ITEM 680.94970003 - VIDEO VEHICLE PRESENCE DETECTOR

DESCRIPTION:

Under this item the Contractor shall furnish and install a system that detects vehicles on a roadway via processing of video images and provides detector outputs to a traffic signal controller for the application shown on the plans or as ordered by the Engineer.

MATERIALS:

1. GENERAL

1.1 System Hardware

The system shall consist of one (1) fixed synchronous television (CCTV) camera as shown on the plans, and an image processor (IP).

1.2 System Software

The system shall be able to detect vehicles in multiple traffic lanes. A minimum of 28 detection zones shall be user-definable through interactive graphics by placing lines and/or boxes in an image on a computer monitor. The user shall be able to redefine previously defined detection zones. The IP shall calculate traffic parameters in real-time.

2. FUNCTIONAL CAPABILITIES

2.1 Real-Time Vehicle Detection

2.1.1 The IP shall be capable of simultaneously processing information from a CCTV video camera. The video shall be digitized and analyzed at a minimum rate of 30 times per second.

2.1.2 The system shall be able to detect the presence of vehicles in a minimum of 28 detection zones within the combined field of view of the camera.

2.1.3 Different detector types shall be selectable via software. Detector types shall include stop-line detectors, presence detectors, and directional presence detectors.

2.1.4 It shall be possible to view vehicle detections on a laptop computer with integrated VGA display. Any special (video capture card) PC equipment shall be supplied in a PCMCIA format. One shall be provided for up to four IPs delivered.

2.1.5 The set-up parameters shall be kept on the IP in non-volatile memory.
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2.1.6 The system shall have the capability of up-loading and down-loading set-up parameters via PC directly or via a dial-up modem.

3. VEHICLE DETECTION

3.1 The video detection system shall provide flexible detection zone placement anywhere and at any orientation within the combined field of view of the cameras. A single detector shall be able to replace multiple conventional detector loops connected in series.

3.2 Detection Zone Programming

3.2.1 Placement of detection zones shall be by means of a laptop computer operating in the Windows 98 or higher operating environment, and a mouse or by using a simple keyboard and monitor. The video monitor or the VGA monitor of a laptop computer shall show images of the detection zones superimposed on the video image of traffic. This configuration shall allow the display of detection superimposed on the video image of traffic directly on the VGA monitor of a laptop computer or video monitor.

3.2.2 The detection zones shall be created by using the mouse or simple keyboard to draw detection zones on the video monitor or laptop computer with integrated VGA monitor. For each location, a programming device as specified by the manufacturer shall be included.

3.2.3 It shall be possible to use the mouse or other input device to edit previously defined detector configurations so as to fine-tune the detection zone placement.

Once a detection configuration has been created, the computer system shall provide a graphic display of the new configuration on a monitor or laptop computer with integrated VGA monitor.

3.2.4 It shall be possible to individually adjust sensitivity for each detection zone in the system.

3.2.5 When a vehicle is under a detection zone, the detection zone shall change in color or intensity on the video monitor or portable supervisor computer with integrated VGA monitor, thereby verifying proper operation of the detection system.

3.3 Detection Performance

Overall performance of the video detection system shall be comparable to inductive loops. Using standard camera optics and in the absence of occlusion, the system shall be able to detect vehicle presence with 98% accuracy under normal conditions (day & night) and 96% accuracy under adverse conditions (fog, rain, snow).
4. IP HARDWARE

4.1 IP Mounting

The IP shall be modular by design and housed in a standard New York State 330 style input file. Each IP shall occupy no more than two file slots, with 4 separate programmable outputs. All power and video input shall come directly from the input rack.

4.2 IP Environmental

The IP shall be designed to operate reliably in the adverse environment found in the typical roadside traffic controller cabinet. It shall meet the environmental requirements set forth for Type 170 and Type 179 controllers. Operating temperature shall be from -31° degrees F to +165.2° degrees F at 0% to 95% relative humidity, non-condensing.

4.3 IP Electrical

4.3.1 Serial communications to the modem shall be through an RS-232 serial port. This port can be used for communications to a modem, or laptop.

4.3.2 The IP shall be equipped with a detector interface for at least 4 detector outputs. Output levels shall be compatible with the Type 170 and Type 179 standards, for a standard NYSDOT model 330 cabinet.

4.3.3 The IP shall be equipped with an RS-170(NTSC) composite video input.

4.3.4 The IP shall be equipped with at least one RS-170(NTSC) composite video output.

4.3.5 The IP shall have error detection, and shall provide a closed output in the event of camera failure or IP malfunction or loss of video due to inclement weather (fog/whiteout).

4.3.6 The IP shall have the capability of operating with an image compression board. This board shall allow still frames to be transmitted via a modem over standard telephone lines, to a central location where it can be decompressed and displayed and/or stored.

4.3.7 The IP shall have separate light emitting diodes that indicate power, video, serial communications, and detector actuations.

5. CAMERA SYSTEM

5.1 The video system shall use medium-resolution monochrome CCD cameras as the video
source for real-time vehicle detection. Each camera shall provide at least 383-line resolution and at least a 510 x 492 pixel CCD sensing element that produces usable video at a scene luminance level of 0.15 lux. It shall have automatic gain, automatic iris and absolute black reference controls. The limits of gain, iris and sensitivity shall be adjustable to minimize blooming during nighttime hours.

5.2 The camera lens shall provide power zoom capability from 5/16” inches to 2” inches, or a fix focal length in the range from 1/8” inches to 3” inches, as specified by the manufacturer. The auto-iris capability of the lens shall operate reliably at -22° degrees F.

5.3 The camera and lens assembly shall be housed in an environmental NEMA-4 enclosure that is watertight, and dust proof. A 15-watt heater shall be attached to the lens of the enclosure to avoid ice and condensation in cold weather. The enclosure shall be light-colored and shall include a sun shield to minimize solar heating, and glare.

5.4 A video interface panel shall be mounted inside the 330 controller cabinet. The panel shall provide a terminal block for power connection and grounding, coaxial cable connection points, and a transient voltage suppressor for each image sensor. The transient suppressor shall be equivalent to an Edco Model CX06-BNCY.

5.5 The camera shall be connected to the IP in such a manner that the attenuation of the RS170 video signal from the image sensor is not attenuated more than 3 db when measured at the IP. The connection between the cameras and the video interface panel shall be coaxial cable suited for outdoor installation, Belden 8281 or approved equal, cost to be included in this item.

6. INSTALLATION AND TRAINING

6.1 The manufacturer of the video detection system, or their representative shall design camera layout, placement and lens size, and supervise the installation and testing of the video and computer equipment. A factory certified representative from the supplier shall be on-site for a minimum of one day.

6.2 Two days of training shall be provided to personnel of the contracting agency in the operation, setup and maintenance of the video detection system. Instruction and materials shall be provided for a maximum of 12 persons and shall be conducted at a location selected by the contracting agency. The contracting agency shall be responsible for any travel, room and board expenses for its own personnel.

6.3 The manufacturer shall provide 8 complete sets of maintenance manuals for the installed equipment. These manuals shall have complete setup, maintenance, and troubleshooting procedures presented in an organized format.
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7. WARRANTY, MAINTENANCE AND SUPPORT

7.1 The video detection system shall be warranted by its supplier for a minimum of one (1) year.

7.2 During the warranty period, technical support by toll-free telephone shall be provided by the supplier during normal business hours, and request for support by telephone shall be answered by factory certified personnel within one (1) hour.

7.3 During the warranty period, certified personnel from the supplier shall be on site within seventy-two (72) hours if required.

7.4 Ongoing software support by the supplier shall include updates of the IP and supervisor software. These updates shall be provided free of charge during the warranty period and at a reasonable charge for the service life of the system.

7.5 The supplier shall maintain a program for technical support and software updates following expiration of the warranty period.

CONSTRUCTION DETAILS:

The Contractor shall develop and deliver shop drawings which illustrate in detail mounting and connection of the CCD cameras and other equipment to the traffic signal equipment as shown on the plans.

METHOD OF MEASUREMENT:

This item will be measured for payment as the number of Video Vehicle Presence Detectors installed in accordance with the contract documents or as ordered by the Engineer.

BASIS OF PAYMENT:

The requirement of Subsection 680.5-01 General, of the Standard Specifications shall apply with additional provisions as follows:

The unit price bid shall include the cost of all installation, hardware, software, mounting bracket, coaxial cable, training, and technical support associated with providing each Video Vehicle Presence Detectors installed and accepted. Payment is to be made as follows: 70% of the contract unit price upon installation; the remaining 30% is to be paid upon completing the final acceptance testing. The cost of conduit excavation, conduit, pullboxes, and signal cable will be paid for under their respective items.