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June 17, 2009

STATE PROJECT NO. 082-03-0027
FEDERAL AID PROJECT NO. 0808(502)
LA 157 IMPROVEMENTS
ROUTE LA 157
BOSSIER PARISH

SUBJECT: ADDENDUM NO. 1 (CONSTRUCTION PROPOSAL REVISION)

Gentlemen:

The following proposal revision dated 06/17/09 on the captioned project for which bids will be received on Wednesday, June 24, 2009 has been posted on http://www.dotd.la.gov/cgi-bin/construction.asp.

1. Revised the special provision entitled **NS Video Detector (MVP) Device and NS Video Detector (MVP) System.** (7 pages)

Please note this revision in the proposal and bid accordingly. Mandatory electronic bidding is required for this project, and electronic bids and electronic bid bonds must be submitted via www.bidx.com for this letting date.

Sincerely,

Randal D. Sanders

RANDAL D. SANDERS, P. E.
CONTRACTS & SPECIFICATIONS ENGINEER

Attachments
ec: Mr. Brian Buckel
Mr. John Sanders
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Mr. Eric Burges
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VIDEO DETECTOR (MVP) DEVICE AND VIDEO DETECTION (MVP) SYSTEM (11/08)

DESCRIPTION. These items consist of furnishing all necessary equipment, labor and material to install a Video Detector Device and Video Detection System in accordance with the plans, the 2006 Louisiana Standard Specifications for Roads and Bridges, and as described in these specifications.

EQUIPMENT REQUIREMENTS.

System Hardware

The machine vision system hardware shall consist of three components: 1) a color, 22x zoom, MVP sensor; 2) a modular cabinet interface unit; and 3) a communication interface panel. The real-time performance shall be observed by viewing the video output from the sensor with overlaid flashing detectors to indicate the current detection state (on/off). The MVP sensor shall be able to store cumulative traffic statistics internally in non-volatile memory for later retrieval and analysis.

The MVP shall communicate to the modular cabinet interface unit via the communications interface panel and the software applications using the industry standard TCP/IP network protocol. The MVP shall have a built-in, Ethernet-ready, Internet Protocol (IP) address and shall be addressable with no plug- in devices or converters required. The MVP shall provide standard MPEG-4 streaming digital video. Achievable frame rates shall vary from 5 to 30 frames/sec as a function of video quality and available bandwidth.

The modular cabinet interface unit shall communicate directly with up to eight (8) MVP sensors and shall comply with the form factor and electrical characteristics to plug directly into a NEMA type C or D detector rack providing up to thirty-two (32) inputs and sixty-four (64) outputs or a 170 input file rack providing up to sixteen (16) contact closure inputs and twenty-four (24) contact closure outputs to a traffic signal controller.

The communication interface panel shall provide four (4) sets of three (3) electrical terminations for three-wire power cables for up to eight (8) MVP sensors that may be mounted on a pole or mast arm with a traffic signal cabinet or junction box. The communication interface panel shall provide high-energy transient protection to electrically protect the modular cabinet interface unit and connected MVP sensors. The communications interface panel shall provide single-point Ethernet connectivity via RJ45 connector for communication to and between the modular cabinet interface module and the MVP sensors.

System Software

The MVP sensor embedded software shall incorporate multiple applications that perform a variety of diagnostic, installation, fault tolerant operations, data communications, digital video streaming, and vehicle detection processing. The detection shall be reliable, consistent, and perform under all weather, lighting, and traffic congestion levels. An embedded web server shall permit standard internet browsers to connect and perform basic configuration, maintenance, and video streaming services.

There shall be a suite of client applications that reside on the host client / server PC. The applications shall execute under Microsoft Windows XP or Vista. Available client applications shall include:

- Master network browser: Learn a network of connected modular cabinet interface units and MVP sensors, display basic information, and launch applications software to perform operations within that system of sensors.
- Configuration setup: Create and modify detector configurations to be executed on the MVP sensor and the modular cabinet interface unit.
- Operation log: Retrieve, display, and save field hardware run-time operation logs of special events that have occurred.
- Software install: Reconfigure one or more MVP sensors with a newer release of embedded system software.
- Streaming video player: Play and record streaming video with flashing detector overlay.
- Data retrieval: Fetch once or poll for traffic data and alarms and store on PC storage media.
- Communications server: Provide fault-tolerant, real-time TCP/IP communications to / from all devices and client applications with full logging capability for systems integration.

Functional Capabilities

MVP Sensor

The MVP sensor shall be an integrated imaging color CCD array with zoom lens optics, high-speed, dual-core image processing hardware bundled into a sealed enclosure. The CCD array shall be directly controlled by the dual-core processor, thus providing high-quality video for detection that has virtually no noise to degrade detection performance. It shall be possible to zoom the lens as required for setup and operation. It shall provide JPEG video compression as well as standard MPEG-4 digital streaming video with flashing detector overlay. The MVP shall provide direct real-time iris and shutter speed control. The MVP image sensor shall be equipped with an integrated 22x zoom lens that can be changed using configuration computer software. The digital streaming video output and all data communications shall be transmitted over the three-wire power cable.

Power

The MVP sensor shall operate on 110/220 VAC, 50/60Hz at a maximum of 25 watts. The camera and processor electronics shall consume a maximum of 10 watts and the remaining 15 watts shall support an enclosure heater.

Detection Zone Programming

Placement of detection zones shall be by means of a PC with a Windows XP or Vista operating system, a keyboard, and a mouse. The PC monitor shall be able to show the detection zones superimposed on images of traffic scenes.

The detection zones shall be created by using a mouse to draw detection zones on the PC monitor. Using the mouse and keyboard it shall be possible to place, size, and orient detection zones to provide optimal road coverage for vehicle detection. It shall be possible to download detector configurations from the PC to the MVP sensor and cabinet interface module, to retrieve the detector

configuration that is currently running in the MVP sensor, and to back up detector configurations by saving them to the PC fixed disks or other removable storage media.

The supervisor computer's mouse and keyboard shall be used to edit previously defined detector configurations to permit adjustment of the detection zone size and placement, to add detectors for additional traffic applications, or to reprogram the MVP sensor for different traffic applications or changes in installation site geometry or traffic rerouting.

Detection Types

The MVP shall be able to be programmed with a variety of detector types that perform specific functions. Detector types shall include the following:

Count Detector--outputs traffic volume statistics;

a) Presence Detector--indicates presence of a vehicle, stopped vehicle, or vehicles traveling the wrong direction;
b) Speed Detector--provides vehicle speed, length, classification, volume, density and traffic flow statistics;
c) Detector Function--combines outputs of multiple detector types via Boolean logic functions and allows timing extensions and delays. Similar to the Contrast Detector below, it monitors video signal quality in multiple detection zones.
d) Station--accumulates traffic data over user specified time intervals, including cycle splits for intersection applications;
e) Input Label Detector--provides states of a user-provided input signal;
f) Speed Alarm--generates an alarm output based on user-defined speed and volume thresholds;
g) Contrast Detector--monitors video signal quality and provides an optical fail safe alarm feature. The Contrast Detector shall be able to monitor specific areas of a detection zone.
h) Incident Detector--operates an incident detection algorithm which monitors speed and occupancy data from individual traffic lanes to detect the shock wave effects which propagate upstream from a capacity-reducing incident that occurs outside the camera field of view. It shall be adjustable for regularly recurring congestion.
i) Scheduler--controls detector operation based upon a user-defined time schedule;
j) Label--displays system or user-defined static or dynamic information on the output video of the MVP, including titles and bitmap graphics.
k) Lane Detector-- generates an alarm for stopped vehicle (default setting), a slow vehicle, or a wrong-way vehicle along an entire outdoor traffic lane within the field of view.
l) Tunnel Detector--generates an alarm for stopped vehicle (default setting), a slow vehicle, or a wrong-way vehicle along an entire tunnel lane within the field of view.

The speed detector shall report vehicle speed and vehicle classification based on five user-defined length categories, satisfying the four generalized category requirement recommended by FHWA.

Multiple detector outputs shall be able to be combined together via OR, AND, NAND, and N of M logical functions. In addition, the MVP shall be able to condition the detector outputs based on the state of associated input signals. The following detector output types shall be available:

a) Type 0 -- send a call for every vehicle presence detected;
b) Type 1 -- extends a call on Green, delays a call on NOT Green;
c) Type 2 -- both Extends and Delays a call on Green, no change to call on NOT Green;
d) Type 3 -- provides Stop Bar detection;
e) Type 4 -- provides Stop Bar detection with a timer;
f) Type 5 -- provides Stop Bar detection with a reset timer;
g) Type 6 -- enables a call when the input phase is Red;
h) Type 8 -- provides Dilemma Zone detection, based on the speed of the vehicle;
i) Type 9 -- provides moving vehicle detection and time validation during Red;
j) Type 10 -- arbitrates between individual Contrast Loss detectors to determine video quality loss.

. Each MVP shall be able to detect the absence of a valid video signal on each image sensor input. Upon detecting the absence of a valid video signal, the MVP shall place all the detector outputs associated with the failed image sensor input into a fail-safe ON state known as recall.

. Each MVP shall be able to detect when the quality of the video input from the image sensor is not sufficient to enable vehicle detection (e.g., when environmental conditions obscure the sensor view). Use of this video loss detection capability shall be selectable by the user. If a video loss failure is detected, the MVP shall place the detector outputs associated with the failed sensor on minimum recall, maximum recall, or fixed time recall as selected by the user.

Interval Traffic Data

Each MVP shall count vehicles in real-time and compute the average of traffic parameters over user-defined time intervals (or time slices), as follows:

a) Volume -- number of vehicles detected during the time interval;
b) Occupancy -- detector occupancy measured in percent of time;
c) Vehicle Classification -- number of vehicles in each of five classes, as defined by vehicle length in feet or meters;
d) Flow Rate -- vehicles per hour per lane;
e) Headway -- average time interval between vehicles;
f) Speed -- time mean and space mean vehicle speed in mi/hr;
g) Level of Service -- determined by user-defined thresholds for average speed or capacity flow rates;
h) Space Occupancy -- sum of the vehicle lengths divided by average distance traveled during the time interval measured as percent;
i) Density -- flow rate divided by space mean speed expressed in vehicles/km or vehicles/mi.

The duration of the time intervals (or time slices) shall be user-customizable as per signal control cycle or 10, 20, or 30 seconds, or 1, 5, 10, 15, 30, or 60 minutes, or any other arbitrary time interval of choice.

It shall be possible to poll the MVP for traffic flow, vehicle presence, or event alarm data during normal operation when connected to a computer with serial communications.

Furthermore, an option to minimize data loss, called persistent polling, shall be provided to collect time interval data when the MVP is not connected to a computer. It shall operate as follows: When the communication link to the traffic management computer is cutoff temporarily, for whatever reason, the MVP shall write the persistent poll data to non-volatile EEPROM flash memory. At such time as the link is restored, the persistent poll data shall be transferred to the traffic management computer. Thus though delayed, there is no loss of data due to communications link failures. This shall also allow the use of dial-up modem applications to be scheduled, for example daily or weekly calls, to collect all data since last connection was made.

Finally, the option for persistent polling shall begin accumulating and storing defined poll data to flash memory if needed after system reboot, as may be caused by local mains power failures.

Using the persistent polling technique above, it shall be possible to save the time-interval data in non-volatile EEPROM flash memory within the MVP for later transfer to the supervisor computer for analysis.

. Retrieval of real-time poll data or persistent poll data stored in the memory of the MVP shall be via a serial communications port or integrated Ethernet port using manufacturer provided software tools. Provision shall be made for transfer of data via a modem and dial-up telephone lines, via private cable, fiber optic network, wireless system, Ethernet or via direct connection to another computer by serial cable.

Each MVP shall provide an optional power line monitor to ensure the accuracy of its internal clock.

Optimal Detection

The video detection system shall optimally detect vehicle passage and presence when the MVP sensor is mounted 30 feet (10 m) or higher above the roadway, when the image sensor is adjacent to the desired coverage area, and when the distance to the farthest detection zone locations are not greater than ten (10) times the mounting height of the MVP. The recommended deployment geometry for optimal detection also requires that there be an unobstructed view of each traveled lane where detection is required. Although optimal detection may be obtained when the MVP is mounted directly above the traveled lanes, the MVP shall not be required to be directly over the roadway. The MVP shall be able to view either approaching or receding traffic or both in the same field of view. The preferred MVP sensor orientation shall be to view approaching traffic since there are more high contrast features on vehicles as viewed from the front rather than the rear. The MVP sensor placed at a mounting height that minimizes vehicle image occlusion shall be able to simultaneously monitor a maximum of six (6) traffic lanes when mounted at the road-side or up to eight (8) traffic lanes when mounted in the center with four lanes on each side.

Modular Cabinet Interface Unit

The modular cabinet interface unit shall provide the hardware and software means for up to eight (8) MVP sensors to communicate real-time detection states and alarms to a local traffic signal controller. It shall comply with the electrical and protocol specifications of the detector rack standards. The card shall have 1500 Vrms isolation between rack logic ground and street wiring.

The modular cabinet interface unit shall be a simple interface card that plugs directly into a 170 input file rack or a NEMA type C or D detector rack. The modular cabinet interface unit shall occupy only 2 slots of the detector rack. The modular cabinet interface unit shall accept up to sixteen (16) phase inputs and shall provide up to twenty-four (24) detector outputs.

Communications Interface Panel

The communications interface panel shall support up to eight MVPs. The communications interface panel shall accept 110/220 VAC, 50/60 Hz power and provide predefined wire termination blocks for MVP power connections, a Broadband-over-Power-Line (BPL) transceiver to support up to 10MB/s interdevice communications, electrical surge protectors to isolate the modular cabinet interface unit and MVP sensors, and an interface connector to cable directly to the modular cabinet interface unit.

The interface panel shall provide power for up to eight (8) MVP sensors, taking local line voltage 110/220 VAC, 50/60 Hz and producing 110/220 VAC, 50/60 Hz, at about 30 watts to each MVP sensor. Two ½-amp SLO-BLO fuses shall protect the communications interface panel.

System Installation & Training

The supplier of the video detection system may supervise the installation and testing of the video detection system and computer equipment as required by the contracting agency.

Training shall be available to personnel of the contracting agency in the operation, set up, and maintenance of the video detection system. The MVP sensor and its support hardware / software shall be a sophisticated leading-edge technology system. Proper instruction from certified instructors shall be recommended to ensure that the end user has complete competency in system operation. The User's Guide is not an adequate substitute for practical classroom training and formal certification by an approved agency.

Warranty, Service, & Support

For a minimum of three (3) years, the supplier shall warrant the video detection system. Ongoing software support by the supplier shall include software updates of the MVP sensor, modular cabinet interface unit, and supervisor computer applications. These updates shall be provided free of charge during the warranty period. The supplier shall maintain a program for technical support and software updates following expiration of the warranty period. This program shall be available to the contracting agency in the form of a separate agreement for continuing support.

CONSTRUCTION REQUIREMENTS. The contractor shall be responsible to provide the necessary hardware for the camera assembly, installation, and operation to detect and or count vehicles as shown in the plans.

This specification sets forth the minimum requirements for a system that monitors vehicles on a roadway via processing of video images. The detection of vehicles passing through the field-of-

view of an image sensor shall be made available to a large variety of end user applications as simple contact closure outputs that reflect the current real-time detector or alarm states (on/off) or as summary traffic statistics that are reported locally or remotely. The contact closure outputs shall be provided to a traffic signal controller and comply with the National Electrical Manufacturers Association (NEMA) type C or D detector rack or 170 input file rack standards.

The system architecture shall fully support Ethernet networking of system components through a variety of industry standard and commercially available infrastructures that are used in the traffic industry. The data communications shall support direct connect, [modem,] and multi-drop interconnects. Simple, standard Ethernet wiring shall be supported to minimize overall system cost and improve reliability, utilizing existing infrastructure and ease of system installation and maintenance. Both streaming video and data communications shall, if specified in the plans, be interconnected over long distances through fiber optic, microwave, or other commonly used digital communications transport configurations.

MEASUREMENT. Video Detector (MVP) Device, per each shall include all required materials, tools, equipment, labor, and incidentals required to install each video detection device as described above, including the cable connection to the controller cabinet, and fully functioning, per each as indicated on the plans.

Video Detection (MVP) System (Intersection) per each shall include all required materials, tools, equipment, labor, incidentals as described above, and fully functioning for the proper operation of the system.

PAYMENT. Payment for Video Detector (MVP) Device and Video Detection (MVP) System will be made at the contract price per each and shall be full compensation for furnishing all materials, tools, equipment, labor, and incidentals required to perform all work as described above or as directed by the engineer.

Payment for the Video Detector (MVP) Device and Video Detection (MVP) System will be made at the contract price.

Payment will be made under:

Item No.	Pay Item	Pay Unit
NS-736-00020	Video Detector (MVP) Device	Each
NS-736-00040	Video Detection (MVP) System	Each