WEBRELAY CONTROLLER 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.

WEBRELAY SALT PROCEDURE

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL

Web Relay Name:		IP Address:		GPS:	
TOTS Network Name:		Associated Cabinet Name:			

Purpose and General Verification

System Integrator: This SALT tests the ability to control a WebRelay from the field cabinet using a laptop. The District is to supply the standard X-410E-S configuration file. The file to be loaded requires the Control-By-Web (CBW) load utility, available on the CBW website, www.controlbyweb.com.

General Verification: For each test below, complete the WebRelay SALT Matrix, circling the "P" or "F" in the appropriate cell. Only indicate a "Pass" on this form if the entire matrix column related to the tested function passes for EACH WebRelay being tested.

Equipment Information

1.	Verify WebRelay Equipment Information using the Web User Interface (UI), the manufacturer software or device label.	**Manufacturer:** _____ **Model:** _____ **Serial Number:** _____ **Firmware Version:** _____	Pass / Fail

Cabling and Grounding

2.	Verify that the WebRelay Controller System is properly mounted within the cabinet.	The WebRelay controller is securely mounted in cabinet.	Pass / Fail
3.	Using a meter, verify the system is properly bonded to earth ground.	Meter reading of 5 Ohms or less.	Pass / Fail
4.	Verify the WebRelay cable length does not exceed 328 feet from the WebRelay to the PoE++ injector or PoE++ switch, using either a time domain reflectometer or beginning- and end-foot markers.	The Ethernet cable length is less than 328 feet. Cable Length: _____	Pass / Fail
5.	Verify the power supply energizes the system.	System is energized.	Pass / Fail
6.	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
7.	Verify WebRelay operations locally via Web User Interface (UI).	WebRelay turns on/off via Web UI.	Pass / Fail

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
8.	Verify the WebRelay can maintain the load requirements of the connected equipment.	The WebRelay Controller maintains uninterrupted power for 5 minutes to all loads.	Pass / Fail
9.	Test door open / close operations and adjust sensor as need to ensure a positive contact.	Door sensors operate as expected according to the NDOT WebRelay block diagram and/or schematic.	Pass / Fail

Verification of Settings

10.	Verify Communication Settings are set to appropriate values per the IP plan.	**IP:** _____ **MASK:** _____ **GATEWAY:** _____ **UDP/TCP PORT:** _____	Pass / Fail

WebRelay Quality Assurance

11.	Verify sign activation. If used as a Flashing Beacon Controller, contact NDOT to provision the field device and WebRelay server.	The sign flashes and the current sensor latched when the "Sign ON" button is pressed. "Beacon Status" and "Beacon Light" switched from Red to Green. The "Beacon Starts" counter incremented.	Pass / Fail
12.	Verify Temperature and Humidity values.	The WebRelay GUI interface and WebRelay server produced accurate Temperature and Humidity readings	Pass / Fail
13.	Verify Voltage In reading on the WebRelay Web UI.	Cabinet voltage is the same as the WebRelay Voltage In reading.	Pass / Fail
14.	Verify Cabinet Power Relay is switching in the Web UI.	The "Cab Power" button activated the closure of the WebRelay.	Pass / Fail
15.	(Optional) Verify the DTMF command operates the 'Beacon light' closure. Work with District Staff to identify the necessary DTMF codes.	The 'DTMF' input should toggle from a Red OFF to a Green ON state. The Beacon Status light shall follow the DTMF action from OFF to ON and so forth.	Pass / Fail / NA
16.	Verify WebRelay operates as expected after a power cycle.	WebRelay is accessible and functions as expected after a power cycle.	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.

3.5. The SST test consists of a 45-day period of operations without major failure of equipment. The Resident Engineer can require the SST be restarted if any major failure occurs. A major failure for the Web Relay Controller is defined as:

3.5.1. Any failure of the equipment associated with the PRIMARY FUNCTION of the Web Relay Controller.

3.6. Demonstrate that the total system (hardware, firmware, software, materials, and construction) is properly installed, is free from problems, exhibits stable and reliable performance, and meets 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.

WEBRELAY SST PROCEDURE

TEST #	SST TEST PROCEDURE	EXPECTED RESULT		PASS / FAIL
Web Relay Name:		**IP Address:**	**GPS:**	
TOTS Network Name:		**Associated Cabinet Name:**		

Purpose and General Verification

System Integrator: *This SST tests the ability to view and control a WebRelay from TMC/ROC using an operator workstation. The District WebRelay server shall also need to be provisioned by District Staff.*

General Verification: For each test below, complete the WebRelay SST Test Matrix, circling the "P" or "F" in the appropriate cell. Only indicate a "Pass" on this form if the entire matrix column related to the tested function passes for EACH WebRelay being tested.

WebRelay Quality Assurance

1.	From TMC/ROC workstation display, verify the presence of the WebRelay.	WebRelay communication and control page are present. It should be noted if during the 45 days that any WebRelay field turns bright yellow to indicate a communication loss.	Pass / Fail

On-Screen Display

2.	Verify the WebRelay name is correct and displays as expected.	WebRelay Controller name is clearly visible and has the correct name on the control page.	Pass / Fail

WebRelay Operations

3.	Verify WebRelay control status. i.e. Perform a "Beacon Light" activation.	The "Beacon status" changed to a green state and the "Beacon Start" field incremented. After the "Beacon Light" button is pressed it turned back to its original "OFF" state.	Pass / Fail

Signatures

SST DAY	DATE	PERFORMED BY (Print Name) (Integrator)	INTL	WITNESSED BY (Print Name) (NDOT)	INTL
1					
8					
15					
22					
29					
36					
45					

Integrator Signature	
NDOT Signature	