DESCRIPTION:

Under this item the Contractor shall install a complete system that detects vehicles on a roadway via processing of video images from cameras and provides detector outputs to State standard traffic signal cabinet to interface with State qualified traffic signal controller for the application shown on the contract documents. Contractor shall also be responsible for the providing and installing auxiliary equipment to assure system functionality per the manufacturer’s recommendations. The contract documents will state if any of the materials will be supplied by the state. Materials not supplied by the state shall be supplied by the contractor. If no materials list is provided in the contract documents, the contractor shall furnish and install the complete system shown on the contract documents.

MATERIALS:

1. GENERAL

1.1 System Hardware

The system shall consist of fixed video cameras where shown on the contract documents, a video image processor and equipment for remote viewing and zone setup.

1.2 System Software

The system shall include software that detects vehicles/bicycles in multiple traffic lanes using only the video image. A minimum of 24 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 system shall calculate traffic parameters in real-time.

2. FUNCTIONAL CAPABILITIES

2.1 Real-Time Vehicle Detection

2.1.1 The system shall be capable of simultaneously processing information from the video cameras. 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 24 detection zones within the combined field of view of the camera. Detection zones shall be programmed via an on-board menu displayed on a video monitor and a pointing device connected to the system. The menu shall facilitate placement of detection zones and setting of zone parameters or to view system parameters.

2.1.3 Different detector types shall be selectable via software. Detector types shall include stop-line detectors, presence detectors, count, queue and directional presence
2.1.4 It shall be possible to view vehicle detections on a laptop or remote computer.

2.1.5 The set-up parameters shall be kept in non-volatile memory.

2.1.6 The system shall have the capability of up-loading and down-loading set-up parameters remotely over a TCP/IP connection.

2.1.7 The system shall provide dynamic zone reconfiguration to enable normal detector operation of existing channels except the one where a zone is being added or modified during the setup process. The system shall output a constant call on any detection channel corresponding to a zone being modified.

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 mouse or by using a simple keyboard and monitor. The video monitor 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 video monitor.

3.2.2 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.

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

3.2.4 When a vehicle is within a detection zone, the detection zone shall change in color or intensity on a configuration video monitor, thereby verifying proper operation of the detection system.

3.2.5 Detection zone outputs shall be configurable to allow the selection of presence, pulse, extend, and delay outputs. Timing parameters of pulse, extend, and delay outputs shall be user definable between 0.1 to 25.0 seconds.

3.2.6 A minimum of four (4) detection zones shall be capable to count the number of vehicles detected. The count value shall be internally stored for later retrieval through the TCP/IP connection. The zone shall also have the capability to calculate and store average speed and lane occupancy at bin intervals of 10 seconds.
seconds, 1 minute, 5 minutes, 15 minutes, 30 minutes and 60 minutes.

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 minimum 96% accuracy under normal conditions (day & night) and minimum 93% accuracy under adverse conditions (fog, rain, snow).

4. HARDWARE

4.1 Mounting

The interface cards shall be modular by design and housed in a standard State traffic signal cabinet style input file. Each card shall occupy no more than two file slots, with four (4) separate programmable outputs. All power and video input shall come directly from the input rack. Detector rack rewiring shall not be required.

4.2 Environmental

The system shall be designed to operate reliably in the adverse environment such as the typical roadside traffic signal controller cabinet. Operating temperature shall be from -35 to 165° F at 0 to 95% relative humidity, non-condensing.

4.3 Electrical and Communication

4.3.1 Communications for configuration and data downloads shall be available through an Ethernet port.

4.3.2 The system shall be equipped with a detector interface for at least 24 detector outputs. Output levels shall be compatible with the State standard traffic signal controller, and for a state standard traffic signal cabinet.

4.3.3 The system shall utilize IP based video input.

4.3.4 The system shall be equipped with at least one IP video output for configuration and monitoring.

4.3.5 The system shall have error detection and shall provide a closed output in the event of camera failure or device malfunction or loss of video due to inclement weather (fog/whiteout).
4.3.6 The system shall be capable of automatically detecting low-visibility conditions such as fog and respond by placing all defined detection zones in a constant call mode. The system shall automatically revert to normal detection mode when the low-visibility condition no longer exists. The system shall output a constant call for each enabled detector output channel if a loss of video signal occurs. The system shall also output a constant call during the background learning period.

4.3.7 The interface card shall have separate front panel light emitting diodes that indicate power, video, communications, and detector actuations.

5. **REMOTE CONNECTIVITY**

5.1 The system shall allow video and data to be transmitted via an Ethernet connection to a central location where it can be displayed and/or stored.

5.2 An internet browser-based remote access firmware shall also be available for remote setup and diagnostics. Browser-based remote access software shall not require any proprietary software to be installed on the user’s personal computer.

5.3 The interface unit shall support streaming video technology using MPEG-4 and H.264 standards to allow the user to monitor video detection imagery.

5.4 If an EIA-232 communications port is provided for local access, the connector for this port shall be a 9-pin “D” subminiature connector on the front of the interface unit. Provisions shall be made to accommodate mating cables to utilize jack screws for securing cables.

5.5 Hi-intensity LED status lights shall be provided to facilitate system monitoring. Indicators shall be provided to show the status of the internal processor, video presence and indication of which video input is being monitored.

5.6 An Ethernet port shall be integrated within the interface unit. The Ethernet port shall conform to 802.3 Ethernet specifications and shall auto-sense between 10 and 100 Mbps data rates. Industry standard TCP/IP protocol shall be supported. The Ethernet connection shall be made through an RJ-45 connector.

5.7 The video/data interface device shall be specifically designed to mount in a state standard type traffic signal cabinet detector rack, using the edge connector to obtain power. No adapters shall be required to mount the interface device in a standard detector rack.

5.8 Each video/data interface card shall occupy no more than two slots in the detector rack.
6. **CAMERA SYSTEM**

6.1 The video system shall use medium-resolution color CCD cameras as the video source for real-time vehicle detection. Each camera shall provide at least 383-line resolution and at least a 640 x 480 pixel CCD sensing element that produces useable 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.

6.2 The camera lens shall provide power zoom capability to allow it to be adapted to a variety of intersection configurations. The auto-iris capability of the lens shall operate reliably at -35 to 165° F.

6.3 The camera and lens assembly shall be housed in an NEMA-4 enclosure that is watertight, and dust proof. A 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.

6.4 A video interface panel shall be mounted inside a state standard traffic signal cabinet. The panel shall provide a terminal block for power connection and grounding, cable connection points, and a transient voltage suppressor and a circuit breaker for each image sensor. The transient suppressor shall be equivalent to an Edco Model CAT6-PoE.

6.5 The camera system shall be able to transmit the video signal, with minimal signal degradation, up to 100 meters under ideal conditions.

7. **INSTALLATION AND TRAINING**

7.1 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.

7.2 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.

7.3 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. One copy of the complete set of maintenance manual shall be provided on CD.
8. WARRANTY, MAINTENANCE AND SUPPORT

8.1 Materials supplied by the contractor for the video detection system shall be warranted by its supplier for a minimum of one (1) year.

8.2 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.

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

8.4 Ongoing software support by the supplier shall include updates of the detection system 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.

8.5 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 contract documents.

METHOD OF MEASUREMENT:

The quantity to be paid for will be the number of Video Vehicle Presence Detector Systems installed in accordance with the contract documents.

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 and materials (including but not limited to hardware, software, mounting bracket, coaxial cable, training, incidentals) as necessary to install the complete system as shown on the contract documents in a state standard traffic signal cabinet, and technical support associated with providing the installation and the accepted of the Video Vehicle Presence Detector System. The cost of all the wire runs from the cameras to the controller shall be included in the item. 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 poles, conduit excavation, conduit, and pull boxes will be paid for under their respective items.