In compliance with contractual obligations as defined in Appendix J – Accuracy Testing from the contract between the State Road and Tollway Authority (SRTA) and Federal Signal Technologies (FST), FST conducted the validation testing during the week of March 7, 2011. The tests were conducted at the Michigan International Technical Resource Park (MITRP.LLC) just outside Sylvania, Ohio. The test utilized a 1.8 mile oval, banked track capable of handling 3 lanes of traffic at speeds up to 85+ mph. The testing was witnessed by consultants and SRTA representatives, as well as, Georgia DOT representatives:

Attendee	Organization
John Hancock	Georgia DOT
Steve Sheffield	SRTA
Chris Carter	SRTA
Bill Brownsberger	MSX
Rajeev Madan	MSX
Steve Debella	HNTB
Bruce Roesner	FSTech
Mike Burchell	FSTech
Julio Hernandez	FSTech
Jim Kirwin	FSTech

The six scenarios defined in Appendix J were performed to successful completion. All tests were performed while reading two different transponder protocols, ISO 18000-6C (6C) and Enhanced ISO 18000-6B 80K (6B 80K). The 6C transponders were all PeachPass sticker transponders and the 6B 80K transponders included both CruiseCard and SunPass sticker transponders and also SunPass license plate mount transponders. All transponders used for the testing were supplied by SRTA and none of the transponders tested were manufactured by FST.

The formal accuracy testing was performed in the following two ORT Zone configurations:

1. Three lane ORT zone with each lane being 12 feet wide. Antennas were mounted 19 feet 7 inches above the roadway. All three lanes had traffic flow in the same direction. Lanes 1 and 2 were monitored by 1 reader while Lane 3 was monitored by a second reader.
2. Two lane ORT zone with each lane being 12 feet wide with a delineated 6 foot median separating the two HOT lanes and a single 12 foot lane on the left and adjacent to center HOT lane to represent a non-tolled General Purpose lane alongside the ORT zone. Both HOT lanes were covered by a single antenna. The General Purpose lane was not covered by RFID equipment and Transponders mounted in vehicles travelling in this lane should not be reported by the RFID system. To accomplish this configuration without having to breakdown the required configuration for the other scenarios, antennas were deactivated to simulate no RFID equipment in the GP lane. The rightmost HOT

lane represented a lane travelling in the opposite direction of the center HOT lane and the General Purpose Lane. A transponder equipped vehicle was parked stationary in this rightmost HOT lane for the duration of Scenarios 4 and 5 testing.

The criteria required to achieve accuracy compliance from the tests were as follows:

1) 99.9% successful Transponder read accuracy for all test Transponders installed in/on vehicles as they travel in a designated "Tolling Lane". For the purposes of these tests a "Tolling Lane" is one that is configured to be covered by the FST's RFID solution. Also for the purposes of the tests, a successful Transponder read was defined as a minimum of three (3) Handshakes per Transponder per passage through the read zone.
2) 1% maximum threshold for "cross lane" reads (which is a successful Transponder read of a vehicle that was in the simulated General Purpose lane) - that is, in no more than 1% of the cases where a Transponder travels in the General Purpose lane should that Transponder be read and reported by the RFID system.

The RFID equipment used for the test, exclusive of the transponders, was manufactured by FST:

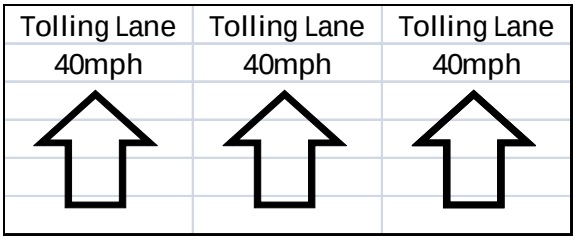
- ID*entity* 5204 Reader part number ID5204-001
- 22° beam width antenna part number Antenna-023
- 30° beam width antenna part number Antenna-024

The following report provides the documentation for the successful completion of this validation testing.

Day 1 (Monday March 7, 2011):

Test #1 (Scenario 3):

Transponders were installed in 9 vehicles, 3 vehicles per lane. All lanes were configured as Tolling Lanes. Congested traffic conditions were simulated in all lanes. Multiple vehicles were closely spaced front to back while travelling at 40 mph in all lanes. This scenario was repeated 100 times for a total of 900 transponder read attempts.



Vehicle Configuration:

Lane 1	Lane 2	Lane 3
Toyota Corolla E02200C813136030 (6B 80K SunPass License Plate Mount)	**Chevrolet Impala** 64010A0198E546C9 (6B 80K Sticker)	**Chevrolet Impala** 355AB1CBA2C4A0E081000121 E20034120135F000067D5EAF (6C PeachPass Sticker)
Chevrolet Impala 355AB1CBA1DB5FA08100011F E20034120135F000067D5EB7 (6C PeachPass Sticker)	**Ford Focus** E02200C813136C71 (6B 80K SunPass License Plate Mount)	**Chevrolet Impala** 355AB1CBAC65D1B08100011C E20034120130F000067D5EC3 (6C PeachPass Sticker)
Dodge Caravan Minivan E02200C81289EDDA (6B 80K Sticker)	**Ford E-450 Bus** 355AB1CBA698A7208100011B E20034120133F000067D5EC7 (6C PeachPass Sticker)	**Dodge Dakota Pickup** E02200C81289ECEE (6B 80K Sticker)

Test Notes:

900 transponder reads were achieved.

Reader time was set to CST time and is 1 hour behind the camera/video time.

Test Summation:

All transponders were read with 3 or more handshakes. This test passed without anomalies. An Excel spreadsheet containing the captured passage data is included in file Test 1 Scenario 3 Annotated.xls with passage starts annotated. Raw data captured from the readers is included in file Test 1 Scenario 3 Reader 1.txt for Lanes 1 and 2 and Test 1 Scenario 3 Reader 2.txt for Lane 3. Video of the test is included in file Day 1.avi

Test #2 (Scenario 2):

Transponders were installed in 8 vehicles (all vehicles except the bus), 4 vehicles per lane. All 3 lanes were configured as Tolling Lanes. One set of 4 vehicles straddled the left and center lanes. One set of 4 vehicles straddled the center and right lanes. This test simulated free-flow

closely spaced traffic while travelling at **80mph**. This scenario was repeated100 times for a total of 800 transponder read attempts.

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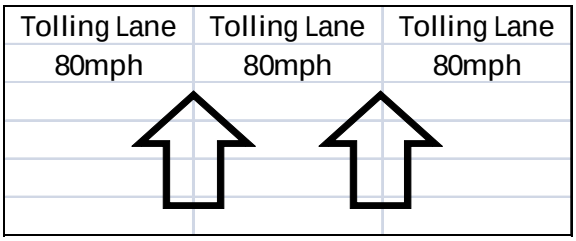


Vehicle Configuration:

Straddle Lanes 1 and 2	Straddle Lanes 2 and 3
Ford Focus E02200C813136C71 (6B 80K SunPass License Plate Mount)	**Chevrolet Impala for 21 passes** 64010A0198E546C9 (6B 80K Sticker) **Nissan Sentra for 79 passes** E02200C81289EE86 (6B 80K Sticker)
Toyota Corolla E02200C813136030 (6B 80K SunPass License Plate Mount)	**Chevrolet Impala** 355AB1CBA2C4A0E081000121 E20034120135F000067D5EAF (6C PeachPass Sticker)
Chevrolet Impala 355AB1CBA1DB5FA08100011F E20034120135F000067D5EB7 (6C PeachPass Sticker)	**Chevrolet Impala** 355AB1CBAC65D1B08100011C E20034120130F000067D5EC3 (6C PeachPass Sticker)
Dodge Caravan Minivan E02200C81289EDDA (6B 80K Sticker)	**Dodge Dakota Pickup** E02200C81289ECEE (6B 80K Sticker)

Test Notes:

All 800 transponder read attempts were achieved.

Starting with the 22nd pass, Chevrolet Impala with 6B 80K sticker transponder 64010A0198E546C9 was replaced with Nissan Sentra with 6B 80K sticker transponder E02200C81289EE86 due to a blown out tire. The Sentra completed the test.

Test Summation:

All transponders were read. Three transponders (all 6B 80K) failed to achieve 3 handshakes:

- Pass 24 transponder E02200C81289EDDA

- Pass 29 transponder E02200C81289ECEE
- Pass 48 transponder E02200C81289EE86

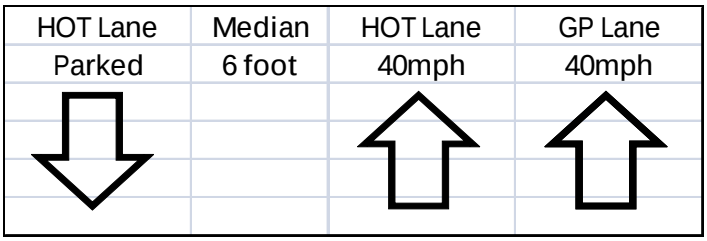
An Excel spreadsheet containing the captured passage data is included in file Test 2 Scenario 2 Annotated.xls. Raw data captured from the readers is included in the files Test 2 Scenario 2 Reader 1.txt and Test 2 Scenario 2 Reader 2.txt. Video of the test is included in file Day 1.avi.

After the Chevrolet Impala had the blown out tire, all vehicles' tires were inspected and 3 other cars were found in need of tires. Time to replace the tires and deteriorating weather conditions postponed the start of the next test for one day until Wednesday, March 9th. Three cars, Chevrolet Impalas, were replaced with Chevrolet Aveo, Chevrolet Cobalt, and Dodge Charger.

Day 2 (Wednesday March 9, 2011):

Test #4 (Scenario 4):

Transponders were installed in 9 vehicles. Leftmost lane was configured as a General Purpose (non-tolled) lane. Right and Middle lanes were configured as Tolling Lanes divided by a delineated 6 foot median. The test simulated congested traffic conditions in all lanes. One vehicle was parked stationary in the antenna pattern in the HOT lane separated from the other two lanes by a six foot wide median. Four vehicles closely spaced front to back while travelling at **40 mph** in the other HOT lane and the GP lane. This scenario was scheduled to be repeated 100 times for a total of 400 possible transponder read attempts, as transponders travelling through the GP Lane are not to be read, but due to human error counting vehicle passages only 96 passes were completed for a total of 384 transactions.



Vehicle Configuration:

Hot Lane Parked	Hot Lane	GP Lane
Dodge Caravan Minivan C4010A019BBA8794 (6B 80K Sticker)	**Ford Focus** E02200C813136C71 (6B 80K SunPass License Plate Mount)	**Ford E-450 Bus** 355AB1CBA698A7208100011B E20034120133F000067D5EC7 (6C PeachPass Sticker)
	Chevrolet Aveo E02200C811B39BB4 (6B 80K Sticker)	**Dodge Dakota Pickup** E02200C813136F2D (6B 80K Sticker)
	Chevrolet Cobalt 355AB1CBA91F86E081000126 E20034120139F000067D5E9B (6C PeachPass Sticker)	**Chevrolet Impala** E2003412013EF000067D5F37 (6B 80K Sticker)
	Toyota Corolla E02200C813136030 (6B 80K SunPass License Plate Mount)	**Dodge Charger** A4010A01A0577316 (6B 80K Sticker)

Test Notes:

Due to human error counting passes, only 96 passes were run for a total of 384 transactions. Passes 1 – 50 reported only the center HOT lane and the GP lane, with no cross lane reads from the GP lane into the HOT lane. At customer request, from pass 51 – 96, Lane 1 became the stationary vehicle HOT lane resulting in extremely high handshake counts, and Lane 3 became the HOT lane where 4 vehicles were passing with transponders. At customer request, starting with pass 72, the vehicles in the GP lane were switched with the vehicles in the HOT lane resulting in different transponder identification numbers being reported in the test data from the previous 71 passes.

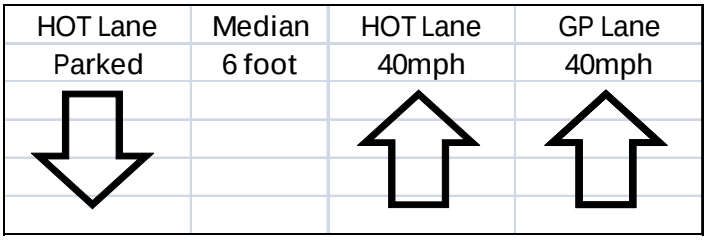
Test Summation:

No cross lane reads occurred from the GP lane into the HOT lane. This test passed without anomalies. An Excel spreadsheet containing the captured passage data is included in file Test 4 Scenario 4 Annotated.xls with passage starts annotated. Raw data captured from the readers is included in file Test 4 Scenario 4.txt and Test 4 Scenario 4b.txt. Video of the test is included in file Day 2.avi

Test #5 (Scenario 5):

This scenario has the same lane configuration as Test #4. Transponders were installed in 4 vehicles and transponders were removed from 4 vehicles. The 4 vehicles without transponders were driven through the center (HOT) lane. The 4 vehicles with transponders were driven through the leftmost (General Purpose) lane. This scenario simulated congested traffic

conditions in all lanes. Multiple vehicles were closely spaced front to back while travelling at **40 mph** through the center HOT and GP lanes. This scenario was repeated 100 times. Any reads which do occur, other than from the HOT Lane Parked lane, would be considered cross lane reads. No reads from the either the HOT Lane or the GP Lane is expected for zero reads recorded.



Vehicle Configuration:

Hot Lane Parked	Hot Lane	GP Lane
Dodge Caravan Minivan C4010A019BBA8794 (6B 80K Sticker)	**Ford Focus** No Transponder	**Ford E-450 Bus** 355AB1CBA698A7208100011B E20034120133F000067D5EC7 (6C PeachPass Sticker)
	Chevrolet Aveo No Transponder	**Dodge Dakota Pickup** E02200C813136F2D (6B 80K Sticker)
	Chevrolet Cobalt No Transponder	**Chevrolet Impala** E2003412013EF000067D5F37 (6B 80K Sticker)
	Toyota Corolla No Transponder	**Dodge Charger** A4010A01A0577316 (6B 80K Sticker)

Test Notes:

One hundred passes were performed. All four vehicles passing through the GP lane were equipped with transponders. All four vehicles passing through the HOT Lane were not equipped with transponders. No reads in either the HOT Lane or the GP Lane were expected.

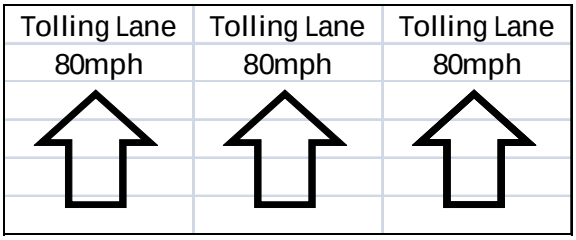
Test Summation:

This test passed with no cross lane reads from the HOT Lane or the GP Lane. An Excel spreadsheet containing the captured passage data is included in file Test 5 Scenario 5 Annotated.xls. Raw data captured from the readers is included in file Test 5 Scenario 5.txt. Video of the test is included in file Day 2.avi

Day 3 (Thursday March 10, 2011):

Test #3 (Scenario 1):

Transponders were installed in 9 vehicles, 3 vehicles per lane with all lanes configured as Tolling Lanes. The test simulated free-flow closely spaced traffic in all lanes while travelling at **80mph** in all lanes. This scenario was run the first 10 times with all nine vehicles including the bus, then eighty-nine times without the bus. This scenario was to be repeated100 times for a total of 810 possible transponder read attempts. Due to pass counting error, only 99 passes were run, resulting in a total of 802 possible transponder read attempts.



Vehicle Configuration:

Lane 1	Lane 2	Lane 3
Chevrolet Aveo E02200C811B39BB4 (6B 80K Sticker)	**Chevrolet Cobalt** 355AB1CBA91F86E081000126 E20034120139F000067D5E9B (6C PeachPass Sticker)	**Ford E-450** Bus (10 passes) 355AB1CBA698A7208100011B E20034120133F000067D5EC7
Chevrolet Impala 355AB1CBA2E6C730810000FF E2003412013EF000067D5F37 (6C PeachPass Sticker)	**Dodge Dakota Pickup** 355AB1CBAD6BEB5081000108 E20034120141F000067D5F13 (6C PeachPass Sticker)	**Dodge Caravan Minivan** C4010A019BBA8794 (6B 80K Sticker)
Ford Focus 355AB1CBA1DB5FA08100011F E20034120135F000067D5EB7 (6C PeachPass Sticker)	**Dodge Charger** A4010A01A0577316 (6B 80K Sticker)	**Toyota Corolla** E02200C813136030 (6B 80K License Plate Mount)

Test Notes:

Human error in counting vehicle passages resulted in only 99 passes instead of the intended 100 passes. Total transactions expected and achieved are 802.

Test Summation:

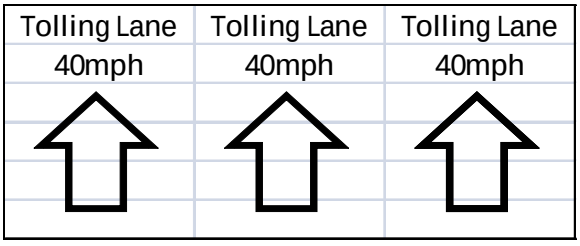
All transponders were read. One transponder (6B 80K) failed to achieve 3 handshakes:

- Pass 60 transponder C4010A019BBA8794 achieved 2 handshakes

An Excel spreadsheet containing the captured passage data is included in file Test 3 Scenario 1 Annotated.xls. Raw data captured from the readers is included in file Test 3 Scenario 1 Reader 1.txt and Test 3 Scenario 1 Reader 2.txt. Video of the test is included in file Day 3.avi.

Test #6 (Scenario 6):

This scenario has two Transponders installed in 9 vehicles (one PeachPass Transponder and one Cruise Card or SunPass Transponder, for a total of two transponders per vehicle). Three vehicles will drive through each lane. All lanes were configured as Tolling Lanes. This scenario simulated congested traffic conditions in all lanes. Multiple vehicles closely spaced front to back travelled through each lane at **40 mph** in all lanes. This scenario was to be repeated100 times for a total of 1800 possible read attempts, but due to human error counting passes, 102 total passes were completed for a total of 1,836 possible reads.



Vehicle Configuration:

Lane 1	Lane 2	Lane 3
Chevrolet Aveo 355AB1CBAB7CE8408100011E E20034120138F000067D5EBB (6C PeachPass Sticker) E02200C811B39BB4 (6B 80K Sticker)	**Chevrolet Cobalt** 355AB1CBA91F86E081000126 E20034120139F000067D5E9B (6C PeachPass Sticker) E02200C811B39C38 (6B 80K Sticker)	**Ford E-450 Bus** (10 passes) 355AB1CBA698A7208100011B E20034120133F000067D5EC7 (6C PeachPass Sticker) 355AB1CBA397EC8081000124 E2003412013FF000067D5EA3 (6C PeachPass Sticker)
Chevrolet Impala 355AB1CBA2E6C730810000FF E2003412013EF000067D5F37 (6C PeachPass Sticker) E02200C811B3A5A8 (6B 80K Sticker)	**Dodge Dakota Pickup** 355AB1CBAD6BEB5081000108 E20034120141F000067D5F13 E02200C811B3A49C (6B 80K Sticker)	**Dodge Caravan Minivan** 355AB1CBA2C4A0E081000121 E20034120135F000067D5EAF (6C PeachPass Sticker) C4010A019BBA8794 (6B 80K Sticker)
Ford Focus 355AB1CBA1DB5FA08100011F E20034120135F000067D5EB7 (6C PeachPass Sticker) E02200C811B3A310 (6B 80K Sticker)	**Dodge Charger** 355AB1CBA1002F6081000122 E2003412013BF000067D5EAB (6C PeachPass Sticker) A4010A01A0577316 (6B 80K Sticker)	**Toyota Corolla** 355AB1CBAF3E101081000103 E2003412013FF000067D5F27 (6C PeachPass Sticker) E02200C813136030 (6B 80K Sticker)

Test Notes:

At the request of the customer, the Ford E-450 Bus had 2 PeachPass (6C) transponders installed in the same vehicle instead of 1 PeachPass and 1 6B 80K transponder.

Human error in counting vehicle passages resulted in 102 passes instead of the intended 100 passes. Total transactions achieved were 1,836.

Test Summation:

All transponders were read. All transponders achieved 3 or more handshakes. Test passed with no anomalies.

An Excel spreadsheet containing the captured passage data is included in file Test 6 Scenario 6 Annotated.xls. Raw data captured from the readers is included in file Test 6 Scenario 6 Reader 1.txt, Test 6 Scenario 6 Reader 1b.txt, Test 6 Scenario 6 Reader 2.txt, and Test 6 Scenario 6 Reader 2b.txt. Video of the test is included in file Day 3.avi.

Test Summary

The FSTech RFID equipment passed the Performance Validation Test. Throughout all the test scenarios, not a single transponder failed to be read by the RFID equipment.

Test #1 (Scenario 3) passed 100% with all transponders read and all transponders achieved 3 or more handshakes.

Test #2 (Scenario 2) had all transponders read with 3 transponders achieving less than 3 handshakes.

Test #3 (Scenario 1) had all transponders read with only 1 transponder failing to achieve 3 handshakes.

Test #4 (Scenario 4) passed with no cross lane reads from the GP lane into the HOT lane.

Test #5 (Scenario 5) passed with no cross lane reads from the HOT Lane or the GP lane.

Test #6 (Scenario 1) passed with all transponders being read and achieving a minimum of 3 handshakes.

The final summarized read accuracy percentages were based on a total of 5,510 possible read attempts. The final cross lane read percentages are based on a possible 400 read attempts.

Transponder read accuracy = 100% (all transponders read).

Transponder read accuracy with transponders achieving 3 or more handshakes per vehicle passage = 99.91% with 99.90% required to pass the test. Out of 4,686 possible read attempts, four 6B 80K transponders did not achieve 3 handshakes.

Cross Lane Read accuracy = 100% with 99.00% required to pass the test. Out of 1,184 possibilities for cross lane reads, no cross lane reads occurred.

The FSTech RFID equipment passed the accuracy validation testing with transponders manufactured by third parties. No FSTech manufactured transponders were used in any of the testing.