

VEHICLE PREEMPTION/VIDEO VEHICLE DETECTION SYSTEM

****From Colchester-Essex STPG SGNL(45)**

- xx. DESCRIPTION. This work shall consist of furnishing and installing vehicle preemption/video vehicle detection system(s) at the location(s) indicated in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 678 of the Standard Specifications.

- xx. MATERIALS. All materials shall be as indicated on the Plans or an approved equivalent, with the exception of the controller. The controller, where specified, shall be as indicated on the Plans without exception.

- xx. GENERAL REQUIREMENTS. All associated electrical work performed and all materials installed shall be subject to inspection and approval of the State or Municipal Electrical Inspector, whichever is applicable. As a minimum, all work must meet the requirements of the National Electrical Code (NEC) and the National Electrical Safety Code (NESC).

- xx. SUBMITTALS.

(a) Fabrication Drawings. The Contractor shall submit Fabrication Drawings in accordance with Sections 105 and 678.

(b) Documentation Requirements. Three (3) advance copies of equipment manuals furnished by the manufacturer shall be submitted to the Engineer for review a minimum of ten days prior to the scheduled start of the first 24-hour operation test period. The Engineer will verify the manufacturer's equipment manual as part of the test and integration process. The equipment manual incorporating the Engineer's corrections and comments shall be integrated by the Contractor into the operations and maintenance manual. The manual shall, as a minimum, include the following:

- (1) Complete and accurate schematic diagrams.
- (2) Complete installation and operation procedures.
- (3) Complete performance specifications (functions, electrical, mechanical, and environmental) of the unit.
- (4) Complete accurate troubleshooting, diagnostic, and maintenance procedures.

- xx. SYSTEM REQUIREMENTS.

- (a) Emergency Vehicle Preemption System. Type of phase selector, size of chassis, manufacturer, model, number of phases and functions, detectors, strobe, and detection cables.

The emergency vehicle preemption systems shall be installed in the same cabinets as the controllers.

The emergency vehicle preemption control systems shall consist of a data-encoded phase selector to be installed within the traffic control cabinets. Those units will serve to validate, identify, classify, and record the signal from the optical detectors located on support structures at the intersections. Upon receiving a valid signal from the detectors, the phase selectors shall generate a preempt call to the controllers initiating preemption operations as shown on the Plans.

The preemption detectors shall be single input, single output units used to control one approach. All traffic signal installations shall be supplied with a single optical detector for each approach to the intersection unless otherwise noted in the major items list or as shown on the Plans.

The phase selectors shall have full ID and logging capabilities and be a rack-mounted plug-in four channel or two channel, dual priority devices. The phase selectors shall plug into shelf-mounted single card slot chassis. Programming the phase selectors shall be via a PC-based computer utilizing unit specific software. One copy of software shall be supplied and licensed to the Village of Essex Junction. A hard copy of final programming data shall be left in the control cabinets. The Contractor shall supply a complete set of interface cables for phase selector to laptop connection in each controller cabinet. The Contractor shall also supply any required cables.

- (b) Video (Optical) Vehicle Detection System. The video vehicle detection system shall include the camera with zoom lens and the integrated machine vision processor in one compact unit, with internal heater and integrated adjustable sunshield, all mounting hardware (video detector camera mounting bracket or video detector camera pole mount extension bracket), the communications interface panel, the detector port master, video detector cable, all associated equipment or miscellaneous fittings (cabinet wiring), and all labor, materials, and equipment required to complete the installation and make the video vehicle detection system fully operational. All of the video detection system components shall be current production equipment produced by the same manufacturer (for system operation compatibility purposes) unless otherwise noted herein or approved in advance by the Engineer.

The video vehicle detection system shall be an Econolite Autoscope Solo Terra, Iteris Versicom, or Traficon VIP series video vehicle detection system (color black).

xx. CONSTRUCTION REQUIREMENTS.

- (a) General. Prior to beginning any work, the Contractor and the Engineer will perform a joint inspection of the condition of existing equipment and components. Any equipment that is found to be defective or damaged prior to beginning work shall be maintained in at least as good condition until replaced under the Contract.

All work shall be performed during daytime off-peak hours from 9:00 a.m. to 3:00 p.m.

The Contractor shall make the necessary changes to the existing signal equipment to integrate the vehicle preemption and video vehicle detection system into the signal control operation. The vehicle preemption and video vehicle detection system shall be installed on existing span wires, strain poles, and in the existing controller cabinet, as required.

The Contractor shall be responsible for furnishing all training, labor, materials, cables, connectors, tools, equipment, shipping, and incidental items necessary to complete the installation and make the vehicle preemption and video vehicle detection systems fully operational.

- (b) Emergency Vehicle Preemption System. The optical preemption detectors for each intersection shall be mounted facing the VT 15 approaches. Final equipment locations and positioning to be performed as directed by the Engineer.

The Contractor is notified that the Town of Essex and Essex Junction currently have a resource sharing agreement. Therefore, any equipment installed in the Village of Essex Junction shall be interoperable with Town of Essex equipment. Emergency vehicle preemption installed under this project shall be functionally compatible between both jurisdiction's emergency services equipment.

The Contractor shall install the quantity of confirmation strobes at each traffic signal location as shown in the Plans or as directed by the Engineer. The confirmation strobe shall serve to validate to the driver of the emergency vehicle that the traffic signal has recognized the preemption call and will initiate the proper preemption sequence. The confirmation strobes shall be illuminated whenever any emergency vehicle preemption green is on. The confirmation strobes shall have a red lens.

The Contractor shall be responsible for the proper programming of the phase selector, orientation of the optical detectors, and all other work necessary to provide

a complete and operating emergency vehicle preemption system. The Contractor may be required to field adjust the location of the optical detectors in the presence of the Engineer and the Village of Essex Junction Fire Department to properly detect preemption calls from approaching vehicles.

- (c) Video (Optical) Vehicle Detection System. All work associated with Video Vehicle Detection System shall be completed prior to removal of the existing vehicle detector loops.

Installation of the video vehicle detection system shall include the installation of any and all associated equipment, including, but not limited to, the following:

- (1) Video Detector Camera Assembly with Integrated Machine Vision Processor. The Contractor shall furnish one (1) Integrated Machine Vision Processor module per approach and all associated enclosures and incidental work necessary to complete the installation and make the video vehicle detection system fully operational. This will also require providing the Integrated Machine Vision Processor CommServer configuration software, all miscellaneous hardware, connectors, and documentation.
- (2) Video Detector Communications Interface Panel. The Contractor shall furnish one (1) Video Detector Communications Interface Panel per cabinet and incidental work necessary to complete the installation and make the video vehicle detection system fully operational.
- (3) Video Detector Port Master. The Contractor shall furnish one (1) Video Detector Port Master per cabinet and incidental work necessary to complete the installation and make the video vehicle detection system fully operational.
- (4) Video Detector Cable. The Contractor shall furnish the specified cable type, all connectors, sealing tape, and incidental work necessary to complete the installation of the Video Detector Cable between the Video Detector Camera Assembly with Integrated Machine Vision Processor and the Video Detector Communications Interface Panel in the traffic control cabinet, and make the video vehicle detection system fully operational.
- (e) Video Detector Camera Mounting Bracket. The Contractor shall furnish one (1) Video Detector Camera Mounting Bracket and all associated equipment, labor, materials, tools, and incidental work necessary to attach the camera mounting bracket to a mast arm or camera extension bracket, complete the installation, and make the video vehicle detection

system fully operational.

The Contractor shall install the Camera/Integrated Machine Vision Processor System (MVP) to achieve the desired field of detection as shown on the Plans or as directed by the Engineer. All equipment shall be installed and wired in a neat and orderly manner in conformance with the manufacturer's instructions. The camera shall be affixed to the support structure in accordance with the manufacturer's instructions to provide the optimal field of detection.

Video detector locations shown on the Plan are for illustration purposes only.

The Contractor shall perform a site survey with a representative of the manufacturer of the video vehicle detection system at all project locations. The purpose of the survey shall be to optimize the performance of the video vehicle detection equipment when it is installed at the various overhead and side-fired mounting locations and ensure that it will meet the accuracy requirements specified herein. The results of this survey shall be submitted to the Engineer in a report which lists all locations with any recommended location shifts, sensor mounting adjustments, camera angle lens adjustments, and desired detection zone locations. The cost of the site survey, including the use of a bucket truck or other method to obtain an elevated vantage point, shall be included in the cost for each intersection's respective video vehicle detection system pay item.

Cable to be installed in conduit shall be pulled with a minimum of dragging on the ground or pavement. This shall be accomplished by means of reels mounted on jacks or approved devices conveniently located for unreeling cable directly into the conduit. Powdered soapstone, talc, or other approved lubricants shall be used when inserting cable into the conduit. Cable shall be pulled through conduit by means of a cable or cables. Wiring within junction boxes and cabinets shall be neatly arranged.

When conductors and cables are pulled into conduits, all ends of conductors and cables shall be taped to exclude moisture, and shall be so kept until they are attached to the Camera/Integrated Machine Vision Processor (MVP) and the Video Detector Communications Interface Panel (CIP) in the traffic control cabinet.

Conductors entering the traffic control cabinet shall be neatly dressed and laced along the base and back of the traffic cabinet to the Video Detector Communications Interface Panel. Spare conductors (if any) shall be tied together with their ends taped. At least 600 mm (2 feet) of slack shall be left for each conductor in the traffic cabinet at the Video Detector Communications Interface Panel.

Routing of the Video Detector Cable shall provide a drip loop for protection of the camera and connector. The Video Detector Cable shall be installed continuous with no splices from the Camera/Integrated Machine Vision Processor (MVP) to the Video Detector Communications Interface Panel in the traffic control cabinet.

Removal and disposal or abandonment of existing inductance loop wiring and lead-in wiring will be considered incidental to other Contract items.

xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Vehicle Preemption/Video Vehicle Detection System) to be measured for payment will be the number of each vehicle preemption/video vehicle detection system installed in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Vehicle Preemption/Video Vehicle Detection System) will be paid for at the Contract unit price per each at each designated intersection. Payment will be full compensation for furnishing, handling, and placing the equipment and materials specified in the Contract Documents; removing, salvaging, disposing of or abandoning any existing equipment and/or materials that are replaced or no longer needed as a result of installation of new equipment and/or materials; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. At the discretion of the Engineer, the Contractor may be required to replace poles and cabinet/controllers that are lost or damaged due to an accident. If required, such work will be considered Extra Work under Subsection 109.06 and additional payment will be allowed. Any equipment that is defective or damaged prior to the beginning of the Contract shall be maintained in at least as good condition, until it is replaced as part of the Contract.

Payment will be made as follows:

- (a) Upon installation of a functioning system as indicated by a successful continuous 24-hour operation test period, 20 percent of the Contract unit price will be paid.
- (b) Thirty percent of the Contract unit price will be paid upon receipt by the Engineer of notice from all responsible Agency parties that all paperwork related to the system installation has been completed to the satisfaction of the Agency.
- (c) Thirty percent of the Contract unit price will be paid after successful completion of the 30-day test control period.
- (d) The final 20 percent of the Contract unit price will be paid upon acceptance of the project.

At the discretion of the Engineer, the Contractor may be required to replace existing traffic signal system components not anticipated to require replacement, including poles and/or

cabinets/controllers that are lost or damaged due to an accident. If required, such work will be considered Extra Work under Subsection 109.06 and additional payment will be allowed.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Vehicle Preemption/Video Vehicle Detection System) (Main Route @ Side Road)	Each