**MODIFIED SPECIAL PROVISION APPROVAL REQUEST**

(REV 3-8-16)

**Date:** 1/27/20 **District:** 5 **Type:** Project Specific

**Letting Month:**  05/2020 **FPID Number:** 446159-1-52-01

**Requested by:** Alexander T. Mims, P.E. **Office/Phone:** 386-753-0558

**Specification being modified:** 660-4.4 Wrong Way Vehicle (WWVDS) Detection System

**Affected Pay Items:** 660-7-11 & 660-7-12

**Expected Cost Impact to this project:** No additional cost.

**Project Description:** Wrong Way Driving Signs Bundle A.

**Background Data:** The project includes installation of wrong way driving deterrents on 17 SR 400 (I-4) off-ramps in Orange County, Seminole County, and Volusia County. Project will install new signing, striping, and wrong way vehicle detection systems. This MSP provides supplementary acceptance testing requirements for wrong way vehicle detection systems installed.

**Name and PE Number of PE signing and sealing the Modified Special Provision:**

**PE Name:** Alexander T. Mims **PE Number:** 77095

***I hereby certify that this Specification was prepared under my responsible charge, and that it has been reviewed in accordance with procedures adopted and implemented by the Florida Department of Transportation.***

The official record of this Special Provision has been electronically signed and sealed by Alexander Teal Mims, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Firm Name: Traffic Engineering Data Solutions, Inc.

Firm Address: 80 Spring Vista Drive

City, State, Zipcode: DeBary, Florida 32713

Certificate of Authorization: 27392

Pages: 1 – 4

## VEHICLE DETECTION SYSTEM

(REV 01-27-20)

 SUBARTICLE 660-4.4 is deleted and the following substituted:

 **660-4.4 Wrong Way Vehicle (WWVDS) Detection System:** Perform testing of the WWVDS as recommended by the manufacturer and as described below. Submit test plan to the Engineer a minimum of 30 calendar days before commencement of testing for review and approval; tests cannot commence or be scheduled until test plans are approved by the Engineer. Notify the Engineer a minimum of 30 calendar days before the start of any tests to permit the Engineer or their representative to observe each test.

 Document detailed test procedures in the test plans. For each testing phase, test plans must include: descriptions of test procedures; test form with areas for test result recording, test conductor, and witness signatures; pass/fail criteria; and test schedule.

 **660-4.4.1 Field Acceptance Testing:** Conduct a field acceptance test for each ramp being monitored by a WWVDS. Test all system functions using the installed WWVDS equipment as detailed in the Plans and as approved by the Engineer. Testing must demonstrate that:

 1. All wiring and local configurations are correct.

 2. The WWVDS is detecting vehicles driving the wrong way, in all ramp travel lanes and any paved shoulders 8 feet or wider, while ignoring vehicles traveling in the correct direction. A true positive rate of 95% or greater must be achieved using the methodology described in Subarticle 660-4.4.1.1. A false positive rate of 1% or less must be achieved using the methodology described in Subarticle 660-4.4.1.2.

 3. The WWVDS is activating all wrong way highlighted signs on the ramp upon detection of a vehicle traveling in the wrong direction.

 4. The WWVDS is sending alerts and images to the District’s SunGuide® software upon detection of a vehicle traveling in the wrong direction consistent with the requirements of Subarticle 995-2.7.2.

 5. The WWVDS SunGuide® alert contains fully accurate information about the wrong way driving event detected.

 6. The WWVDS SunGude® images provide clear visibility of vehicle that was detected going the wrong direction.

 If any WWVDS fails to pass its field acceptance test, correct the unit or substitute another unit in its place, then repeat the test.

 If a unit has been modified as a result of a field acceptance test failure, prepare a report describing the nature of the failure and the corrective action taken and submit it to the Engineer prior to re-testing. If a failure pattern develops, the Engineer may direct that design and construction modification be made to all units without additional cost to the Department or extension of the Contract Time.

 **660-4.4.1.1 True Positive Testing:** Conduct this test on a closed ramp using Contractor-provided test vehicles. Test each lane and paved shoulder 8 feet or wider by driving two types of test vehicles traveling at two travel speed ranges the wrong direction. For this testing, the small vehicle shall be a FHWA Class Group 2 (passenger car) vehicle and the large vehicle shall be a FHWA Class Group 3 (pick-ups and vans) or Class Group 5 (two-axle truck) vehicle.

 Each ramp lane shall be subjected to all of the following test vehicle runs; each ramp paved shoulder 8 feet or wider must only undergo test runs described in #1 and #2.

 1. Five runs of a small vehicle traveling between 10 and 15 miles per hour.

 2. Five runs of a large vehicle traveling between 10 and 15 miles per hour.

 3.Five runs of a small vehicle traveling 35 miles per hour or greater.

 4. Five runs of a large vehicle traveling 35 miles per hour or greater.

 Calculate the true positive rate using the following formula:

 $TPR= ^{TP}/\_{N }\*100$

 Where *TPR* = True positive rate %.

 *TP* = Cumulatively for all test runs, the total number of times the WWVDS correctly detected the wrong way vehicle, activated the highlighted signs, and transmitted alerts to the District’s SunGuide® software.

 *N* = Total number of test vehicle runs.

 **660-4.4.1.2 False Positive Testing:** Conduct this test on a ramp open to the traveling public. Test the WWVDS by monitoring a minimum of 300 total vehicles traveling in the correct direction of travel passing through the WWVDS detection zones—at least 150 vehicles shall be monitored during daylight hours and at least 150 vehicles shall be monitored at night.

 Calculate the false positive rate using the following formula:

 $FPR= ^{FP}/\_{N }\*100$

 Where:

 *FPR* = False positive rate %.

 *FP* = Total number of times the WWVDS activated for a vehicle traveling in the correct direction.

 *N* = Total number of vehicles traveling in the correct direction.

 **660-4.4.2 Operational Testing:** After field acceptance testing is successfully completed, conduct a continuous 30 calendar day operational test. Include all control, monitoring, and communications functions of the WWVDS. This test shall demonstrate that all WWVDS installed function properly over the 30-day test period. During the test period, limit downtime due to mechanical, electrical, software, or other malfunctions to a maximum of three total calendar days. Limit the number of false positive detection events to one per ramp every two calendar days.

 If the system malfunctions because of any component failure, repair that component or substitute another in its place. Record any failures or anomalies during operational testing and supply the record to the Engineer at the conclusion of operational testing.

 If the system fails to operate properly for a total of four or more calendar days, testing will be restarted. The Engineer may select to pause and extend the 30-day test period by the number of days lost to failure and repair time in lieu of restarting the full 30-day test. The Engineer will provide the Contractor with a letter of approval and completion stating the first and last day of the 30-day test period upon successful completion of the test.