

ROAD COMMISSION FOR OAKLAND COUNTY

SPECIAL PROVISION  
FOR  
**TRAFFIC MONITORING CAMERA**

RCOC/TOC:JJ

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**a. Description**

This work consists of the furnishing, installing, integrating, testing, and providing manufacturer warranty of a Traffic Monitoring Camera (CCTV) with an integrated Digital Video Encoder (DVE) and associated appurtenances.

This work performed according to the plans and sections 818, 819, 820, 918 and 921 of the *Michigan Department of Transportation (MDOT) 2020 Standard Specification for Construction* except as herein provided.

**b. Materials**

1. General

All materials furnished, assembled, fabricated, or installed under this section must be new, corrosion resistant, and in accordance with the details shown on the plans and in this special provision.

Requirements of regulatory agencies. Comply with the following codes or standards:

A. *National Transportation Communications for ITS Protocol (NTCIP)*

(1) *NTCIP 1201*

(2) *NTCIP 1205*

(3) *NTCIP 1208*

(4) *NTCIP 2104*

(5) *NTCIP 2202*

(6) *NTCIP 2301*, as it applies to the Simple Network Management Protocol (SNMP)

B. *National Television Systems Committee (NTSC)*

C. *Moving Picture Experts Group (MPEG)*

D. *Institute of Electrical and Electronics Engineers (IEEE) 802.3*

E. *National Electrical Manufacturers Association (NEMA)*

All electrical components must operate on 120 Volt Alternating Current (VAC) ( $\pm 10$  percent) 50/60 Hertz (Hz) electricity. Provide appropriate Direct Current (DC) conversion for any equipment requiring DC power. Provide appropriate DC to DC and Alternating Current (AC) to DC conversion as necessary. Solar power is only permissible when approved by the Engineer. If the site is solar powered, the Contractor will be allowed to power the devices using DC equipment.

All field equipment must operate in all weather conditions. Use identical and completely interchangeable equipment at each location. Use equipment designed to protect personnel from exposure to high voltage during equipment operation, adjustments and maintenance.

All equipment required for the configuration and testing of devices and subsystems contained within this project will be supplied by the Contractor as an appurtenance to the equipment included within the project and at no additional cost.

## 2. Traffic Monitoring Camera (CCTV)

### A. Functional Specifications

- (1) Provide an IP video camera system located as identified on the plans. Power the CCTV camera by a single outdoor rated Power over Ethernet (POE) cable from a POE injector. The CCTV camera must have an integrated DVE for the transmission of MPEG-4, H.264, or MJPEG encoded video streams.
- (2) Ensure the camera provides a resolution of 1080p/720p High Definition video.
- (3) Ensure the camera includes an environmentally rugged housing suitable for harsh environments that is compatible with the temperature, power, vibration, and shock requirements of NEMA TS-2, as well as the environmental dust and water resistance requirements of IEC 60529 IP66 and IP67 ratings.
- (4) Ensure the camera has a side-mounted lens configuration for continuous 360-degree pan and tilt rotation on both axes and automatic image flip.
- (5) Ensure the camera has a minimum of 30x optical zoom.
- (6) Ensure the camera has an image sensor capable of providing full color images at low levels of light and black/white images in the dark.
- (7) Ensure the camera can provide both full motion video and still images.
- (8) Ensure the camera is configurable for up to 20 user definable camera presets, stored on-board.

- (9) Ensure the camera can set continuous tours for the preset locations and that presets are selectable between 2 seconds and 5 seconds for 180-degree motion in both axes.
- (10) Ensure the camera can set privacy zones to black out areas.
- (11) Ensure the camera supports both NTSC and Phase Alternating Line (PAL).
- (12) Control Data protocol support must include Coahu, Pelco D and Pelco P codes without the use of additional protocol convertor hardware.
- (13) Ensure the camera is low maintenance, hydrophilic coated, energy saving, directly heated, non-fogging camera faceplate window.

#### B. Environmental Specifications

- (1) The CCTV camera must operate within an ambient temperature of -29 degrees Fahrenheit (F) to 140 degrees F with 100 percent relative humidity, condensing.
- (2) The environmental housing enclosure must be able to sustain a minimum of 3 second winds gusts from any direction of 120 miles per hour (MPH) as required by ASCE 7.
- (3) The pressurized housing assembly must include a thermostat-controlled, heater and follows NEMA 4X/IP-67.
- (4) The POE injector must operate within an ambient temperature of -29 degrees F to 140 degrees F with 5 to 90 percent relative humidity, non-condensing.
- (5) The CCTV camera must provide a clear, focused image in all weather conditions.
- (6) The outside surface of camera housing window must be provided with high temperature vacuum deposited hydrophilic coating to reduce window cleaning maintenance.
- (7) The inside surface of camera housing window must be provided with electrically conductive coating to allow energy saving, directly heating of window glass to prevent fogging.

### C. DVE Functional Specifications

(1) The integrated DVE must provide MJPEG encoding, as well as either MPEG-4 or H.264 encoding. The DVE must be capable of providing both full motion video and still images.

(2) The DVE must support 1 to 30 frames per second (fps) frame rate at resolutions. The Contractor is responsible for integrating the optimal resolution, bit rate, and frame rate that will deliver the best video into the Advanced Traffic Management Software (ATMS) or web server.

(3) The DVE must encapsulate and pass through PTZ and control data, compliant with NTCIP.

(4) The DVE must not exceed 250 milliseconds of latency for PTZ controls.

### D. Equipment and Port Specifications.

(1) The data sub-channels must be software programmable, directly or over the Network, as defined by the Electronic Industries Association (EIA) for the recommended standard (RS) 232/422/485 data format, data rate, and data structure (e.g., the number of bits, parity, stop bits, etc.) and be IP addressable.

(2) The network connection must be Ethernet-compliant IEEE 802.3, 802.3u, and 802.3x; 10/100 Megabits per second (Mbps), static or dynamic host configuration protocol (DHCP), auto sensing full/half-duplex and compatible by way of a Registered Jacks (RJ)-45 connector, allowing transmissions over a Category 6A Class EA Enhanced (CAT-6e) cable to an attached fiber optic media converter, an Ethernet switch or an IP wireless device.

(3) The video input performance measures must comply with NTSC and EIA requirements, including the EIA-170 standard, with a composite video of 1.0 to 1.2 volts peak-to-peak (Vp-p). Ensure the equipment has an electrical resistance of 75 Ohms at 60 Hertz (Hz).

### E. Network Parameter Specifications.

(1) Use the 10/100BASE-TX with Type RJ-45 connectors, as required in the IEEE 802.3 standards and amendments, as the connection to the network devices.

(2) Conform to version 4 of the user datagram protocol (UDP), version 2 of the internet group management protocol (IGMP), and transmission control protocol (TCP)/IP Version 4.

(3) Must be compatible with the following network protocols: Unicast/Multicast, UDP, TCP, IP, HyperText Transfer Protocol (HTTP), Real Time Streaming Protocol (RTSP), Telnet, IGMP 2.0, Internet Control Message Protocol (ICMP), DHCP, Simple Network Management Protocol (SNMP) and Real-time Transport Protocol (RTP).

F. Bracketry, accessories, or custom modifications for mounting shall be as per manufacturer recommendations and approved by the engineer.

### 3. Communication and Power Conductors

Utilize shielded outdoor rated certified ANSI/TIA-568-C.2 Category 6A, ISO 11801 Class EA Enhanced cable (Cat 6a cable) with weatherproof Registered Jacks RJ-45 connector(s) rated for Cat 6a cabling. Cat 6a cable must have a UV resistant polyethylene (PE) jacket and be F/UTP shielded OSP, 4-pair.

Provide an in-line POE repeater/extender for each run of Cat-6a cable greater than 200' in length. The ethernet interfaces must be two independently auto-configuring 10/100 ports. The POE repeater/extender must not require an external power supply.

### 4. Acceptance

Provide General Certification per the MDOT's *Materials Quality Assurance Procedures Manual* to the Engineer that the materials meet the requirements specified herein.

## c. Construction

### 1. General.

A. Prior to installing any cable, the contractor must submit a detailed drawing to the Engineer showing the proposed location of the camera, cabling, and all POE repeaters / extenders. Drawing must indicate proposed cable routing and cable lengths between each component. Allow 10 working days for each review cycle.

B. Furnish, assemble, fabricate and/or install materials that are new, corrosion resistant and in accordance with the details shown on the plans and the *MDOT 2020 Standard Specifications for Construction*.

C. Furnish, install and integrate all available software upgrades through final acceptance.

D. Furnish, install, test and qualify all components including patch cords and jumpers, as well as required power adapters, as an appurtenance to this special provision. All communication cabling shall be field qualified at 100 MBps and full duplex level to verify connectivity.

- E. Complete initial ITS tests prior to implementation to ensure the proper functionality of the specified operation.
- F. Submit a complete detailed cut sheet showing all devices and their connectivity, for the Engineer's approval before procurement. All cut sheets must include device manuals, installation and operation guides and preventative maintenance schedules.
- G. If the CCTV camera's regular maintenance schedule or calibration comes due prior to final system acceptance, the Contractor must recalibrate the device and to perform routine maintenance at no additional cost to the Road Commission for Oakland County.
- H. Comply with working clearances and dedicated spaces per *NEC Articles 110, 384 and 800-5*, as well as all current NEC articles, and Federal, State and Local regulations.
- I. Submit a detailed report or as-built drawings for each camera installation, listing all cable length(s) and qualification results to the Engineer in a .PDF format.

## 2. Traffic Monitoring Camera

- A. Install the camera in conformance with the manufacturer's requirements and in accordance with this special provision.
- B. If the camera requires a user specific IP address designation. The camera shall be provided to the Engineer a minimum of 72 hours in advance of installation to be configured. Any delays caused by configuration will not be grounds for an extension of time.
- C. Work with Engineer to determine the preferred configuration settings on the CCTV camera. This includes, but is not limited to, the privacy zones, presets and tours, on-screen labels or identifiers, azimuth display, and low-pressure warnings.
- D. Installation must meet local and state electrical requirements including grounding. Grounding will not be paid for separately and is covered under the MDOT Special Provision for Grounding, Bonding, Lightning Protection and Surge Protection for Electrical System Equipment (20SP-826A-01).
- E. Ensure that a representative from the CCTV camera manufacturer or other certified company is in attendance during the installation of the first camera.
- F. Do not damage any part or equipment during installation. Damaged parts or equipment must be replaced at no additional cost. Repair is not an acceptable

means of addressing damage, replacement of the camera is the only acceptable resolution. All equipment is to be replaced with new parts. Any delays due to damaged equipment is not grounds for an extension of time.

G. Protect the power, control, and return conductors along with all site equipment as specified by CCTV camera manufacturers with the appropriate surge protector.

The surge protector must have an indicator light that indicates the surge protector is functioning properly and/or the light is not illuminated, it indicates that the surge protector has received a catastrophic surge and will need to be replaced.

#### 4. Communication Conductors

Install POE repeater/extender for each run of Cat 6A cable greater than 200' in length per the manufacturer's directions. One repeater/extender must be installed for each 200 feet of communication cabling.

All cabling must be labeled on both ends, bundled and stressed. All communication cabling must be field qualified at 100 Mbps full duplex after the installation of the RJ45 ends. Provide a report listing lengths of all cabling runs and locations of any extenders/repeater as detailed above in C.1.H.

#### 5. Communications Antenna

Install an Owner provided communications (cellular) antenna on the Traffic Signal Controller Cabinet. The antenna must be installed at a location directed by the Engineer and per the antenna manufacturer's installation directions. At a minimum, the Contractor must plan on the following installation process and provide the following materials.

A. Clean the installation area with Isopropyl Rubbing Alcohol

B. Mark hole to be drilled on left back corner of cabinet.

C. Hole location must be approved by the engineer before proceeding.

D. Place towel inside of cabinet to catch drill shavings. Other methods may be approved by the engineer.

E. Installation will require the Contractor to create a 1" diameter hole on the top of the Traffic Signal Controller Cabinet, preventing any debris from the hole creation from entering into the Traffic Signal Controller Cabinet.

F. Clean surface again with Isopropyl Rubbing Alcohol

G. Deburr the entry hole of loose materials or sharp edges that may damage any cabling.

H. Clean the installation area with Isopropyl Rubbing Alcohol immediately before installing the antenna.

I. Peel red film off bottom of antenna. Verify "front" is facing cabinet door.

J. Provide a weathertight seal on the interior of the Traffic Signal Controller Cabinet including applying a 100% silicone sealant around the antenna shank.

K. Place cables from antenna through hole and stud pushing firmly on antenna.

L. Make drip loop for cables.

M. Torqueing the installation nut per the manufacturer's recommendations.

N. Manufacturer's instructions can be requested by the contractor during the bidding process.

#### 6. Manufacturer Warranty.

Provide a manufacturer's warranty full transferrable to the Road Commission for Oakland County

A. Any defect in design, materials, or workmanship which may occur during proper and normal use prior to final system acceptance must be corrected, repaired, and/or replaced by the Contractor without cost to the Commission.

B. The camera system must carry a manufacturer's warranty (parts, software and labor) of 5 years from the date of final acceptance.

C. Warranty coverage must include expedited part supply to ensure replacement or repair of warranted equipment within 10 calendar days of the notification of equipment failure from RCOC or their Maintenance Contractor.

D. Warranty coverage must include a determination, at no cost to the Road Commission for Oakland County, by the manufacturer of the defect.

#### 7. Testing.

A. Furnish test equipment that can complete test procedures whose parameters are equal or better than the minimum test parameters specified by the manufacturer. Provide a list of tools and test equipment (common and specialized, including any built-in testing facilities that are functionally equivalent to external test equipment) necessary to test the equipment.



**d. Measurement and Payment**

The completed work, as described, will be measured and paid for at the contract unit price using the following pay item(s).

<b>Pay Item</b>	<b>Pay Unit</b>
Camera, Traffic Monitoring, RCOC .....	Each
Camera, Traffic Monitoring, Salv, RCOC .....	Each
Camera, Traffic Monitoring, Rem, RCOC .....	Each

**Camera, Traffic Monitoring, RCOC (Ea)** includes furnishing, installing, integrating, testing, providing manufacturer warranty, and make fully operational the CCTV camera including but not limited to camera, POE injector, patch cables, electrical components, data transmission cabling, mounting accessories, mounting brackets, pipe extensions, power and communications connections. Includes all labor, equipment and materials required to install the owner supplied communications antenna.

**Camera, Traffic Monitoring, Salv, RCOC (Ea)** includes removing, salvaging and reinstalling the CCTV camera to make fully operational the salvaged CCTV camera including but not limited to POE injector, patch cables, electrical components, data transmission cabling, mounting accessories, power and communications connections.

**Camera, Traffic Monitoring, Rem, RCOC (Ea)** includes removing the CCTV camera and associated appurtenances, returning the CCTV camera and any requested appurtenances to RCOC.