

DILEMMA ZONE/VIDEO VEHICLE DETECTION SYSTEM, INTERSECTION

****From Charlotte-South Burlington NH 2907(1)**

- xx. DESCRIPTION. This work shall consist of furnishing and installing dilemma zone/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. 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. SYSTEM REQUIREMENTS. 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, or approved equal.

- 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. CONSTRUCTION REQUIREMENTS. All work associated with Video Vehicle Detection System shall be completed prior to removal of the existing vehicle detector loops.

The Contractor shall make the necessary changes to the existing signal equipment to integrate the dilemma zone and video vehicle detection system into the signal control operation. The dilemma zone and video vehicle detection system shall be installed on existing strain poles.

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 dilemma zone and video vehicle detection system fully operational.

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

- (a) 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.
- (b) 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.
- (c) 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.
- (d) 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. Payment for maintaining and protecting traffic, including the use of uniformed traffic officers, will be included under Contract items 630.10 and 641.10 as needed.

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 (Dilemma Zone/Video Vehicle Detection System, Intersection) to be measured for payment will be the number of each dilemma zone and video vehicle detection system installed in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Dilemma Zone/Video Vehicle Detection System, Intersection) 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 all materials and equipment specified in the Contract Documents not otherwise paid for under other Contract items. 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) When applicable, 10 percent of the Contract unit price will be paid for the installation of the strain poles.
- (b) Upon installation of a functioning system as indicated by a successful continuous 24-hour operation test period, an additional 10 percent of the Contract price will be paid. When the installation does not include strain poles, 20 percent of the Contract unit price will be paid upon successful completion of a continuous 24-hour operation test.
- (c) 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 a signal or

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beacon installation has been completed to the satisfaction of the Agency.

- (d) The remainder, less 20 percent of the Contract unit price, will be paid after successful completion of the 30-day test control period.
- (e) The final 20 percent of the Contract unit price will be paid upon acceptance of the project.
- (f) The Contractor will not be paid more than 50 percent of the Contract unit price for the traffic signal or flashing beacon installation, whether directly or through stockpile or any other means until the Engineer has been notified that all signal related paperwork has been completed to the satisfaction of the Engineer.

Payment will be full compensation for furnishing, transporting, handling, and installing the materials and equipment specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

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