

6600000 VEHICLE DETECTION SYSTEM  
COMMENTS FROM INTERNAL/INDUSTRY REVIEW

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Comments: (3-20-15)

**1. 660-2.1.2.1.5 Loop Sealant, 7<sup>th</sup> paragraph:** These two statements are redundant. Say either a shelf life of 12 months or retains properties during the 12 month period

→ → → → → Ensure loop sealant has a minimum shelf life of 12<sup>o</sup>yearmonths in undamaged containers ~~when stored per manufacturer recommendations and retains all specified properties under normal storage conditions during the 12<sup>o</sup>month period.~~<sup>[BK1]</sup>¶  
The supplied containers must have a label showing the:

Response: Agree. Language has been modified.  
Changes made.

**2. 660-2.1.2.2.2 Detection Camera:** Insert the highlighted text.

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 **meeting the requirements of Section 662**<sup>[BK2]</sup> ~~that and is listed on the APL.~~¶

Response: We do not plan to evaluate these cameras against all of the requirements in Section 682 and list them separately. That would be overkill. However, the camera(s) approved for use with the video detection system will be identified in the APL listing for the system.  
Change made.

**3. 660-2.1.3 Mechanical Requirements for all Detectors:** Insert highlighted text.

→ → → **660-2.1.3 Mechanical Requirements for all Detectors:** **Ensure equipment is permanently marked with manufacturer name or trademark, part number, and**<sup>[BK3]</sup> **date of manufacture or serial number.** Ensure that all parts are made of corrosion-resistant materials, such as plastic, stainless steel, anodized aluminum, brass, or gold-plated metal. Ensure that all fasteners exposed to the elements are Type 304 or 316 passivated stainless steel.¶

Response: Agree. Change made.

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Comments: (3-23-15)

Thanks for updating operations, to be consistent with other specs. I offer the additional small changes (highlighted):

660-5 Method of Measurement.¶  
→ 660-5.1 Furnish and Install: The Contract unit price for each inductive loop detector and per assembly for loop assembly, furnished and installed, will include all equipment, materials as specified in the Contract Documents, and all labor, equipment, and miscellaneous materials necessary for a complete and accepted installation.¶  
→ → The Contract unit price for each component of an MVDS, VVDS, WMDS, or AVI detection system, furnished and installed, will include furnishing, placement, and testing of all materials and equipment, and for all tools, labor, equipment, hardware, operational software packages and firmwares, supplies, support, personnel training, shop drawings, warranty documentation, and incidentals necessary to complete the work.¶  
→ 660-5.2 Furnish: The Contract unit price for each inductive loop detector, per assembly

Response: Agree. Changes made.

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Comments: (3-31-15)

Why is the manufacturer's warranty being changed from 5 to 2 years?

Response: Prior warranty requirements for various detectors in 660 and 786 were:

- MVDS = 2years
- VVDS = 5years
- WMDS = 5years
- Acoustic (removed) = 3 years
- Loops = silent/undefined
- AVI=new/undefined.

The warranty durations were originally based on what was commonly required in TSPs and offered by vendors at the time (as far back as 2007). In some cases, this required manufacturers to factor in the inclusion of an "extended" warranty in their prices. In an effort to be more consistent, we opted to standardize on a minimum of 5 years when we did the 660 consolidation and update to see what kind of feedback we received. None was provided during the comment/review period, so we left it at 5 years.

We have since received a request from an MVDS manufacturer that we consider changing the duration of the MVDS warranty back to 2 years (as it was in the past). For consistency and fairness we should use the same duration as the minimum for the other detector types also. These devices perform the same function and we do not have a large amount of data to conclude whether or not one technology type is more or less reliable, or more prone to require repair than another. Based on our experience with these devices at the TERL, 2 years seems to be a commonly offered and reasonable standard warranty duration at this point in time. Reducing this to 2 years should also remove the need for bundled "extended warranties" to be provided for certain device types, hopefully resulting in reduced costs to the Department.

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Comments: (4-15-15)

In subarticle 660-2.3.1.2.2, in the sentence below please verify if 'I th' should be written as 'i th'. SEM,VD,Ini,vehk represents the speed for the k th vehicle in the I th lane during the early morning period using the vehicle detector.

Response: Yes. Change made.

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Comments: (4-15-15)

**1. Section 660-2.1.2.5.3 (2):** Please consider applications where commercial power and entity communication network is available and Power over Ethernet can be provided to the Bluetooth reader without the need of solar panel, and local Ethernet communication is available. In which case Cellular communications may not be required. An example of such application is when the BT reader is collocated with other ITS device like a camera or DMS sign structure. Some BT reader vendors can provide a "connected" version of the BT reader that is meant to be connected via Cat5 Network cable to a PoE injector and later an MFES switch. Example of such provider is Trafficast.

Response: Applications using commercial power and hardline network connection are accommodated in the current requirements. The requirements in 660-2.1.2.5.4 also apply to BT readers. BT readers are required to be capable of operation using hardline power and communication as well as solar and wireless.  
No change made.

**2. Section 660-2.3.1.2:** Many FDOT project requirements, are now mandating via their requirements document, to validate speed accuracy for 95% or better for each and every lane. This has proven almost impossible to achieve or validate in limited access highways with more than 3 lanes. The factors affecting measurement of speed with and FHP certified handheld laser speed gun are: Cosine effect error, occlusion when reading inside lanes and the exposure of technicians to live highway traffic while taking the speed measurements in the close proximity of the outside lanes. Since the APL certified detectors have been thoroughly tested and validated by TERL, I suggest that the specification 660-2.3.1.2 be modified to specify that the speed accuracy will be computed by obtaining the average ground truth data for the first two (2) highway lanes closest to the roadway's outside shoulder. The average ground truth data will be compounded by the average speed data from each of the two lanes being used for the speed validation, and not by using individual lane calculated accuracy. The accuracy or validity of the speed in the other lanes will be assumed as correct if the average accuracy calculation is 90% or higher on the two probed lanes

Response: The requirements are intended to ensure that speed accuracy is 95% or better with respect to average speed across all lanes, across all periods sampled. Drops below 95% accuracy in an individual lane, in an individual time slice, are not uncommon and should not be grounds

for failure based upon current requirements. The Department is currently sponsoring a research project to investigate data needs and detection accuracy requirements. The accuracy levels required by current specifications can be met by several products that rely on different detection technologies. We are hesitant to raise minimum accuracy levels or reject systems that may occasionally drop below accuracy requirements when using a “per-lane” measure at this time. Based on current field experience with these products, it appears that no detector is able to maintain the minimum accuracy levels specified on a per-lane basis, in every lane, at all times. No change made.

**3. 660-2.4 and 660-2.4.1 (Penetration Rate):** Please consider how this requirement can be measured in a real world scenario. The number of qualified vehicles that passes within the Probe Detector detection area is almost impossible to quantify, since it involves transponder devices and active Bluetooth sessions, in live traffic situations, that are almost impossible to account for by an observer standing near the detection area. Consultants and contractors will be required by the local DOT projects to measure this penetration rate, on live roadways including arterials. This specs need to provide measurable parameters or a detailed explanation on how to measure them, while keeping in perspective the monetary cost involved with such test procedures.

Response: We agree that in-depth testing of penetration rate as part of field acceptance testing is unrealistic/unreasonable. A product that is approved and listed on the APL has already demonstrated compliance with penetration rate requirements. Listed products have also demonstrated that they are able to produce acceptable match rates. We recommend that field acceptance tests be used to verify that sites are installed in a manner that allows detectors to read data from a qualified vehicle within its general detection area and that match rates are reasonable. This can be accomplished by passing a qualifying vehicle (with a known transponder, Bluetooth device, etc.) multiple times through the detection area indicated in the contract documents and verifying that the information from the qualifying vehicle is captured. Similarly, it should be relatively straightforward to do a limited comparison of matches produced by upstream and downstream systems to total segment volumes in order to demonstrate compliance with match rate requirements. No change made.

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Comments: (4-27-15)

The Detection Camera as mentioned in 660-2.1.2.2.2 needs to be listed separately as a APL, instead of the video detection system manufacturer approved camera or the listed with the detection system on the APL. There have been video detection system manufacturer approved cameras that have not be performing well. The local agency (Broward Co.) have been incurring significant labor cost in removing and reinstalling cameras that are under a warranty.

Response: We have included information on the APL that identifies the cameras evaluated with the approved detection systems. We do not plan to evaluate these cameras against the requirements in Section 682 and list them separately. No change made.

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D5 Const.

Comments: (5-4-15)

**1. 660-2.1.2.1.5 Loop sealant:** Suggest the following: "Ensure loop sealant has a minimum shelf life of 12 months in undamaged containers when stored per manufacturer recommendation". This will ensure the material is stored properly in accordance with the manufacturer's recommendation, since neither the spec nor the APL cover the storage aspect.

Response: Text replaced to provide clarity that materials are expected to be stored per manufacturer recommendations.  
Change made.

**2. 660-2.1.2.5 Automatic Vehicle Identification (AVI):** Suggest leaving the spec as is: "AVI detection systems collect data". Technologies do not collect data, the system is.

Response: Agree. Change made.

**3. 660-4 Warranty:** Warranty is being reduced from 5 years to 2. Suggest not less than 3 years.

Response: Please see previous response to Rudy Powell.

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Comments: (5-12-15)

District 6 needs to comply with Miami Dade county specifications because it is the maintaining agency. Miami Dade requires that the loops are cut on the friction course, not the structural course.

Response: Noted.  
No change made.

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Comments: (5-12-15)

I would like for the loops to be placed prior to the FC, additionally, the last sentences of note 2 and 3 (DS 17781 1of2) are confusing and appear to conflict with 660-3.2.2 last paragraph. Please consider removing both these notes from the DS and consolidating this information in the Specifications by changing 660-3.2.2 second paragraph and adding an additional paragraph as follows below. I've tried to account for a range of FC thickness from 3/4" to 1 1/2" and given the

Engineer the capability to waive this requirement when insufficient structural course is an issue (typically on side streets).

"The width of all saw cuts shall be sufficient to allow unforced placement of loop wires or lead-in cables into the saw cut. The depth of all saw cuts, except across expansion joints, shall be no deeper than necessary. Ensure that the top conductor of the loop wire or lead-in cable is a minimum of 1 inch and a maximum of 3 ½ inches below the final surface of the roadway. On resurfacing or new roadway construction projects, the loop wires and lead-in cables shall be installed in the asphalt structural course prior to the placement of the final asphalt wearing course. In areas of insufficient structural course this requirement may be waived if approved by the Engineer."

Response: There is no conflict between 660-3.2.2 and 17781, but these are good points to consider as updates to the Design Standard. Updates to 17781 will require additional research, vetting, and input/agreement from other districts (see comment from D6 above). The specification content may be revised following updates to the Design Standard, but is not necessary at this time.

No change made.

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