SPECIAL PROVISIONS
FOR
TRAFFIC SIGNALIZATION

Scott County
IM-080-8(373)300--13-82

Effective Date
July 15, 2025

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.

230319.01 DESCRIPTION

A. General.

1. Sections 2525 and 4189 of the Standard Specification, as modified by these special provisions, shall apply to this project. Traffic signals and signs shall be installed in conformance with the MUTCD as adopted in rule 761—130.1(321).
2. These Special Provisions cover the work described in the contract documents. This includes furnishing all labor, equipment, and materials, and performing all required operation to complete the work per the contract documents and provide a fully operational and working traffic signal system. Unless modified by the Special Provisions, all work, including equipment, material, and installation, shall be in accordance with the Standard Specifications.
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 City.
4. At the completion of the project, the Contractor shall provide the City with as-built drawings of the signals and fiber optic system.
5. The Contractor shall submit to the Engineer shop drawings (catalog cuts acceptable) for all signal equipment that is proposed for installation.
6. The Contractor shall notify the Engineer in writing of any discrepancy or ambiguity as to the intent or meaning of the contract documents or Special Provisions before starting work on that area.

B. System Integration.

1. The Contractor shall coordinate with the City's staff to facilitate integration with the existing City of Bettendorf systems.

230319.02 MATERIALS

A. General.

1. All materials shall comply with Section 4189 of the Standard Specifications with the following modifications and additions.

B. Foundations. (4189.01, D) (Add the Following Articles).

1. Traffic signal cabinet foundations shall be per plan detail. Anchor bolts shall be as specified by the cabinet manufacturer.

C. Detection. (4189.02) (Add the Following Articles).

1. AI Tracked Entity Detection System
    a. AI Tracked Entity Detection System (AI-TEDS) that uses fused sensors and machine learning algorithms to detect, identify, classify, and track discrete road users at signalized intersections.
    b. The system user interfaces shall be used for managing, monitoring, controlling and reporting and be backed by 24 hours a day, 7 days a week, 365 days a year support and monitoring for a period of five years.
    c. The sensor unit shall operate over a nominal voltage range of 90-263 volts of alternating current (VAC) to 50-60 Hertz (Hz). Maximum power consumption shall be 40 watts (W). Video Sensor shall comprise of a 1080pixel (p) high-definition camera that supports H.265 encoding. One Remote Sensor Unit (RSU) shall be included and have the same functionality as the Sensor Unit with the added Vehicle-to-Everything (V2X) communications chipset that supports Dedicated Short-Range Communications (DSRC) and Cellular Vehicle-to-Everything (C-V2X) and two omnidirectional V2X antennas.
    d. The control unit shall reside in the traffic signal cabinet. It shall include a Graphics Processing Unit (GPU), a Wi-Fi radio, and have at minimum:
        - 1x gigabit Ethernet (8P8C)
        - 1x asynchronous serial (DB-25)
        - 2x synchronous serial (DA-15, NEMA TS2 Port 1)
    e. The local software shall include embedded software that resides in non-volatile storage on the control unit. The software shall be accessible by a user at the traffic signal equipment cabinet via a wired or wireless connection. Access to the local software shall be restricted to users designated by the Owner.
    f. The cloud software shall include software-as-a-service that is hosted by the AI-TEDS manufacturer on a secure cloud platform. The cloud software shall be accessible via an internet domain name that is unique to the Owner. The cloud software shall have a browser user interface that allows viewing and editing all real-time, historical, and configuration data for all the Owner's AI-TEDS. All AI-TEDS shall include a minimum of 5 years of access to and hosting of the Cloud Software.
    g. The system shall include, but not be limited to:
        - Sensor Unit
        - RSU Sensor Unit
        - Control Unit
        - Main DIN Assembly
        - Power DIN Assembly
        - Antenna
        - Three Conductor (3/C) power cable

D. Emergency Vehicle Preemption System (4189.04, C) (Replace with the Following Articles).

1. Emergency Vehicle Preemption System shall consist of Tomar 4090-1-ST detectors or

approved equal.

2. Contractor shall supply detector heads, associated wiring, and cabinet interface required for a fully functioning emergency vehicle preemption system for all vehicle movements at the intersection.

E. Traffic Monitoring System. (4189.03, A) (Replace with the Following Articles).

1. Pan/Tilt/Zoom (PTZ) Cameras shall be Axis Q6135 or approved equal.
2. 180degree cameras shall be Axis P3818 or approved equal.
3. License Plate Cameras shall be Axis Q1700 or approved equal.
4. Contractor shall supply cameras, associated wiring, and required cabinet interface required for a fully functioning camera installation as shown in the contract documents.

F. Ethernet Switch (4189.03) (Add the Following Articles).

1. The fiber optic Ethernet switch shall be Cisco IE3300-8P2S-E or approved equal.
2. The switch shall be supplied with the following:

    a. Six Ethernet patch cables. Each patch cable shall be 6 feet in length.

    b. Two fiber optic SFPs. SFPs shall be 1000BASE-LX.

    c. All necessary materials, labor, equipment, and other incidental items necessary for a fully functioning Ethernet switch compatible with the City of Bettendorf's existing Traffic Signal Network.

G. Controller. (4189.04, A, 1) (Add the Following Articles).

1. Traffic signal controller shall be Yunex M60 or approved equal.

H. Cabinet. (4189.04, A, 2) (Replace with the Following Articles).

1. All materials furnished, assembled, fabricated, or installed shall be new, corrosion resistant and in strict accordance with NEMA 3R and UL specifications. Each cabinet shall be provided complete with all internal components and mounting hardware necessary to provide for the installation and operation of a traffic signal.
2. General Requirements:

    a. The exterior cabinet housing shall be fabricated from 1/8 inch minimum thickness aluminum alloy sheet meeting the requirements in ASTM Specification No. 5052-H32. Each cabinet shall be provided with a 1 inch slope toward the rear of the cabinet to prevent the accumulation of water on its top surface.

    b. The bottom external dimensions of the Traffic Signal Cabinet shall be 44 inches wide by 25 inches deep by 56 inches high.

    c. Equipment provided as part of the NEMA Traffic Signal Cabinets shall connect to NEMA TS2 Type A2 Traffic Signal Controllers through the three military style connectors (Connectors A, B and C) located on the front panel of the controller unit.

    d. The Contractor shall submit an interior cabinet layout for each cabinet specified for review and approval by the Engineer.

3. Mechanical Requirements:

    a. Door and Door Hardware:

        i. The traffic signal cabinet shall have a hinged main door which permits access to all equipment within the cabinet and visual inspection of all indicators and controls. The main door shall be double flanged on all four edges to increase strength around the openings and to keep dirt and liquids from entering the enclosure when the doors are open.

        ii. The cabinet door shall be constructed of 1/8 inch thick type 5052-H32 aluminum alloy to provide a strong rigid construction. All welds shall be neatly formed and free of cracks, blowholes and other irregularities, and all inside and outside edges of the cabinet shall be free of burrs.

        iii. The door hinges shall be a one-piece, continuous piano hinge, with a stainless-steel hinge pin. The hinge shall be located on the right side

of the door when viewed from the front. The hinge and pin shall run the entire length of the door. The hinge pin shall be capped at the top and bottom by weld to render it tamper proof.

iv. The doors shall be furnished with a gasket that satisfies the physical properties as found in UL508 table 21.1, including a weather tight seal between the cabinet and door.

v. The door shall be equipped with a catch mechanism to automatically hold the door open at least 125 degrees.

vi. All doors shall be provided with a main door lock, Corbin No. 15481RS, or equivalent, constructed of stainless steel which shall operate with a traffic industry conventional No. 2 key. The lock shall engage a three-point locking system. Two No. 2 keys shall be provided with each cabinet for use by traffic department personnel.

b. Police Compartment:

i. A hinged police compartment door shall be provided on the outside face of the main cabinet door. The door shall permit access to a switch panel but shall not allow access to exposed electrical terminals or other equipment within the cabinet.

ii. The interior volume of the police panel compartment with the door closed shall be 150 cubic inches minimum. Minimum internal dimensions shall be 5 inch high by 10 inch wide by 3 inch deep.

iii. The electrical components to be housed in the police compartment are as indicated elsewhere in this specification.

c. Shelves:

i. Traffic signal cabinets shall be supplied with two removable shelves manufactured from 5052-H32 aluminum having a minimum thickness of 1/8 inch.

d. Pull out drawer:

i. A pull-out drawer shall be attached to the lowest shelf between the cabinet lighting. The drawer shall be 13 inches deep by 18 inches wide by 2.5 inches tall. The drawer shall be manufactured from 5052-H32 aluminum having a minimum thickness of 1/8 inch.

e. Ventilation:

i. Traffic signal cabinets shall be equipped with suitable top and bottom vents. The lower section of the cabinet door shall be provided with a louvered air entrance. Louvers shall satisfy the NEMA rod entry test for 3R ventilated closures. A removable air filter shall be supplied with each cabinet for the louvered air entrance. The exhaust area shall be screened with a material having a maximum hole diameter of 1/8 inch. Each cabinet shall have an active ventilation system that is thermostatically controlled by two fans. Requirements for the ventilation fan are as indicated elsewhere in this specification.

f. Ventilation Fan:

i. Each cabinet shall be provided with two thermostatically controlled ventilation fans. The thermostat turn-on point shall be manually adjustable from +91° F to +113°F, with a differential of not more than +43° F between automatic turn-on and turn-off. The thermostat shall be located on the inside of the cabinet not lower than 6 inches from

the top of the cabinet.

4. Electrical Requirements:

a. All back panels shall be hinged at the bottom to allow easy access to all wiring on the rear of the panel. The cabinet back panel conductors shall be arranged to allow the top of the panel to be tilted out through the main cabinet door.

b. The back panel shall be fully wired to accommodate 16 load switch sockets, six flash transfer relay sockets, and one flasher socket.

c. Reference designations for all load switch and flash transfer relay sockets shall be silk-screen labeled on the front and rear of the back panel. The back panel shall provide means of programming the controller phase outputs to load switch inputs with only the use of a screwdriver. As a minimum, sufficient screw terminals shall be provided for the termination of the input/output functions described in section 5.3.2 of the NEMA TS2-2003 standard.

d. All necessary cables to interface the back panel with the traffic signal controller and other control equipment shall be provided under this item. Cables shall be of sufficient length to allow the controller to be placed on either shelf. Connecting cables shall be sleeved in a braided nylon mesh.

e. Duplex Receptacle:

i. Each cabinet shall be supplied with a NEMA Type 5-15R duplex receptacle with integral ground fault interrupting circuits on the door.

ii. Each cabinet shall be supplied with one double duplex receptacle or similar, not integral to the ground fault on both the right and left side panels of the cabinet. The receptacles shall be located so that no electrical hazard exists when used by service personnel.

f. Terminal Blocks:

i. Terminal strips located on panels shall be accessible to the extent that it shall not be necessary to remove the electronic equipment from the cabinet to make an inspection or connection.

ii. Terminal blocks shall be two position multiple pole barrier type. Shorting bars shall be provided in each of the positions along with an integral marking strip. Terminal blocks shall be so arranged that they shall not upset the entrance, routing, and connection of incoming field conductors.

iii. All terminals shall be suitably identified by legends permanently affixed and attached to the terminal blocks, or side and top. Not more than three conductors shall be brought to any one terminal screw. No electrically alive parts shall extend beyond the protection afforded by the barriers. All terminal blocks shall be located below the shelves.

iv. As a minimum, all connections to and from the electronic equipment shall terminate to an interwiring type block. These blocks shall act as intermediate connection points for all electronic equipment inputs and outputs.

v. All load switch terminal blocks (1-16) and pushbutton terminal blocks shall have mechanical crimps.

g. Cabinet Wiring:

i. All wires shall be cut to the proper length before assembly. No wires shall be doubled back to take up slack. Wires shall be neatly laced into cables with nylon lacing. Cables shall be secured with nylon cable

clamps. The grounded side of the electric service shall be carried throughout the cabinet without a break.

ii. All electrical connections in the cabinet, including relays, flashers, terminal strips, etc., shall have sufficient clearance between each terminal and the cabinet to provide an adequate distance to prevent a leakage path or physical contact under stress. Where these distances cannot be maintained, barriers must be provided.

iii. All equipment grounds shall run directly and independently to the ground bus. The lay of the interconnect cable between the components must be such that when the door is closed, it does not press against the cables or force the cables against the various components inside the cabinets.

iv. Sufficient length of cable harnesses shall be provided to easily reach the electronic equipment placed anywhere on the shelves.

v. All conductors used in the cabinet wiring shall be No. 22 AWG or larger with a minimum of 19 strands. Conductors shall conform to MIL SPEC #MIL-W-16878D, type B or D. The insulation shall have a minimum thickness of 0.001 inch. All wiring containing line voltage shall be a minimum size of No.14 AWG as long as it on a 15 amp Square D QO Breaker.

h. Cabinet Grounding:

i. The copper ground bus bar shall have a minimum of 10 connector points, each capable of securing at least one No. 10 conductor. A.C. return and equipment ground wiring shall return to the ground bus bar. Where multiple bus bars are used, they shall be bonded to each other with bare stranded No. 10 copper wire.

i. Circuit Breaker(s):

i. The circuit breaker(s) shall be approved and listed by UL. The operating mechanism shall be enclosed, trip free from operating handles on overload, and trip indicating. Each cabinet shall have, as a minimum, a circuit breaker to protect the lamp, ventilation fan, and duplex outlet. All circuit breakers need to be square D QO.

ii. Breakers shall have a minimum interrupt capacity of 5000 amperes.

j. Power Line Surge Protection:

i. A surge protector shall be provided to reduce the effects of voltage transients on the AC power line, “200 Series ASCO, Surge Block should be a Edco SHA-1250, with a base of Edco SHA-1250 Base-A”.

k. Flasher and Flash Transfer Relay:

i. A dual circuit flasher shall be provided in each cabinet that is of solid-state design and conforms to the NEMA Standards Publication TS2-2003 Traffic Controller Assemblies. The flasher shall produce between 50 and 60 flashes per minute at equal on and off intervals.

ii. An interchangeable electromechanical flash transfer relay that conforms to the NEMA Standards Publication TS2-2003 Traffic Controller Assemblies shall be provided with each cabinet. The flash transfer relay shall energize flasher and transfer signal light circuits from the controller unit to the flasher. All bearings and moving parts used in the flasher relay units shall be approved sealed bearings of such design that lubrication shall not be necessary. When an

intersection is operating in the flash mode, the traffic signal controller shall be able to be disconnected without interfering with the flash operation.

iii. Means shall be provided to allow the flashing signal to be altered during the flashing mode of operation to any one of three states: dark, flashing yellow, or flashing red. Utilization of this means shall not require more than the use of simple tools. Such means shall be provided for every load switch output designated to drive vehicular traffic signals.

l. Malfunction Management Unit:

i. Each cabinet shall be supplied with a MMU2-16Leip SmartMonitor 12/16 Channel LCD Series with Ethernet Port or approved equal.

m. Flash Switch Panel:

i. A flash switch panel shall be provided in the interior of the cabinet with, at a minimum, an auto/flash switch and a control equipment power on/off switch. When the auto/flash switch is placed in the FLASH position, power shall be maintained to the controller and the intersection shall be placed in flash. When the switch is moved from FLASH position to the AUTO position, an external start signal shall be applied to the controller. This external signal will force the controller to initiate the startup sequence when exiting flash. The power supply to the controller shall not be affected and the controller shall continue to operate normally.

ii. When the control equipment power on/off switch is in the ON position, AC power shall be applied to the controller unit, conflict monitor, and Power Supply AC power.

n. Police Panel:

i. The police compartment shall contain an auto/flash switch, Auto/Manual, and signals on/off switch. Switches shall be heavy duty toggle type switches rated for 15 amps. All switch functions shall be permanently and clearly labeled.

ii. When the auto/flash switch is placed in the FLASH position, power shall be maintained to the controller and stop time shall be applied. The traffic signal shall be placed in flash operation. When the switch is moved from the FLASH position to the AUTO position, an external start signal shall be applied to the controller. The controller will then initiate the startup sequence when existing flash.

iii. When the signals on/off switch is in the SIGNALS OFF position, power shall be removed from all signal heads at the intersection. The conflict monitor shall not have to be reset to resume operation from this position.

o. Interior Main Door Panel:

i. The interior of the main cabinet door shall contain a signal on/off, timer auto/stop, auto/flash, and light on/off. Switches shall be heavy duty type toggle type switches rated at 15 amp minimum.

ii. All switch functions shall be permanently and clearly labeled.

iii. When the signals on/off switch is in the SIGNALS OFF position, power shall be removed from all signal heads at the intersection. The conflict monitor shall not have to be reset to resume operation from this

position.

iv. When the auto/stop switch is in the Time stop position, the timer on the controller needs to stop time until the switch is switched back into the auto position.

v. When the auto/flash switch is placed in the FLASH position, power shall be maintained to the controller and stop time shall be applied. The traffic signal shall be placed in flash operation. When the switch is moved from the FLASH position to the AUTO position, an external start signal shall be applied to the controller. The controller will then initiate the startup sequence when existing flash.

vi. When the light on/off switch is in the LIGHT ON position, the light at the top of the cabinet and the two lights on the bottom self between the pull out drawer should come on. The light in the cabinet shall be LED.

p. Emergency Vehicle Preemption (EVP):

i. Each cabinet shall be furnished with an emergency vehicle preemption card rack. This rack shall be installed on the left side of the top shelf inside the cabinet. From the card the field wiring shall be installed to a terminal block for all field wiring. A terminal block with a 37 pin D cable shall be installed above the preemption terminal block.

q. Battery backup:

i. All cabinets shall have a terminal block on the right side of the cabinet for connection of a battery backup system.

r. There shall be a minimum of eight port Synchronous Data Link Control (SDLC) block mounted inside the cabinet.

5. Supplies in Cabinet:

a. Cabinet shall be supplied with a full complement of load switches, flasher switches, and flash transfer cube relays.

230319.03 CONSTRUCTION

A. General.

1. Construction shall be per Article 2525.03 of the Standard Specification with the following modification and additions.

B. Detection (2525.03, B) (Add the Following Articles).

1. AI Tracked Entity Detection System: Install according to the manufacturer's recommendations.

C. Ethernet Switch (2525.03, C) (Add the Following Articles).

1. Ethernet Switch: Install according to the manufacturer's recommendations.

230319.04 METHOD OF MEASUREMENT

Method of measurement for the traffic signalization bid item shall be per Article 2525.04 of the Standard Specifications.

230319.05 BASIS OF PAYMENT

Basis of payment for the traffic signalization bid item shall be per Article 2525.04 of the Standard Specifications.