SPECIAL SPECIFICATION

8276

CLOSED CIRCUIT TELEVISION SYSTEM

1. Description. Supplier’s scope as defined by this specification shall include the furnishing of all engineering, design, labor, equipment, and materials for the design, installation, and testing of the Closed Circuit Television (CCTV) System as indicated on the drawings and specifications.

Drawings and specifications are supplied to provide a CCTV System designer a basis for design.

The primary purpose of the CCTV System is to allow identification of a fire in the enclosed freeway from a remote location with 24-hour supervision. A secondary purpose is to provide images for traffic flow monitoring.

Supplier shall provide a complete functioning CCTV System consisting of all necessary hardware and equipment Digital Video Recorder (DVR), Internet Protocol (IP) Cameras, ethernet switches, and network interface equipment as required to transmit live and archived video to remote locations.

CCTV System as specified herein, along with the Fire Alarm System, forms the Fire Detection System as per applicable sections of NFPA 502.

2. General.

A. The equipment and service provider (Supplier) shall be a nationally recognized company specializing in the design and installation of CCTV systems with a minimum of 10 years experience. Supplier shall employ factory trained technicians and shall maintain a service organization within 50 miles of the project location.

B. The system and all associated operations shall be in accordance with the following:

C. NFPA 70, National Electrical Code, 2008 Edition
D. NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways, 2008 Edition
E. Local Jurisdictional Adopted Codes and Standards
F. Supplier shall provide a complete CCTV System, based on IP cameras, to include the following equipment:

   • Digital Video Recorder (DVR), with transmission capability, to be located in the Park Control Life Safety Room.
• Internet Protocol (IP) Cameras, both fixed and Pan-Tilt-Zoom (PTZ), located throughout the enclosed freeway as indicated on the drawings.
• Ethernet Switches located in the electrical equipment vaults.
• Camera power supplies located in the electrical equipment vaults.
• Network interface equipment, as required, to transmit video to Dallas Police Incident Dispatch Center and the Texas Department of Transportation (TxDOT) DalTrans Traffic Control Center.

G. Each and every item of the Fire Alarm System shall be listed under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.


A. Digital Video Recorder

System Requirements

1. DVR shall be a digital video recorder and transmission system based on the Windows XP operating system. DVR shall be supplied in a standard EIA 19-inch rack mountable enclosure and provided with a keyboard, mouse, and 24” LCD display for full system control. DVR shall be equipped with a CD/DVD writer to export recorded video that can be reviewed and authenticated on any Windows based PC workstation.

2. DVR shall be designed to provide live video surveillance via a graphical user interface while providing simultaneous continuous image recording capability. Images shall be recorded to an internal or external hard disk system using MPEG-4 compression technology.

3. DVR shall accept a minimum of 30 analog video inputs. In addition the DVR shall also accept a minimum of 32 compatible IP cameras. The IP cameras shall be viewable in live mode or recorded and reviewed from the internal disk archives. The number of IP cameras and IP encoders installed shall not impact or conflict with the number of images per second that the system records for the analog camera inputs.

4. DVR shall provide two analog spot monitor outputs to display alarm call-up, or full screen images or sequences of images from the connected analog cameras. Video shall be capable of being dragged and dropped to either spot monitor from the main system display monitor.

5. Live video from the analog and IP cameras, or the images previously recorded in the DVR, shall be viewable locally at the DVR and remotely (via a network connection to the DVR) at both the Dallas Police Incident Dispatch Center and the TxDOT DalTrans Traffic Control Center.

6. DVR shall be NTSC compatible and shall provide selectable record rates of 0.5, 1, 2, 3, 5, 6, 7.5, 10, 15, and 30 images per second (ips).
7. DVR shall support live image display and recording of analog camera inputs up to 4 Common Intermediate Format (CIF) resolution. With the maximum number of cameras connected to the DVR, the DVR shall be capable of recording a maximum of the following:

- 15 images per second (ips) per camera in CIF (352 x 240) resolution,
- 10 ips per camera in 2CIF (704 x 240) resolution
- 5 ips per camera in 4CIF (704 x 480) resolution

8. DVR shall also support live image display and recording of IP camera inputs up to 4CIF resolution.

9. DVR shall be capable of recording a maximum of 30 ips per camera in the following resolutions:

- CIF (352 x 240)
- 2CIF (704 x 240)
- 4CIF (704 x 480)

10. DVR shall display live or recorded video in a full screen or multi-screen format image area on an SVGA monitor with up to 30 images per display screen. Display selection options shall be, but not limited to:

- Multiscreen views selectable in symmetrical full screen, 2x2, 3x3, 4x4, 6x5 formats.
- Asymmetrical displays shall be configurable with one or more large image window(s) surrounded by smaller image windows.

11. Camera video shall be placed within the image windows by using the “Drag and Drop” method.

12. When full screen video is selected in any of the formats, the operator shall have the option to display the full screen with or without the Windows GUI being displayed.

13. Sequences shall be user-programmable to allow any or all of the video inputs to be sequenced on the SVGA monitor as a full-screen display. The global dwell time of the camera to camera sequence shall be programmable.

14. The recorder shall provide a smart search mode capable of searching for motion within desired areas of recorded images. The smart search feature shall be operational from the local recorder or via the network. Smart search shall also be possible between any two specified recorder units in the entire network and also via the optional remote receiver software running on a remote PC workstation operating on Windows XP.

15. Images shall also be retrievable using criteria such as camera number, date, and time.
The recorder shall provide a timeline function that allows either the selection of the camera list with the timeline or a list of the search results. The camera list with the timeline shall contain such information as alarm recording, motion recording, continuous recording, video loss, protected video, audio data, and areas where there has been no recording. The timeline can be set in a measuring unit of 1 month, 1 day, 4 hours, and 15 minutes and shall display the timeline entries by color.

DVR shall have an option that allows the user to overlay the local date and time on all displayed cameras connected to the recorder. The DVR shall record both the Universal Time Code (UTC) and the local time zone information of each camera connected. The user shall be capable of displaying the local time of cameras in different time zones and synchronize their playback.

Playback Requirements

1. DVR shall allow playback of the stored video in the forward or reverse direction, frame by frame, and from beginning or end of the clip using standard VCR-like buttons. Reviewed video clips or still images can be zoomed in or out. The images can be sent to a printer connected to the parallel port of the local recorder or to a network printer. An image displayed in the image window can be saved as a single JPEG, BMP, or HTML file.

2. DVR shall have an instant playback function that allows instant recall of recorded images from 10 to 300 seconds in the past to be replayed at the same rate the images were recorded. Live images continue to be simultaneously displayed along with the recorded images.

Exporting of Video Images

1. DVR shall be capable of exporting video clips to the CD/DVD drive or network drive.

2. Images shall be exportable along with a stand-alone player. Playback of the exported images with the player shall be possible from any Windows based PC. This proprietary format shall provide video authentication to assure that images are not altered in any way.

3. Images shall also be exportable in a format that can be played back with a default software program such as Windows Media Player.

4. DVR shall provide an export video scheduler function that allows previous days recorded video to be exported for back up to a designated target drive. Images from the current day shall also be exportable up to the time that the export program job is activated.

Camera Control
1. DVR shall provide camera control from local or remote recorders or via PC workstations running optional remote receiver software and/or using the Internet Explorer 7.0 or higher, Web Browser.

2. DVR shall be capable of configuring cameras via a coaxial cable.

3. DVR shall provide an RS 232 port that supports Bosch, Panasonic, Pelco (D-Protocol) JVC, SAE, and Sensormatic/American Dynamics protocols.

4. DVR shall provide manual or automatic call-up to preset positions stored within supported dome cameras.

System Administration

1. Upon initial installation of the recorder, three (3) user authorization levels shall be automatically created. These levels can not be edited or deleted. An unlimited number of users can then be assigned to these authorization levels. The authorization levels shall be as follows:
   
   • The first authorization level (Administrator) shall allow the user all the rights of the system including configuration and operation.
   
   • The second level of authorization (Extended User) allows the user all system operational rights- but no configuration capability. The Extended User may, however, create a user at the next lower authorization level.
   
   • The third level of authorization (Normal User) has operational rights of the recorder only, but can not configure the unit.

2. DVR shall also have a dual login feature where one user may only login to the system in conjunction with a second user.

3. DVR shall log events of who starts up or shuts down the system, who logs in or off, status changes, and images transmitted.

B. Internet Protocol (IP) Cameras

System Requirements

1. The camera specified shall be designed for surveillance and industrial applications requiring a compact, rugged, day/night charge-couple device (CCD) camera with IP network capability.

2. The camera shall be a high resolution, fully automatic, day/night camera capable of providing DVD quality video over an IP LAN/WAN network while simultaneously providing analog video to support existing analog equipment.

3. The camera shall automatically switch from color to monochrome operation as the
light levels vary.

4. The camera shall be capable of providing MPEG-4 compression video at 4CIF quality at the rate of 30 images per second (NTSC) over an IP network.

5. Housings, where required, shall have the following features:
   - Weather proof design.
   - Heaters and blowers with thermostats.
   - Pendant mounting bracket.
   - For PTZ cameras, a clear exterior dome with black inner dome which moves with the camera and lens assembly to conceal camera position.

**Camera Networking Requirements**

1. The camera specified shall be a true hybrid, 1/3-inch format, Day/Night camera that provides both an Ethernet connection for direct connection to a network and a BNC connection that can simultaneously support existing analog CCTV equipment.

2. The camera shall incorporate a network video server whose primary function is to encode video for transmission over an IP network.

3. The specified camera shall produce 30 images per second (NTSC) of DVD-quality, 4CIF MPEG-4 video over IP. The camera shall also support 2CIF, ½ D1, CIF and QCIF resolution.

4. The camera video signals sent via the IP network may be received and displayed using any of the following methods:
   - A PC camera web browser (Microsoft IE browser version 7.0 or later).
   - Video management software program running on Windows 2000/XP operating system.
   - A Digital Video Recorder.
   - A Video over IP (VIP) decoder for viewing on a standard CCTV or VGA monitor.

5. The camera shall be capable of generating two separate MPEG-4 video streams and one JPEG stream simultaneously to allow bandwidth usage and image quality to be configured to meet specific requirements.

6. The camera specified shall support the unicast function that allows communication between a single sender and a single receiver via a network. It shall also support multicast video streaming that allows communication between a single sender and multiple receivers when used in a suitably configured network using UDP and IGMP protocols.

7. Access to the camera via the network shall be restricted by any of three user levels of
protection where each level has its own password and authorizations.

8. The camera shall have video authentication capability where all images transmitted are marked with a visual indication of whether the image is the original or has been manipulated.

9. The camera shall support a snapshot mode that saves individual images from the video sequence, currently being displayed on the live view page, as JPEG format, 4CIF resolution images to a computer’s hard drive.

10. The camera shall also support a recording function to save video sequences to the computer’s hard drive. These saved images may then be viewed from the computer hard drive using an MPEG viewer provided by the manufacturer.

11. The camera shall provide both a configuration settings menu and a graphical user interface display through which camera settings can be made when using a web browser. Both these interfaces shall give access to the same settings. Settings shall be stored in the camera memory and are preserved during power interruption.

12. The camera shall display separate system log entries that contain information about the operating status of the camera and its connection and an event log that displays the method of alarm triggering or when the end of alarms occurs. System and event messages may be saved automatically in a computer file.

13. To ensure that all of the specified cameras operating on the network have their internal clocks set for the same time and date, a camera function shall be available that synchronizes the camera’s time and date to the computer’s time and date. The camera shall also be capable of receiving a time signal from a time server using the time server protocol RFC 868 that may be called up automatically by the camera every ten minutes.

General Camera Requirements

1. The product specified shall provide enhanced night viewing through the increase of IR sensitivity by automatically switching a motorized IR filter from color to monochrome operation in low-light or IR illuminated applications. The camera shall also allow the IR filter to be switched manually via the alarm input, preprogrammed in a camera mode profile, or remotely via the web browser.

2. The camera design shall be based on a 15-bit DSP image processing technology to provide enhanced sensitivity.

3. The camera shall utilize XF-Dynamic technology to extend the dynamic range of the camera to provide a sharper image, simultaneously, in both the high-light and low-light areas of the scene.

4. The camera specified shall use a 1/3-inch, interline transfer, CCD image sensor
capable of producing up 540 TVL of resolution at the analog video output.

5. The camera shall provide an on-screen display to simplify the camera/lens back focus and network configuration settings.

6. The camera shall produce a composite video signal, via a BNC connector, that allows a direct input to a conventional analog matrix switcher, DVR, or any standard analog CCTV video equipment.

7. The camera shall be capable of producing a color video image with as little as 0.24 lux (0.024 fc) of scene illumination and a monochrome image, when in the night mode, with as little as 0.038 lux (0.0038 fc) scene illumination.

8. The camera shall provide a frame integration mode that can produce a color image with a minimum scene illumination of 0.024 lux (0.0024 fc) and a monochrome image, when in the night mode, with a minimum of 0.0038 lux (0.00038 fc).

9. The camera shall accept CS and C mount type lenses. For ease of installation, the camera shall auto detect the type of lens used and optimize performance accordingly.

10. The camera shall provide a lens wizard during lens back focus setup to allow focusing at maximum lens opening to ensure that the object of interest within the field of view always remains in focus.

11. The camera shall provide a video motion detection function that provides up to four fully programmable areas with individual thresholds. The motion detector function shall incorporate a global scene change detector to minimize false alarms caused by sudden changes in lighting conditions.

**Electrical Requirements**

1. Video standards: MPEG-4; M-JPEG
2. Video output: Composite video 1.0 Vpp, 75 ohms, BNC connector.
3. Analog video resolution: 540 TVL.
4. Power consumption: Maximum 8 VA.
5. Signal-to-noise ratio: 50 dB.

**Mechanical Requirements**

1. Video Output: BNC
2. Ethernet: 10/100 Base-T, auto-sensing, half/full duplex, RJ-45 connector.
3. Power connections:
   - 12 VDC and 24 VAC, Push type connectors.
   - PoE: IEEE 802.3af compliant via RJ-45 connector.

C. Ethernet Switches
System Requirements

Drop and repeat transmission of four 10/100 Mbps Ethernet data signals shall be provided. The system shall utilize an integrated wave depth transmission (WDM) optic operating at 1310/1550nm capable of bi-directional data transmission of 10 or 100Mbps on one multimode optical fiber.

General Requirements

1. Network switches shall support the transmission of four channels of 10 or 100 Mbps over a single-mode or multimode fiber and shall support the Ethernet data IEEE 802.3 protocol using Auto-negotiating and Auto-MDI/MDI-X features.

2. Network switches feature four electrical ports and two optical ports for drop and repeat capability.

3. Network switches shall require no in-field electrical or optical adjustments or in-line attenuators to ease installation.

4. Network switches shall provide power, link speed, Simplex or Duplex transmission, and fiber port status indicating LED’s for monitoring proper system operation.

5. Network switches shall also provide two continuously active contact closure relays to activate an external alarm.

6. Network switches shall provide automatic re-settable solid-state current limiters and independent voltage regulators on each module to reduce the chance of a single point failure of the system.

7. Network switches shall be hot swappable in a rack mount system to reduce complete system shut down during maintenance or repair.

Data Requirements

1. Data Interface: Ethernet IEEE802.3
2. Data Rate: 10/100 Mbps
3. Data Inputs: 4
4. Operation Mode: Simplex or Duplex

Optical Requirements

1. Optical Fiber: 62.5/125 micron multimode
2. Number of Optical ports: 2
3. Number of Fibers Required: 1 per port
4. Optical Wavelength: 1310/1550, 1550nm/1310nm,
5. WDM: Integrated WDM
6. Optical Power Budget: 10 dB
7. Maximum Distance: 6.2 miles (10 Km)
Connectors

1. Optical: ST
2. Power: Terminal Block with Screw Clamps.
3. Data: RJ-45
4. Contact Closures: Terminal Block with Screw Clamps


A. Supplier shall, at a minimum, submit the following documents to the Owner for their review and approval.

1. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.

2. Wiring diagrams from the manufacturer.

3. Shop drawings showing system details including location of all devices and proposed circuiting.

4. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product. Provide the names, addresses, and telephone numbers of service organizations.

5. Full Schematic of system, including wiring information for all devices.

B. In addition of routine submission of the above material, Supplier shall make an identical submission to the Authority Having Jurisdiction (AHJ). Submittal shall include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the AHJ, Supplier shall make resubmissions, if required, to make clarifications or revisions to obtain approval.

5. Installation.

A. General

1. A factory authorized installer shall perform the work of this section.

   • System components and all associated devices shall be installed in accordance with applicable standards and manufacturer's recommendations.

   • All equipment shall be utilized for the purpose to which it was designed and manufactured.
• All CCTV cameras shall be installed at the approximate locations shown on the drawings. Field adjustments shall be made as required to provide or improve the field of view of the area to be monitored.

• Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of CCTV Systems.

B. Equipment Installation

1. Supplier shall furnish and install a complete CCTV System as described herein and as shown on the plans. Include IP Cameras, Ethernet Switches, Power Supplies, DVR/T, terminations, electrical boxes, and all other necessary material for a complete operating system.

2. Coordinate location of CCTV cameras with the work of electrical to ensure that both video and power junction boxes are adjacent to each other.

3. Power supplies shall be furnished and installed for all equipment as required and supplies shall have performance characteristics compatible with the unique requirements of the equipment being supplied. Power supplies shall be loaded to a maximum of 80% of the rated power output. The power circuit to each camera shall be individually fused.

4. Check dimension of all camera housing assemblies to ensure that the camera, lens, mounting brackets, and heaters & blowers (where required) and any other required components shall fit in the housing. The contractor shall be responsible for any costs associated with installing or re-stocking any camera system components and purchasing and installing new components, where the assembly of the camera, lens, and other required components does not fit in the camera housing.

C. Wiring Installation

1. Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the AHJ and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).

2. Supplier shall obtain from the CCTV System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Supplier without the prior written approval of the CCTV equipment manufacturer.

D. Field Quality Control
1. Supplier shall provide the services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

2. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of CCTV Systems.

3. Supplier shall determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Supplier shall correct deficiencies observed in pretesting.

4. Inspection:
   - Supplier shall inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
   - Supplier shall verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

5. Supplier shall perform operational system tests to verify conformance with specifications.
   - Supplier shall test signal to TxDOT and Incident Dispatch Center and shall coordinate testing with the appropriate entity at the each location.
   - Supplier shall provide minimum 10 days notice of acceptance test performance schedule to Owner and local AHJ.
   - Supplier shall submit a written certification that the CCTV System installation is complete including any punch-list items.

6. Supplier shall correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Supplier shall verify by the system test that the total system meets the Specifications and complies with applicable standards.

7. Supplier shall provide a written record of inspections, tests, and detailed test results in the form of a test log.

E. Training

1. Supplier shall provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.

2. Supplier shall train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Supplier shall provide a minimum of 8 hours' training.

6. Measurement. This Item will be measured as Lump Sum.
7. **Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement”, will be paid for at the unit price bid for “CLOSED CIRCUIT TELEVISION SYSTEM”. This price shall be full compensation for furnishing, installing and testing all lamps, conductors, and connections and for all labor, tools, equipment and incidentals.