



**SPECIAL PROVISIONS
FOR
TRAFFIC SIGNALIZATION**

**Polk County
STP-A-3827(619)--86-77**

**Effective Date
April 16, 2024**

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

231021.01 DESCRIPTION.

A. GENERAL.

1. Sections 2525 and 4189 of the Standard Specifications, as modified by these special provisions, shall apply to this project. The installation of the traffic control signals and appurtenances shall be in conformance with the MUTCD, as adopted by the Iowa DOT.
2. These Special Provisions cover the work described in the contract documents. It covers furnishing all labor, equipment and materials, and performing all required operations to complete the work as per contract documents and to provide a completely operational and working signal system. Unless otherwise modified by the Special Provisions, all work, including equipment, material and installation, shall be in accordance with the Standard Specifications. Where reference is made to the codes, the safety orders, the general orders, the standards, laws, and ordinances, it shall mean the version of the reference that is in effect on the bid advertising date.
3. The Contractor shall be responsible for ONE-CALL locates of the traffic and interconnect cables installed under this project until acceptance of the project by the Engineer. Any damage because of failure to locate the equipment shall be the responsibility of the Contractor to replace with no additional cost to the Contracting Authority.
4. The Contractor shall notify and receive approval from the Engineer prior to any operational shutdown of any existing traffic signal installation.
5. Contractor shall provide to the Engineer "as-built" drawings that identify all changes made to the contract plans.

B. SYSTEM INTEGRATION.

1. The Contractor shall provide a System Integrator to facilitate with system integration of the project.
2. The System Integrator will program, network, connect, and test the complete communication system including all network switches, and any other component of the complete and functional system.
3. City's Public Works shall supply the internet protocol (IP) address Schema.
4. The System Integrator shall be considered incidental to the project and no additional compensation shall be provided for this effort.

231021.02. MATERIALS.

A. UNDERGROUND.

1. Handhole.
 - a) HDPE Handhole and Cover.
 - (1) Size: Provide handhole and cover with minimum inside diameter of 24 inches and minimum 24 inches in depth. Handhole to be conical in shape with taper from bottom to top.
 - (2) Loading: Ensure handhole, extensions, and cover comply as a complete unit with ANSI 77 with a minimum Tier 15 rating.
 - (3) Resin: HDPE resin to comply with ASTM D790 for minimum flexural modulus of 142,000 psi and ASTM D638 for minimum yield strength of 3100 psi when using a Type IV specimen, 2 inch per minute test speed, and 0.075 inch thick molded sample.
 - (4) Cover: Ensure cover has skid resistant surface meeting PROWAG requirements with stainless steel bolts meeting manufacturer's requirements. Ensure cover fits handhole to meet PROWAG vertical surface discontinuity requirements when placed in pedestrian walkways.
 - (5) HDPE Handhole and Cover not allowed unless otherwise approved by the Engineer.
2. Conduit: Material type as specified in Article 4189, B of the Standard Specifications.
3. Wiring and Cable.
 - a) Fiber Optic Cable and Accessories.
 - (1) Fiber Optic Jumper/Patch Cords.
 - (a) Duplex pigtail jumpers shall be used to branch traffic signal controller circuits from the distribution panel in the cabinet to Ethernet switch.
 - (b) Length of pigtail jumpers will vary according to distribution panel to Ethernet switch. Length of jumper should provide for a minimum of 2 feet total slack between distribution panels and switch connections.
 - (c) Controller cabinet pigtail jumpers shall consist of factory-assembled patch cords, each of which shall contain two fibers. Each such fiber shall have an SC compatible, physical contact connector with ceramic ferrule on one end and LC compatible, physical contact connector with ceramic ferrule on the other end (i.e., a total of two SCPC connectors and two LC connectors per cord). Each patch cord shall have a dielectric strength member and a durable outer jacket designed to withstand handling.

- b) Pull Tape: Pull tape shall be flat woven lubricated polyester tape with 1250 pound pulling strength and 1/2 inch width.

B. DETECTION.

1. Pedestrian Push Button Detectors.

a) Assembly.

- (1) Ensure the entire assembly is weather tight, secure against electrical shock, withstands continuous hard usage.
- (2) Provide a removable contact assembly mounted in a die cast aluminum case.
- (3) Ensure contacts are normally open with no current flowing except at the moment of actuation.
- (4) Ensure the contacts are entirely insulated from the housing and operating button with terminals for making connections.
- (5) Provide housing with one outlet for 1/2 inch pipe.
- (6) Housing shall have a black finish.

C. COMMUNICATIONS.

1. Ethernet Switch.

- a) Provide as specified in the contract documents.
- b) Shall have seven 10/100BASE-TX ports and three Gigabit RJ45/SFP combo ports (10/100/1000BASE-TX, 100BASE-FX, 1000BASE-X).
- c) 32Gbps non-blocking, 8K MAC address table.
- d) VLAN, GVRP, QoS, IGMP snooping V1/V2/V3, rate control, port trunking, LACP, online multi-porting mirroring.
- e) Management via console CLI, Web, SNMP V1/V2/V3, RMON, HTTPS, SSH and PortVision DX.
- f) Advanced security feature supports IP security, port security, DHCP server, IP and MAC binding, 802.1x network access control.
- g) Event notification by email, SNMP trap, syslog, digital input and relay output.
- h) Operating temperature range: -40° to 74°C.
- i) Rigid aluminum IP31 housing, excellent heat dispersion, redundant power, DIN rail/wall mount installation.
- j) NEMA TS2 Compliant.
- k) IPv6 support.
- l) Provide necessary Ethernet cables, with 2 feet of slack, connecting switch to all capable devices within cabinet.

D. CABINET AND CONTROLLER.

- 1. NEMA Controller, Cabinet, and Auxiliary Equipment: Comply with the latest edition of NEMA TS1 or TS2 standards or ITE advanced transportation controller (ATC).
 - a) **Controller:** Shall be a NTCIP compliant Siemens m60 Series NEMA configurable controller with fiber optic communication capability or approved equal and including a smart malfunction management unit (MMU).

b) Cabinet.

- (1) Unpainted aluminum ATC cabinet according to ITE ATC standards and complying with NEMA standards to accommodate both an ATC and NEMA TS2 controller.
- (2) Aluminum cabinet riser with same dimensions as cabinet, 8 inch height and matching finish on the signal cabinet.
- (3) Cabinet shall be 350i high voltage ATC cabinet.
- (4) Service Assembly shall be modular and shall be mounted on the left of the EIA rail. Cabinet fuses shall be snap-in style.
- (5) Cabinet assembly shall include the following plug-ins: 16 HDSP, two HDFU, two 242L, three SIU, one CMU-HV, 16 HDFTR, 16 HDSP Suppressors, four Input Suppressors, ADU, Input Test Panel, SDLC Terminator shall be internal to the DC Comm Bus, Monitor Key Programming Tool.
- (6) Police door with auto/flash switch, manual/stop time switch, and on/off power switch for signal heads only. Controller to remain in full operation regardless of switch positions.
- (7) Maintenance panel on inside of the main door containing the following test switches.
 - (a) Controller power switch.
 - (b) Detector test switches.
 - (c) Stop time switch.
 - (d) Signal flash switch.
- (8) Heavy-duty clear plastic envelope attached to inside wall of cabinet or cabinet door, for cabinet wiring diagrams, 12 inches by 18 inches minimum. Shall include cabinet prints and intersection drawing stickers per project plans.
- (9) GFI electrical outlet and lamp in accessible location near the front of the cabinet. GFI outlet fused separately from main AC circuit breaker. LED cabinet lamp connected and fused with GFI outlet.
- (10) Cabinet shall have a fully populated 32-channel output assembly with HDSP, SIU and suppressors. Cabinet shall accommodate 24-channel inputs.
- (11) Power protection devices including AC power circuit breakers, radio interference suppressors, and lightning and surge protectors.
 - (a) AC field service single pole, nonadjustable, magnetic breaker rated for 117 VAC operation, NEC approved.
 - (b) Radio interference suppressors (RIS) as required to minimize interference in all broadcast transmission and aircraft frequency bands.
 - (c) Lightning arrestor/surge protector capable of withstanding repeated (minimum of 25) 30,000 ampere surges.
- (12) Neatly train wiring throughout the cabinet and riser. Bundle and attach wiring to interior panels using nonconductive clamps or tie-wraps.
- (13) Cabinet size shall be 26 inches deep by 44 inches wide by 67 inches tall.
- (14) Cabinet shall be pre-assembled by the supplier prior to delivery to the contractor for installation.
- (15) Cabinet shall accommodate a Clary SP1400LT, bypass switch, and two lithium batteries.
- (16) All fiber optic cable shall be suitably identified inside the cabinet.

- c) **Auxiliary Equipment:** Conflict monitor/malfunction management unit, flasher, load switches, terminals and facilities, and miscellaneous equipment and materials according to NEMA standards.
2. **Uninterruptible Power Supply Battery Backup System:** Monitors 120VAC input from the electric utility source and automatically switches to/from a system consisting of batteries and electronics. Clary Traffic/ITS system with the following components.
- a) Control Unit – SP 1400LT.
 - b) Communication – SNMP.
 - c) Bypass Switch.
 - d) Two Lithium Batteries.

E. POLES, HEADS AND SIGNS.

- 1. Traffic Signs.
 - a) Sheet aluminum and retroreflective sheeting complying with Section 4186 of the Standard Specifications.
 - b) Use a universally adjustable mast arm mounted sign bracket.
 - c) Comply with MUTCD and the contract documents for the street name sign dimensions, letter height and font.
 - d) Street name lettering shall be white FHWA Series C with 12 inch uppercase and lowercase letters on green background.
 - e) All sheeting material for traffic, street name, and pedestrian signs shall be 3M Diamond Grade DG3.

231021.03. CONSTRUCTION.

A. UNDERGROUND.

- 1. Handhole.
 - a) HDPE Handhole and Cover: Construct according to Article 2525.03, A, 1 of the Standard Specifications.
- 2. Conduit.
 - a) Place conduit to a minimum depth of 42 inches and a maximum depth of 60 inches below the gutterline. When conduit is placed behind the curb, place to a minimum depth of 42 inches and a maximum depth of 48 inches below top of curb.
 - b) Extend conduit into the handhole, through a knockout, approximately 2 inches beyond the inside wall. Conduit to slope down and away from the handhole.
 - c) Place non-shrink grout (complying with Materials I.M. 491.13) in the opening of the knockout area after placement of conduit.
- 3. Wiring and Cable.
 - a) Fiber Optic Cable and Accessories.
 - (1) Use a suitable cable feeder guide between the cable reel and the face of the conduit to protect the cable and guide the cable directly into the conduit off the reel. During the installation, carefully inspect cable jacket for defects. If defects are found, notify the Engineer prior to any additional cable being installed. Take care when pulling the cable to ensure the cable does not become kinked, crushed, twisted, snapped, etc.

- (2) Attach a pulling eye to the cable and use to pull the cable through the conduit. Use a pulling swivel to preclude twisting of the cable. Lubricate cable prior to entering the conduit with a lubricant recommended by the manufacturer. Use dynamometer or break away pulling swing to ensure the pulling tension does not exceed the specified force of 600 pounds or the cable manufacturer's recommendations, whichever is less. Do not allow the cable to twist, stretch, become crushed, or forced around sharp turns that exceed the bend radius or scar or damage the jacket. Manually assist the pulling of the cable at each pull point.
- (3) Do not pull cable through any intermediate junction box, handhole, pull box, pole base, or any other opening in the conduit unless specified in the contract documents. Install cable by pulling from handhole or controller cabinet to the immediate next downstream handhole or cabinet. Carefully store the remaining length of cable to be installed in the next conduit run(s) in a manner that is not hazardous to pedestrian or vehicular traffic yet ensures that no damage to the cable occurs. Storage methods are subject to Engineer approval.
- (4) At each handhole, visibly mark or tag cable, "CITY (or COUNTY) FIBER OPTIC".
- (5) Secure cables inside controller cabinet so that no load is applied to exposed fiber strands.
- (6) Ensure the radius of the bend for static storage is no less than 10 times the outside diameter of the cable, or as recommended by the manufacturer. Ensure the radius of the bend during installation is no less than 15 times the outside diameter of the cable, or as recommended by the manufacturer.
- (7) Provide cable slack in each handhole, junction box, and cabinet as specified:
 - Traffic Cabinet 50 feet.
 - Type I, II, III Handhole 50 feet.
 - Type IV Handhole (tub) 100 feet.Where handholes or junction boxes lack sufficient area for cable storage or bend radius requirements, provide equivalent additional slack in adjacent facilities. Coil and bind slack cable at three points around the cable perimeter and support in its static storage position.
- (8) Install fiber optic accessories according to the manufacturer's recommendations and as specified in the contract documents.

B. DETECTION.

Pedestrian Push Button Detectors: Install per Article 2525.03, B, 2 of the Standard Specifications.

C. COMMUNICATIONS.

Ethernet Switch: Install inside the traffic signal controller cabinet according to manufacturer's recommendations.

D. CABINET AND CONTROLLER.

1. Install per Article 2525.03, D of the Standard Specifications.
2. Installation includes any and all jumpers/pigtail cables, splice trays/enclosures, termination panels to accommodate the number of terminations per plan, fiber optic connectors, and fiber breakout kits.

E. POLES, HEADS AND SIGNS.

Install per Article 2525.03, E of the Standard Specifications.

231021.04 METHOD OF MEASUREMENT.

Lump sum item; no measurement will be made.

231021.05 BASIS OF PAYMENT.

Payment will be at the lump sum price for Traffic Signalization. Partial payment will be made according to the approved schedule of unit prices for those materials installed.