ORIGINATION FORM
Proposed Revisions to the Specifications

(Please provide all information - incomplete forms will be returned)

Date: May 18, 2017

Specification Section: 660

Originator: Jeffrey Morgan

Articles/Subarticles: 660-2.1.2
660-2.1.2.2

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Will the proposed revision involve Design Standard Index changes? **Yes** ○ **No** ●

Roadway Design staff contacted (name):

Structures Design staff contacted (name):

Will the proposed revision involve PPM changes? **Yes** ○ **No** ●

Roadway Design staff contacted (name):

Will the proposed revision involve CPAM changes? **Yes** ○ **No** ●

Construction staff contacted (name):

Will the proposed revision involve Pay Item changes? **Yes** ● **No** ○

Estimates staff contacted (name): Melissa Hollis

Will the proposed revision involve SDG changes? **Yes** ○ **No** ●

Structures staff contacted (name):

Will the proposed revision involve APL changes? **Yes** ● **No** ○

Product Evaluation staff contacted (name): Elizabeth Birriel

Will the proposed revision involve Material Manual changes? **Yes** ○ **No** ●

State Materials Office staff contacted (name):

Will this revision necessitate any of the following:

Design Bulletin ☐ **Construction Bulletin** ☐ **Estimates Bulletin** ☐ **Materials Bulletin** ☐

Are all references to external publications current? **Yes** ○ **No** ○

If not, what references need to be updated? (Please include changes in the redline document.)

Why does the existing language need to be changed?

Language is needed to allow new technology on the Approved Product List.

Summary of the changes:

Language added to add new technology (thermal detectors) on the APL.

Are these changes applicable to all Department jobs? **Yes** ○ **No** ○
If not, what are the restrictions?

Contact the State Specifications Office for assistance in completing this form.
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M E M O R A N D U M

DATE: June 7, 2017

TO: Specification Review Distribution List

FROM: Dan Hurtado, P.E., State Specifications Engineer

SUBJECT: Proposed Specification: **6600201-3 Vehicle Detection System.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

This change was proposed by Jeff Morgan of the State Traffic Engineering Research Lab (TERL) to update the language for new technology.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or online at http://www2.dot.state.fl.us/ProgramManagement/Development/IndustryReview.aspx . Comments received after **July 5, 2017,** may not be considered. Your input is encouraged.

DH/dt
Attachment

VEHICLE DETECTION SYSTEM.
(REV 5-18-17)

SUBARTICLE 660-2.1.2 is deleted and the following substituted:

660-2.1.2 Technology Types: Provide the detection technology type detailed in the Plans. Detection technology types include inductive loop, video, thermal, microwave, wireless magnetometer, and AVI systems.

660-2.1.2.1 Inductive Loop: An inductive loop detection system uses a minimum of one inductive loop and loop detector. The system operates by energizing and monitoring wire embedded in the road surface to detect vehicle presence and provide an output to traffic controllers or other devices that can generate volume, occupancy, and speed data (detection output).

660-2.1.2.1.1 Inductive Loop Detector Units: Ensure rack mount inductive loop detector units meet the requirements of NEMA TS-2-2003. Ensure shelf mount detector units meet the requirements of NEMA TS-1-1989.

660-2.1.2.1.2 Loop Wire: Use No. 12 AWG or No. 14 AWG stranded copper wire with Type XHHW cross-linked polyethylene insulation and an additional outer sleeve composed of polyvinylchloride or polyethylene insulation that meets the requirements of International Municipal Signal Association (IMSA) 51-7.

660-2.1.2.1.3 Shielded Lead-in Cable: Use No. 14 AWG two conductor, stranded copper wire with shield and polyethylene insulation, meeting the requirements for IMSA 50-2.

660-2.1.2.1.4 Splicing Material: Butt-end connectors may be used for splicing the loop wire to the lead-in cable. Butt-end connectors must be non-insulated. Use resin-core solder for soldered splices. Splicing tape must be self-fusing silicone rubber. Ensure insulated tubing used to cover splice is heat-shrinkable, cross-linked polyethylene with a silicon sealant inside the tubing and an insulation rating of at least 600 V.

660-2.1.2.1.5 Loop Sealant: Ensure loop sealant is intended for traffic loop embedding in both asphalt and concrete pavement. Ensure sealant is furnished in a one part or pre-measured two part formulation meeting the requirements specified herein.

Ensure that loop sealant is self-leveling when applied and is designed to be installed flush with the roadway surface. Ensure that loop sealant does not run out of unlevel slots as tested for viscosity using ASTM D562 at 77°F. Ensure loop sealant is tack free within a maximum of 2 hours from time of application and when cured as tested for tack free time using ASTM C679 at 77°F.

Ensure loop sealant securely adheres to concrete and asphalt when installed in a 3/8 inch by 3 inch saw cut, cured for 2 weeks at 77°F as tested for adhesion using visual inspection. Ensure loop sealant shows no visible signs of shrinkage after curing when installed in a 3/8 inch by 3 inch saw cut, cured for 2 weeks at 77°F as tested for shrinkage using a dimensional measurement.

Ensure loop sealant resists weather, oils, gasoline, antifreeze, and brake fluid as tested for absorption using ASTM D570 for water, No. 3 oil, gasoline, antifreeze, and brake fluid for 24 hours. Ensure loop sealant resists penetration of foreign materials as tested for durometer hardness using ASTM D2240 Shore A for 24 hours.

Ensure loop sealant resists cracking caused by expansion and contraction due to temperature changes as tested for tensile strength and elongation using ASTM D412.

Ensure loop sealant does not become brittle with age or temperature extremes as tested for weight loss, cracking, and chalking using ASTM C1246.

Ensure loop sealant has a minimum shelf life of 12 months when stored per manufacturer recommendations.

Loop sealant containers must have a label showing the manufacturer's name or trademark, model number, date of manufacture or manufacturer's batch number and installation instructions.

660-2.1.2.2 Video: A video vehicle detection system (VVDS) uses one or more cameras or an integrated thermal sensor and video analytics hardware and software to detect vehicle presence, provides a detection output, and generates volume, occupancy, and speed data.

660-2.1.2.2.1 Configuration and Management: Ensure that the VVDS is provided with software that allows local and remote configuration and monitoring. Ensure that the system can display detection zones and detection activations overlaid on live video inputs.

Ensure that the VVDS allows a user to edit previously defined configuration parameters, including size, placement, and sensitivity of detection zones.

Ensure that the VVDS retains its programming in nonvolatile memory. Ensure that the detection system configuration data can be saved to a computer and restored from a saved file. Ensure that all communication addresses are user programmable.

Ensure that the detection system software offers an open Application Programming Interface (API) and software development kit available to the Department at no cost for integration with third party software and systems.

660-2.1.2.2.2 Detection Camera: Provide a camera that is furnished or approved by the video detection system manufacturer and listed with the detection system on the APL.

660-2.1.2.2.3 Machine Vision Processor: Ensure the VVDS includes a machine vision processor that allows video analysis, presence detection, data collection, and interfaces for inputs and outputs as well as storage and reporting of collected vehicle detection data.

660-2.1.2.2.4 Communications: Ensure that the VVDS includes a minimum of one serial or Ethernet communications interface.

Ensure the serial interface and connector conforms to Telecommunications Industry Association (TIA)-232 standards. Ensure that the serial ports support data rates up to 115200 bps; error detection utilizing parity bits (i.e., none, even, and odd); and stop bits (1 or 2).

Ensure that wired Ethernet interfaces provide a 10/100 Base TX connection. Verify that all unshielded twisted pair/shielded twisted pair network cables and connectors comply with TIA-568.

Ensure wireless communications are secure and that wireless devices are Federal Communications Commission (FCC) certified. Ensure that the FCC

identification number is displayed on an external label and that all detection system devices operate within their FCC frequency allocation.

Ensure cellular communications devices are compatible with the cellular carrier used by the agency responsible for system operation and maintenance.

Ensure the system can be configured and monitored via one or more communications interface.

660-2.1.2.2.5 Video Inputs and Outputs: Ensure that analog video inputs and outputs utilize BNC connectors.

660-2.1.2.2.6 Solid State Detection Outputs: Ensure outputs meet the requirements of NEMA TS2-2003, 6.5.2.26.

660-2.1.2.2.7 Electrical Requirements: Ensure the system operates using a nominal input voltage of 120 volts of alternating current (V_{AC}). Ensure that the system will operate with an input voltage ranging from 89 to 135 V_{AC}. If a system device requires operating voltages other than 120 V_{AC}, supply a voltage converter.

660-2.1.2.3 Microwave: A microwave vehicle detection system (MVDS) transmits, receives, and analyzes a FCC-certified, low-power microwave radar signal to detect vehicle presence, provide a detection output, and generate volume, occupancy, and speed data.

Ensure that sidefire MVDS sensors used for data collection have a minimum 200-foot range and the capability to detect 8 lanes of traffic.

660-2.1.2.3.1 Configuration and Management: Ensure that the MVDS is provided with software that allows local and remote configuration and monitoring. Ensure that the system software can display detection zones and detection activations in a graphical format.

Ensure that the MVDS allows a user to edit previously defined configuration parameters, including size, placement, and sensitivity of detection zones.

Ensure that the MVDS retains its programming in nonvolatile memory. Ensure that the detection system configuration data can be saved to a computer and restored from a saved file. Ensure that all communication addresses are user programmable.

Ensure that the detection system software offers an open API and software development kit available to the Department at no cost for integration with third party software and systems.

660-2.1.2.3.2 Communications: Ensure that major components of the detection system (such as the sensor and any separate hardware used for contact closures), include a minimum of one serial or Ethernet communications interface.

Ensure the serial interface and connector conforms to TIA-232 standards. Ensure that the serial ports support data rates up to 115200 bps; error detection utilizing parity bits (i.e., none, even, and odd); and stop bits (1 or 2).

Ensure that wired Ethernet interfaces provide a 10/100 Base TX connection. Verify that all unshielded twisted pair/shielded twisted pair network cables and connectors comply with TIA-568.

Ensure wireless communications are secure and that wireless devices are FCC-certified. Ensure that the FCC identification number is displayed on an external label and that all detection system devices operate within their FCC frequency allocation.

Ensure cellular communications devices are compatible with the cellular carrier used by the agency responsible for system operation and maintenance.

Ensure the system can be configured and monitored via one or more communications interface.

660-2.1.2.3.3 Solid State Detection Outputs: Ensure outputs meet the requirements of NEMA TS2-2003, 6.5.2.26.

660-2.1.2.3.4 Electrical Requirements: Ensure the microwave detector will operate with a nominal input voltage of 12 V_{DC}. Ensure the microwave detector will operate with an input voltage ranging from 89 to 135 V_{AC}. If any system device requires operating voltages other than 120 V_{AC}, supply a voltage converter.

Ensure that the detector is FCC-certified and that the FCC identification number is displayed on an external label. Ensure that the detector has been granted authorization to operate within a frequency range established and approved by the FCC.

660-2.1.2.4 Wireless Magnetometer: A wireless magnetometer detection system (WMDS) uses one or more battery-powered wireless sensors embedded in the road surface, which communicates data by radio to a roadside receiver. Wireless magnetometer systems detect vehicle presence and provide a detection output to traffic controllers or other devices that can generate volume, occupancy, and speed data.

660-2.1.2.4.1Configuration and Management: Ensure that the detection system is provided with software that allows local and remote configuration and monitoring.

Ensure that the WMDS allows a user to edit previously defined configuration parameters.

Ensure that the WMDS retains its programming in nonvolatile memory. Ensure that the detection system configuration data can be saved to a computer and restored from a saved file. Ensure that all communication addresses are user programmable.

Ensure that the detection system software offers an open API and software development kit available to the Department at no cost for integration with third party software and systems.

660-2.1.2.4.2 Communications: Ensure that components of the detection system (such as sensors, access points, and contact closure cards) include a minimum of one serial or Ethernet communications interface.

Ensure the serial interface and connector conforms to TIA-232 standards. Ensure that the serial ports support data rates up to 115200 bps; error detection utilizing parity bits (i.e., none, even, and odd); and stop bits (1 or 2).

Ensure that wired Ethernet interfaces provide a 10/100 Base TX connection. Verify that all unshielded twisted pair/shielded twisted pair network cables and connectors comply with TIA-568.

Ensure wireless communications are secure and that wireless devices are FCC-certified. Ensure that the FCC identification number is displayed on an external label and that all detection system devices operate within their FCC frequency allocation.

Ensure cellular communications devices are compatible with the cellular carrier used by the agency responsible for system operation and maintenance.

Ensure the system can be configured and monitored via one or more communications interface.

660-2.1.2.4.3 Solid State Detection Outputs: Ensure outputs meet the requirements of NEMA TS2-2003, 6.5.2.26.

660-2.1.2.4.4 Electrical Requirements: Ensure the detection system will operate with an input voltage ranging from 89 to 135 V_{AC}. If any system device requires operating voltages other than 120 V_{AC}, supply a voltage converter.

660-2.1.2.5 Automatic Vehicle Identification (AVI): An AVI detection system uses one or more different methods to collect information that can be used to establish a unique identifier for each vehicle detected and the time and location that the vehicle was detected. AVI detection systems collect data using radio-frequency identification (RFID), optical character recognition, magnetic signature analysis, laser profiling, Bluetooth®, or other methods to establish vehicle identifier, time, and location.

660-2.1.2.5.1 Configuration and Management: Ensure that the detection system is provided with software that allows local and remote configuration and monitoring.

660-2.1.2.5.2 Communications: Ensure that components of the detection system (such as sensors, controllers, and processing hardware) include a minimum of one serial or Ethernet communications interface.

Ensure the serial interface and connector conforms to TIA-232 standards. Ensure that the serial ports support data rates up to 115200 bps; error detection utilizing parity bits (i.e., none, even, and odd); and stop bits (1 or 2).

Ensure that wired Ethernet interfaces provide a 10/100 Base TX connection. Verify that all unshielded twisted pair/shielded twisted pair network cables and connectors comply with TIA-568.

Ensure wireless communications are secure and that wireless devices are FCC-certified. Ensure that the FCC identification number is displayed on an external label and that all detection system devices operate within their FCC frequency allocation.

Ensure cellular communications devices are compatible with the cellular carrier used by the agency responsible for system operation and maintenance.

Ensure the system can be configured and monitored via one or more communications interface.

660-2.1.2.5.3 Probe Data Detector Requirements

1. Transponder Readers: Ensure transponder readers are compatible with multiple tag protocols, including Allegro and the protocol defined in ISO18000-6B.

2. Bluetooth Readers: Ensure that Bluetooth readers will operate using solar power and cellular communications. Ensure that Bluetooth readers will operate with a nominal input voltage of 12 V_{DC}.

3. License Plate Readers: Ensure license plate readers do not require the use of visible strobes or other visible supplemental lighting.

660-2.1.2.5.4 Electrical Requirements: Ensure the detection system will operate with an input voltage ranging from 89 to 135 V_{AC}. If any system device requires operating voltages other than 120 V_{AC}, supply a voltage converter.