

**DERRY-LONDONDERRY EXIT 4A
13065****February 6, 2020****SPECIAL PROVISION****SECTION 677 – INTELLIGENT TRANSPORTATION SYSTEMS (ITS) EQUIPMENT****Item 677.415 – Closed Circuit Television (CCTV) System without Pole**

This special provision provides for installation of a Closed Circuit Television (CCTV) System mounted to an existing structure. All provisions of Section 677 (Special Provision to Section 677 - Intelligent Transportation Systems (ITS) Equipment – Base Specification), except as modified or changed below, shall apply.

Add to Description (Special Provision to Section 677 - Intelligent Transportation Systems (ITS) Equipment – Base Specification):

1.4 This work shall consist of furnishing, installing, wiring, licensing, testing, and providing GPS as-built documentation of a new Closed Circuit Television (CCTV) System with mounting bracket and all ancillary equipment necessary to provide a complete working system mounted to an existing structure.

Add to 2.3 Technical Submittal (Special Provision to Section 677 - Intelligent Transportation Systems (ITS) Equipment – Base Specification):

2.3.9 Additional submittal requirements for CCTV camera system installations shall include the following:

2.3.9.1 Documentation of any software modifications required to interface equipment to NHDOT's existing statewide Advanced Traffic Management System (ATMS).

2.3.9.2 Underwriter's Laboratory (UL) approval certifications for all proposed equipment.

2.3.9.3 Typical life expectancy of each system component.

2.3.9.4 A list of parts that will require periodic replacement, including their typical life expectancy.

2.3.9.5 The address where the proposed equipment will be produced and serviced and the turnaround time for replacement and/or repair of equipment.

2.3.9.6 Available maintenance plans.

2.3.9.7 Environmental operating requirements for all equipment and associated equipment including heating, cooling, circuit, and grounding requirements.

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2.3.9.8 Documentation and user instructions for any CCTV camera control software provided by the CCTV camera Manufacturer.

2.3.9.9 Complete electronic user documentation for the CCTV camera, including instructions on operation and calibration.

2.3.9.10 Maintenance manuals for the CCTV camera, which shall include instructions suitable for technicians to perform routine services and minor repairs.

2.3.9.11 Documentation of any Manufacturer's warranties provided for the proposed equipment.

2.3.9.12 Video recordings of multiple, accurate 360 degree field-of-view video images, with camera tilt range from 20 degrees above horizon to 90 degrees below horizon, captured from the precise site location and camera height of the proposed installation. Video images shall be obtained by the Design-Build Team and delivered to NHDOT for use by the Department to determine camera preset views. The Design-Build Team shall submit video images prior to installation, at the same time as all other shop drawings for the proposed CCTV system equipment.

Add to Materials (Special Provision to Section 677 - Intelligent Transportation Systems (ITS) Equipment – Base Specification):

2.6 CCTV camera with Pan-Tilt-Zoom (PTZ) capabilities.

2.6.1 All proposed CCTV cameras shall include a Milestone XProtect Corporate Edition (latest version) device license with Milestone Care Premium Support for 1 year. A compatibility list can be found on the Milestone website.

2.6.2 The CCTV camera and associated equipment shall provide video coverage as directed by the ITS Project Manager (603-227-0016).

2.6.3 The CCTV camera shall be Underwriter's Laboratory (UL) approved. UL certification shall be provided with the catalog cuts in the Technical Submittal.

2.6.4 The CCTV camera shall weigh no more than 10 pounds.

2.6.5 The CCTV camera shall be digital, IP addressable and Ethernet ready.

2.6.6 The CCTV interface shall be an RJ45 type connector for 10BASE-T/100BASE-TX, and shall include an IP66-rated RJ45 connector kit.

2.6.7 The CCTV camera shall be compatible with existing CCTV software at the NHDOT Transportation Management Center (TMC), including the Milestone Video Management System, Corporate Edition, latest version.

2.6.8 The CCTV shall have the following image setting functionalities: Wide dynamic range (WDR), manual shutter time, compression, color, brightness, sharpness, white balance, exposure control, exposure zones, backlight compensation, fine tuning of behavior at low light, rotation, text and image overlay, 32 individual 3D privacy masks, image freeze on PTZ, electronic image stabilization and automatic defog.

2.6.9 The CCTV shall provide a camera imaging system that automatically shifts from daytime mode to nighttime mode, and shifts from color mode to a black-and-white mode under very low light conditions, in order to render a more detailed video image.

2.6.10 The CCTV shall provide automatic and manual control of camera imaging characteristics (such as exposure and contrast).

2.6.11 The CCTV shall return operational status and report system faults to the NHDOT TMC.

2.6.12 The CCTV shall receive and process camera positioning and camera configuration commands received from the NHDOT TMC.

2.6.13 The CCTV shall have the capability to be viewed, controlled, and tested locally at the camera site utilizing a laptop computer with OEM software. This shall include the capability to locally retrieve operational status and fault data for the CCTV.

2.6.14 The CCTV camera dome shall be constructed of clear polycarbonate with a sun shield.

2.6.15 The lower exterior dome shall be made of seamless polycarbonate, optically clear with no distortion, optical discontinuities, or anomalies of any type in any portion of the dome up to 20-degrees above horizontal.

2.6.16 The CCTV camera dome drive system shall consist of an integral camera pan-tilt assembly with a variable high speed drive unit with continuous 360-degree rotation, CCD camera, optical and digital zoom, auto focusing, motorized zoom lens and integral camera control receiver.

2.6.17 The CCTV shall have user-defined "presets" for position, zoom, exposure and focus, to be defined by the NHDOT Transportation Systems Management and Operations (TSMO) Bureau.

2.6.18 The CCTV shall have a minimum Pan/Tilt/Zoom functionality of: 100 preset positions, 360° endless pan at a speed of 0.05 - 450°/sec; 220° Tilt at a speed of 0.05 - 450°/sec.

2.6.19 NHDOT TMC control of CCTV PTZ features shall have a latency of no greater than one second.

2.6.20 The CCTV shall have an automatic variable pan-tilt speed adjustment operating as a function of degree of zoom.

2.6.21 The CCTV shall have a minimum 30x optical zoom and 12x digital zoom, total 360x zoom.

2.6.22 The CCTV shall have the following intelligent video analytics: video motion detection, auto-tracking.

2.6.23 The CCTV shall have alarm triggers from multiple sources including intelligent video, PTZ position.

2.6.24 The CCTV shall have a minimum 1/3-inch progressive scan CCD image sensor.

2.6.25 The CCTV shall have a minimum illumination of: Color: 0.2 lux at 30 IRE; B/W: 0.04 lux at 30 IRE.

2.6.26 The CCTV shall have minimum resolution range of: HDTV 320x180 up to 1280x720, 720p.

2.6.27 The CCTV shall provide H.264 (MPEG-4 Part 10/AVC) and Motion JPEG video compression formats.

2.6.28 The CCTV shall have a minimum frame rate of: H.264 25/30 frames per second (fps) (50/60 Hz) in all resolutions, M-JPEG: up to 25/30 fps (50/60 Hz) in all resolutions.

2.6.29 The CCTV shall be capable of multi-streaming in H.264 and Motion JPEG formats: Multiple individually configured streams in maximum resolution at 25/30 fps (50/60 Hz). The frame rate and bandwidth shall be controllable.

2.6.30 The CCTV shall have the following security features: password protection, IP address filtering, HTTPS encryption, IEEE 802.1X network access control, digest authentication, user access log.

2.6.31 The CCTV shall support the following protocols: IPv4/v6, HTTP, HTTPSa, SSL/TLSa, QoS Layer 3 DiffServ, FTP, CIFS/SMB, SMTP, Bonjour, UPnP/TM, SNMPv1/v2c/v3 (MIB-II), DNS, DynDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, SSH, and NTCIP.

2.6.32 The CCTV shall conform to the ONVIF Profile S standard and have an open Application Programming Interface for software integration.

2.6.33 The CCTV camera shall be able to process, at a minimum, the following alarm events:

- (a) File upload: FTP, HTTP, and network share.
- (b) Email notification: email, HTTP and TCP.
- (c) Data transmitted from CCTV camera: PTZ preset, guard tour, video recording to edge storage, auto-tracking, day/night mode, and pre- and post-alarm video buffering.

2.6.34 The CCTV shall include transient voltage surge suppression (TVSS) to protect against transients and surges within 5 feet of the camera enclosure.

2.6.35 The CCTV shall be powered by a Manufacturer approved Power Over Ethernet Injector (POEI).

2.6.35.1 The POEI shall provide operating power and Ethernet data to the CCTV. The POEI power consumption shall not exceed 60 watts.

2.6.35.2 The POEI shall include TVSS to protect against transients and surges on the incoming power and data (Ethernet) connections to the POEI, as well as to protect against transients and surges on the outgoing data (Ethernet) connection to the camera. The TVSS shall be a product approved by the CCTV Manufacturer for use with the camera.

2.6.35.3 The POEI shall include a Manufacturer supplied DIN rail mounting bracket or stainless steel mounting screws to securely attach the POEI to a rack mounted back plate.

2.6.36 The CCTV shall be housed in an environmentally hardened aluminum enclosure suitable for continuous outdoor use and shall feature an internal temperature regulation system. The CCTV shall be IP66-, NEMA 4X- and IK09-rated and shall have an operating temperature range of -40°F to +122°F, minimum.

2.7 CCTV Mount

2.7.1 CCTV camera mounting bracket and hardware shall be of the type recommended by the CCTV Manufacturer, such that the CCTV camera can be securely affixed to the structure and resists movement from environmental forces that may shift the camera out of alignment.

2.7.1.1 When mounting to a pole the mount shall include a notched or curved baseplate such that the baseplate maintains a minimum of two points of contact to the curved surface.

2.7.2 The CCTV camera mount shall be Manufactured of aluminum, or similar approved non-corrosive material, and powder coated white or light gray in color unless otherwise directed.

2.7.2.1 Pipe style mounts shall include an internal manufacturer recommended pipe seal to protect against insect, water and dust intrusion.

2.8 Grounding, Bonding, and Transient Voltage Surge Suppression

2.8.1 The CCTV support structure shall be supplied with a lightning dissipater, consisting of a series of at least four spot dissipaters in a candelabra arrangement with a single mounting assembly. The lightning dissipater system shall include surge suppressor devices of the type recommended by the lightning dissipater Manufacturer, and shall properly interface with the pole mounted dissipater, and the size and type of cables used for communication and control of any installed equipment.

2.9 ITS Cables.

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2.9.1 All equipment shall be supplied with the Manufacturer's recommended cables and approved connectors.

2.9.2 All Ethernet cable shall be shielded, weatherproof Category 6 (Cat. 6).

2.9.3 Any Ethernet cable not installed within a cabinet, conduit, or other enclosed space shall be UV protected and weatherproof.

2.9.4 All free-hanging Ethernet cable shall be plenum type.

2.9.5 When specifically called for in the Contract plans, Ethernet cable shall be armored, ruggedized, or gel filled as required for rodent control or underground burial.

Add to Construction Requirements (Special Provision to Section 677 - Intelligent Transportation Systems (ITS) Equipment – Base Specification):

3.12 The CCTV system shall be installed in accordance with the National Electric Safety Code (NESC).

3.13 The Design-Build Team shall install CCTV cameras to provide unobstructed roadway views as indicated or directed by the Engineer.

3.13.1 The Design-Build Team shall establish camera preset views as directed by the TSMO Bureau. Preset camera views will be based on video recordings provided as part of the Technical Submittal, Section 2.3.9 above. The Design-Build Team shall request the specific pre-set views from the Engineer a minimum of 15 working days prior to CCTV system installation.

3.13.2 The CCTV camera shall be mounted to the support structure using mounting hardware and accessories as recommended by the CCTV camera Manufacturer.

3.13.3 The CCTV camera shall be connected to the proposed communication system using Manufacturer recommended cabling and approved connectors. Ethernet connections shall be shielded and environmentally sealed.

3.13.4 The POEI shall be installed securely within equipment cabinets using Manufacturer provided DIN rail mounts or by the casings designated anchoring points using mounting screws to a rack mounted back plate so it can be easily removed or maintained.

3.14 CCTV Camera Mounting.

3.14.1 A minimum of two stainless steel banding straps shall be used when attaching the CCTV mount to a steel pole or a tubular shaped support structure.

3.14.2 A Manufacturer recommended pipe seal shall be used inside the base of pipe mounts to protect against insect, water and dust intrusion.

3.14.3 Camera wiring shall be installed through the camera mount to the CCTV in a manner that provides a watertight installation and prevents moisture damage to the CCTV.

3.15 Intentionally Left Blank.

3.16 Grounding, Bonding and Transient Voltage Surge Suppression.

3.16.1 The Design-Build Team shall furnish and install Transient Voltage Surge Suppressor (TVSS) devices for all power and communications conductors installed.

3.16.2 The Design-Build Team shall provide and install a TVSS between the AC power mains and all installed equipment.

3.16.3 If the CCTV is not mounted to another ITS device that already has transient protection, the CCTV shall include TVSS to protect against transients and surges on all incoming power and data connections to the CCTV. The TVSS shall be a product approved by the CCTV Manufacturer for use with the CCTV.

3.16.4 When mounted to a structure without existing TVSS or grounding system, the following components shall be supplied and installed by the Design-Build Team:

3.16.4.1 An air terminal and earth terminal shall be installed on the support structure. Both terminals shall be bonded to the structure and each other by an insulated wire.

3.16.4.2 The support structure's air terminal and ground terminal wires shall be bonded to the structure using an attached electric lug that allows for removal of the wires and independent resistance measurement of the earth ground resistance.

3.16.4.3 The support structure air terminal shall be attached to a minimum #6 AWG stranded bare copper wire bonded to the grounding system at the base of the support structure.

3.16.4.4 Any cabinet enclosure ground connections shall be made to a suitable common threaded heavy-gauge lug that can be attached to both sides (inside and outside) of the cabinet. The lug shall have the same composition as the cabinet.

3.16.4.5 The Design-Build Team shall supply and install a ground array system to be installed at the base of the support structure. The ground rod array system shall be connected to the CCTV support structure through an appropriate ground clamp. A #6 AWG copper wire shall be installed between the CCTV support structure and any equipment cabinets, providing a common ground system for each terminus.

3.16.4.6 The support structure shall be bonded to the earth terminal using an earth ground array system with a resistance no greater than 25 ohms to ground. All metallic enclosures, lightning arrestors, and instrument mounting brackets shall be bonded to this system.

3.16.4.7 Additional ground rods shall be installed to meet the Manufacturer's recommended resistance to ground, or a maximum of 25 ohms, whichever is less.

3.16.4.8 The external earth terminals shall not be encased in any foundation.

3.16.4.9 All electrical connections to and within the grounding system shall be exothermically welded where possible.

3.16.4.10 Anti-oxidation electrical compound shall be used on all attachment points of the ground system where dissimilar metals intended for grounding and bonding come in contact with each other and on ground wire attachment points when exothermic welding cannot be used.

3.16.4.11 The support structure shall be supplied with a lightning dissipater that is attached to a #6 AWG stranded bare copper wire bonded to the ground terminal.

3.16.4.12 The support structure lightning dissipater shall consist of a series of at least four spot dissipaters in a candelabra arrangement with a single mounting assembly. The lightning dissipater system shall include surge suppressor devices of the type recommended by the lightning dissipater Manufacturer, and shall properly interface with the pole mounted dissipater, and the size and type of cables installed at the CCTV site.

3.16.4.13 The lightning dissipater shall be attached to the support structure using Manufacturer-recommended clamps that are attached to the structure. These clamps shall rigidly hold the lightning dissipater to the support structure in winds up to 100 MPH.

3.16.4.14 The lightning dissipater shall be offset from the support structure and provide protection for the CCTV above installed equipment without interfering with the functionality of any equipment, sensors, or other feature attached to the structure.

3.17 ITS Cables.

3.17.1 All equipment shall be installed using the Manufacturer's recommended cables.

3.17.2 The Design-Build Team shall furnish, install, connectorize, and test all Cat. 6 cables, of the types required for the application, at locations shown on the plans or as required to construct a complete, functional system.

3.17.2.1 The Cat. 6 cables shall not exceed 325 feet or the Manufacturers recommended length unless the Design-Build Team is granted written permission from the Engineer and approved by the TSMO Project Engineer.

3.17.3 All cables shall be installed in a continuous run. Splicing will not be allowed.

3.17.4 All above ground cables shall be installed in flexible liquid tight conduit in accordance with Section 3.3, unless otherwise directed in the Contract documents.

3.17.5 All externally mounted conduit and cables attached to a steel structure shall be secured using stainless steel banding straps and approved mounting clips. Field drilling or other mounting methods that damage the protective coating of the steel structure are not authorized.

3.18 Camera Licensing. The Design-Build Team shall provide Milestone XProtect Corporate Edition camera licenses to the Department for each CCTV camera installed. The Design-Build

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Team shall purchase the initial camera licenses plus the first year renewal cost, with upgrade protection. Licenses shall be provided for the Milestone software version used by the NHDOT TMC at the time of camera installation.