PTZ CCTV CAMERA 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 provided 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.

PTZ CCTV (CCTV) SALT PROCEDURE

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
Camera Name:		**IP Address:**	**GPS:**
TOTS Network Name:		**Associated Cabinet Name:**	
Purpose and General Verification			
System Integrator: *This SALT tests the ability to view and control a CCTV camera with an integrated video encoder from the top of the pole to the field cabinet using a laptop. TOTS will provide the software required for the execution of these test procedures depending on the camera manufacturer.* ***General Verification****: For each test below, complete the CCTV 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 CCTV CAMERA being tested.*			
Equipment Information			
1.	Verify CCTV information using the manufacturer software or device label.	**Manufacturer: _____** **Model: _____** **Serial Number: _____** **Firmware Version: _____**	Pass / Fail
Installation, Cabling, and Power			
2.	Verify the CCTV is securely mounted on top of the pole.	CCTV is securely mounted on top of the pole.	Pass / Fail
3.	Verify the CCTV controller is securely mounted in the cabinet/rack.	CCTV controller is securely mounted in the cabinet/rack.	Pass / Fail
4.	Using a meter, verify the system is properly bonded to earth ground.	Meter reading of 5 Ohms or less.	Pass / Fail
5.	Verify the CCTV camera cable length does not exceed 328 feet from the camera housing 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
6.	Verify the power system energizes the system.	System is energized.	Pass / Fail
7.	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

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
8.	Verify CCTV operations locally via Web User Interface (UI).	CCTV turns on/off via Web UI.	Pass / Fail
9.	Using manufacturer's software, issue command to actuate the field device.	Visual confirmation of field device activation.	Pass / Fail
10.	Using manufacturer's software issue command to de-actuate the field device.	Visual confirmation of field device deactivation.	Pass / Fail
Verification of Settings			
11.	Verify Communication Settings are set to appropriate values per the IP plan.	**IP: _____** **MASK: _____** **GATEWAY: _____** **UDP/TCP PORT: _____**	Pass / Fail
12.	Verify the video settings.	**MULTICAST IP: _____** **VIDEO PORT: _____** **ENCODING: _____** **RESOLUTION: _____** **BIT RATE: _____** **FRAME RATE: _____** **QUALITY: _____**	Pass / Fail
13.	Verify the CCTV is running the FAST or Axis VAPIX protocol.	CCTV is running the FAST or Axis VAPIX protocol.	Pass / Fail
Video Quality Assurance			
14.	Verify video quality.	Video shall be free from snow, ghosting, AC ripple, hesitation, pixilation, and other abnormalities. *Tested through surge protection.	Pass / Fail
15.	Verify Real Time Streaming Protocol (RTSP) and Real Time Protocol (RTP) is enabled and is accessible through the VLC media player. This may require the use of a Session Description Protocol (SDP) file or dedicated multicast Uniform Resource Identifier (URI). Annotate if an Session Description Protocol (SDP) file was used in lieu of a Uniform Resource Identifier (URI).	Video is present. The unicast and multicast video is playable in VLC media player. **RTSP URI used:** **RTP URI used (may require SDP file):**	Pass / Fail

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
16.	Using VLC media player verify the presence of video streaming on your laptop screen.	Verify nominal loss of frames for the testing duration. VLC media player > Tools > Codec Information > Statistics Tab. Nominal loss is no more than 20 to 30 video frames lost for a duration of five (5) minutes. **Test Duration: _____** **Video Frames Lost: _____** Provide screenshots of passing test results with the test documentation.	Pass / Fail
Camera Titling			
17.	Issue a command to download a CCTV title.	Camera title is displayed correctly (all caps) on the test monitor.	Pass / Fail
18.	Issue a command to display the camera title.	Camera title is displayed correctly (all caps) by the test software.	Pass / Fail
19.	Issue a command to stop displaying titling.	Camera title is not displayed	Pass / Fail
20.	If applicable, issue a command to display the cardinal direction.	Cardinal direction is correctly displayed.	Pass / Fail / NA
Privacy Zones			
21.	Verify privacy zones have been setup as specified on the plans.	Privacy zones have been set according to the plans	Pass / Fail / N/A
22.	Verify privacy zones are functional.	When attempting to view a privacy zone, view is restricted. Privacy zones appear as a single-color overlay where set.	Pass / Fail / N/A
On-Screen Display and Cardinal Direction			
23.	Verify the camera name is correct and displays as expected on the video stream.	Camera name is clearly displayed and correctly named as shown in the Equipment Information field of this document. **Name: _____**	Pass / Fail
24.	Verify the cardinal direction is correct and displays as expected on the video stream.	Cardinal direction is correctly identified.	Pass / Fail / NA
CCTV Operations			

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
25.	Perform pan check through the full 360° using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail
26.	Perform pan check through the full 360° using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail
27.	Perform tilt check to the high and low stopping points using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail
28.	Perform tilt check to the high and low stopping points using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail
29.	Perform zoom check between in and out limits.	Camera zooms in and out smoothly and stops when expected.	Pass / Fail
30.	Verify zoom out limit.	Zoom out limit meets manufacturer's specification.	Pass / Fail
31.	Verify that a selected object image sharpens or blurs when exercising focus command.	CCTV focuses on the intended object as expected.	Pass / Fail
32.	Verify CCTV returns to focus when position is moved.	CCTV refocuses as expected.	Pass / Fail
33.	Verify that the iris can open and close.	The iris opens and closes as expected.	Pass / Fail
34.	Verify auto iris mode is enabled and functional.	The closed iris opens to the proper level for environmental conditions.	Pass / Fail
35.	Verify CCTV operates as expected after a power cycle.	Video returns after reboot.	Pass / Fail
36.	Verify four (4) presets, ¼ mile and ¾ mile, have been configured, as determined by the TMC/ROC prior to configuration.	The configured presets display what the TMC/ROC requested. **Preset 1: _____** **Preset 2: _____** **Preset 3: _____** **Preset 4: _____**	Pass / Fail
37.	Verify switching between presets operates without error.	The camera travels to each of the presets, in any order, smoothly.	Pass / Fail
38.	Verify defog / dehazing mode is enabled.	Defog / dehazing model is enabled	Pass / Fail
39.	Verify electronic image stabilization is enabled.	Electronic image stabilization is enabled.	Pass / Fail
40.	Verify Day/Night mode is enabled.	Day/Night mode is enabled.	Pass / Fail

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
41.	Verify the heater/fan on the CCTV camera is operational.	The heater/fan is enabled on the CCTV camera based on the manufacturer's recommendations. **Heater settings: _____** **Fan settings: _____**	Pass / Fail
Camera Lowering Device (CLD) Operation - Tower or High Mast (If Applicable)			
42.	Verify that the camera assembly is fit snugly to the top assembly of the CLD.	All electrical and signal contacts are fully engaged and operational when the camera unit is fully seated.	Pass / Fail / NA
43.	Verify that there is no tension on the operating cable, no locking of gears, and no tension on the braking device to keep the camera unit in place.	Lack of tension on the operating cable and braking device and no locking of gears of the CLD.	Pass / Fail / N/A
44.	Lower the unit fully per manufacturer directions.	Lowering the camera is be smooth and free from any excessive force or jerky movements.	Pass / Fail / NA
45.	Verify the presence of video using the Freeway Management System (FMS) media player.	Video is present.	Pass / Fail / NA
46.	Verify video quality.	Video quality is free from snow, ghosting, AC ripple, hesitation, pixilation, and other abnormalities.	Pass / Fail / NA
47.	Perform pan check through the full 360° using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / NA
48.	Perform pan check through the full 360° using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / NA
49.	Perform tilt check to the high and low stopping points using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / NA
50.	Perform tilt check to the high and low stopping points using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / NA
51.	Perform zoom check between in and out limits.	Camera zooms in and out smoothly and stops when expected.	Pass / Fail / NA
52.	Verify zoom out limit.	Zoom out limit meets manufacturer's specification.	Pass / Fail / NA
53.	Verify that a selected object image sharpens or blurs when exercising focus command.	CCTV focuses on the intended object as expected.	Pass / Fail / NA
54.	Verify CCTV returns to focus when position is moved.	CCTV refocuses as expected.	Pass / Fail / NA
55.	Verify that the iris can open and close.	The iris opens and closes as expected.	Pass / Fail / NA

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
56.	Verify auto iris mode is enabled and functional.	The closed iris opens to the proper level for environmental conditions.	Pass / Fail / NA
57.	Verify CCTV operates as expected after a power cycle.	Video returns after reboot.	Pass / Fail / NA
58.	After lowering the camera, remove the umbilical cord and fully raise the camera back up. Verify that the unit properly re-seats in the socket.	The camera rises fully and smoothly and sit properly in the socket. The electrical and signal pins and sockets of the connector connect firmly.	Pass / Fail / NA
Confirm Camera Operations from Pole Top Position using Lowering Device (If Applicable)			
59.	Verify the presence of video using the Freeway Management System (FMS) media player.	Video is present.	Pass / Fail / N/A
60.	Verify video quality.	Video quality is free from snow, ghosting, AC ripple, hesitation, pixilation, and other abnormalities.	Pass / Fail / N/A
61.	Perform pan check through the full 360° using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / N/A
62.	Perform pan check through the full 360° using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / N/A
63.	Perform tilt check to the high and low stopping points using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / N/A
64.	Perform tilt check to the high and low stopping points using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / N/A
65.	Perform zoom check between in and out limits.	Camera zooms in and out smoothly and stops when expected.	Pass / Fail / N/A
66.	Verify zoom out limit.	Zoom out limit meets manufacturer's specification.	Pass / Fail / N/A
67.	Verify that a selected object image sharpens or blurs when exercising focus command.	CCTV focuses on the intended object as expected.	Pass / Fail / N/A
68.	Verify CCTV returns to focus when position is moved.	CCTV refocuses as expected.	Pass / Fail / N/A
69.	Verify that the iris can open and close.	The iris opens and closes as expected.	Pass / Fail / N/A
70.	Verify auto iris mode is enabled and functional.	The closed iris opens to the proper level for environmental conditions.	Pass / Fail / N/A
71.	Verify CCTV operates as expected after a power cycle.	Video returns after reboot.	Pass / Fail / N/A
Signatures			

TEST #	SALT TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL

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 PTZ CCTV Camera is defined as:

3.5.1. Any failure of the equipment associated with the PRIMARY FUNCTION of the PTZ CCTV Camera.

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.

PTZ CCTV (CCTV) SST PROCEDURE

TEST #	SST TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
Camera Name:		**IP Address:**	**GPS:**
TOTS Network Name:		**Associated Cabinet Name:**	
Purpose and General Verification			
System Integrator: *This SST tests the proper installation of a functional CCTV. The system integrator will use an Operator Workstation at the TMC/ROC to perform this test* ***General Verification****: For each test below, complete the CCTV 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 CCTV CAMERA being tested.*			
1.	Verify network connectivity by issuing a ping test from the CCTV workstation located at the TMC/ROC.	CCTV responds to the ping test.	Pass / Fail
2.	Verify field device operation with system turned on from the CCTV workstation located at the TMC/ROC.	Visual confirmation of field device activation.	Pass / Fail
3.	Verify field device operation with system turned off from TMC/ROC.	Visual confirmation of field device deactivation.	Pass / Fail
4.	Verify access to the Web User Interface (UI) from the TMC/ROC.	Web UI is accessible.	Pass / Fail
Video Quality Assurance			
5.	From TMC/ROC workstation display, verify the presence of video.	Video is present.	Pass / Fail
6.	Verify video quality feed to TMC/ROC.	Video is visually free of snow, ghosting, AC ripple, hesitation, pixilation, and other abnormalities when viewing from TMC/ROC.	Pass / Fail
Privacy Zones			
Privacy zones should be established such that they cover any area that should have restricted viewing. These areas are approved by an NDOT representative at the TMC/ROC in the SALT phase and will be verified as part of the SST. <u>NDOT may elect to waive the Privacy Zone tests.</u>			
7.	Verify privacy zones have been setup as specified on the plans.	Privacy zones have been set according to the plans.	Pass / Fail / N/A / Waived
8.	Verify privacy zones are functional.	When attempting to view a privacy zone, view is restricted. Privacy zones appear as a single-color overlay where set.	Pass / Fail / N/A / Waived
On-Screen Display			

TEST #	SST TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
9.	Verify the camera is name is correct and displays as expected.	Camera name is clearly displayed and correctly named as shown in the Equipment Information field of this document. **Name: _____**	Pass / Fail
10.	Verify the cardinal direction is correct and displays as expected on the video stream.	Cardinal direction is correctly identified.	Pass / Fail / NA
CCTV Operations			
11.	Perform pan check through the full 360° using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail
12.	Perform pan check through the full 360° using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail
13.	Perform tilt check to the high and low stopping points using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail
14.	Perform tilt check to the high and low stopping points using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail
15.	Perform zoom check between in and out limits.	Camera zooms in and out smoothly and stops when expected.	Pass / Fail
16.	Verify zoom out limit.	Zoom out limit meets manufacturer's specification.	Pass / Fail
17.	Verify that a selected object image sharpens or blurs when exercising focus command.	CCTV focuses on the intended object as expected.	Pass / Fail
18.	Verify CCTV returns to focus when position is moved.	CCTV refocuses as expected.	Pass / Fail
19.	Verify that the iris can open and close.	The iris opens and closes as expected.	Pass / Fail
20.	Verify auto iris mode is enabled and functional.	The closed iris opens to the proper level for environmental conditions.	Pass / Fail
21.	Verify CCTV operates as expected after a power cycle.	Video returns after reboot.	Pass / Fail
22.	Verify four (4) presets, ¼ mile and ¾ mile, have been configured, as determined by the TMC/ROC prior to configuration.	The configured presets display what the TMC/ROC requested. **Preset 1: _____** **Preset 2: _____** **Preset 3: _____** **Preset 4: _____**	Pass / Fail

TEST #	SST TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
23.	Verify switching between presets operates without error.	The camera travels to each of the presets, in any order, smoothly.	Pass / Fail
24.	Verify defog / dehazing mode is enabled.	Defog / dehazing model is enabled	Pass / Fail
25.	Verify electronic image stabilization is enabled.	Electronic image stabilization is enabled.	Pass / Fail
26.	Verify Day/Night mode is enabled.	Day/Night mode is enabled.	Pass / Fail
27.	Verify the heater/fan on the CCTV camera is operational.	The heater/fan is enabled on the CCTV camera based on the manufacturer's recommendations. **Heater settings: _____** **Fan settings: _____**	Pass / Fail
Camera Lowering Device (CLD) Operation - Tower or High Mast (If Applicable)			
28.	Verify that the camera assembly is fit snugly to the top assembly of the CLD.	All electrical and signal contacts are fully engaged and operational when the camera unit is fully seated.	Pass / Fail / N/A
29.	Verify that there is no tension on the operating cable, no locking of gears, and no tension on the braking device.	Lack of tension on the operating cable and braking device and no locking of gears of the CLD.	Pass / Fail / N/A
30.	Lower the unit fully per manufacturer directions.	Lowering of the camera should be smooth and free from any excessive force or jerky movements.	Pass / Fail / N/A
31.	From TMC/ROC workstation display, verify the presence of video.	Video is present.	Pass / Fail / N/A
32.	Verify video quality feed to TMC/ROC.	Video is visually free of snow, ghosting, AC ripple, hesitation, pixilation, and other abnormalities when viewing from TMC/ROC.	Pass / Fail / N/A
33.	Perform pan check through the full 360° using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / N/A
34.	Perform pan check through the full 360° using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / N/A
35.	Perform tilt check to the high and low stopping points using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / N/A
36.	Perform tilt check to the high and low stopping points using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / N/A
37.	Perform zoom check between in and out limits.	Camera zooms in and out smoothly and stops when expected.	Pass / Fail / N/A

TEST #	SST TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
38.	Verify zoom out limit.	Zoom out limit meets manufacturer's specification.	Pass / Fail / N/A
39.	Verify that a selected object image sharpens or blurs when exercising focus command.	CCTV focuses on the intended object as expected.	Pass / Fail / N/A
40.	Verify CCTV returns to focus when position is moved.	CCTV refocuses as expected.	Pass / Fail / N/A
41.	Verify that the iris can open and close.	The iris opens and closes as expected.	Pass / Fail / N/A
42.	Verify auto iris mode is enabled and functional.	The closed iris opens to the proper level for environmental conditions.	Pass / Fail / N/A
43.	Verify CCTV operates as expected after a power cycle.	Video returns after reboot.	Pass / Fail / N/A
44.	After lowering the camera, remove the umbilical cord and fully raise the camera back up. Verify that the unit properly re-seats in the socket.	The camera rises fully and smoothly and sit properly in the socket. The electrical and signal pins and sockets of the connector connect firmly.	Pass / Fail / NA
Confirm Camera Operations from Pole Top Position using Lowering Device (If Applicable)			
45.	From TMC/ROC workstation display, verify the presence of video.	Video is present.	Pass / Fail / N/A
46.	Verify video quality feed to TMC/ROC.	Video quality is free from snow, ghosting, AC ripple, hesitation, pixilation, and other abnormalities.	Pass / Fail / N/A
47.	Perform pan check through the full 360° using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / N/A
48.	Perform pan check through the full 360° using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / N/A
49.	Perform tilt check to the high and low stopping points using normal speed.	Camera moves smoothly at normal speed and stops when expected.	Pass / Fail / N/A
50.	Perform tilt check to the high and low stopping points using fast speed.	Camera moves smoothly at fast speed and stops when expected.	Pass / Fail / N/A
51.	Perform zoom check between in and out limits.	Camera zooms in and out smoothly and stops when expected.	Pass / Fail / N/A
52.	Verify zoom out limit.	Zoom out limit meets manufacturer's specification.	Pass / Fail / N/A
53.	Verify that a selected object image sharpens or blurs when exercising focus command.	CCTV focuses on the intended object as expected.	Pass / Fail / N/A

TEST #	SST TEST PROCEDURE	EXPECTED RESULT	PASS / FAIL
54.	Verify CCTV returns to focus when position is moved.	CCTV refocuses as expected.	Pass / Fail / N/A
55.	Verify that the iris can open and close.	The iris opens and closes as expected.	Pass / Fail / N/A
56.	Verify auto iris mode is enabled and functional.	The closed iris opens to the proper level for environmental conditions.	Pass / Fail / N/A
57.	Verify CCTV operates as expected after a power cycle.	Video returns after reboot.	Pass / Fail / N/A

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					