

**STATE OF OHIO  
DEPARTMENT OF TRANSPORTATION**

**SUPPLEMENTAL SPECIFICATION 907  
VIDEO DETECTION SYSTEM**

**JANUARY 19, 2007**

Provide a 36-month warranty or the manufacturers standard warranty, whichever is greater on the video detection system.

Ensure that the warranty period begins on the date of shipment to the project. Ensure that each system has a permanent label or stamp indicating the date of shipment.

The warranty to include, technical support shall be available from the supplier, at no cost, via telephone within 4 hours of the time a call is made, from factory-certified personnel or factory-certified installers.

The warranty to include, updates to video detection processor and application software shall be available from the manufacturer without charge.

**A. Functional Capabilities.** Provide camera systems able to transmit NTSC video signals up to 1,000 feet (300 m).

Furnished video detection system configuration shall utilize video processors with 1 or more video inputs and 1 video output, responding to specific site applications, camera locations and detection zones shown on the project plans.

**B. Interface.** Provide video inputs that accept RS170 (NTSC) signals from an external video source. Provide a BNC type interface connector located on the front of the video processing unit.

Provide a LED indicator to indicate the presence of the video signal. The LED shall illuminate upon valid video synchronization and turn off when the presence of a valid video signal is removed.

Provide one video output per processor module. The video output shall be RS170 compliant and shall pass through the input video signal. The video output shall have the capability to show text and graphical overlays to aid in system setup. The overlays shall display real-time actuation of detection zones upon vehicle detection or presence. Control of the overlays and video switching shall also be provided through the serial communications port. The video output interface connector shall be BNC or RCA type.

Provide a serial communications port on the front panel. The serial port shall be compliant with RS-232 or RS-422 electrical interfaces and shall use a DB9 or RJ45 type connector. The serial

communications interface shall allow the user to remotely configure the system and/or to extract calculated vehicle/roadway information.

Furnish interface software. The interface protocol shall support multi-drop or point-to-multipoint communications. Each video detection system shall have the capability to be individually IP addressable either built in or with third party video server units.

Provide open collector contact closure outputs meeting NEMA TS2 requirements. The open collector output will be used for vehicle detection indicators as well as discrete outputs for alarm conditions.

Provide LED status indicators on the front panel. The LEDs shall illuminate when a contact closure output occurs. Provide one output LED for each contact closure output.

Provide a mouse compatible port on the front panel of the video processing unit. The mouse port shall be used as part of the system setup and configuration. Provide a compatible mouse with each video detection system.

**C. Functionality.** Detection zones shall be programmed via an on-board menu displayed on a video monitor and a pointing device connected to the video detection processor. The menu shall facilitate placement of detection zones and setting of zone parameters or to view system parameters.

The video detection processor shall detect vehicles in real time as they travel across each detection zone.

The video detection processor shall have an RS-232 port for communications with an external computer. The video detection processor port shall be multi-drop capable.

The video detection processor shall accept new detection patterns from an external computer through the RS-232 port when the external computer uses the correct communications protocol for downloading detection patterns. Provide a Windows™-based software designed for local or remote connection and providing video capture, real-time detection indication and detection zone modification capability with the system.

The video detection processor shall send its detection patterns to an external computer through the RS-232 port, when requested, when the external computer uses the correct communications protocol for uploading detection patterns.

The video detection processor shall default to a safe condition, such as minimum recall, fixed recall or a constant call on each active detection channel, in the event of unacceptable interference with the video signal or low visibility conditions.

A user-selected output shall be active during the low-visibility condition that can be used to modify the controller operation if connected to the appropriate controller input modifier(s). The

system shall automatically revert to normal detection mode when the low-visibility condition no longer exists.

**D. Vehicle Detection.** A minimum of 24 detection zones per camera input shall be possible, and each detection zone shall be capable of being sized to suit the site and the desired vehicle detection region/type.

A single detection zone shall be able to replace multiple inductive loops and the detection zones shall be OR'ed as the default or may be AND'ed together to indicate vehicle presence on a single phase of traffic movement.

Placement of detection zones shall be done by using only a pointing device, and a graphical interface built into the video detection processor and displayed on a video monitor, to draw the detection zones on the video image from each video camera. Detection zones created in this manner shall be compatible with the PC-based software provided with the system.

The video detection processor's memory shall be non-volatile to prevent data loss during power outages.

When a vehicle is detected crossing a detection zone, the corners or entire zone of the detection zone shall flash on the video overlay display to confirm the detection of the vehicle.

Detection shall be at least 98% accurate in good weather conditions, with slight degradation acceptable under adverse weather conditions (e.g. rain, snow, or fog) which reduce visibility.

The video detection processor shall maintain normal operation of existing detection zones when one zone is being added or modified. The video detection processor shall output a constant call on any detector channel corresponding to a zone being modified and shall resume normal operation upon completion.

Detection zones shall be directional to reduce false detections from objects traveling in directions other than the desired direction of travel in the detection area.

The video detection processor shall process the video input from each camera using a microprocessor at 30 frames per second at one volt peak to peak 75  $\Omega$  or EIA 170 NTSC video standard.

The video detection processor shall output minimum recall, fixed recall or constant call for each enabled detector output channel if a loss of video signal occurs. The recall behavior shall be user selectable for each output. The video detection processor shall output a constant call during the background "learning" period.

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.

Up to six detection zones per camera view shall have the capability to count the number of vehicles detected, measure classification and speed. The data values shall be internally stored within the processor module for later retrieval through the RS-232 port. The data collection interval shall be user definable in periods of 5, 15, 30 or 60 minutes or by intersection cycle. Real-time data shall be retrieved from the PC-based software provided with the system.

**E. Camera.** Cameras shall be completely compatible with the video detection processor and shall be certified by the manufacturer to ensure proper system operation.

The detection system shall produce accurate detector outputs under all roadway lighting conditions, regardless of time of day. The minimum range of scene luminance over which the camera shall produce a useable video image shall be the minimum range from nighttime to daytime, but not less than the range 0.009 to 930 foot-candles (0.1 lux to 10,000 lux).

The camera shall use a color CCD sensing element with resolution of not less than 470 lines horizontal and 400 lines vertical.

The camera shall include mechanisms to compensate for changing of lighting by using an electronic shutter and/or auto-iris lens.

The camera shall include a motorized variable focal length lens with factory preset focus that requires no field adjustment. Zooming of the camera lens to suit the site geometry by means of a portable interface device designed for that purpose and manufactured by the detection system supplier. The horizontal field of view shall be adjustable from 8.1 to 44.3 degrees. Camera configuration shall be customized for each approach based on field site conditions and the project plans.

The camera electronics shall include automatic gain control (AGC) to produce a satisfactory image at night.

The camera shall be housed in a weather-tight sealed enclosure. The housing shall be field rotatable to allow proper alignment between the camera and the traveled road surface.

The camera enclosure shall be equipped with a sunshield. The sunshield shall include a provision for water diversion to prevent water from flowing in the camera's field of view. The camera enclosure with sunshield shall be less than 6" (150 mm) diameter, less than 15" (375 mm) long, and shall weigh less than 6 pounds (2.7 kg) when the camera and lens are mounted inside the enclosure.

The camera enclosure shall include a thermostatically controlled heater to assure proper operation of the lens shutter at low temperatures and prevent moisture condensation on the optical faceplate of the enclosure. The heater shall directly heat the glass lens and require less than 5 watts over the temperature range.

When mounted outdoors in the enclosure, the camera shall operate satisfactorily in a temperature range from -30°F to +140°F (-34 °C to +60 °C) and a humidity range from 0% RH to 100% RH.

Power consumption of the camera shall be 15 watts or less under all conditions.

The camera enclosure shall be equipped with separate, weather-tight connections for power and setup video cables at the rear of the enclosure. These connections shall allow diagnostic testing and viewing of video at the camera while the camera is installed on a mast arm or pole using a lens adjustment module furnished under this bid item.

The video signal output by the camera shall in accordance with NTSC standards.

All necessary mounting brackets shall be mounted to pole shafts, mast arms, or other structures to mount cameras as indicated on the project plans. Mounting brackets shall result in a fixed-position mounting.

**F. Video Cable.** The cable provided shall be as recommended by the manufacturer for optimal video detection performance. The cable shall be either multi-paired jacketed cable or coaxial cable. Coaxial cable can be used between the camera and the video detection processor in the traffic signal controller cabinet and shall be as recommended by the manufacturer, or a Department approved 75 ohm precision video cable with 20 AWG solid bare copper conductor (9.9 ohms/M), RG-59, U-Type, solid polyethylene insulating dielectric, 98% (min) tinned copper double-braided shield and light blue polyethylene jacket previously proven to provide successful operation with the video detection system.

The signal attenuation shall not exceed 0.78 dB per 100 feet (30 m) at 10 MHz.

Nominal outside diameter shall be approximately 0.305 inches (7 mm).

Coaxial cable shall be suitable for installation in conduit and in exposed sunlight environment. 75-ohm BNC plug connectors shall be used at both the camera and cabinet ends. The coaxial cable, BNC connector, and crimping tool recommended by the manufacturer of the video detection system shall be used and installed per the manufacturer's recommended instructions to ensure proper connection.

Multi-paired jacketed cable shall include a minimum of four individually paired No. 19 AWG communication cables with an overall shield. Pairs shall not be individually shielded. Paired cable and power cables may be installed under the same outer jacket.

**G. Power Cable.** Power cable shall be rated for 90°C, 300 volt, 16 AWG, stranded, three-conductor cable with a nominal outside diameter of approximately 0.330 inches (8 mm). Conductor insulation color code shall be black, white and green. Outside jacket shall be black.

Camera power cable shall be suitable for installation in conduit and in exposed sunlight environment, and UL listed.

The power and video cable may be installed under the same outer jacket.

**H. Surge Protection.** Provide surge protection devices for all new or added video detection devices as recommended by the manufacturer. Coaxial cable shall be protected with an inline surge suppressor as recommended by the manufacturer or a panel mounted surge suppressor as recommended by the manufacturer or approved equal, installed and grounded per video detection manufacturer's recommendations.