details, see applicable drawings.

One cable guide shall be positioned 2 inches below the handhole and the other shall be positioned 1 inch directly below the top of tenon. Two parking stands shall be positioned a maximum of 2.0 inches below the top of the handhole and located at 90 and 270 degrees from the handhole. A third parking stand shall be located in the center of the upper inside edge of the handhole as shown on the drawings. These parking stands shall be a minimum of 1/4 inch O.D. and a max 3/8 inch O.D.

3.8. Cable Connectors and Splices

Supply 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.

PART IV. METHOD OF MEASUREMENT & BASIS OF PAYMENT

4.1. FURNISH & INSTALL ITS INFRASTRUCTURE

“Furnish & Install ITS Infrastructure” 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. The Engineer reserves the right to issue partial payment of this lump sum item based upon the estimated percentage of work completed under this item as determined by the Engineer.

4.1.1. Cabinets and Racks

“Furnish & Install ITS Infrastructure” includes furnishing and installation of all free-standing, wall mounted, pole mounted or other structure mounted, cabinets, racks, frames, shelves, wiring, cable managers, and accessories on the mounting structure or surface. It includes mounting materials, cable pulling, routing and termination of cables to the proper termination panel, all necessary electric grounding materials, and installation.

4.1.2. Handholes

“Furnish & Install ITS Infrastructure” includes furnishing and installation of all handholes and junction boxes per the Contract Documents. It includes surface excavations and repair or re-grading of any nearby areas, proper water/moisture drainage materials all necessary electric grounding materials, and installation.

4.1.3. Wire and Cable

“Furnish & Install ITS Infrastructure” includes furnishing and installation of all wire and cable per the Contract Documents. It shall include the proper installation of the wire and cable into existing conduit and new conduit systems installed, supply and installation of splices and connectors, and slack, coiled, or stored wires or cables.

4.1.4. Conduit

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

4.1.5. Footings

“Furnish & Install ITS Infrastructure” includes furnishing and installation of all concrete footings per the Contract Documents. It includes surface excavations, repair or restoration of any nearby areas, concrete, steel reinforcement, anchors, bolts, and bolt mounting assemblies for connection to poles or other structures.

4.1.6. Poles

“Furnish & Install ITS Infrastructure” includes furnishing and installation of all poles and accessories. It shall include fitting the appropriate bolt pattern set in the footing, fitting into the surface, all necessary electric grounding materials, and installation.

4.1.7. Misc.

“Furnish & Install ITS Infrastructure” includes furnishing and installation of all electrical panels as described in the plans. It includes access and connection to local nearby power and appropriate grounding techniques per National Electric Code. This project will include providing all necessary power connections at the traffic signal cabinet to power the QCTV and wireless communications.

“Furnish & Install ITS Infrastructure” includes removal of all existing facilities identified for removal that directly or indirectly conflict with the proposed work. Items that may be removed include but are not limited to cables, wires, conduits, handholes, poles, and cabinets. Remove items designated to be salvaged in a manner to avoid damage. Stockpile and secure or deliver to the local Iowa Department of Transportation maintenance facility salvaged items as directed by the Engineer.

4.2. Traffic Control

Work Zone traffic control is expected to be minimal with this project. The ITS device installation should be accomplished with project sequencing and traffic control provided during that sequencing. Any traffic control needed will be made on a lump sum basis for payment for “Traffic Control” which includes full compensation for all labor, equipment, tools, materials, and other items associated with all work zone traffic control necessary to meet the requirements of the Contract Documents. Work zone traffic control includes traffic control devices, lane/ramp/roadway closures, flagging personnel, channelization, barricades, markings, special services for off-duty law enforcement personnel, nighttime lighting, and other related items. Any posted detours will be determined by the Engineer. The Engineer reserves the right to issue partial payment of this lump sum item based upon the estimated percentage of work completed of the item “Furnish & Install Fiber Optic Network System” as determined by the Engineer.

PART V. ADDITIONAL BIDDING ATTACHMENTS

5.1. Schedule of Unit Prices

laDOT PROJECT NO. IM-074-1(191)1--13-82 SCOTT COUNTY - CITY OF DAVENPORT

ITEM	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST (\$)	TOTAL COST (\$)
1	TYPE II HANDHOLE	EA.	3		
2	TYPE III HANDHOLE	EA.	1		
3	ITS CABINET (PAD MOUNTED)	EA.	1		
4	ITS CABINET FOOTING	EA.	1		
5	NEW CAMERA POLE – 45 FOOT	EA.	1		
6	POLE FOOTING	EA.	1		
7	REMOVAL OF CAMERA POLE	EA.	1		
8	REMOVAL OF ITS CABINET (POLE MOUNTED)	EA.	1		
9	2 INCH HDPE CONDUIT	LF	360		
10	4 INCH HDPE CONDUIT	LF	80		
11	1C #8 POWER WIRE	LF	720		
12	1C #8 GROUND WIRE	LF	360		
13	1C #12 TRACER WIRE	LF	90		

Total Lump Sum Cost to Furnish and Install the ITS Infrastructure \$_____

laDOT PROJECT NO. IM-074-1(191)1--13-82 SCOTT COUNTY - CITY OF DAVENPORT

Approved: _____
Project Engineer Date

5.2. Equipment and Materials List**laDOT PROJECT NO. IM-074-1(191)1--13-82 SCOTT COUNTY - CITY OF DAVENPORT**

DESCRIPTION	UNIT	MANUFACTURER	CATALOG NUMBER
TYPE II HANDHOLE	EA.		
TYPE III HANDHOLE	EA.		
ITS CABINET (PAD MOUNTED)	EA.		
ITS CABINET FOOTING	EA.		
NEW CAMERA POLE – 45 FOOT	EA.		
CAMERA POLE FOOTING	EA.		
REMOVAL OF CAMERA POLE	EA.		
REMOVAL OF ITS CABINET (POLE MOUNTED)	EA.		
2 INCH HDPE CONDUIT, INSTALLED	LF		
4 INCH HDPE CONDUIT, INSTALLED	LF		
1C #8 POWER WIRE	LF		
1C #8 GROUND WIRE	LF		
1C #12 TRACER WIRE	LF		