Testing for ASCT:

All required key personnel shall be in attendance prior to initiating the indicated test. The Resident Engineer will be the point-of-contact for the scheduling of the tests with the key personnel.

Definitions:

The term "Business Day" as used in this document is synonymous with the term "Working Day" as used in N.J.S.A. 27:7-31 and N.J.S.A. 27:7-33 and is any day exclusive of Saturdays, Sundays, State recognized legal holidays, and such other holidays or State office closings as declared by the State.

Documentation/Certification:

The contractor will provide documentation and certification for the testing of the devices carried out in the lab prior to installation and deployment in the field such as, but not limited to, 168 hour test for controller units, testing for image detector units, testing for system detector units and reference documentation as requested in the Verification Plan in the Special Provisions.

Deployment Testing:

The deployment testing period of 14 business days shall be completed prior to the initiation of System Integration Testing. Deployment testing shall include accuracy testing of the field installed detection units (image and system detection) as per Plans, Standard Specifications, and Special Provisions, including the testing of the integration of the detection units with the controller for the designed intersection operation.

Device failures are from the devices or components of the devices in the field. This type of failure requires that the failure be corrected within 24 hours of notification. The testing clock will be stopped when the Contractor is notified of the failure. After the repairs are completed, then the clock will resume at the start of the next business day. Contractor is required to submit the EL-11C form.

If the device failure occurs after the 11th business day of the 14 business day testing period, the clock will be stopped when the Contractor is notified. Then the clock will be restarted on the next business day, after the repairs are completed. In addition, five additional business days will be added to the testing period due to the failure occurring after the 11th day. The Contractor is required to submit the EL-11C form.

Operational failures will be defined as failure of the operation of the intersection as designed and indicated in the Systems Requirement document and the Verification Plan. This type of failure requires that the issue be corrected within four (4) hours of notification. The clock will be stopped upon notification to the Contractor and restarted on the next business day, after the repairs are completed.

If the testing accumulates five (5) operational failures, then the Contractor will be required to submit a Corrective Action Plan for review and approval by NJDOT. After the repairs are completed, then the clock will be restarted on the next business day. If there is an operational failure number six, then the 14 business day clock will be reset to day zero, after the repairs have been completed.

Subsystem Testing:

Subsystem testing requires testing of the remote operation of systems installed and integrated on NJDOT's IT network for the corridor, the testing period is 20 business days. Each subsystem will be tested independent of the other.

The Image Detection System, Radar Detection System, and Traffic Control System will be tested for remote access, functionality, monitoring and reporting requirements as specified in the System Requirements and Verification Plan documents, and Special Provisions. The tests will be verified over a period of 20 business days, wherein the operators will monitor and test multiple functionalities of each of the subsystems, including alarms and alerts, if applicable.

Failure will be defined as the inability of a subsystem to perform the designated function from a remote location, as indicated in the System Requirements, the Verification Plan, and the Special Provisions for the project. If one (1) or more devices fail at a specific time, then this will count as one (1) failure within that individual subsystem.

If there is a failure which requires the system to be offline for less than 12 hours, then this will result in no penalties to the Contractor and the testing clock will not be stopped. If the repairs take greater than 12 hours but less than five (5) business days, then the clock will resume on the next business day after the repairs have been completed. If the failure takes greater than five (5) business days, then the 20 business day testing clock will be reset to day zero.

If a specific subsystem accumulates 20 or more failures, then the Contractor shall submit a Corrective Action Plan which shall be reviewed and approved by NJDOT. After the repairs have been completed, then the 20 business day testing period will be reset at day zero.

System Integration Testing:

Each subsystem needs to integrate with Adaptive for full system functionality. The testing period will be 20 days. The testing for integration of the subsystems as per System Requirement and Verification Plans, part of Special Provisions, shall be carried out prior to acceptance of the system.

The inputs of the subsystem to the Adaptive System, and the accuracy of the resultant outputs shall be verified. The operational failures are defined as errors of the input from a subsystem, or an erroneous resulting output from the Adaptive System.

If the repair for any failure(s) takes between two (2) and 12 hours, then the testing clock will be stopped upon notification to the Contractor and will resume once the repair is completed. There will be one (1) business day added to the testing period due to this failure.

If the corrective action for any failures takes more than 12 hours, then the testing clock will be stopped upon notification to the Contractor and will resume once the repairs are completed. There will be three (3) business days added to the testing period.

If the failures accumulate to six (6) or more, then the Contractor shall submit a Corrective Action Plan for review and approval by NJDOT. The tasks or repairs will be at the Contactor's expense, and the testing clock will be reset to day zero after the repairs have been completed.

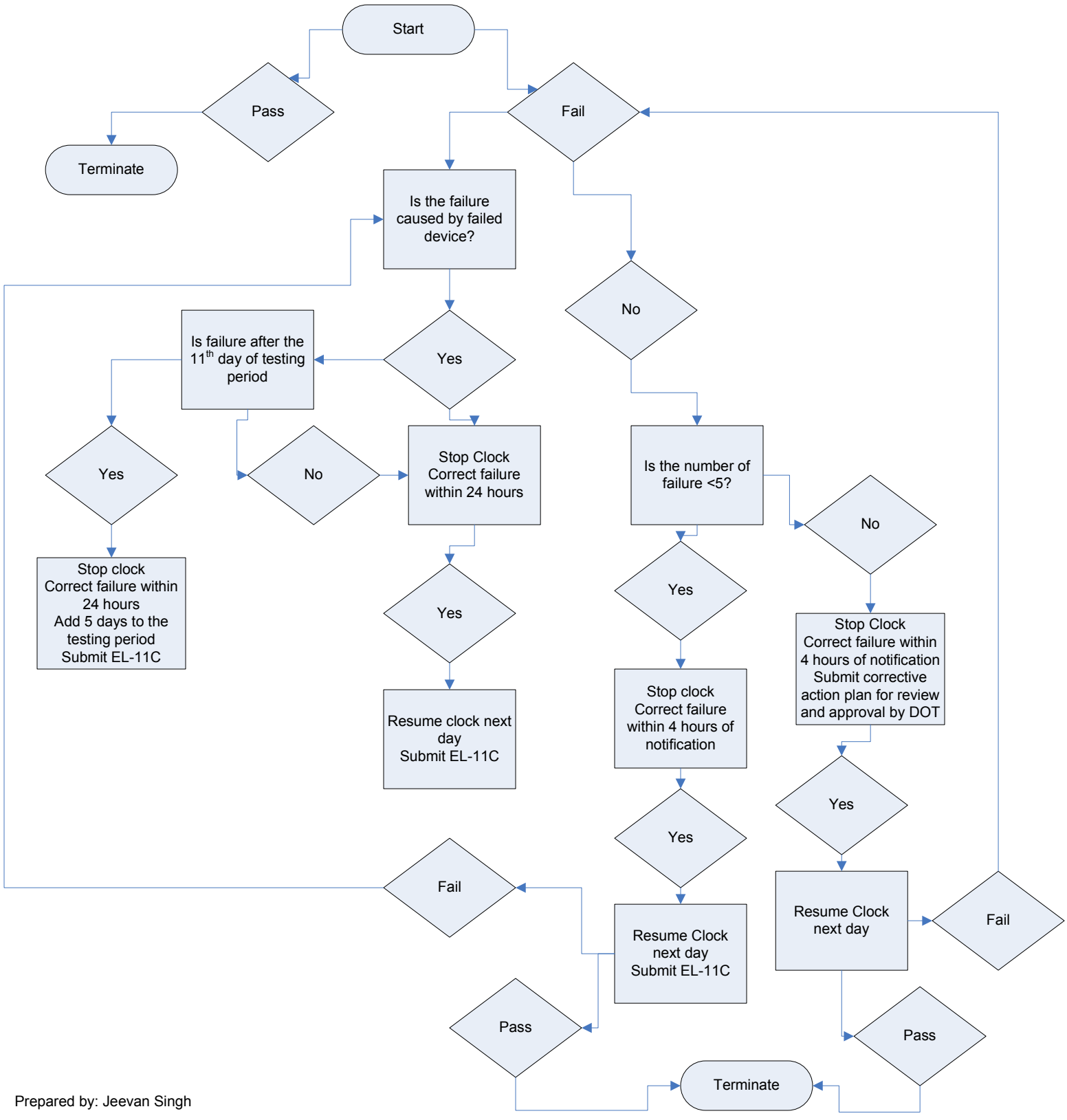
System Acceptance Testing:

The testing of the system, in accordance with the Validation Plan, part of Special Provisions and the successful completion of the System Integration testing shall be the initiation of System Acceptance. Additional documentation from the contractor will be required prior to Acceptance, as indicated in the As-Built Information forms, warranty, maintenance agreements, and continuing contractual obligations that need to be transferred over from the Contractor to NJDOT.

Deployment Testing

Pre-requisites:

1. Certification for Controller Bench Testing according to Section 702.03.01
2. Certification of Compliance for Image Detection – As per ITS Specifications (reference required – sample attached)
3. Certification of Compliance for Radar Detection – As per ITS Specifications (reference required – sample attached)
4. Installation Certificate from the Inspector on the job, through the RE certifying that "Installation is complete as per Design Plans & Special Provisions for the _____ project as designed unless otherwise noted (with approvals) below".
5. Calibration Certificate from the manufacturer certified agent, through the contractor indicating that "System components and devices have been calibrated to meet or exceed requirements in the Special Provisions and Design documents (as applicable) unless otherwise noted (with approvals) below".
6. Wiring and cable testing performed and submitted according to Section 701.03.15 D.
7. Notification of Intent to test (Letter submission by contractor to RE)
8. All required personnel are scheduled to be present at the time of testing in the field, including the required DOT staff, RE's office staff, Contractor's staff and all applicable Vendor staff.



Prepared by: Jeevan Singh

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **Side Street 1 Name:** _____

Side Street 2 Name:_____

This Deployment Test plan will not be initiated until the following requirements stated below have been met:

☐ Wiring and cable testing is completed according to Section 701.03.15D of the Specifications/Special Provisions.

☐ Attach the bench testing certification for the Controller Unit. Confirm that the serial number on the Certification document matches the unit that is being tested according to Section 701.03.07 of the Specifications/Special Provisions.

☐ Attach the material approval for the Image Detector Unit provided by the NJDOT.

☐ Attach the material approval for the System Detection, Type Radar Unit provided by the NJDOT.

☐ All the personnel required for the testing are present. This includes providing manufacture certified representative to ensure complete functionality of the system and subsystem. In addition, representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as Mobility and Systems Engineering are present.

☐ Installation Certificate Letter from NJDOT Designated Inspector stating "Construction at the intersection is complete as per Plans, Specifications and Special Provisions," unless otherwise noted.

☐ Calibration Completion Letter from the certified vendor or manufacturer's representative stating "Devices have been calibrated as required in the Specifications/Special Provision for the project unless otherwise noted.

☐ Letter of Intent to initiate the test from the Contractor.

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM _____ **(NB/SB/EB/WB/Median)** **Nearest Side Street Name:** _____

Area of Motion Detection: _____

This procedure outlines the Deployment Testing to be performed on the Traffic Volume System. Please perform the following test at the Controller, TVS cabinet using the vendor certified Software. This Deployment testing demonstrates that the individual devices at each work site are fully operational.

Mobility Management North ☐ **Mobility Management South** ☐

Testing Software Name : _____

TVS Manufacturer : _____ **TVS Model No:** _____

TVS Serial No. : _____

1: SOLAR EQUIPMENT TEST

No.	Task	Actual Value	Pass	Fail	Comments
1.	Mounting structure & Height.				Structure: Height(Feet):
2.	Vertical angle/Pitch of solar panel (degrees).				
3.	Orientation of solar panel (degrees).				
4.	Quantity of solar panels.				
5.	Dimensions of solar panel (Length x width in feet) each.				
6.	Record power output of solar panels (watts).				
7.	Record number of batteries.				
8.	Record battery capacity (each).				
9.	Record battery voltage (volts).				
10.	Verify terminals are tightened and covered.				
11.	Check circuit breaker functionality.				
12.	Record voltage on output side of charger (volts).				
13.	Verify wiring labeled, neat and organized.				
14.	Record load at charger (amps).				
15.	Turn off power supply for 2 minutes. Verify that battery backup retains the data.				

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **(NB/SB/EB/WB/Median)** **Nearest Side Street Name:** _____

Area of Motion Detection: _____

2: SENSOR TEST AT SYSTEM DETECTION, TYPE RADAR LOCATION

No.	Task	Actual Value	Pass	Fail	Comments
1)	Establish communications to System Detection, Type Radar unit.				
2)	Verify set clock function.				
3)	Verify sensor alignment tor detection zone.				
4)	Record RF channel.				
5)	Record number of lanes configured.				
6)	Identify the lane and direction of travel for the detection zones as configured. Note the lanes by software assigned zone as applicable.				
7)	Verify lane naming scheme with Resident engineer				
8)	Verify volume interval data bins				
9)	Verify speed interval data bins				
10)	Verify class interval data bins				
11)	Verify unit is receiving per vehicle interval data				
12)	Volume- Verify accurate vehicles counts for all detection. Perform manual count for each lane for 30 minute time interval. Record measured values.				

Nested table for item 6):

Direction (circle)	Left lane Zone #	Center Zone #	Right Zone #	Accel/Decel Zone #
EB / NB				
WB / SB				
On / off Ramp				

Nested table for item 12):

Lane/ Zone	Test 1	% Error	Test 2	% Error	Test 3	% Error

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **(NB/SB/EB/WB/Median)** **Nearest Side Street Name:** _____

Area of Motion Detection: _____

2: SENSOR TEST AT SYSTEM DETECTOR, TYPE RADAR LOCATION (continued)

No	Task	Actual Value	Pass	Fail	Comments
13)	Occlusion - Verify accurate occluded vehicle counts for all detection zones when blocked from view by an adjacent truck or large vehicle. Perform manual count for each lane for 30 minute time interval during peak period or a time period discussed with RE. Record measured values.				Record the % error:
14)	Speeds - Verify accurate speed data for all detection zones. Perform manual speed reading using radar gun (or equivalent device) for each accessible lane (i.e. lane adjacent to shoulder). Record the detector measured values.				Record the % error:
15)	Record storage mode configuration.				
16)	Map lanes to approach (as directed by MSE Representative).				
17)	Set data push 1 RS-232 or RS-485 or None.				
18)	Set data push 2 RS-232 or RS-485 or None.				
19)	Turn power Off to sensor, confirm settings remain upon reboot.				

Observed volume counts

Lane Zone #	Test #1	Test #2	Test #3

Measured volume counts from TVS

Lane Zone #	Test #1	Test #2	Test #3

Observed radar gun speeds

Lane Zone #	Test #1	Test #2	Test #3

Measured speeds from TVS

Lane Zone #	Test #1	Test #2	Test #3

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **(NB/SB/EB/WB/Median)** **Nearest Side Street Name:** _____

Area of Motion Detection: _____

3: SENSOR TEST AT CONTROLLER CABINET

No	Task	Actual Value	Pass	Fail	Comments
1)	Set clock.				
2)	Verify IP address loaded Ethernet converter.				
3)	Verify establish communications to radar device.				
4)	Upload radar data file to laptop.				
5)	Confirm data receive.				
6)	Number of I/O modules.				
7)	Number of lane outputs.				
8)	Confirm lane mapping to I/O module.				
9)	Confirm detector call is accurately placed in the controller for each lane at the designated ports.				

* For detector input configuration: Contact RE.

4. GENERAL CONTROLLER REQUIREMENTS

No	Task	Required Value	Measured Value	Pass	Fail	Comments
1)	Equipment enclosure provides protection to personnel against access to hazardous parts (lock, key, door function); provides protection of the equipment against ingress of dirt and sand, falling rain, sleet, snow, and external ice formation (tight seal).					
2)	Power supply voltage is adequate.	24 VDC ± 10%				
3)	Equipment is grounded per the NEC Standard. There are no loose wiring connections.					
4)	Ground resistance meets NEC Standard.	< = 25 ohms				
5)	Equipment is provided with surge protection.					

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: ____/____/____

Route: _____MM: _____ **Side Street 1**: _____

Side Street 2: _____ **Latitude Longitude:** _____

This procedure outlines the Deployment Testing to be performed on the Image Detector Camera (IDC), part of Image Detection System (IDS). Perform the following test at controller using NJDOT approved software. Deployment testing demonstrates that the individual devices at each work site are fully operational.

IDC Mfr.:_____ **IDC Manufacture Date:** ____/____/____

IDC Installation Date: ____/____/____

IDC Software: _____ **IDC Model:** _____

Interface Panel S/N: _____ **Access Point S/N:** _____

Input/ Output Type: _____ **IDC Warranty Period:** _____

Number of IDCs: _____

IDC 1:
CPU ID: _____ **Description:** _____

IDC 2:
CPU ID: _____ **Description:** _____

IDC 3:
CPU ID: _____ **Description:** _____

IDC 4:
CPU ID: _____ **Description:** _____

IDC 5:
CPU ID: _____ **Description:** _____

IDC 6:
CPU ID: _____ **Description:** _____

IDC 7:
CPU ID: _____ **Description:** _____

IDC 8:
CPU ID: _____ **Description:** _____

IDC 9:
CPU ID: _____ **Description:** _____

IDC 10:
CPU ID: _____ **Description:** _____

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **Side Street 1 Name:** _____

Side Street 2 Name: _____

5: IDC TEST AT CONTROLLER CABINET

No.	Task	IMAGE DETECTOR CAMERA									
		1	2	3	4	5	6	7	8	9	10
1)	IDC Approach Designation										
2)	IDC mfr. & wiring sunshield is secure										
3)	IDC is properly aimed and focused										
4)	Number of lanes being detected										
5)	Output Phase Assignment										
6)	Verify output from Detector Access point map to controller										
7)	Input Phase Assignment										
8)	Verify detection zone per approach										
9)	Verify digital streaming video										
10)	Zoom setting value										
11)	IDC background refresh rate										
12)	IDC overlay off/on										
13)	Upload and save detector file										
14)	No obstruction in IDC view										
15)	Phase assignment matches software										
16)	Phase assignment matches convention										

NEW JERSEY DEPARTMENT OF TRANSPORTATION
DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **Side Street 1 Name:** _____

Side Street 2 Name: _____

5: IMAGE DETECTOR TEST AT CONTROLLER CABINET (continued)

No.	Task	Pass	Fail	Comments
17)	Confirm TS1 I/O inputs are terminated to phase reds on controller backpanel.			
18)	Confirm TS1 I/O outputs are terminated to vehicle detects on controller backpanel.			
19)	Confirm TS2 connection to controller.			
20)	Confirm gray wire from I/O harness is terminated to controller cabinet logic board.			
21)	Confirm interface panel is grounded.			
22)	Confirm cable connection between Detector Interface and Detector Access Point.			
23)	Confirm IDC sensor cables securely terminated to Detector Interface.			
24)	Confirm IP address/ subnet mask / gateway are correct.			
25)	Confirm IDC refresh rate is higher than the longest cycle length.			
26)	Verify unused Detector Access point output pins are disabled.			
27)	Resync clock software from IDC software.			
28)	Verify Detector Access point Rotary selector switch is set to I/O position.			
29)	Confirm status LED on Detector Access point is flashing “Green”.			
30)	Verify that IDC has CCD sensor and integrated processor.			
31)	Confirm detector calls are accurately placed in the controller for each lane at the designated inputs.			
32)	Verify that IDC are being monitored.			
33)	Verify that IDC status is continuously monitored as : a. Operational b. Disabled c. Failed			
34)	Verify that the IDC switches to stop bar counter/presence detection bar during the green phase and switches back to full presence zone detection during all other times.			
35)	Local Detector fails in: a. Min Recall b. Max Recall c. Ped Recall			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **Side Street 1 Name:** _____

Side Street 2 Name: _____ **Approach:** NB ☐ SB ☐ EB ☐ WB ☐ _____ ☐

6: IMAGE DETECTOR ACCURACY TEST AT THE APPROACH & CONTROLLER CABINET

Volume – Please substantiate the accuracy of vehicle counts for all IDC for all approaches. Perform manual counts of vehicles for a 30 minute time interval for each detection lane and record the detector measured values. Contact RE regarding any negative changes in the conditions that would impact the accuracy of the device. Accuracy levels required under the circumstances will be as per RE discretion.

Table 1. Level of Service Criteria

Level of Service	Average Control Delay (sec/veh)
A	≤10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	>80

Lane orientation – Lane numeration begins from the median, to the curb /edge of the pavement.

Environmental Conditions: Snow ☐ Rain ☐ Fog ☐ Clear ☐ Other ☐

Traffic Level of Service (LOS):

☐ LOS A-B ☐ LOS C-D ☐ LOS E-F

Please check all appropriate boxes below that apply at the time of this test.

Illumination:

☐ Overhead Sun
☐ Steep incidence angle into the sun
☐ Dusk/Dawn
☐ Steep incidence angle, transverse
☐ Steep incidence angle away from the sun
☐ Night

Visual Noise/ Interference:

☐ None
☐ Optical degradation (dust on window)
☐ Wind-induced vibration (horizontal/ vertical sway)
☐ Optical degradation (water drops on window)

Verify if the following type of events were observed during visual counts.

☐ Detection with Latch
☐ Dropped After Detection
☐ Tailgate with Latch
☐ False Detection
☐ Failure to Detect
☐ Tailgate
☐ Multiple Detections
☐ False Detection with Latch

	Lane Configuration						Actual Value	Required Value	Pass	Fail
	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6				
Vehicle Detection	LT ☐ TH ☐ RT ☐	LT ☐ TH ☐ RT ☐	LT ☐ TH ☐ RT ☐	LT ☐ TH ☐ RT ☐	LT ☐ TH ☐ RT ☐	LT ☐ TH ☐ RT ☐	% of error	As per specification		
Detections by IDC										
Actual Vehicles (Visual counts)										

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: ____/____/____

Route: _____MM:_____ **Side Street 1 Name:** _____

Side Street 2 Name: _____ **Approach:** NB ☐ SB ☐ EB ☐ WB ☐ _____ ☐

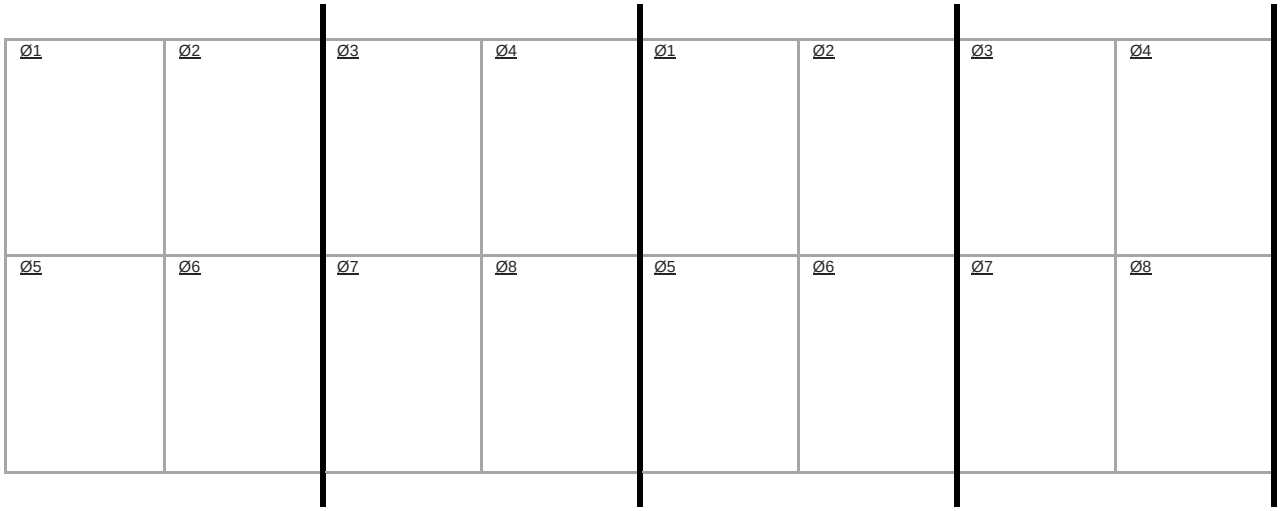
7: PHASE SETTING PROGRAMMED IN THE CONTROLLER

Fill out the table below based on the parameters programmed into the controller.

Phase	Direction	Amber	Red	PP	PED	WALK	FDW	Min Green	Max Green
Ø1									
Ø2									
Ø3									
Ø4									
Ø5									
Ø6									
Ø7									
Ø8									

☐ Verify that the intersection is running as per directive

Sequence: Populate the ring and barrier diagram based on the phasing sequence, overlaps, and pedestrian operations programmed into the controller which have been field verified. Utilize the legend seen at the bottom of the ring and barrier diagram to complete it.



——► Protected phase - - -► Permitted phase ◄- - -► Pedestrian phase

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING FORM

Project Name: _____ **Test Date**: _____/_____/_____

Route: _____MM: _____ **Side Street 1 Name:** _____

Side Street 2 Name: _____

DEPLOYMENT TEST RESULTS: **PASS** _____ **FAIL** _____

Correction Work Items:

1. _____
2. _____
3. _____
4. _____
5. _____

We agree that Deployment testing at the local intersection has been performed and that the information above accurately represents the results of the test.

Contractor Name: _____

Contractor Representative Name: _____

Signature: _____ **Date:** _____

Vendor Name: _____

Vendor Representative Name: _____

Signature: _____ **Date:** _____

ITS Inspector Name: _____

Signature: _____ **Date:** _____

Resident Engineer Name: _____

Signature: _____ **Date:** _____

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** _____/_____/_____

Route: _____**MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

This Deployment Test will not be initiated until all the requirements stated below have been met.

☐ All Sub-system Testing has been completed

☐ All the personnel required for the testing are present. This includes providing a manufacturer certified representative to ensure complete functionality of the system and subsystem. In addition, representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as NJDOT Mobility & Systems Engineering are present

☐ Installation Certificate Letter from NJDOT Designated Inspector stating "Construction at the intersection is complete as per Plans and Special Provisions," unless otherwise noted.

☐ Calibration Completion Letter from the certified vendor or manufacturer's representative stating "Devices have been calibrated as required in the Special Provisions for the project unless otherwise noted.

☐ Letter of Intent to initiate the test from the Contractor.

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** _____/_____/_____

Route: _____**MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

This procedure outlines the Deployment Testing to be performed on the Adaptive Signal Controller in the field. Please perform the following tests and/or verifications at the controller cabinet using NJDOT approved software. This Deployment Testing demonstrates that the individual devices at each work site are fully operational.

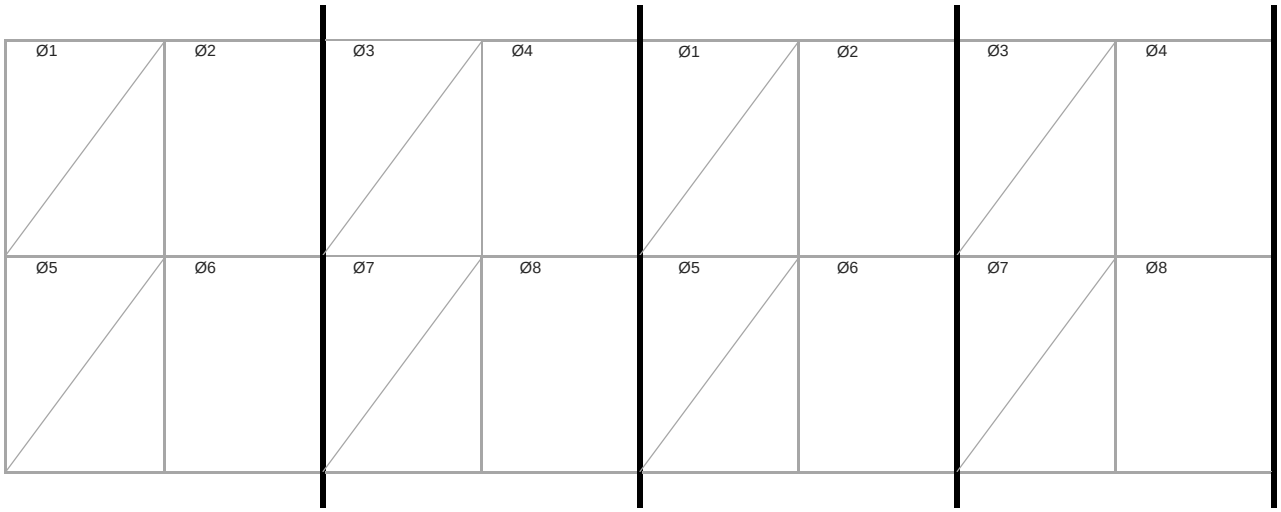
Software version: _____

Fill out the table below based on the parameters programmed into the intersection personality and attach a copy of the intersection personality.

Lowest and Highest cycle length programmed:_____

Phase	Direction	Time allocation by %/#	Min Green	Max Green	Amber	All Red	EVP	PP	PED	WALK	FDW	Extension time
Ø1												
Ø2												
Ø3												
Ø4												
Ø5												
Ø6												
Ø7												
Ø8												

Sequence: Populate the ring and barrier diagram below based on the phasing sequence, overlaps, and pedestrian operations programmed into the controller which have been field verified. Utilize the legend seen at the bottom of the ring and barrier diagram to complete it. Attach an intersection graphic.



Protected phase - - - Permitted phase ◄- - - Pedestrian phase

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING

ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** _____/_____/_____

Route: _____**MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

No.	Task	Expected Results	Pass	Fail	Comments
1.	Confirm ASCT shall assign unused time from a preceding phase that terminates early or is skipped to a user-specified phase as follows:				
	• Previous Phase				
	• Next Phase				
	• Next coordinated phase				
	• User – specified phase				
2.	When the force off loop is triggered as per directive, the controller changes phasing to appropriate cycle/plan to prevent queuing. Compare the changes in the controller that indicate these and verify with the field conditions (changes in signal operations).	Adaptive provides green time for the phase for which the force loop was triggered.			
3.	Note down the ADT volumes on the mainline Pre-adaptive and Post-adaptive operation.	Mainline throughput should be maximized by ASCT.			
4.	Verify ASCT works non-adaptively (Isolated mode).	The intersection should be running in fully actuated mode.			
5.	Disable image detectors on the side street.	Parameter programmed in the controller: ☐ Min Recall ☐ Max Recall ☐ Pedestrian Recall Verify to be as programmed			
6.	Disable Call to Non-Actuated (CNA).	Mainline should rest in Green. Minimum Green is equal to pedestrian clearance for non-actuated pedestrian.			
7.	Verify controller time settings can be changed from the ASCT user interface.	The controller time setting is changed from the ASCT system software.			
Define Critical Communication failure					
8.	Critical Communication failure – disable communication link to the center.	ASCT should switch to isolated TOD fallback operation. ASCT should switch back to Adaptive operation after the fallback timer times out or is manually reset.			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** _____/_____/_____

Route: _____**MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

Define Software failure					
9.	Critical software failure	ASCT should switch to isolated TOD fallback operation mode/ TOD operation. ASCT should switch back to Adaptive operation after the fallback timer times out or is manually reset.			
10.	Verify if phase failures are occurring and logged	Provide phase failure logs for the testing period			
11.	Observe the reported queues from the phase failures.	ASCT should change operations so that residual delay doesn't occur.			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING

ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** _____/_____/_____

Route: _____**MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

No.	Task	Expected Results	Pass	Fail	Comments
12.	Confirm ASCT does not alter the order of the phase at the intersection.	ASCT is running sequential operation.			
13.	Verify Actuated Pedestrian calls are answered.				
14.	Verify Unactuated pedestrian call come up every cycle.	Pedestrian Recall			
15.	Verify Cycle lengths and splits change every cycle.	Verify for 15 minutes.			
16.	Verify that signal rest on Mainline.				
17.	Verify Mid-block detector inputs in ASCT.				
18.	Number of Overlaps provided by ASCT.				
19.	Number of rings at each signal.				
20.	Number of phase accommodated at each signal.				
21.	Number of phase accommodated by each ring.				
22.	Number of user defined phases sequence at the intersection.				
23.	Detector channels being utilized by adaptive:				
	• Image detector				
	• System detector (Radar)				
24.	Verify if extension/passage times are assigned to each vehicle.				
25.	Late start : Allowed ☐ - Verify Not Allowed ☐				
26.	List parameters for operation of queue detection system/ Verify parameters.				
27.	Verify/List skipped actuated phases.				

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING

ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** _____/_____/_____

Route: _____**MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

<table>
<tr><th>No.</th><th>Task</th><th>Expected Results</th><th>Pass</th><th>Fail</th><th>Comments</th></tr>
<tr><td>28.</td><td>Complete the table below on the basis of the programed parameters as well as the traffic reporter.
<table>
<tr><th rowspan="2">Phase</th><th rowspan="2">Min green observed</th><th rowspan="2">Max green Observed</th><th colspan="3">Phase skips allowed based on</th><th rowspan="2">Assignment of unused time</th></tr>
<tr><th>Cycle length (Y/N)</th><th>Volume (Y/N)</th><th>Time of Day (Y/N)</th></tr>
<tr><td>Ø1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø7</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td></td><td></td><td></td><td></td></tr>
<tr><td>29.</td><td>Verify if ASCT is able to override the parameters programed into the controller.</td><td></td><td></td><td></td><td></td></tr>
<tr><td>30.</td><td>Verify if ASCT logs exist for the following in days:
<table>
<tr><th>ASCT Internal Log</th><th>No of Day</th></tr>
<tr><td>Intersection Operations</td><td></td></tr>
<tr><td>Control</td><td></td></tr>
<tr><td>Monitoring</td><td></td></tr>
<tr><td>Performance</td><td></td></tr>
</table></td><td></td><td></td><td></td><td></td></tr>
<tr><td>31.</td><td>Commence a 14 business day testing period.</td><td></td><td></td><td></td><td></td></tr>
</table>

NEW JERSEY DEPARTMENT OF TRANSPORTATION

DEPLOYMENT TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** _____/_____/_____

Route: _____**MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

DEPLOYMENT TEST RESULTS: **PASS** _____ **FAIL** _____

Correction Work Items:

1. _____
2. _____
3. _____
4. _____
5. _____

We agree that Deployment testing at the local intersection has been performed and that the information above accurately represents the results of the test.

Contractor Name: _____

Contractor Representative Name: _____

Signature: _____ **Date:** _____

Vendor Name: _____

Vendor Representative Name: _____

Signature: _____ **Date:** _____

ITS Inspector Name: _____

Signature: _____ **Date:** _____

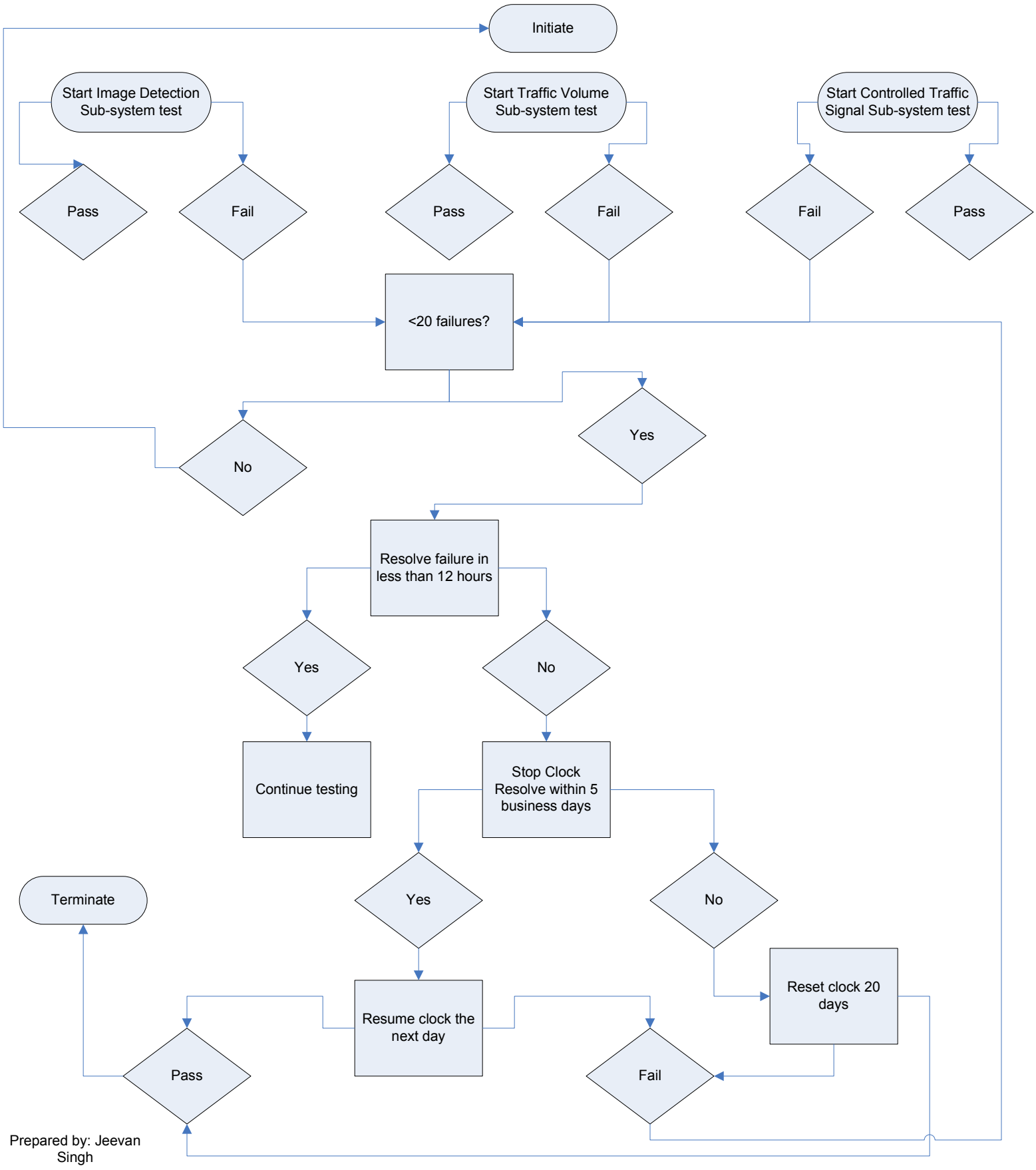
Resident Engineer Name: _____

Signature: _____ **Date:** _____

Sub-System Testing

Pre-requisites:

1. Sub-system integration into the servers (Letter confirming completion of server integration for the sub-system, including but not limited to, Image Detection Sub-System; Traffic Volume Sub-System; Controlled Traffic Signal Sub-System)
2. Successful completion of Deployment Testing
3. Final Network Configuration and Integration to the NJDOT network, including any and all VPN issues and RDP access.
4. Notification of Intent to initiate Sub-System Testing from t he contractor to the RE.
5. All required personnel, including but not limited to, required DOT personnel, OIT personnel, RE's Office, Contractor's staff and all applicable vendors are scheduled and present at the time of testing at the designated venue.



Prepared by: Jeevan Singh

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING
IMAGE DETECTION SYSTEM (IDS)

Project Name: _____ **Test Date:** ____/____/____

Route:_____MM:_____**(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

This Subsystem Test will not be initiated until the requirements stated below have been met:

☐ The Deployment Testing for all intersections has been completed.

☐ All the personnel required for the testing are present. This includes providing manufacture certified representative to ensure complete functionality of the system and subsystem. In addition representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as NJDOT Mobility and Systems Engineering are present.

☐ Letter from NJDOT Designated Inspector stating that the "Servers have been installed at the location and with the software indicated by OIT and all system integration has been completed including, but not limited to Genetec system.

☐ Project plan set shall be accessible during testing.

☐ A letter of Intent to initiate the test from the Contractor.

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING
IMAGE DETECTION SYSTEM (IDS)

Project Name: _____ **Test Date:** ____/____/____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

This procedure outlines the Subsystem Software Test to be performed on the Image Detection Camera System. Perform the following test at the Arterial Management Center (AMC) using NJDOT approved software. Subsystem Testing demonstrates that the software is fully operational.

IDC Software Manufacture's Name:_____ **IDC Model:** _____

IDC Software Version: _____ **Number of IDC:** _____

No	Task	Pass	Fail	Comments
1)	Launch the Image detector server.			
2)	Verify if the IDC(s) are in the database.			
3)	Verify if the Detector Access Point for the intersection is in the database.			
4)	Verify that the live image detection feeds can be seen in Genetec system with flashing detector overlay.			
5)	Verify if the properties for all the devices are available in the software.			
6)	Retrieve the configuration file from all IDC.			
7)	Verify the detection zones, length of the zones, phases and direction assignment for each approach as per plans.			
8)	Alter the detection zone programming – change configuration between arrows and detection polygon.			
9)	Save the changes and download the configuration file to the IDC.			
10)	Verify if the changes are reflected in the file using Genetec system.			
11)	Delete an IDC.			
12)	Add an IDC and configure all the necessary parameters.			
13)	Integrate the new IDC into Genetec system.			
14)	Open Archive log reports for the Image detection system and export the log in CSV, XML, and XLSX format.			
15)	Remotely connect the detection feed from the neighboring detectors to intersection.			
16)	EDIT/ ADD the Detector Access Point and configure al the parameters.			
17)	Verify Data Storage on server.			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING
IMAGE DETECTION SYSTEM (IDS)

Project Name: _____ **Test Date:** ____/____/____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

No	Task	Pass	Fail	Comments
16)	Perform two consecutive 15 minute manual counts and compare lane-by-lane processed counts for Image Detection System against the counts in the field using Genetec viewer for a 30 minute time interval.			
	Observed volume counts using Genetec / Measured counts using IDS			

Lane/ Zone	TEST 1	Error	Test 2	Error	Test 3	Error

17)	Compare lane-by-lane processed counts for image detection system with counts in the CTSS/Adaptive software interface for the same time frame as the preceding test.			
	Measured counts using IDS/ Observed counts in the CTSS/Adaptive Interface			

Lane/ Zone	TEST 1	Error	Test 2	Error	Test 3	Error

18)	Commence the 20 business day testing period			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING
IMAGE DETECTION SYSTEM (IDS)

Project Name: _____ **Test Date:** ____/____/____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

SUBSYSTEM TEST RESULTS: **PASS** _____ **FAIL** _____

Correction Work Items:

1. _____
2. _____
3. _____
4. _____
5. _____

We agree that the Subsystem Testing of the Image Detection System has been performed and that the information above accurately represents the results of the test.

Contractor Name: _____

Contractor Representative Name: _____

Signature: _____ **Date:** _____

Vendor Name: _____

Vendor Representative Name: _____

Signature: _____ **Date:** _____

ITS Inspector Name: _____

Signature: _____ **Date:** _____

Resident Engineer Name: _____

Signature: _____ Date: _____

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING

TRAFFIC VOLUME SYSTEM (TVS)/ SYSTEM DETECTION, TYPE RADAR (SDR)

Project Name: _____ **Test Date**:_____/_____/_____

Route:_____MM:_____**(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

This Subsystem Test will not be initiated until the requirements stated below have been met:

☐ The Deployment Testing for all intersections has been completed.

☐ All the personnel required for the testing are present. This includes providing a manufacturer certified representative to ensure complete functionality of the system and subsystem. In addition representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as NJDOT Mobility & Systems Engineering are present.

☐ Letter from NJDOT Designated Inspector stating that the "Servers have been installed at the location and with the software indicated by OIT and all system integration has been completed".

☐ Project plan set for project shall be accessible during testing.

☐ A letter of Intent to initiate the test from the Contractor.

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING

TRAFFIC VOLUME SYSTEM (TVS)/ SYSTEM DETECTION, TYPE RADAR (SDR)

Project Name:_____ **Test Date:** ____/_____/_____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

This procedure outlines the Subsystem Test to be performed on the Radar Detector Server. Perform the following test at the AMC using NJDOT approved software. This Subsystem Test demonstrates that the software is functional and operational.

Mobility Management North ☐ **Mobility Management South** ☐
Radar Detector Manufacture's Name:_____
Software Version: _____

No.	SENSOR TEST PROCEDURE	Pass	Fail	Problem / Corrective Action
	Command Collector			
1	Login to software / logout of software.			
2	Login to software.			
3	Remove Sensor.			
	- Click "Remove Sensor" button on sensor toolbar page.			
4	Add Sensor.			
	- Click "Add Sensor" button on sensor toolbar page.			
	- Enter all properties and options, then click "Add Sensor".			
5	Search for a Sensor.			
	- Use the search tool in the Sensors toolbar to find a			
	single sensor by one of its identifying fields.			
6	Sort a Sensor List			
	- Click on any description field on the Sensor main page to			
	sort / organize by that column.			
7	Sensor Status			
	- Confirm green "COM" radio button on main sensor page is green.			
	- Confirm green "DATA" radio button on main sensor page is green.			
	- Click on any sensor to view its "Comm. Status Graph".			
	- Click on any sensor to view its "Data Status Graph".			
8	Change Sensor Configuration.			
	- From main sensor page, click the link on the sensor column			
	and make any changes required.			
9	Lanes and Approaches.			
	- Edit fields then click "Save Changes".			
10	Sensor Commands.			
	- Click "Update Configuration" to retrieve configuration			
	settings from sensor in the field.			
	- Click "Synchronize Time" to send time setting to			
	sensor in the field.			
	- click "Collect Data" tab to request data from a user			
	defined date and time range.			
11	Data Query.			
	- Create and output a data query in text format.			
	- Create and output a data query in table format.			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING

TRAFFIC VOLUME SYSTEM (TVS)/ SYSTEM DETECTION, TYPE RADAR (SDR)

Project Name:_____ **Test Date:**_____/_____/_____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

No.	SENSOR TEST PROCEDURE	Pass	Fail	Problem/Corrective Action
	- Create and output a data query in graph format.			
12	Data Reporting			
	- Create a data validation report.			
	- Create and save a report template.			
13	Data Packet Validation			
	- Run a data download for an interval of 24 hours directly from the sensor			
	- From the server, run a data query for the same time period and compare.			
	Command Monitor			
14	Login to software / logout of software			
15	Login to software			
16	Remove Monitor			
	- On the Monitor List detail page, Click "Remove" to eliminate a particular			
	Monitor.			
17	Add/ Edit Monitor			
	- On the Monitor list page, Click "Add Monitor"/ monitor's name			
	- Enter/edit all properties and options, then click "Save".			
18	Subscribing monitors			
	- On the Subscriptions page, check the Subscribe column to view			
	Monitor's results are available on My Alerts page.			
	- Click "Alert "or "Complete" in order to receive email notification.			
	- Click on Monitor's name to bring up slider control toolbar. Adjust the			
	test level and Click "Save Levels".			
19	Subscribing to Reports			
	- On the Subscription page, Click "Send Email" option to receive email when			
	when a particular report is run.			
20	Reports to Execute			
	- Click on Reports to access the Reports section. Click on the "add" or			
	"remove" button to allow/disallow a report to run.			
21	Add & Verify Report			
	- Go to the reports page, Click "Add Report" and enter properties			
	and option required, and save them. Verify by reviewing the report created above			
22	Alarm Status			
	- Review to confirm the alarms are configured.			
	- Confirm all alarms are coming to designated staff			
23	Accuracy of Data			
	- Confirm that the data in the CTSS system is within ± 5% of data in the			
	the Historical server.			
24	Data channels in the CTSS			
	- Confirm that the System data is coming in to the designated data channels.			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING

TRAFFIC VOLUME SYSTEM (TVS)/ SYSTEM DETECTION, TYPE RADAR (SDR)

Project Name:_____ **Test Date:**_____/_____/_____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

No.	SENSOR TEST PROCEDURE	Pass	Fail	Problem/Corrective Action
25	Data Bin Retrieval			
	- Temporarily disable the communication of a sensor for an interval.			
	- In the interface, observe the Comm. Status bar turn red and Data Status bar			
	turns gray for the interval.			
	- Re-establish the detector comm., run data query for the interval and			
	review the results, and confirm the status bar turn blue for the interval			
26	Begin 20 Business Day Testing period (Date and time)			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING

TRAFFIC VOLUME SYSTEM (TVS)/ SYSTEM DETECTION, TYPE RADAR (SDR)

Project Name:_____ **Test Date:**_____/_____/_____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

SUBSYSTEM TEST RESULTS: **PASS** _____**FAIL** _____

Correction Work Items:

1. _____
2. _____
3. _____
4. _____
5. _____

We agree that the Subsystem Testing of the Traffic Volume System (TVS)/System Detection, Type Radar (SDR) has been performed and that the information above accurately represents the results of the test.

Contractor Name: _____

Contractor Representative Name: _____

Signature: _____**Date:**_____

Vendor Name: _____

Vendor Representative Name: _____

Signature: _____**Date:**_____

ITS Inspector Name: _____

Signature: _____**Date:** _____

Resident Engineer Name: _____

Signature: _____Date:_____

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING
CONTROLLED TRAFFIC SIGNAL SYSTEM (CTSS)

Project Name: _____ **Test Date:** _____/_____/_____

Route:_____**MM:**_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

This Subsystem Test will not be initiated until the requirements stated below have been met:

☐ The Deployment Testing for all intersections has been completed.

☐ All the personnel required for the testing are present both in the Arterial Management Center (AMC) as well as the individual intersections to be tested. This includes providing a manufacturer certified representative to ensure complete functionality of the system and subsystem. In addition representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as NJDOT Mobility & Systems Engineering are present.

☐ Letter from NJDOT Designated Inspector stating that the "Servers have been installed at the location with the software indicated by OIT and all system integration has been completed."

☐ Project plan set shall be accessible during testing. Letter of Intent to initiate the test from the Contractor.

☐ Staff to be stationed at the intersections during testing is as follows: Contractor, MSE Representative, Regional Electrical Representative, Certified Controller Representative, and ITS Inspector.

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING
CONTROLLED TRAFFIC SIGNAL SYSTEM (CTSS)

Project Name: _____ **Test Date:** ____/____/____

Route:_____**MM:**_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

This procedure outlines the Subsystem Software test to be performed on the CTSS Software. Please perform following test at the AMC using NJDOT approved software. This CTSS System test demonstrates that the software is functional and operational.

Mobility Management North ☐ **Mobility Management South** ☐
CTSS Controller Manufacture's Name: _____
Software Name & Version: _____

No.	CTSS CONTROLLER UNIT TEST PROCEDURE	Pass	Fail	Problem / Corrective Action
1	Login to software / logout of software.			
2	Login to software.			
3	Check communication status to the intersection (s)			
4	Verify pedestrian and vehicular detection inputs.			
5	Verify front panel real-time connectivity.			
6	Upload controller parameters from the field unit.			
7	Change and download control parameters back to the controller.			
8	Verify changes to control parameters in to the controller while in the field.			
9	Verify mid-block and approach counts as applicable, through video recording			
	Or field counts			
10	Test and verify all reporting components including but not limited to:			
	- Time space diagram.			
	- Logs for user activity.			
	- Logs for alarms.			
	- Miscellaneous logs.			
	- Split and offset history.			
	- Historical data.			
	- Accuracy of data: Compare counts from the IDS, TVS/RDS, and CTSS			
11	Test for alarms by remote and field induced situations.			
	- Failed detection.			
	- Failed communication: local or global.			
	- Signal in flash.			
	- Pre-emption.			
	- Power failures.			
	- Time-based coordination			
	- Conflict monitor			
	-Traffic congestion alarm when the occupancy and/or volume numbers from a			
	detection zone exceed a threshold.			
12	Verify clock synchronization by running time sync report and testing			
13	Verify GUI functionality as per Specifications/Special Provision			
14	Verify adding user, changing rights, and deleting user.			
15	Test all aerial images including arrow changes.			
16	Test response time after TOD transition and activation.			
17	Check polling.			
18	Begin 20 Business Day Testing period			

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SUBSYSTEM TESTING
CONTROLLED TRAFFIC SIGNAL SYSTEM (CTSS)

Project Name:_____ **Test Date:**_____/_____/_____

Route:_____MM_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

SUBSYSTEM TEST RESULTS: **PASS** _____ **FAIL** _____

Correction Work Items:

1. _____
2. _____
3. _____
4. _____
5. _____

We agree that the Subsystem Testing of the Controlled Traffic Signal System (CTSS) has been performed and that the information above accurately represents the results of the test.

Contractor Name: _____

Contractor Representative Name: _____

Signature: _____ **Date:**_____

Vendor Name: _____

Vendor Representative Name: _____

Signature: _____ **Date:**_____

ITS Inspector Name: _____

Signature: _____ **Date:** _____

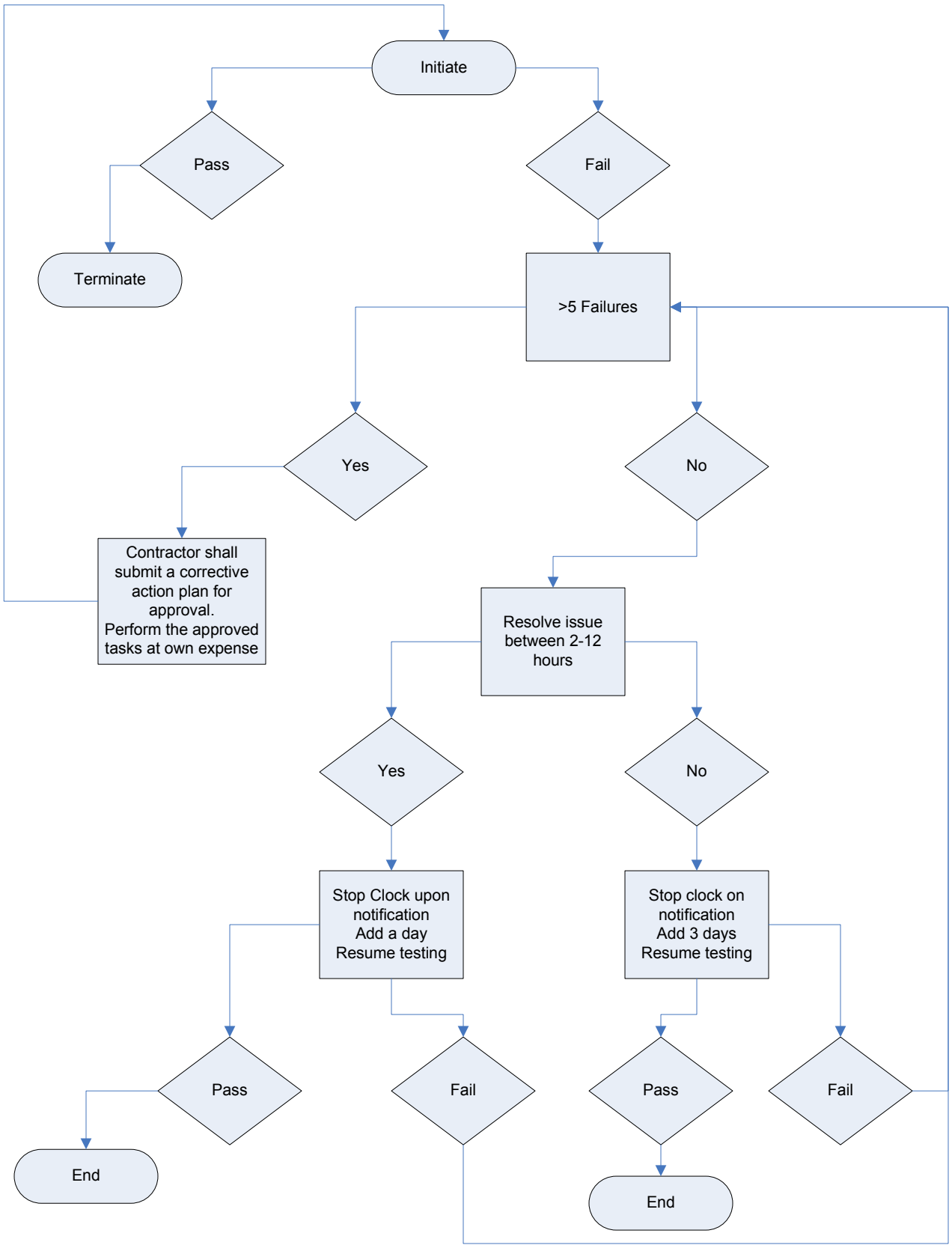
Resident Engineer Name: _____

Signature: _____ Date:_____

System Integration Testing

Pre-requisites:

1. Documents certifying that the sub-system testing passed.
2. Certificate of completion of Adaptive installation and integration, as per design unless otherwise noted, from the Inspector through the RE's Office.
2. A plan submitted by the contractor for monitoring the Adaptive system 24/7.
3. DOT personnel confirming access to alerts on the Adaptive System.
4. All required personnel, including but not limited to, DOT personnel, OIT personnel, RE's Office, Contractor and applicable manufacturer certified representatives, are scheduled and present at the venue for the time of the initial test.



Prepared by: Jeevan Singh

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SYSTEM INTEGRATION TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:** ____/____/____

Route: _____ **MM:** _____ **(NB/SB/EB/WB/Median)** **Side Street 1:** _____

Side Street 2: _____

This System Integration Test will not be initiated until the requirements stated below have been meet:

☐ The Subsystem and Deployment Testing for Adaptive has been completed.

☐ All the personnel required for the testing are present both in the Arterial Management Center (AMC) as well as the individual intersections to be tested. This includes providing a manufacturer certified representative to ensure complete functionality of the system and subsystem. In addition, representatives from the Resident Engineer's Office, OIT, ITS Inspector, NJDOT Electrical Maintenance, NJDOT Traffic Engineering as well as NJDOT Mobility & Systems Engineering are present.

☐ Letter from NJDOT Designated Inspector stating that the "Servers have been installed at the location and with the software indicated by OIT and all system integration has been completed."

☐ Project plan set as well as timing directives shall be accessible during testing.

☐ A Letter of Intent to initiate the test from the Contractor.

☐ Staff to be stationed at the intersections during testing is as follows: Contractor, MSE Representative, Regional Electrical Representative, Certified Controller Representative, and ITS Inspector.

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SYSTEM INTEGRATION TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:**_____/_____/_____

Route:_____**MM**_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

This Procedure outlines the System Integration Testing to be performed on the Adaptive Signal Control Technology System (ASCT). Please perform the following test at the AMC in Trenton, Mercer County, using the NJDOT approved software. This System Integration testing demonstrates that the individual subsystems are fully integrated with Adaptive software and ASCT is fully operational.

Software version: _____

Note: There is some information in this testing form which has been intentionally left blank. The vendor/RE shall list the parameter(s) in the blank space.

No.	Task	Pass	Fail
1.	**Coordination parameters**		
	• Volume /TOD – Verify if the thresholds are activated for the selected coordinated parameters.		
	• Traffic Conditions – Verify if the thresholds are triggered for the selected coordinated parameters.		
	• Manual Override – Verify if the parameters governing the coordination can be manually altered by the system from a central location by an operator.		
	• Verify intersections are added to or deleted from a coordinated zone based on programmed thresholds.		
2.	**Non– Adaptive Operation**		
	• Manual – Verify if the system can switch from Adaptive operation to either TOD operation or vehicle actuated operation for the corridor (assure a smooth transition).		
	• Detector failure thresholds: Critical Failure : Non-critical Failure:		
	• Detection/ Adaptive Failure – Verify if the number of failed detectors exceed threshold mentioned above or if an adaptive failure occurs switch to TOD or vehicle actuated operation.		
	• Communication Failure – Verify that ASCT ceases Adaptive operation when the communication to the central fails, the system falls back to TOD or actuated operation.		
	• TOD schedule – Verify if ASCT changes to the non-adaptive operation schedule based on time-of-day.		
3.	**Optimization Strategy**		
	• List optimization Strategies:		
	• Coordinated route – Verify if the throughput along the coordinated route is maximized Before: Week 1: Week 2: Week 3:		
	• Equitable green time distribution – Verify if ASCT distributes phase times in an equitable manner between side-street green and mainline green (based on control delay).		
6.	**Phase Failures**		
	• Review log report for phase failures.		
	• Verify ASCT response to phase failures.		

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SYSTEM INTEGRATION TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name: _____ **Test Date:**_____/_____/_____

Route:_____**MM**_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

<table>
<tr><th>No.</th><th>Task</th><th>Pass</th><th>Fail</th></tr>
<tr><td></td><td>• Traffic Conditions – List and verify ASCT coordinated route based optimized strategy
Define Subzone:
Volume threshold programmed:
Criteria for coordinating:
Criteria for disconnecting:</td><td></td><td></td></tr>
<tr><td></td><td>• TOD Schedule – Verify if the designated coordinated route programmed varies based on the time-of-day schedule.</td><td></td><td></td></tr>
<tr><td></td><td>• Prevent queue proliferation – Verify if ASCT alters the signal phasing parameters to inhibit the queue from exceeding the programmed threshold.</td><td></td><td></td></tr>
<tr><td>4.</td><td>Verify that all timing plans programmed are operating as per directives</td><td></td><td></td></tr>
<tr><td>5.</td><td>Complete the following table based on the parameters programed in the controller
<table>
<tr><th>Phase</th><th>Direction</th><th>Time allocation by %/#</th><th>Min Green</th><th>Max Green</th><th>Amber</th><th>All Red</th><th>EVP</th><th>PP</th><th>PED</th><th>WALK</th><th>FDW</th><th>Extension time</th></tr>
<tr><td>Ø1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>Ø8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
Complete the following table based on the parameters programed in the ASCT
<table>
<tr><th>Phase</th><th>Direction</th><th>Time allocation by %/#</th><th>Min Green</th><th>Max Green</th><th>Amber</th><th>All Red</th><th>EVP</th><th>PP</th><th>PED</th><th>WALK</th><th>FDW</th><th>Extension time</th></tr>
<tr><td>Ø1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Ø2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</table></td><td></td><td></td></tr>
<tr><td></td><td>• Programmed sequential/recall operation by TOD: YES ☐ NO ☐</td><td></td><td></td></tr>
<tr><td></td><td>• Traffic Condition – Verify if ASCT shall omit a phase based on traffic condition.</td><td></td><td></td></tr>
<tr><td></td><td>• List how the excess time has been programmed in ASCT</td><td></td><td></td></tr>
<tr><td></td><td>• Late Start allowed/programmed.</td><td></td><td></td></tr>
</table>

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SYSTEM INTEGRATION TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name:_____ **Test Date:**____/____/____

Route:_____**MM**_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

No.	Task	Pass	Fail
8.	**Sequence based Adaptive Coordination**		
	• Cycle Length – Verify if ASCT cycle length changes based on traffic conditions, time-of-day schedule and coordination strategy, as programmed (list individually).		
	• Phase Length - Phase allocation programmed by % green time or by number of seconds.		
	• List Offset programmed • List Offset operating		
	• Cycle length optimization based on TOD: YES ☐ NO ☐		
9.	**Pedestrian calls**		
	• Verify if pedestrian calls are being processed.		
	• Identify intersection with infrequent pedestrian calls.		
	• Identify intersection with frequent pedestrian calls (pedestrian calls every alternate cycle)		
	• Pedestrian non Actuated calls – Verify that the corresponding phase is always on pedestrian recall.		
10.	**Verify if emergency preemption calls are being processed.**		
11.	**Detector Failure.**		
	• Confirm, in case of detector failure - data from a user specified alternate detector or stored historical data from the failed detector may be substituted.		
	• Confirm that authorized personnel receive emails or text messages regarding the failure. Also, a pop-up window informs of such failure on the workstation and the failure is registered in the permanent log.		
12.	**Communication failure**		
	• Verify if ASCT issues an alarm for communication failure. Delay/frequency programmed.		
	• Confirm that authorized personnel receive emails or text messages regarding the failure. Also, a pop-up window informs of such failure on the workstation and the failure is registered in the permanent log		
13.	**Adaptive failure**		
	• Confirm that authorized personnel receive emails or text messages regarding the failure. Also, a pop-up window informs of such failure on the workstation and the failure is registered in the permanent log.		
14.	**Compare the lane by lane vehicle counts in the adaptive GUI with the image detector server counts. Verify that they are within ± 5% of each other.**		

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SYSTEM INTEGRATION TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name:_____ **Test Date:**____/____/____

Route:_____**MM**_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

No.	Task	Pass	Fail
15.	**Compare the vehicle counts from the System Detector, Type Radar in the ASCT GUI with the Historical server counts. Verify that they are within ± 5% of each other**		
16.	**Data Log**		
	Please verify if any of the below events have been logged: • Time-stamped emergency vehicle preemption calls • Time-stamped transit priority calls • Time-stamped railroad preemption calls • Time-stamped start and end of each phase • Time-stamped controller interval changes • Time-stamped start and end of each transition to a new timing plan		
	• Verify if ASCT log shall be exportable in text and CVS format.		
	• Verify volume stored in files can be displayed graphically.		
	• Verify if ASCT stores event logs and all timing parameter calculations for at least 30 days.		
	• Verify if ASCT archives all data automatically and have the ability to generate historic reports with less than a 5 minute lag.		
	• ASCT shall store the following data in 15 minute increments from stop line detectors and midblock system detectors: • Volume • Occupancy • Queue length		
	• Verify if the system stores the following measured data in ASCT server for a minimum of 30 days: • Volume • Occupancy • Queue length • Phase utilization • Arrivals in green • Green band efficiency		
17.	Verify if the system can relay operational and performance data in SQL format to ITS readiness checklist.		
18.	Verify if the system is able to export operational, monitoring, and control data in text, XML and CVS format.		
19.	Verify if the GUI can update the changes in an operational parameter, failure, and preemption with a latency of 2 seconds.		
20.	Verify if force-off is operational.		
21.	Commence a 20 business day testing period.		

NEW JERSEY DEPARTMENT OF TRANSPORTATION

SYSTEM INTEGRATION TESTING
ADAPTIVE SIGNAL CONTROL TECHNOLOGY (ASCT)

Project Name:_____ **Test Date:**____/____/____

Route:_____**MM**_____**(NB/SB/EB/WB/Median)** **Side Street 1 Name:** _____

Side Street 2 Name: _____

SYSTEM INTEGRATION TEST RESULTS: **PASS**_____ **FAIL** _____

Correction Work Items:

1. _____
2. _____
3. _____
4. _____
5. _____

We agree that System Integration Testing for the project has been performed and that the information above accurately represents the results of the test.

Contractor Name: _____

Contractor Representative Name: _____

Signature: _____ **Date:**_____

Vendor Name: _____

Vendor Representative Name: _____

Signature: _____ **Date:**_____

ITS Inspector Name: _____

Signature: _____ **Date:** _____

Resident Engineer Name: _____

Signature: _____ **Date:**_____

Project Name: _____ MSE-602-002

Contract #: _____ Rev.-0001 | Date:1/21/2015

IMAGE DETECTOR (CTSS)

	Units/Format	Accuracy Required	
Camera Latitude	Dec. Degrees	0.000001	
Camera Longitude	Dec. Degrees	0.000001	
Turning Movements Detected			
Route			
Milepost	Miles	0.01	
Location(Mast Arm/Pole) Ht.	Feet		
Municipality/County			
Project Installed Under			
Manufacturer Name			
Model (Analog, Digital)			
Model Number			
Serial Number			
Installer (Contractor/Vendor)			
Testing Date (Tactical/ System integration)	mm/dd/yyyy		
Software Version			
IP Address			
Communication Mode (Fiber Optic, POTS, Ethernet, T1, 56K, OC, Cable, DSL, Other)			
Support Structure			
Area of View (Distance covered at Max zoom in any one direction) Optical Zoom (X)			
Include Digital Photos			
Network IP Address			
Subnet Mask			
Default Gateway			
Detector Port Protocol			
Detector Port Master Type			
Detector Port Master CPU ID			
Time Zone			
Use AC Power Frequency to run clock			
Accept TS2 Time Set Commands			
Warranty	mm/dd/yyyy		Start Date_____End Date_____
Technical Support	mm/dd/yyyy		Start Date_____End Date_____

Certification:

I Hereby Certify That All of the Above Information Is Accurate As Constructed to the Best of My Knowledge.

Submitted By: **Date:** **Contractor:** _____

_____ _____ **Contractor Phone #:** _____

Project Name: _____ MSE-602-003

Contract #: _____ Rev. - 0001 | Date:1/21/2015

Controller, TVS (Traffic Volume System/System Detection)

	Units/Format	Accuracy Required	
Cabinet Location Latitude	Dec. Degrees	0.000001	
Cabinet Location Longitude	Dec. Degrees	0.000001	
Route			
Milepost	Miles	0.01	
Location			
Municipality/County			
Cabinet Size (L x W x D)	Inches		
Communication Mode (Fiber Optic, POTS, Wireless, T1, 56K, Cable, DSL, Other)			
Controller Manufacturer			
Controller Model			
Controller Serial Number			
Software Version			
Accessories			
FO Termination			
Ethernet Switch # Provide Details in Ethernet Communication Switch Table			
Project Installed Under			
Installer (Contractor/Vendor)			
Testing Date (Tactical/System Integration)	mm/dd/yyyy		
Heated	Yes/No		
If Heated, Make/Model and Serial Number			
Power Source (Load Center/Pole Number)			
If Metered Provide Details in Meter Cabinet Table			
If not Metered, Location of Load Center (Rt., MP, Location)			
Radar Detector Serial No.			
Radar Detector License Date			
Radar Detectort IP Address			
Radar Detector Port & Multiport			
Firmware Version			
Build Date			
Mac Address			
Network Node			
DHCP HostName			
Default Gateway			
DNS Server			
No. of Solar pannel			
No. of Backup batteries			
Duration Backup batteries lasting			
Current supplied per hour (AMP-Hour)			
MTU			
Warranty	mm/dd/yyyy		Start Date_____End Date_____
Technical Support	mm/dd/yyyy		Start Date_____End Date_____

Certification:

I Hereby Certify That All of the Above Information Is Accurate As Constructed to the Best of My Knowledge.

Submitted By: **Date:** **Contractor:** _____

_____ _____ **Contractof Phone #:** _____

Project Name: _____ MSE-602-004

Contract #: _____ Rev. - 0001 | Date:1/21/2015

CTSS Controller Unit (Controlled Traffic Signal System)

	Units/Format	**Accuracy Required**	
Cabinet Location Latitude	Dec. Degrees	0.000001	
Cabinet Location Longitude	Dec. Degrees	0.000001	
Route			
Milepost	Miles	0.01	
Location			
Municipality/County			
Cabinet Type & Size (L x W x D)	Inches		
Communication Mode (Fiber Optic, POTS, Wireless, T1, 56K, Cable, DSL, Other)			
Controller Manufacturer			
Controller Model/Type			
Controller Serial Number			
Software Version/ Firmware			
Accessories			
FO Termination			
Ethernet Switch # Provide Details in Ethernet Communication Switch Table			
Project Installed Under			
Installer (Contractor/Vendor)			
Testing Date (Certification/Tactical)	mm/dd/yyyy		
Heated	Yes/No		
If Heated, Make/Model and Serial Number			
Power Source (Load Center/Pole Number)			
If Metered Provide Details in Meter Cabinet Table			
If not Metered, Location of Load Center (Rt., MP, Location)			
Warranty	mm/dd/yyyy		Start Date_____End Date_____
Technical Support	Start Date____	Start Date_____	Start Date_____End Date_____

Certification:
I Hereby Certify That All of the Above Information Is Accurate As Constructed to the Best of My Knowledge.

Submitted By: **Date:** **Contractor:** _____

_____ _____ **Contractor Phone #:** _____

Project Name: _____ MSE-602-005

Contract #: _____ Rev. - 0001 | Date:1/21/2015

ASCT (Adaptive Signal Control Technology)

	Units/Format	Accuracy Required	
Project installed under			
Route (Corridor)			
System Description (Type/Version)			
Intersection name			
Milepost	Miles	0.01	
Municipality/County			
Communication Mode to TOC (Fiber Optic/DSL/POTS/Wireless)			
Manufacturer			
Model Number			
Serial Number			
System Firmware Version			
Controller Firmware Version			
Electrical Job Number			
System Detection (Yes/No) - If Yes, Provide Details			
Signal Timing Directive Number and Date (Attach a Copy)			
Warranty - Controller	mm/dd/yyyy		Start Date_____End Date_____
- Detectors	mm/dd/yyyy		Start Date_____End Date_____
- System	mm/dd/yyyy		Start Date_____End Date_____
Technical Support - System	mm/dd/yyyy		Start Date_____End Date_____
IP Addresses			
- Controller			
- Image Detectors	Ø2 _____	Ø6 _____	Ø4 _____ Ø8 _____
	Ø1	Ø5	Ø3 Ø7

Certification:

I Hereby Certify That All of the Above Information Is Accurate As Constructed to the Best of My Knowledge.

Submitted By: _____ **Date:** _____

Contractor: _____

Contractor Phone #: _____

Project Name: _____ MSE-602-006

Contract #: _____ Rev. - 0001 | Date:1/21/2015

CTSS (Controlled Traffic Signal System)

	Units/Format	Accuracy Required	
Project installed under			
Route (Corridor)			
System Description (Type/Version)			
Intersection name			
Milepost	Miles	0.01	
Municipality/County			
Communication Mode to TOC (Fiber Optic/DSL/POTS/Wireless)			
Manufacturer			
Model Number			
Serial Number			
System Firmware Version			
Controller Firmware Version			
Electrical Job Number			
System Detection (Yes/No) - If Yes, Provide Details			
Signal Timing Directive Number and Date (Attach a Copy)			
Warranty - Controller	mm/dd/yyyy		Start Date_____End Date_____
- Detectors	mm/dd/yyyy		Start Date_____End Date_____
- System	mm/dd/yyyy		Start Date_____End Date_____
Technical Support - System	mm/dd/yyyy		Start Date_____End Date_____
IP Addresses			
- Controller			
- Image Detectors	Ø2 _____	Ø6 _____	Ø4 _____ Ø8 _____
	Ø1	Ø5	Ø3 Ø7

Certification:

I Hereby Certify That All of the Above Information Is Accurate As Constructed to the Best of My Knowledge.

Submitted By: _____ **Date:** _____

Contractor: _____

Contractor Phone #: _____