

WRONG WAY DRIVER WARNING SYSTEM TEST PLANS

1. DEVICE NAMING COORDINATION

- 1.1. The System Integrator shall coordinate with the TMC/ROC to identify the device names for each device.
- 1.2. The System Integrator shall then send a request to TOTS to identify the network name, IP address, and any pertinent configuration information.

2. EXPLANATION – STANDALONE (SALT) TESTING

- 2.1. The System Integrator shall work with the DEVICE VENDOR (if required by the testing form) and complete the NDOT specified SALT tests (non-network) on each unit of equipment after installation.
- 2.2. Conduct SALT testing on each unit of equipment as outlined on the NDOT provided testing form.
- 2.3. The System Integrator shall coordinate through the Resident Engineer and the Construction Crew to have an appropriate NDOT representative present for the onsite inspection.
- 2.4. The System Integrator shall submit the DEVICE vendor commissioning documents with the SALT testing to the Engineer for review and approval.
- 2.5. Supply a bucket truck and operator, or suitable equivalent equipment necessary to carry out procedures as required by the testing documents, at no direct payment..

WRONG WAY DRIVER WARNING SYSTEM (WWD) SALT PROCEDURE

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
WWD Name:		IP Address:	GPS:
TOTS Network Name:		Associated Cabinet Name:	
<i>Purpose and General Verification</i>			
<p>System Integrator: This SALT tests the proper installation of a functional WWD. The system integrator will use a laptop to perform this test. Using the manufacture's software, the integrator will be able to verify the WWD is operational.</p> <p>General Verification: For each test below, complete the WWD SALT Matrix, circling the "Pass" or "Fail" in the appropriate cell. Only indicate a "Pass" on this form if the entire matrix column related to the tested function passes for EACH WWD being tested.</p>			
<i>WWD Information</i>			
1.	Verify WWD Information using the manufacturer software or device label.	Manufacturer: _____ Model: _____ Serial Number: _____ Firmware Ver: _____	Pass / Fail
2.	Manufacturer's commissioning of WWD equipment.	Manufacturer confirmation of full operation of all WWD -associated equipment.	Pass / Fail
<i>Equipment Verification</i>			
3.	Verify WWD controller is securely mounted in cabinet.	WWD controller is securely mounted in cabinet.	Pass / Fail
4.	Verify power supply energizes the system.	System is energized.	Pass / Fail
5.	Verify all cabling is labeled with the to/from on each end and at any major transition point and is neatly managed throughout the cabinet.	All premise or inside plant cables originating and ending in the cabinet are properly terminated and labeled. Labeling material rated for Outside Plant (OSP) use. Cables are neatly managed using adjustable hook-and-loop fastener straps.	Pass / Fail
6.	Using a meter, verify the system is properly bonded to earth ground.	Meter reading of 5 Ohms or less.	Pass / Fail
7.	Verify operation of the Rectangular Rapid Flashing Beacon (RRFB) test button and the full Wrong Way Alert test button.	When respective test button is pressed, an alert is issued.	Pass / Fail
8.	Verify WWD User Interface (UI) is accessible.	WWD UI is accessible	Pass / Fail

9.	Verify WWD operations locally via User Interface (UI).	WWD turns on/off via User Interface (UI).	Pass / Fail			
10.	Using manufacturer's software, issue command to actuate the field device.	Visual confirmation of field device activation.	Pass / Fail			
11.	Using manufacturer's software issue command to de-actuate the field device.	Visual confirmation of field device deactivation.	Pass / Fail			
Verification of Settings						
12.	Verify Communication Settings are set to appropriate values per the IP plan.	IP: _____ MASK: _____ GATEWAY: _____ UDP/TCP PORT: _____	Pass / Fail			
Signatures						
DATE	AGENCY/FIRM	PERFORMED BY (Print Name) (Integrator)	INTL	AGENCY/FIRM	WITNESSED BY (Print Name) (NDOT)	INTL
Integrator Signature						
NDOT Signature						

3. EXPLANATION - SUBSYSTEM (SST) TESTING

- 3.1. At the beginning of the SST phase, the System Integrator shall submit, in PDF format and original signed hard copies of the certified SALT results for approval by the Engineer.
- 3.2. The Engineer shall approve all SALT testing prior to the System Integrator starting the SST testing.
- 3.3. Conduct SST testing in accordance with NDOT's testing documentation for all field and related equipment once the system has been interconnected to form a complete subsystem (i.e. Network connectivity).
- 3.4. The SST test shall demonstrate connectivity to all field equipment utilizing NDOT's current freeway management system (FMS).
- 3.5. The SST test consists of a 45-day period of operations without major failure of equipment. The Resident Engineer may require the SST be restarted if any major failure occurs. A major failure for the Wrong Way Driver System is defined as:
 - 3.5.1. Failure of any individual hardware component or equipment associated with the detection, notification, monitoring, control, or operation of the Wrong Way Driver System.
 - 3.5.2. Five false detections or more within any consecutive seven-day period during the SST period.
 - 3.5.3. One false validation or more within any consecutive seven-day period during the SST period.
 - 3.5.4. One delayed notification or more taking longer than 60-seconds to the TMC/ROC within any consecutive seven-day period during the SST period.
 - 3.5.5. One missed notification or more to the TMC/ROC within any consecutive seven-day period during the SST period.
 - 3.5.6. Any missed detection or validation of a true (confirmed) wrong way driver event during the SST period.
- 3.6. Demonstrate that the total system (hardware, firmware, software, materials, and construction) are properly installed, free from problems, exhibits stable and reliable performance, and meets project requirements.
- 3.7. Once per week, the System Integrator shall demonstrate that all system functions tested in the SST are operational and meets requirements.
- 3.8. The System Integrator shall coordinate through the Resident Engineer and the Construction Crew to have an appropriate NDOT representative present for the onsite inspection.

- 3.9. The System Integrator must provide proof that each device has been tested each week for the duration of the testing period witnessed by an NDOT representative.
- 3.10. The testing time must be scheduled a minimum of one week prior and coordinated and approved by the Resident Engineer and the Construction Crew.

WRONG WAY DRIVER WARNING SYSTEM (WWD) SST TEST PROCEDURE

TEST #	SST TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL		
WWD Name:		IP Address:	GPS:		
TOTS Network Name:		Associated Cabinet Name:			
<i>Purpose and General Verification</i>					
<p>System Integrator: This SST tests the proper installation of a functional WWD. The system integrator will use an Operator Workstation at the TMC/ROC to perform this test.</p> <p>General Verification: For each test below, complete the WWD SST Matrix, circling the "Pass" or "Fail" in the appropriate cell. Only indicate a "Pass" on this form if the entire matrix column related to the tested function passes for EACH WWD being tested.</p>					
<i>System WWD Information</i>					
1.	Verify network connectivity by issuing a ping test from the WWD workstation located at the TMC/ROC.	WWD responds to the ping test.	Pass / Fail		
2.	Verify field device operation with system turned on from the WWD workstation located at the TMC/ROC.	Visual confirmation of field device activation.	Pass / Fail		
3.	Verify SMTP functionality by sending a test email.	WWD correctly sends an email to the TMC/ROC.	Pass / Fail		
4.	Verify field device operation with system turned off from TMC/ROC.	Visual confirmation of field device deactivation.	Pass / Fail		
5.	Verify access to the Web User Interface (UI) from the TMC/ROC.	Web User Interface (UI) is accessible.	Pass / Fail		
6.	<p>Verify notification of a true positive event occurrence (an actual vehicle is driving against the intended flow of traffic) to the TMC/ROC.</p> <p>***This procedure shall be performed with 4 vehicles (motorcycle, small-, medium- and large vehicle) at 3 different speeds (5 mph, 25 mph, and 45 mph, unless determined unsafe by the engineer)</p> <p>***This test shall be performed on SST Day 1 with all listed vehicles and speeds. On SST Day 45 it shall be tested with a motorcycle at 25 mph (unless directed otherwise by the Engineer).</p>	WWD properly sends a notification, consisting of a time stamp, location, and supporting video of the event, of a true positive event to the TMC/ROC.	Pass / Fail		
SST DAY	DATE	PERFORMED BY (Integrator)	INTL	WITNESSED BY (NDOT)	INTL
1					

8					
15					
22					
29					
36					
45					

Wrong Way Driver (WWD) Vehicle Matrix					
SST Day 1 Date:			WWD Location:		
Vehicle Type	Vehicle Model	5MPH	25MPH	45MPH	
Motorcycle		Pass / Fail	Pass / Fail	Pass / Fail / N/A	
Small Vehicle		Pass / Fail	Pass / Fail	Pass / Fail / N/A	
Medium Vehicle		Pass / Fail	Pass / Fail	Pass / Fail / N/A	
Large Vehicle		Pass / Fail	Pass / Fail	Pass / Fail / N/A	

Wrong Way Driver (WWD) Vehicle Matrix				
SST Day 45 Date:			WWD Location:	
Vehicle Type	Vehicle Model	25MPH		Reason (if applicable)
Motorcycle		Pass / Fail / N/A		