

**SP-097014
(New)**



Iowa Department of Transportation

**SPECIAL PROVISIONS
for
CLOSED CIRCUIT TELEVISION (CCTV) CAMERA SYSTEM**

**Polk County
STP-A-1945(767)--86-77**

**Effective Date
June 15, 2010**

THE STANDARD SPECIFICATIONS, SERIES OF 2009, ARE AMENDED BY THE FOLLOWING ADDITIONS AND MODIFICATIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

**SPECIAL PROVISIONS
FOR
CLOSED CIRCUIT TELEVISION (CCTV) CAMERA SYSTEM**

The Contractor shall ensure that all elements of the CCTV Camera System are operational and function as intended, both in the field and in the TOC. The CCTV Camera System Specification may include field equipment as well as TOC equipment, hardware, software, and integration components.

The City of Des Moines will provide IP addresses to the Contractor to be used for the CCTV cameras and traffic signal controllers. The City will also provide direction for connecting the new fiber optic system to the City's existing system.

PART 1 - DESCRIPTION

The Closed Circuit Television (CCTV) Camera System shall comply with all rules and regulations of the City of Des Moines, the Iowa Department of Transportation, the Federal Communications Commission (FCC) and these Special Provisions. The proposed locations for CCTV camera equipment installation are shown on the Plans.

The new CCTV camera at each location will be located on an existing or new traffic signal pole, light pole, or traffic signal truss structure as shown on the plans. CCTV data and video transmission between the TOC (Traffic Operations Center) and the CCTV camera system locations will be via a fiber optic cable, Ethernet communications system. The video and data shall be transmitted from the CCTV camera to a hardened one-channel MPEG video/data encoder to the Ethernet switch located in the traffic signal controller cabinet, to the Gigabit Ethernet switch at the communication hub for transmission to the City of Des Moines TOC.

The CCTV camera system shall be compatible and fully functional with the City's existing camera management system, which is Cameleon (Version 4) by the "360 Surveillance" Company. The Contractor shall update the existing CCTV camera management system to include the new camera locations that are being installed as part of this project.

The CCTV cameras and encoders shall be provided by the same vendor and shall be developed specifically for traffic management applications. They shall be compatible and fully functional with the City's existing camera system.

The Contractor shall be responsible for all incidental accessories necessary to make the CCTV camera system complete, fully functional, and ready for operation, even if not particularly specified. Such incidentals shall be furnished, delivered and installed by the Contractor without additional expense to the City. Minor details not usually shown or specified, but necessary for the proper installation and operation of the CCTV camera system, shall be included in the work and in the Contractor's price bid. It is understood and agreed by the Contractor that the system description provided herein is complete and includes all equipment necessary for the proper functioning of the CCTV camera system, even though every item may not be specifically mentioned.

1.1 General Requirements

1. Contractor shall furnish all components of the CCTV camera system, including the dome CCTV cameras, hardened one-channel video and data MPEG encoders, integrated CCTV video/data cable, mounting hardware, and rack-mounted, hardened encoders for the field to ensure a fully-operational system.
2. Contractor shall furnish and install all necessary miscellaneous equipment and cabling to make the CCTV camera systems operational, including power to the CCTV camera systems, and

connection to the communications equipment.

3. All equipment and materials used shall be standard components, regularly manufactured, and regularly utilized in the manufacturer's system.
4. Contractor shall integrate all CCTV system components with existing City of Des Moines Gigabit Ethernet network.
5. All Systems and components shall have been thoroughly tested and proven in actual use.
6. Unless otherwise shown on the Plans, all field equipment installed shall be operational in all weather conditions and shall be able to withstand a wind load of 100 mph without permanent damage to mechanical and electrical equipment.
7. Equipment used shall be identical at each field location and shall be completely interchangeable.
8. All installed equipment shall be operational within NEMA TS2 standards – see below.

Test	NEMA TS2
Temperature	-34°C to 74°C (-29.2°F to 165.2°F)
Humidity	18% to 90% RH, non condensing
Voltage	120VAC–135VAC @ 57Hz - 63Hz
Vibration	0.5g @ (5-30) Hz
Shock	10g's for 11ms

1.2 Power Requirements

The CCTV equipment shall meet all of its specified requirements when the input power is 115 VAC plus or minus 10%, 60 plus or minus 3 HZ. The maximum power required shall not exceed 100 watts.

The equipment operations shall not be affected by the transient voltages, surges and sags normally experienced on commercial power lines. It is the Contractor's responsibility to check the local power service to determine if any special design is needed for the equipment. The extra cost, if required, shall be included in the bid of this item.

1.3 Wiring Requirements

All wiring shall meet the requirements of the national electric code. All wires shall be cut to proper length before assembly. No wire shall be doubled-back to take up slack. Wires shall be neatly laced into cable with nylon lacing or plastic straps. Cables shall be secured with tie-wraps. Service loops shall be provided at all connections.

1.4 Design Requirements

The CCTV equipment shall be modular in design to allow major portions to be readily replaced. Modules and assemblies shall be clearly identified with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.

1.5 Fail Safe Provision

The equipment shall be designed such that the failures of the equipment shall not cause the failure of any other unit of equipment.

PART 2 - MATERIALS

The CCTV camera system shall consist of all of the following items in addition to any other items required for a fully-operational CCTV camera system:

- Pressurized dome CCTV camera assembly (including camera lenses, dome enclosure, Pan and Tilt Drive Units, and other necessary components) with vendor provided mounting hardware for installation on existing or new traffic signal pole, lighting pole, or traffic signal truss structure
- Dedicated power supply of adequate capacity for the CCTV camera system and all supporting control, communication, and network equipment
- Integrated CCTV camera cable that supports video, data and power to the CCTV dome camera
- Integrated one-channel video and data MPEG encoder at each CCTV camera location installed as part of this project
- Hardened Fast Ethernet switches at each CCTV camera location (refer to Ethernet Switch specification)
- New traffic signal or lighting poles as shown on the plans
- Fiber optic cable, conduit, and pull boxes to support the CCTV camera system
- Power surge and lightning suppression equipment, as required

2.1 Camera Assembly

The CCTV camera shall have the following minimum features:

- The camera shall be analog DSP, Color CCD and capable of producing no less than 470 horizontal lines of resolution and communicate using non-proprietary control protocol.
- The camera shall have an active low-light sensor system and include automatic switching technology that makes use of color images during daylight and monochrome after dark or low light conditions.
- The camera shall have Pan, Tilt, Zoom (PTZ) capabilities with a 23X minimum optical zoom, 8X digital zoom, with manual as well as auto focus capability.
- The camera shall be able to operate with a continuous 360 degree horizontal rotation (no stops) and support at least 16 programmable zones.
- The camera shall be able to operate with a 180 degree vertical rotation and be capable of inverting the output camera image when passing through 90 degree down.
- The camera shall support a variable pan speed of 0.1 degree to at least 250 degree/second and a variable tilt speed of 0.1 degree to at least 80 degree/second.
- The camera shall be able to operate a light rating of 3.0 lux at 60 frames per second color and at 0.3 lux at 60 frames per second black and white.
- The camera shall operate at NEMA TS2 voltage levels of 89 VAC to 135 VAC and environmental temperatures of -34°C to 74°C at up to 100% relative humidity.
- The camera shall have a minimum of 6 programmable privacy zones at which the video is blanked.
- The camera shall support a minimum 8 tours and up to 32 preset positions.
- The camera shall be in a pressurized, tamper-proof, dry nitrogen sealed enclosure.
- The camera shall have a built-in character generator for site ID name and/or number, and alarm codes.
- The camera shall weigh no more than 30 lbs. and shall have dimensions no greater than 18 inches tall and 15 inches long.

- The camera system shall meet the requirements of the National Transportation Communications for ITS Protocol (NTCIP) 1201 and 1205, as appropriate. The Contractor shall submit a certification letter from the CCTV camera vendor stating that the CCTV camera system has been tested and passed NTCIP certification. At the request of the City of Des Moines, the Contractor shall be prepared to submit a CCTV camera and peripheral equipment so that it can be subjected to NTCIP testing by the City of Des Moines or another third party selected by the City.
- The camera enclosure shall have a heater, operational in temperature ranges of -40°C to 75°C, to support efficient camera operation in cold weather, prevent formation and build-up of ice and condensation, and assure proper operation of the lens' iris mechanism. The heater shall not interfere with operation of the image sensor electronics or video signal.

All equivalencies must be approved by the Engineer prior to procurement.

2.2 Camera Mounting Hardware

Camera shall use pole-mounting hardware provided by the CCTV camera vendor, capable of mounting to a vertical traffic signal or lighting pole, or a traffic signal truss structure. The camera mount shall be affixed to the pole to extend the camera towards the center of the signalized intersection and/or roadway corridor to provide optimal viewing capability. The CCTV camera and mounting hardware shall withstand a wind load of 100 mph when affixed to traffic signal pole, lighting pole, or traffic signal structure without permanent damage to mechanical and electrical equipment.

2.3 One-Channel Video and Data MPEG Encoder

The one-channel video and data MPEG encoder shall provide compressed MPEG-1, MPEG-2 or MPEG-4 video streams onto the City's Gigabit Ethernet IP network. MPEG-4 is the preferred standard and will be used unless otherwise specified by Engineer. The video streams shall have video latency of under 500ms (video delay) and a frame rate of 30 fps. Compression data rates shall be user selectable from 384 Kbits/second to 15 Mbits/second.

Encoders installed at the CCTV camera locations shall be hardened and shall be a shelf or wall mounted when installed in Type 170 controller cabinets used by the City of Des Moines. Contractor shall recommend mounting procedures to Engineer for approval, including the Contractor furnishing and installing a 19 inch rack mounted shelf in Type 170 cabinets where communication equipment is installed.

The encoder shall provide at least one video input for an NTSC CCTV camera. Camera control shall be RS422/RS485 to interface with the encoder. In addition, the encoder shall include a second COM port that can be utilized for RS232 or RS422 pass through of commands for other field equipment.

The encoder shall be equipped with a minimum of one independent LAN Ethernet port that can be configured with unique IP addresses. The compressed video streams shall be output through the LAN port.

Access to the encoder, including the MPEG video streams, camera control and setup, shall be through the on board web server. The host computer shall connect to the encoder's web server using Microsoft Internet Explorer (IE5 or above) or proprietary browser to access all functions of the encoder. The web server shall at a minimum include the camera protocols for the CCTV cameras installed as part of this contract, and shall control pan, tilt, zoom, presets, and on-screen display. The encoder shall have optional support for ISDN, wireless 802.11 and T1 protocols. In addition, the encoder shall be stereo analog audio ready. The encoder shall provide audio communications at rates up to 96 Kbits/s.

The encoder shall have the following features as a MINIMUM:

- NTSC or PAL video standards
- Composite and S-Video inputs
- One video input CODECs with vendor options for two or four inputs

- MPEG-4 CODECs shall be provided with vendor options for MPEG-1, MPEG-2 Video Compressed video data rate adjustable from 384 Kb/s and 15 Mb/s
- Resolution settings include:
 - 4 SIF
 - NTSC @ 320X240, 640X480 and 720X480
 - PAL @ 352X288 and 720X586
- NTSC frame rate is 30 fps and PAL frame rate is 25 fps
- Analog audio at rates from 8 to 96 Kb/s
 - Output formats are MPEG-1 & 2 (L1, L2), MP3 and AC3
- System management/setup and integrated camera control is through TCP/IP
- TCP/IP network protocols include Multicast (IGMP), Unicast and Broadcast
- Control I/O using COM port, RS232 protocol
- Input power from 85 to 250 VAC (auto-ranging power supply)
- Power supply rated at 250 watt maximum power consumption (60 – 80 watts typical)
- Operating temperature range from -20°C to +70°C (hardened encoders only)
- Wall or standard 19 inch rack shelf mounted
- System control via standard web browsers including IE 5.0 or better
- Camera protocols for the vendor CCTV cameras installed as part of this contract.
- Minimum camera controls include pan/tilt/zoom, presets (set/move to), OSD on/off

2.4 Gigabit Ethernet Hardened Field Switch

If required in the plans, an Ethernet hardened field switch will be provided. The switch shall be constructed for modular port configuration housed in a high strength metal enclosure designed for DIN-Rail mounting and convection cooling. Nominal dimensions 1.75 inches H by 8.75 inches W by 10.0 inches D and weigh less than 4.75 lbs.

The standard configuration will be with four 10/100 copper ports and two Gigabit single mode fiber ports with one spare GBIC slot for future growth. Power input shall be AC. Manufactured in United States and Warranted for 3 years from day of contract acceptance for all parts and labor.

Additionally the Hardened Switch shall provide:

- Two modular slots for user selection of 100Mb and 10MB fiber ports, Gigabit fiber ports, 10/100 copper ports, and PoE. Up to a maximum of 16 ports.
- Relay contacts for external “Alarm” monitoring of internal power, and of selected software operations. Form C, one NC indicating internal power, one NC software controllable.
- SNMP, rich commands including access control
- SNMPv3 for encrypted authentication & access security
- RMON with statistics, history, alarms and events
- GUI with Hubview/Bitview support
- CLI with multi-level password security
- VLANs, Port-based, Tag-based, with GVRP
- Spanning Tree Protocol, 802.1w
- LACP Link Aggregation Control Protocol, 802.3ad

- Rapid Spanning Tree Protocol, 802.1d
- Link-Loss-Learn (LLL) for fast switch buffer flush
- Ring Redundancy software available for sub-second recovery of ring faults
- QoS, multi-level 802.1p, ToS and DiffServ
- IGMP Snooping and multicast pruning
- Telnet, both client and server support
- Secure Web Management with SSL Secure Sockets Layer and TLS Transport Layer Security protocol support
- Port Security, controlled access by MAC address, support of 200 MAC addresses for port security
- Port mirroring for selective traffic analysis
- Event Log for the 1000 most recent events
- Port Settings Control, copper and fiber ports
- SMTP provides email alerts of traps and event
- SNTP with world-wide time zones
- Radius server and TACACS+ Terminal Access Controller Access Control System
- IP support for SNMP both TCP/IP and UDP/IP
- Passive or active FTP and TFTP for load/save convenience
- CLI Script method supported for ease of upgrading multiple switches
- BootP/DHCP for auto configuration
- Back pressure and flow control option per
- Temperature rating of -40°C to 75°C and NEMA TS2 certified, or -50°C to 95°C by the IEC 60068 Type Test method
- Store and Forward with IEEE 802.3x full-duplex flow control. All ports non-blocking. System aggregate forward and filter rate 6.0 Mpps.
- Address table: 4K nodes, with address aging time of 155 seconds typical
- Latency: $6\mu\text{s}$ + packet time max (TX – TX, TX – FX, FX – FX, TX-G, G-G)
- MTFB of greater than 10 years calculated via Telcordia Bellcore method and/or MilStd Handbook 217

2.5 Connectors and Harnesses

All external connections shall be made by means of connectors. The connectors shall be keyed to preclude improper hookups. All wires to and from the connectors shall be color-coded and/or appropriately marked. In order to assure compatibility and performance compliance, the cables from the dome CCTV camera shall be assembled by the camera manufacturer.

Connecting harnesses of appropriate length and terminated with matching connectors shall be provided for interconnection with the communications system equipment.

All pins and mating connectors shall be gold-plated to provide good electrical connection and resist corrosion. Connectors utilizing solder-type connections shall have each soldered connection covered by a piece of heat shrink tubing securely shrunk to insure that it protects the connection.

2.6 Camera Interface

1. Each camera unit shall have a user selectable PTZ address. The unit shall respond to the central command only if it is addressed.
2. Camera shall be able to interface the encoder through proper cable connections on the CODEC
3. Minimum camera controls shall be PTZ Auto, or Manual Focus, Iris, and Power.
4. Control signals shall be EIA/TIA 422/485. A minimum 9600-baud data rate shall be used.
5. Camera control protocol shall be non-proprietary.

2.7 CCTV Camera Pole

The Contractor shall furnish and install CCTV camera poles and foundations at locations requiring new poles, if shown on the plans. The CCTV pole and foundation shall be per City of Des Moines standards. Installation of CCTV poles shall include necessary conduit, pull boxes, and integrated CCTV camera cable to support the CCTV installation, as shown on the Plans.

2.8 Lightning Suppression

The Contractor shall provide lightning and surge suppression devices to protect the CCTC camera system deployed in this project. At a minimum, lightning suppression devices shall be installed to protect the following system components:

- The CCTV camera pole
- The enclosure (traffic signal controller cabinet) housing CCTV equipment
- Video cable between the camera and encoder
- Camera enclosure power cable between the power supply and camera enclosure
- PTZ cable between the cabinet and the camera enclosure

Alternatively, and at the direction of the Engineer, the installed CCTV system and its components shall be tied to the existing lightning/surge suppression system currently in place at each CCTV camera location. Lightning/surge suppression equipment shall meet City of Des Moines standards.

PART 3 - CONSTRUCTION AND INTEGRATION

3.1 CCTV Camera Site Installation

The CCTV camera system shall be installed as shown on the Plans or as specified in these Special Provisions, unless otherwise directed by the Engineer. The mounting standards and specifications shall be provided by the camera manufacturer. The Contractor shall verify the mounting requirements and hole patterns of the camera enclosure and the suitability of the approach depicted in the manufacturer's standards. The Contractor may request approval for alternate mounting details by submitting a shop drawing. The Contractor shall incur complete responsibility for the integrity of all mounting structures.

CCTV camera assemblies shall be mounted at the highest feasible point on the existing pole structure to provide optimal viewing capability.

During mounting of camera enclosures or any other work operation, the Contractor is responsible for avoiding and protecting from damage any existing poles, structures or wiring. All damage to existing poles, structures or wiring shall be repaired by the Contractor at his/her sole expense. The Engineer shall have final authority in determining the extent of repairs that shall be required.

The video and camera control data for the CCTV cameras installed, as part of this project, shall terminate at the existing Video server at the City of Des Moines TOC.

3.2 CCTV Service (Power)

The Contractor shall furnish and install a wall-mounted power strip/surge suppressor that plugs into the 120 VAC GFI outlet in each traffic signal controller cabinet associated with a new CCTV installation. The power strip/surge suppressor shall be sized to accommodate the CCTV camera and other communications equipment installed in the traffic signal controller cabinet, including the Ethernet Switch, encoder and other equipment to be installed at the CCTV camera installation as shown on the Plans.

The Contractor shall coordinate all activities related to service for power with both the City, and any other utility as directed by the Engineer. The power strip/surge suppressor shall satisfy City of Des Moines or Iowa DOT standards.

3.3 Des Moines TOC Integration

The Contractor shall be responsible for the integration of the elements installed as part of this contract with the existing systems at the Des Moines TOC, to make the CCTV system installed as part of this Contract fully operational and functional as shown on the Plans, as specified in these Special Provisions, and as directed by the Engineer. The contract elements include the following:

1. Fiber optic cable
2. Ethernet network system
3. CCTV camera system and software

The work to be performed under this Contract shall consist of, but not be limited to, the project elements listed below, in support of the TOC Integration effort, as shown on the Plans, as specified in these Special Provisions, and as directed by Engineer.

1. Integration of the new CCTV cameras and existing CCTV cameras into one IP video management system.
2. Integration of Ethernet System into the existing Des Moines TOC operations to support the CCTV camera system.
3. Furnish accurate project documentation, as specified in these Special Provisions.

3.4 Warranty

All components of the CCTV camera system, except the cameras, shall have a minimum 1-year manufacturer's warranty for parts and labor. The cameras shall have a minimum of a 2-year manufacturer's warranty for parts and labor from date of contract acceptance. This warranty does not replace any manufacturer's warranty if greater than what is required herein. Repair or replacement of defective parts for a period of two (2) years from the date of shipment is required.

PART 4 - METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Plan quantities are for estimating purposes only, and these quantities will not be paid for separately. Payment will be made on a lump sum basis.

No direct payment will be made for any incidental materials or work required to complete the CCTV camera system unless specifically provided for in the contract documents. All work or materials for which no basis of payment is specifically provided will be considered incidental to the bid item for "Traffic Signalization".