



Regional Integrated Corridor Management System Iteration 1

System Test Report

Version: 0.2

Approval date:



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Reviewed By:	Clay Weston, SwRI	November 28, 2018
	Clay Packard, VHB	January 2, 2019
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List of Acronyms and Abbreviations

COTS	Commercial Off The Shelf
DFE	Data Fusion Environment
DMS	Dynamic Message Sign
DSS	Decision Support System
FDOT	Florida Department of Transportation
HCS7	Highway Capacity Software Version 7
HDFS	Hadoop Distributed File System
HWU	Hot Wash Up
IC	Integration Case
IEN	Information Exchange Network
R-ICMS	Regional Integrated Corridor Management System
SQL	Structured Query Language
SwRI	Southwest Research Institute
TC	Test Case
TRR	Test Readiness Review
VHB	Vanasse Hangen Brustlin
VM	Virtual Machine
VPN	Virtual Private Network

1 Introduction

This document provides a record of the testing of Iteration 1 of the Regional Integrated Corridor Management System (R-ICMS).

1.1 Purpose

The first sections of this document describe the software and resource management used to conduct the test. The last sections of this document specify the requirements verified by this test.

1.2 Overview

The R-ICMS is intended to be an initial implementation of a multi-modal regional transportation management system. The R-ICMS will integrate freeway, arterial, transit, and rail transportation management for the I4 corridor, including management of transportation system components owned and operated by the state, as well as the county, city, and regional transportation agencies.

The R-ICMS will consist of, but not be limited to; commercial off-the-shelf (COTS) modeling software (provided by the DEPARTMENT), a custom-built Decision Support System (DSS), a custom-built Information Exchange Network (IEN) subsystem that includes dashboards and other user interfaces to the system, and a Data Fusion Environment (DFE) to host data sources for both the R-ICMS and other external users and applications.

This project is funded and managed by District 5 of the Florida Department of Transportation (FDOT). It is intended for the use of District personnel, as well as personnel from the cities, counties, and transportation agencies located within the District. The initial deployment of the R-ICMS will be to the Transportation Management Center being built in District 5 by the FDOT.

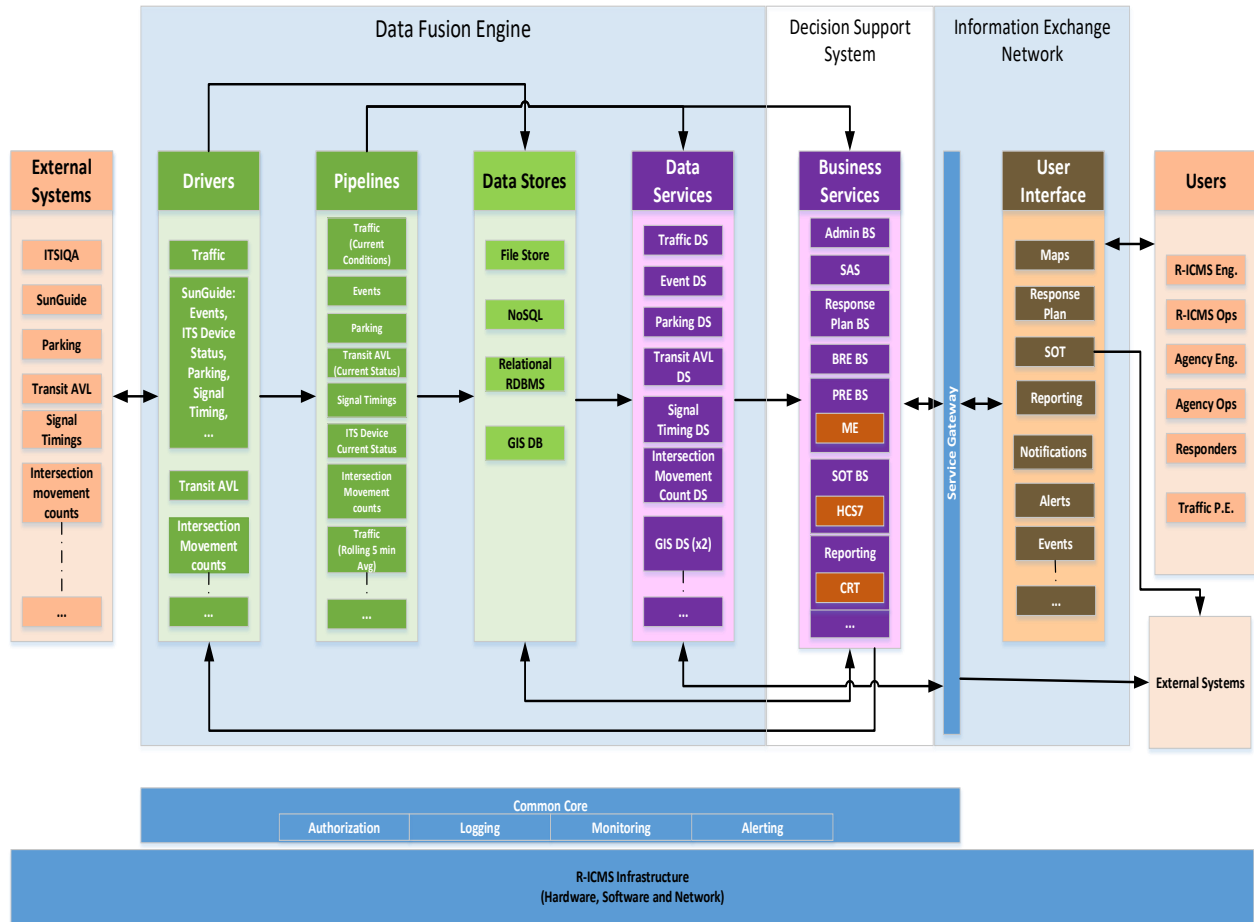


Figure 1 - High Level Architecture

1.2.1 Release Scope

Iteration 1 of 4 is the design validation phase. This iteration focused on testing and validating three primary features.

1. Ensure ingestion of static data and one dynamic data source.
2. Ensure access to the data through the R-ICMS User Interface map.
3. Programmatic encapsulation of the HCS7 Streets tool for use as the Signal Optimization back end.

1.2.2 System Configuration

This initial iteration of testing was conducted on a test environment system located at the headquarters of EPIC Engineering. All necessary servers and R-ICMS related software ran on the EPIC test environment. Additionally, the SunGuide software ran on the District 5 SunGuide test system. The dedicated VPN tunnel between EPIC and District 5 was used to consume data from the SunGuide system.

2 Reference Documents

The documents in Table 1, of the exact issue shown, form a part of this document to the extent specified herein. In the event of a conflict between the documents referenced herein and the contents of this document, this document shall be considered the superseding requirement.

Table 1 - Referenced Documents

Document Name	Document Location
System and Subsystem Requirements Specification for R-ICMS for: Regional Integrated Corridor Management System: R-ICMS-REQ-0.2	Southwest Research Institute FDOT R-ICMS Project SharePoint Site
BE521 - Executed Contract	Florida Department of Transportation D5prcustodian@dot.state.fl.us
Data Sets Needed by ICMS - ICMS Requirements Table 7	Southwest Research Institute FDOT R-ICMS Project SharePoint Site
Software Development Plan for the Regional Integrated Corridor Management System: R-ICMS-SDP-1.0	Southwest Research Institute FDOT R-ICMS Project SharePoint Site
System Design Document for R-ICMS: Regional Integrated Corridor Management System: R-ICMS-SDD-1.0	Southwest Research Institute FDOT R-ICMS Project SharePoint Site
System Test Plan for R-ICMS: Regional Integrated Corridor Management System R-ICMS-STP-1.0	Southwest Research Institute FDOT R-ICMS Project SharePoint Site
System Test Procedures for R-ICMS: Regional Integrated Corridor Management System R-ICMS-TPD-1.0	Southwest Research Institute FDOT R-ICMS Project SharePoint Site

3 Integration and Testing

This section summarizes the results of the integration testing.

3.1 Test Participants

Table 2 - Test Participants shows the personnel designated to participate in the testing process.

Table 2 - Test Participants

Participant	Contact Info	Environment Prep	Test Readiness Role	Test Execution Role	Test Report
Clay Weston, SwRI	cweston@swri.edu (210) 867-7353	Oversight	Conduct	Conduct	Develop
Angela Bos, SwRI	abos@swri.edu (210) 867-5969	SOT Setup	Conduct	Conduct	Develop
Cristian Romo, SwRI	cromo@swri.edu (210) 867-5520	System Deployment	Attend	Attende	Develop
Sutha Krishnan, SwRI (EPIC)	sutha@epicgroupllc.com (407) 542-1652	Oversight, System Setup	Conduct	Conduct	Develop
Natalie Coggeshell,	natalie@epicgroupllc.com (407) 381-3742		Conduct	Conduct	Develop

Participant	Contact Info	Environment Prep	Test Readiness Role	Test Execution Role	Test Report
SwRI (EPIC)					
Gary Miller, SwRI (EPIC)	gary@epicgroupplc.com (407)545-1973	Oversight	Attend	Attend	Oversight
Suresh Sanka, SwRI (EPIC)	suresh@epicgroupplc.com (407) 381-3742	System Setup	Conduct	Conduct	Develop
Bill Kuhn, SwRI (EPIC)	bill@epicgroupplc.com 407-381-3742	DFE Setup	Attend	Attend	Develop
Sindhura Pandrangi, SwRI (EPIC)	sindhura@epicgroupplc.com 407-381-3742	GIS Setup	Attend	Attend	Attend
Clay Packard, FDOT (VHB)	cpackard@vhb.com (407) 901-2804	SunGuide Prep	Witness	Witness	Review
Claudia Paskauskas, FDOT (Innovo Partners)	cpaskauskas@innovopartners.com 407.432-4866		Witness	Witness	Review
Matt Juckes, FDOT (Kapsch)	Matthew.Juckes@kapsch.net (347) 224-9790		Witness	Witness	Review
Kevin Miller, FDOT (Kapsch)	Kevin.Miller@kapsch.net		Witness	Witness	Review
Tushar Patel, FDOT	Tushar.Patel@dot.state.fl.us 386-943-5315		Witness	Approve	Approve
Jeremy Dilmore, FDOT	Jeremy.Dilmore@dot.state.fl.us (386) 943-5360		Witness	Witness	Review
Jay Williams, FDOT	Jay.Williams@dot.state.fl.us 386-943-5329		Witness	Witness	

3.2 Test Environment

Figure 2 - Physical Diagram shows the physical configuration for this test. Some servers were run as Virtual Machines (VMs) and some services were combined to run on a single server. The primary installation for the purposes of this test were installed on servers located at EPIC headquarters. Through the VPN tunnel to the FDOT District 5 network, the system received SunGuide DMS data to demonstrate the updating dynamic data source requirement for this test.

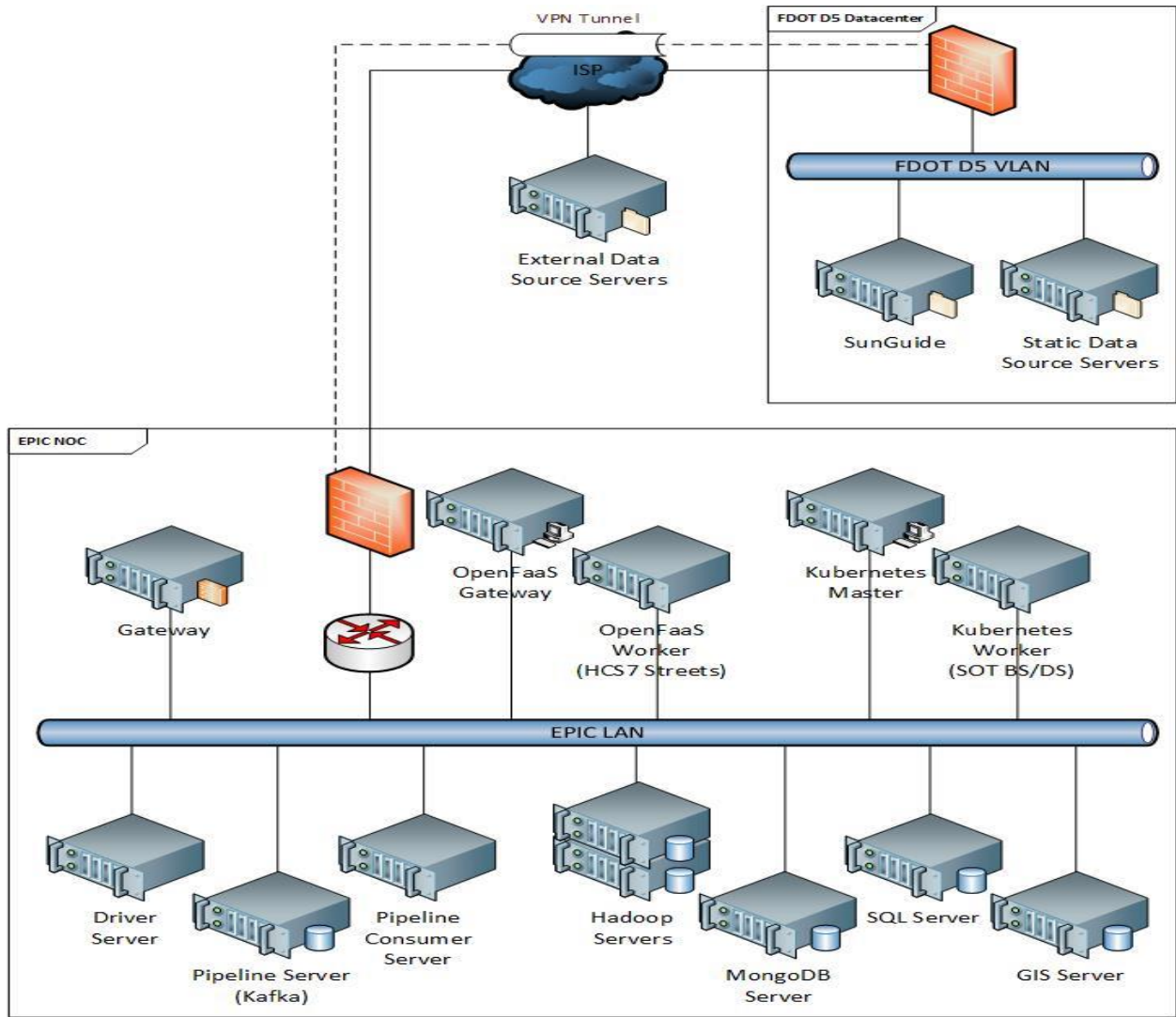


Figure 2 - Physical Diagram

3.3 Test Dependencies

Table 3 - Test Dependencies lists the resources used in the testing as the owner agency responsible for providing the associated resource.

Table 3 - Test Dependencies

Resource	Owner
Iteration 1 R-ICMS Software	SwRI, EPIC
Windows Servers	EPIC
Linux Servers	EPIC
Data Stores (SQL, MongoDB, HDFS)	EPIC
ArcGIS	EPIC
Operator Workstations	EPIC
HCS7 Streets Software	SwRI
SunGuide 7.1.x Production System (DMS)	District 5

Resource	Owner
SunGuide 7.1.x Test System (DMS)	District 5
SunGuide DMS Simulator	District 5
Static Data Sources	District 5
EPIC – FDOT D5 VPN Tunnel	EPIC, District 5

3.4 Test Schedule

Table 4 - Test Schedule shows a schedule for the Iteration 1 testing activities.

Table 4 - Test Schedule

Activity	Date (2018)
Test Readiness Review Meeting	11/6
Test Execution	11/6
Hot Wash Up Meeting	11/8
Corrective Action	11/9
Finalize Test Report	12/11

3.5 Test Preparation Tasks

1. Installation of the Software Under Test on the EPIC hardware configuration.
2. Ensure VPN connection to FDOT from EPIC.
3. Ensure SunGuide DMS subsystem is running and producing messages.

4 Test Results

The following sections detail the steps performed to complete testing for Iteration 1.

4.1 Test Readiness Review

The Test Readiness Review (TRR) was held immediately prior to the Test Execution. The slides presented as part of the TRR are show in Exhibit A - RICMS Iteration 1 TRR.pptx.

4.2 Test Execution

The test team conducted the testing as described in the Software Test Procedures:

- Exhibit B - R-ICMS_Test Log Iteration 1.pdf is a pdf of the Software Test Procedures with notations indicating deviations from the test procedures if any as well as indication of Pass / Fail for each of the test steps.
- The Exhibit C – Test Scripts folder contains relevant test scripts referenced in the Test Log.
 - Test scripts are individually marked according to the test case in which they were run.
- The Exhibit D – Test Case Captures folder contains relevant documents and images captured during test execution.

- Test captures are marked according to the test case in which they were captured.
- The Software Test Log notes that all test steps passed, and no failures were noted.

Table 5 - Test Case Pass/Fail

Test Case ID	Test Case Name	Test State
RICMS-T32	ITER1-Optimize Timing Plan Set for Single Intersection	Pass
RICMS-T99	Verify static bus provider data is available on the map	Pass
RICMS-T100	Verify school data and Emergency Responder locations are available on the map	Pass
RICMS-T101	Verify SunGuide DMS data is accessible on the map	Pass
RICMS-T102	Verify icons representing devices shall display the status of the device they represent.	Pass
RICMS-T103	Demonstrate data can be ingested / stored by the RICMS	Pass
RICMS-T105	Demonstrate the RICMS will re-establish a lost connection to data sources.	Pass
RICMS-T106	Demonstrate the RICMS can transform and store data source data.	Pass
RICMS-T107	Demonstrate the RICMS can store data across reboots	Pass
RICMS-T108	Demonstrate the RICMS can store GIS data from identified data sources	Pass
RICMS-T109	Demonstrate the RICMS can expand the capacity of data stores	Deferred
RICMS-T110	Demonstrate the RICMS can index data sets	Pass

4.3 Hot Wash Up

The Hot Wash Up (HWU) meeting was held following Test Execution. The slides presented as part of the HWU are show in Exhibit E - RICMS Iteration 1 Hot Wash Up.pptx. The HWU included:

- Test Case Status
- Demonstrated R-ICMS capabilities
- Deviations
- Known Software Issues
- Test Procedure Updates

4.4 Corrective Action

No immediate correction actions were identified at the time of test execution. One test case (RICMS-T109) was deferred to Iteration 2. This test case (Demonstrating the capability to expand data stores) will be tested prior to Iteration 2 Test Execution due to the nature of the test. Test results from this test will be included in the Iteration 2 Test Log.

5 User Definitions

None.

DOCUMENT REVISION HISTORY			
Version Number	Approved Date	Description of Change(s)	Created/ Modified By

Attachment A
Regional Integrated Corridor Management System
Test Readiness Review (TRR) Meeting
R-IUCMS-1.0TRR

**Regional Incident Corridor Management System
Test Readiness Review (TRR) Meeting for R-ICMS
Iteration 1**

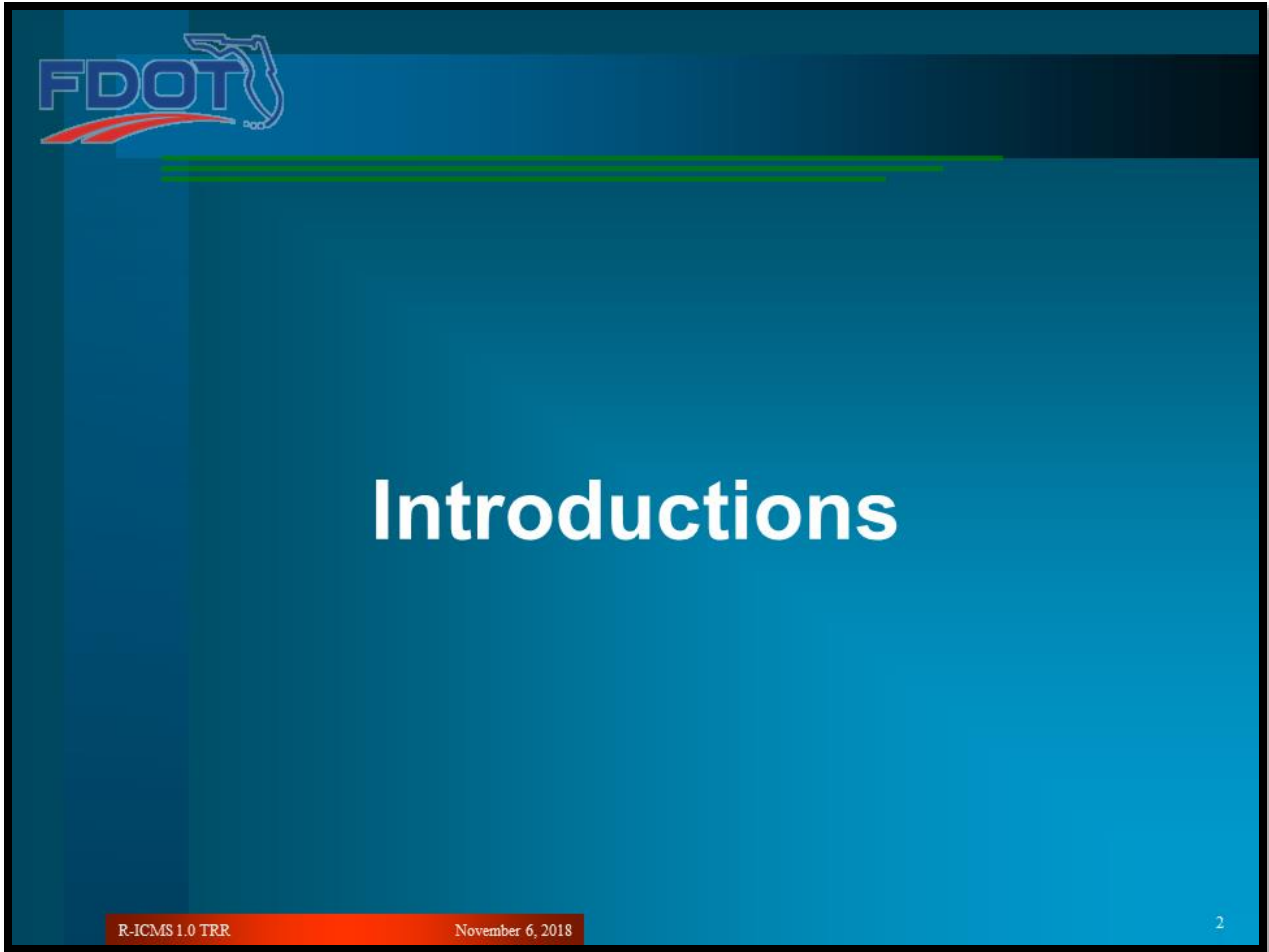
November 6, 2018



November 6, 2018

R-ICMS 1.0 TRR

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Agenda

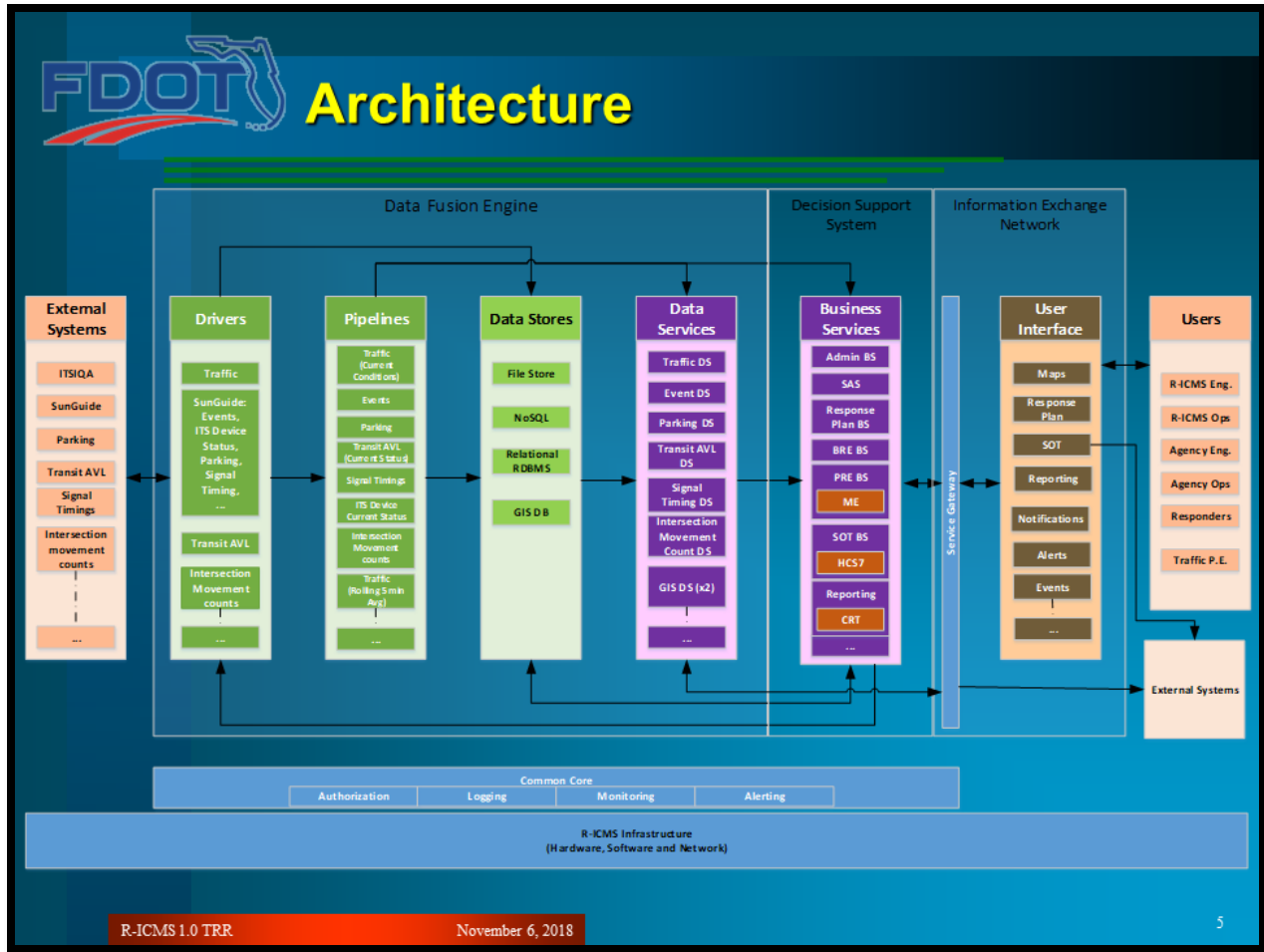
Start	End	November 6, 2018 Training Room Suite 2001	Facilitator
9:00	9:15	Introductions / Safety / Misc.	Clay Weston
9:15	11:00	Test Readiness Review Begin Testing	Clay Weston Various
11:00	11:15	Break (Order Lunch)	
11:15	12:30	Continue Acceptance Testing	Various
12:30	1:30	Lunch (Order in, continued testing)	
1:30	3:00	Continue Acceptance Testing	Various
3:00	3:15	Break	
3:15	6:00	Continue Acceptance Testing (End at 5:00 if testing is progressing rapidly)	Various

Start	End	November 7, 2018 Training Room Suite 2001	Facilitator
9:00	9:15	Introductions / Safety / Misc.	Clay Weston
9:15	11:00	Continue Acceptance Testing (SOT)	Various
11:00	11:15	Break (Or end if done)	
11:15	12:30	Hot Wash Up	Various



TRR Agenda

- Logistics
- Project Status and Changes
- Testing
- Issues
- Configuration and Notes
- PCA
- Testing Procedures
- Agenda
- Questions





- **Test location:**
 - Training room @ Business Incubation Program
 - 1511 E. State Road 434, Suite 2001
 - Winter Springs, FL 32708
- **Breaks:**
 - Rolling
- **Public Internet:**
 - Available on guest network (wireless)



Current Project Status

- **Iteration 1 Development Complete**
- **Features:**
 - **User Interface**
 - **Map**
 - **Static Data**
 - **Dynamic Message Sign Data**
 - **DFE**
 - **Functional testing**
 - **Disconnects**
 - **Etc**
 - **SOT**
 - **Display selection**
 - **Display results**
 - **Show backend file processing**
- **SwRI has exercised the system**
 - **Unit testing , integration testing**
 - **Acceptance Test Dry Runs**



- **Unit Tests**
 - **Currently manually run**
 - **SOT Unit Test Demo**
 - **Will be integrated into Continuous Build and Integration automated processes**
 - **Performed on each code check in**
 - **Will not report a successful build unless unit tests pass**



- **Integration Tests**
 - **Currently a challenge**
 - **SwRI has procured but not set up DFE servers for Hadoop, Mongo and Elastic**
 - **HCS7 FDOT license not finalized**
 - **SwRI purchased own license for development**
 - **VPN access to Test SunGuide system finalized on 11/2/2018**
 - **Deployment done to EPIC servers**



Known Issues

- **Known issue with software**
 - DMS Icons color and opStatus description is off (fixed in “unfrozen” code)
 - DMS Config updates require screen refresh to show
 - retrieveDataResp messages do not “flush” out the config and status of DMS.

- **Setup Notes**
 - Deployment done with containers as appropriate
 - Orchestration done through Kubernetes



Discuss Test Configuration

- Virtual Servers running Windows 2016 Server
- Virtual Servers running Ubuntu 16.04

- Setup
 - R-ICMS Release 0.1.0

- Workstations
 - Windows 10 Pro



Environment Note

- Testing dependent on Production and Test SunGuide systems. Any issues with these applications could cause issues for R-ICMS.
- Involves using simulators to test DMS functionality
- There are times that the simulators “misbehave” and we find ourselves “retesting” to achieve the results
- The “retests” do NOT require software modifications



Discuss Testing Process

- **Purpose:**
 - Review preparations for testing
 - Walk through the test procedures at a very high level and determine if anyone has any comments

- **Ground Rules:**
 - Testing will not depart from the written procedures
 - Any requested “ad hoc” testing will occur after the formal testing process
 - Re-writing of requirements / scope additions will be captured for future consideration

- **Approvals:**
 - FDOT/SwRI will witness each test case



How Testing Will Occur

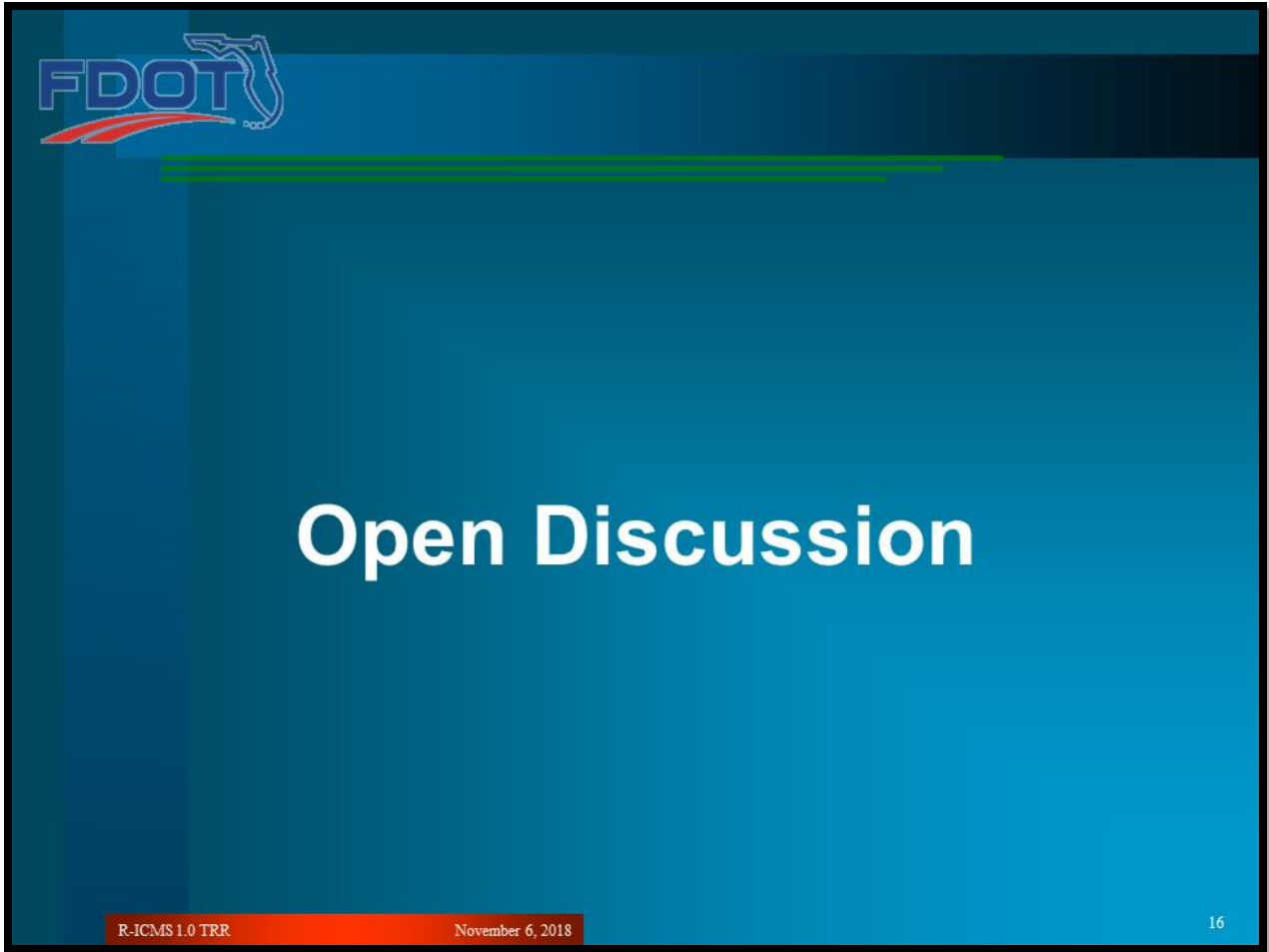
- **For each Test Case (TC):**
 - Team will explain the objective of the TC
 - Requirements will be reviewed
 - An operator will walk through each test case and perform the GUI actions (see next slide for an 'example' test case)
 - Results will be captured

- **Note: Enhancements will be captured for future review by FDOT**



Test Case Example

Step	Instruction	Expected Result	Pass/Fail	Req #
1	Download static data from https://corporate.SunRail.com/about-SunRail/gtfs-data-download/	File is stored to a secure location		
2	Launch ArcMap From the ArcToolbox, expand Display GTFS in ArcGIS and right click Display GTFS stops. Open file: stops.txt Right click on Layers on the left menu and select "Open Attribute Table"	File is displayed in tabular view		
3	Navigate to RICMS URL and select the SunRail Stops layer and select an icon	Icon details are displayed		
4	Validate Lat/Long coordinates match for selected icon	Lat/Long coordinates match	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	2.1.4.5



Attachment B
Regional Integrated Corridor Management System
Test Log

Regional Integrated Corridor Management System Test Procedures Iteration 1



Transportation Systems Management & Operations

Regional Integrated Corridor Management Test Procedures Document Iteration 1

Version: 0.1

Approval date: TBD



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Regional Integrated Corridor Management System Test Procedures Iteration 1

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Reviewed By:	Matt Juckes, Kapsch	October 29, 2018
	Kevin Miller, Kapsch	October 29, 2018
	Clay Packard, VHB	October 30, 2018
Modified By:		
Approved By:		

R-ICMS-TPD-0.1.docx

Regional Integrated Corridor Management System Test Procedures Iteration 1

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3.4	<i>Test Case: Demonstrate the RICMS can transform and store data source data</i>	7
3.5	<i>Test Case: Demonstrate the RICMS can store GIS data from identified data sources</i>	9
3.6	<i>Test Case: Verify static bus and rail provider data is available on the map</i>	10
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Regional Integrated Corridor Management System Test Procedures Iteration 1

List of Acronyms and Abbreviations

API	.....	Application Program Interface
DFE	.....	Data Fusion Environment
DMS	.....	Dynamic Message Signs
ETL	.....	Extract, Transform, Load
FDOT	.....	Florida Department of Transportation
FTP/SFTP	.....	File Transport Protocol / Secure File Transport Protocol
GIS	.....	Geographic Information System
GTFS	.....	General Transit Feed Specification
GTFS-RT	.....	General Transit Feed Specification – Real Time
IC	.....	Integration Case
IEN	.....	Information Exchange Network
IMC	.....	Intersection Movement Counts
ITS	.....	Intelligent Transportation System
ITSIQA	.....	Intelligent Transportation System Input Quality Assurance
JSON	.....	JavaScript Object Notation
JWT	.....	JSON Web Tokens
LDAP	.....	Lightweight Directory Access Protocol
ME	.....	Modeling Engine
PD	.....	Preliminary Design
PDR	.....	Preliminary Design Review
R-ICMS	.....	Regional Integrated Corridor Management System
SDD	.....	System Design Document
SOT	.....	Signal Optimization Tool
TC	.....	Test Case
TSMO	.....	Transportation Systems Management and Operations
UI	.....	User Interface

Regional Integrated Corridor Management System Test Procedures Iteration 1

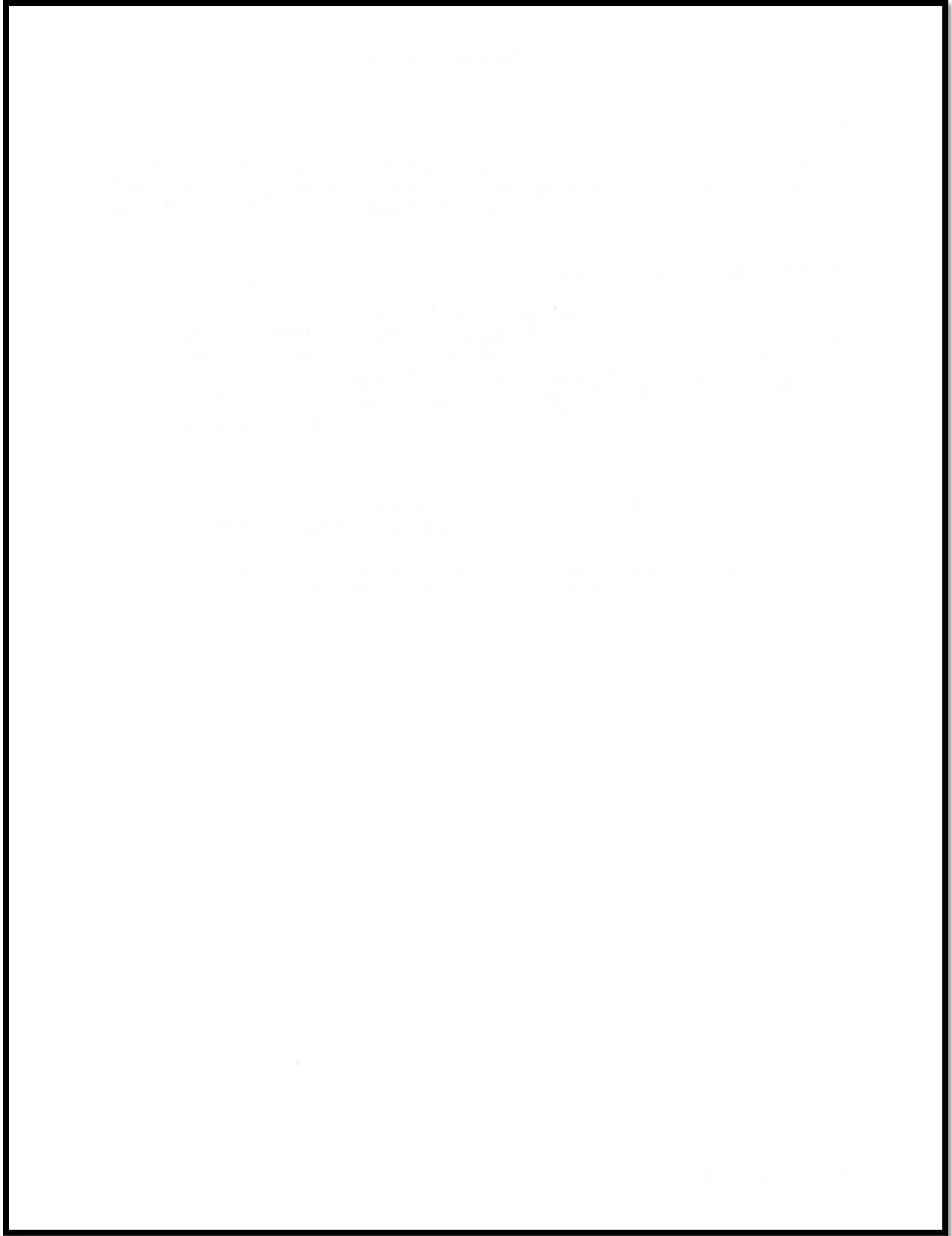
1 Scope

This document contains the testing procedures for the Regional Corridor Incident Management System Iteration 1. Details for the testing times and locations, required equipment, and overall testing strategy can be found in the Regional Corridor Incident Management System-System Test Plan.

2 Reference Documents

The following documents, of the exact issue shown, form a part of this document to the extent specified herein. In the event of a conflict between the documents referenced herein and the contents of this document, this document shall be considered the superseding requirement.

Document Name	Document Location
System and Subsystem Requirements Specification for R-ICMS for: Regional Integrated Corridor Management System: R-ICMS-REQ-0.2	Southwest Research Institute FDOT R-ICMS Project SharePoint Site
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Regional Integrated Corridor Management System-System Test Plan: R-ICMS-SDP-1.0	Southwest Research Institute FDOT R-ICMS Project SharePoint Site



Regional Integrated Corridor Management System Test Procedures Iteration 1

3 Test Case Detailed Procedures

This section provides the detailed test procedures. Each test case includes test case information, and detailed steps to be followed. The starting and ending times of each test case are to be collected and recorded. Upon the successful completion of each test case, tester and witness signatures will confirm the complete execution of the test steps.

3.1 Test Case: ITER1-Optimize Timing Plan Set for Single Intersection

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T32	ITER1-Optimize Timing Plan Set for Single Intersection	Demonstrate using the HCS7 Streets back end via the RICMS user interface to run a signal timing optimization for a single intersection	20.1.6

Test Script

Test Start Date and Time	11/6/2018 3:15 PM
--------------------------	-------------------

Step	Instruction	Expected Result	Pass/Fail	Req #
1	Using a web browser, visit the OpenFaaS Prometheus dashboard at the following URL: http://10.0.80.73:9090/graph using the drop-down, select the following query: gateway_function_invocation_total and click the "Execute" button	View the tab: Console Record the values of the function counts for: streets streets-optimize These values show a count of the number of times each function-as-a-service has been called. For now, a SOT optimization run should call each function once. Future development will include retry on failure. But for now, we record these values at the start and end of this test to verify the counts are incremented by 1 by the end of the test.		
2	Using a web browser, log in to R-ICMS User Interface at the following URL:	R-ICMS User Interface Opens		

R-ICMS-TPD-0.1.docx

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Regional Integrated Corridor Management System Iteration 1 System Test Report

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
	http://10.1.80.71			
3	From the left navigation menu, click "SOT", then click "Run optimization"	"SOT Intersection Configs" view opens, with a data table listing the first page of pre-configured intersection data.		
4	Select an intersection configuration and click the "Run optimization" button	"Confirm Optimization Run" dialog opens, showing the selected intersection, direction, and time period.		
5	Select an objective function from the drop-down, then click the "Run Optimization" button	A spinner icon replaces the run button, indicating that the optimization is being submitted. After the SOT back end accepts the task for pre-processing, the dialog closes and a success notification "Optimization submitted!" is shown. The notification automatically disappears after a few seconds.		
6	<p>From the left navigation menu, click "View Results" under the "SOT" item.</p> <p>Note: user may need to complete/repeat step 4 and 5 in quick succession in order to observe the full sequence of status changes on the results view as the optimization runs.</p>	<p>"SOT Optimization Results" view opens, showing a new row for the optimization run with the correct intersection, direction, time period, and objective function.</p> <p>As the optimization runs, the data view updates through the following sequence:</p> <p>1) Status: pre-processing, LOS Before: (blank), LOS After: (blank)</p> <p>2) Status: processing, LOS Before: (range: A-G)</p> <p>3) Status: completed, LOS After: (range: A-G)</p> <p>If the view is open when an optimization completes, a success notification is received "Optimization completed!" The notification automatically disappears after a few seconds.</p>	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	20.1.6
7	<p>After the optimization run is complete, run Microsoft SQL Server Management Studio and using the Object Explorer make a connection to</p> <p>Type: Database Engine Server name: 10.1.80.71 Authentication: SQL Server Authentication</p>	<p>Expand the object explorer tree node Databases</p> <p>Verify the SOT database exists containing the following tables: dbo.opt_config dbo.opt_run</p>		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
	Login: sa Password: fooBar##			
8	<p>In the SOT database, run the following query:</p> <pre>select * from dbo.opt_config</pre> <p>Find the row where corridor_name, direction, and analysis_period correlates with selected config from step #4</p> <p>Click the link in the column "base_config" to view the config details in the XML editor.</p>	<p>Find and record the values of:</p> <p>SystemCycleLength PhaseSplits ID="EBL" PhaseSplits ID="EBT" PhaseSplits ID="WBL" PhaseSplits ID="WBT" PhaseSplits ID="NBL" PhaseSplits ID="NBT" PhaseSplits ID="SBL" PhaseSplits ID="SBT"</p> <p>Verify the following values: CycleLengthOptimization = Yes SplitOptimization = Yes</p> <p>Scroll to the bottom of the file and verify it ends thusly (ignoring XML comments): </Period> </INTERSECTION> </TMML></p>		
9	<p>In the SOT database, run the following query:</p> <pre>select * from opt_run</pre> <p>Find the row where id correlates with Result ID from the SOT View Results in step #6</p> <p>Click the link the the column "input_xml" to view the input details in the XML editor.</p>	<p>Verify the following value matches the user-selected optimization objective from step #5: FitnessFunction</p> <p>Verify the following values match base_config from previous step: PhaseSplits ID="EBL" PhaseSplits ID="EBT" PhaseSplits ID="WBL" PhaseSplits ID="WBT" PhaseSplits ID="NBL" PhaseSplits ID="NBT" PhaseSplits ID="SBL"</p>	<p>Pass <input checked="" type="checkbox"/></p> <p>Fail <input type="checkbox"/></p>	20.1.6


Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
		<p>PhaseSplits ID="SBT"</p> <p>Scroll to the bottom of the file and verify it ends thusly:</p> <pre><IntersectionLevelOfService>XXX</IntersectionLevelOfService> <Cycle>YYY</Cycle> </IntersectionPeriod> </Periods> </Intersection> </Intersections> </OutputData> </TMML></pre> <p>Where XXX matches LOS Before from the SOT View Results data in step #6 Where YYY matches value of base_config SystemCycleLength from the previous test step #8 (with decimal is OK)</p>		
10	<p>In the SOT database, run the following query:</p> <pre>select * from opt_run</pre> <p>Find the row where id correlates with Result ID from the SOT View Results in step #6</p> <p>Click the link the the column "output_xml" to view the output details in the XML editor.</p>	<p>Verify the following value matches the user-selected optimization objective from step #5: FitnessFunction</p> <p>Verify the following values are modified from base_config from previous step: PhaseSplits ID="EBL" PhaseSplits ID="EBT" PhaseSplits ID="WBL" PhaseSplits ID="WBT" PhaseSplits ID="NBL" PhaseSplits ID="NBT" PhaseSplits ID="SBL" PhaseSplits ID="SBT"</p> <p>Scroll to the bottom of the file and verify it ends thusly:</p>		

Regional Integrated Corridor Management System Iteration 1 System Test Report

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
		<pre><IntersectionLevelOfService>XXX</IntersectionLevelOfService> <Cycle>YYY</Cycle> </IntersectionPeriod> </Periods> </Intersection> </Intersections> </OutputData> </TMML></pre> <p>Where XXX matches LOS After from the SOT View Results data from step #6 Where YYY has been modified from the value of base_config SystemCycleLength from step #8</p> <p>Note: cycle length and phase splits may be unchanged if the base_config value was determined to be optimal</p>		
11	<p>Using a web browser, visit the OpenFaaS Prometheus dashboard at the following URL:</p> <p>http://10.0.80.73:9090/graph</p> <p>using the drop-down, select the following query:</p> <p>gateway_function_invocation_total</p> <p>and click the "Execute" button</p>	<p>View the tab: Console</p> <p>Verify the values of the function counts match the values from step #1 incremented by 1 for:</p> <p>streets streets-optimize</p>	<p>Pass <input checked="" type="checkbox"/></p> <p>Fail <input type="checkbox"/></p>	20.1.6

Test End Date and Time	11/6/2018 3:39 PM
Test Result (Pass/Fail)	Pass
Tester	

Regional Integrated Corridor Management System Test Procedures Iteration 1

Approver 

3.2 Test Case: Demonstrate data can be ingested / stored by the RICMS

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T103	Demonstrate data can be ingested / stored by the RICMS	The objective of this test is to demonstrate the RICMS can ingest and store data from data sources.	2.1.1 2.1.2.3 2.1.2.2 2.1.2 2.1.2.1

Test Script

Test Start Date and Time 11/6/2018 9:41 AM

Step	Instruction	Expected Result	Pass/Fail	Req #
0	<p>Preconditions:</p> <p>1. Download python 3.70 to computer to run the python script.</p> <p>2. The user need to be on same network as the Mongo database).</p> <p>Locate the test scripts and save to a local folder.</p>			
1	<p>Open a command prompt ✓</p> <p>Navigate to the scripts folder ✓</p> <p>Run the test script file: python get_kafka_sample_records.py</p> <p>Press Ctrl+C</p>	<p>Verify the receiveDateTime values are unique and recent.</p> <p>NOTE: datetimes are UTC</p>		

Revise →

Regional Integrated Corridor Management System Iteration 1 System Test Report

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
	Locate xml tags that are named SunGuideData Find the attribute named receivedDateTime			
2	Run the test script file: python get_mongodb_sample_records.py --source sunguide --sample_count 5 --iterations 3 --interval_time 1	The script will automatically connect to MongoDB and retrieve the data and write it to the output file: sunguide_mongodb_sample_records_YYYYMMDDHHMMSS.txt		
3	Open the output file: sunguide_mongodb_sample_records_YYYYMMDDHHMMSS.txt Verify DMS data is present	Three different sets of DMS data with time stamp will be available.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.1 2.1.2.3 2.1.2.2 2.1.2 2.1.2.1
4	Run the test script file: python get_mongodb_sample_records.py --source gtfs_transit_avl	The script will automatically connect to MongoDB and retrieve the data and write it to the output file: gtfs_transit_avl_mongodb_sample_records_YYYYMMDDHHMMSS.txt		
5	Open the output file: gtfs_transit_avl_mongodb_sample_records_YYYYMMDDHHMMSS.txt Find "source" property	Verify value = SunRail, Lynx		
6	Verify GTFS data from SunRail is stored	GTFS data with time stamp for SunRail will be available in output file.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.1 2.1.2.3 2.1.2.2 2.1.2 2.1.2.1
7	Verify GTFS data from Lynx is stored	GTFS data with time stamp for Lynx will be available in output file.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.1 2.1.2.3 2.1.2.2 2.1.2 2.1.2.1

Test End Date and Time	11/6/2018 9:56 AM
Test Result (Pass/Fail)	Pass

Regional Integrated Corridor Management System Test Procedures Iteration 1

Tester	<i>[Signature]</i>
Approver	<i>[Signature]</i>

3.3 Test Case: Demonstrate the RICMS can index data sets

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T110	Demonstrate the RICMS can index data sets	The objective of this test is to demonstrate RICMS can index data as specified in the Systems Design Document (SDD).	2.1.12

Test Script

Test Start Date and Time	11/6/2018 8:57 AM
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Step	Instruction	Expected Result	Pass/Fail	Req #
1	Login to the same network where the database is located			
2	Run the test script file: python get_mongodb_index_list.py	The script will automatically connect to MongoDB, retrieve the data and writes it to the output file: mongodb_index_list_YYYYMMDDHHMMSS.txt		
3	Open the output file	Data is displayed		
4	Validate the file contains Index data sets	The file contains multiple indexes. Note: each index is preceded by "Index:"		

Test End Date and Time	11/6/2018 10:01 AM
Test Result (Pass/Fail)	Pass
Tester	<i>[Signature]</i>
Approver	<i>[Signature]</i>

3.4 Test Case: Demonstrate the RICMS can transform and store data source data.

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
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Regional Integrated Corridor Management System Test Procedures Iteration 1

RICMS-T106	Demonstrate the RICMS can transform and store data source data.	The objective of this test is to demonstrate RICMS can load and store transformed data from the data sources into JSON format.	2.1.4 2.1.2.11 2.1.2.10 2.1.2.9 2.1.2.8 2.1.2.7
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Test Script

Test Start Date and Time 11/6/2018 9:01 AM

Step	Instruction	Expected Result	Pass/Fail	Req #
1	Login to the same network where the database is located			
2	Run the test script file: python get_mongodb_sample_records.py --source sunguide --sample_count 5 --iterations 3 --interval_time 1	The script will automatically connect to MongoDB, retrieve sample records at defined intervals and iterations and writes the data to the output file: sunguide_mongodb_sample_records_YYYYMMDDHHMMSS.txt		
3	Open the output file and check for data	Data is displayed		
4	Validate format using https://jsonlint.com	JSON format is validated.		
5	Verify DMS data is transformed, stored in JSON format and associated with Geolocation (Transformed from XML to JSON format) using	Three different records of DMS data with time stamp will be available Example: Dynamic Message Signs.		
6	Run the test script file: python get_mongodb_sample_records.py --source gtfs_transit_avl	The script will automatically connect to MongoDB and retrieve the data and writes it to the output file: gtfs_transit_avl_mongodb_sample_records_YYYYMMDDHHMMSS.txt		
7	Validate format using https://jsonlint.com	JSON format is validated.		
8	Verify SunRail GTFS data is stored in JSON format with associated Geolocation. (Transformed from GTFS to JSON format)	Two different records of SunRail data with time stamp will be available Example: Agency, Routes, Stops, trips.		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
9	Verify Lynx GTFS data is stored in JSON format with associated Geolocation. (Transformed from GTFS to JSON format)	Two different records of Lynx data with time stamp will be available Example: Agency, Routes, Stops, Trips		

Test End Date and Time	11/6/2014 10:27 AM
Test Result (Pass/Fail)	Pass
Tester	<i>[Signature]</i>
Approver	<i>[Signature]</i>

3.5 Test Case: Demonstrate the RICMS can store GIS data from identified data sources

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T108	Demonstrate the RICMS can store GIS data from identified data sources	The objective of this test is to demonstrate RICMS can store GIS data from identified sources.	2.1.4.5

Test Script

Test Start Date and Time	11/6/2014 10:25 AM
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Step	Instruction	Expected Result	Pass/Fail	Req #
1	Download static data from https://corporate.SunRail.com/about-SunRail/gtfs-data-download/	File is stored to a secure location		
2	Launch ArcMap From the ArcToolbox, expand Display GTFS in ArcGIS and right click Display GTFS stops . Open file: stops.txt Right click on Layers on the left menu and select "Open Attribute Table"	File is displayed in tabular view		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
3	Navigate to RICMS URL and select the SunRail Stops layer and select an icon	Icon details are displayed	<input checked="" type="checkbox"/>	
4	Validate Lat/Long coordinates match for selected icon	Lat/Long coordinates match	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.4.5

Test End Date and Time	11/6/2018 11:20 AM
Test Result (Pass/Fail)	Pass
Tester	<i>[Signature]</i>
Approver	<i>[Signature]</i>

3.6 Test Case: Verify static bus and rail provider data is available on the map


Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T99	Verify static bus provider data is available on the map	The objective of this test is to demonstrate the RICMS can display the static bus provider data for Lynx and SunRail on the map.	1.1.1.12

Test Script

Test Start Date and Time	
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Step	Instruction	Expected Result	Pass/Fail	Req #
1	Open REST endpoint URL: https://gisportal.epicgroupplc.com/agswa104/1/rest/services/RICMS/ICMS_Static_Data_Iteration1/MapServer/24/query Enter "1=1" for the Where field Select GeoJSON for the format field Select the "Query (Get)" button at the bottom of the screen	SunRail Station names and Lat Long values are displayed		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
	Scroll down to view results			
2	Open REST endpoint URL: https://gisportal.epicgroupinc.com/agswa1041/rest/services/RICMS/ICMS_Static_Data_Iteration1/MapServer/21/query Enter "1=1" for the Where field Select GeoJSON for the Format field Select the "Query (Get)" button at the bottom of the screen Scroll down to view results	Lynx Station names and Lat Long values are displayed 		
3	Enter the RICMS URL address into a browser: http://10.1.80.71/	The RICMS login page is displayed		
4	Enter Valid credentials and select Login	The system validates the credentials and the landing page is displayed		
5	Navigate to the Layers widget	The widget expands and the layer groups are displayed		
6	Expand the Static Data Category details	The sub category details are displayed		
7	Verify Transit data is listed in the static data sub category Layers widget	Lynx and SunRail are displayed as selectable layers		
8	Select the Lynx layer	Lynx routes and Lynx stops are displayed as optional layers.		
9	Select Lynx routes layer	System refreshes the map display		
10	Verify Lynx routes are displayed	Lynx routes are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.12,
11	Select Lynx stops layer	System refreshes the map display		
12	Verify Lynx stops are displayed	Lynx stops are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.12,
13	Use query results to enter a value in the search bar to find a Lynx stop	Map will zoom to approximate location to the street of the stop		
14	Validate lat/ long values are the same	Values match		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
15	Select a Lynx icon from the map	The system displays an info window for the selected icon		
16	Verify the info window is displayed	The info window displays data for the selected icon	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.12
17	Select the SunRail layer	SunRail routes and SunRail stops are displayed as optional layers.		
18	Select SunRail routes layer	System refreshes the map display		
19	Verify SunRail routes are displayed	SunRail routes are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.12
20	Select SunRail stops layer	System refreshes the map display		
21	Verify SunRail stops are displayed	SunRail stops are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.12
22	Use query results to enter a value in the search bar to find a SunRail stop	Map will zoom to approximate location to the street of the stop		
23	Validate lat/ long values are the same	Values match		
24	Select a SunRail icon from the map	The system displays an info window for the selected icon		
25	Verify the info window is displayed	The info window displays data for the selected icon	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.12

Test End Date and Time	11/6/2014
Test Result (Pass/Fail)	Pass
Tester	Chy n
Approver	Justin Patel

3.7 Test Case: Verify school data and Emergency Responder locations are available on the map

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T100	Verify school data and Emergency Responder locations are available on the map	The objective of this test is to demonstrate RICMS can display school and emergency responder data on the map.	1.1.1.14

Regional Integrated Corridor Management System Test Procedures Iteration 1

Test Script

Test Start Date and Time | 11/6/2018 11:45 AM

Step	Instruction	Expected Result	Pass/Fail	Req #
1	Enter the RICMS URL address into a browser: http://10.1.80.71/	The RICMS login page is displayed		
2	Enter Valid credentials and select Login	The system validates the credentials and the landing page is displayed		
3	Navigate to the Layers widget	The widget expands and the layer groups are displayed		
4	Expand the Static Data Category details	The sub category details are displayed		
5	Verify Schools is listed in the Layers widget	Schools is displayed as a selectable layer	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14
6	Select the Schools layer	School locations and School zones are displayed as optional layers.		
7	Select School locations layer	System refreshes the map display		
8	Verify School locations are displayed	School locations are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14
9	Select School zones layer	System refreshes the map display		
10	Verify School zones are displayed	School zones are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14
11	Select a School icon from the map	The system displays an info window for the selected icon		
12	Verify the info window is displayed	The info window displays data for the selected icon	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14
13	Open the Layers widget and expand the Static Data section	Static Data subsections are displayed in the Layers widget.		
14	Verify Emergency Responder Locations is listed in the Layers widget	Emergency Responder Locations is displayed as a selectable layer	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14

Regional Integrated Corridor Management System Iteration 1 System Test Report

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
15	Select the Emergency Responder Locations layer	System displays the following sub categories: Fire Stations by County; Law Enforcement Agencies by County; Healthcare Facilities by County		
16	Select Fire Stations	The system will display the fire station locations for the selected county layers.		
17	Verify Fire Stations are displayed for the selected counties.	Fire station icons are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14
18	Select a Fire Station icon from the map	The system displays an info window for the selected icon		
19	Verify the info window is displayed	The info window displays data for the selected icon		
20	Select Law Enforcement Agencies	System refreshes the map display to show law enforcement agency locations for the selected county(ies)		
21	Verify Law Enforcement Agencies are displayed for the selected counties.	Law Enforcement Agency icons are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14
22	Select a Law Enforcement Agency icon from the map	The system displays an info window for the selected icon		
23	Verify the info window is displayed	The info window displays data for the selected icon		
24	Select Healthcare Facilities	System refreshes the map display to show healthcare facility locations for the selected county/counties		
25	Verify Healthcare Facilities are displayed for the selected counties.	Healthcare Facility icons are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.14
26	Select a Healthcare Facilities icon from the map	The system displays an info window for the selected icon		
27	Verify the info window is displayed	The info window displays data for the selected icon		

Test End Date and Time	11/6/2014 12:03 PM
Test Result (Pass/Fail)	Pass
Tester	<i>[Signature]</i>
Approver	<i>[Signature]</i>

Regional Integrated Corridor Management System Test Procedures Iteration 1

3.8 Test Case: Verify SunGuide DMS data is accessible on the map

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T101	Verify SunGuide DMS data is accessible on the map	The objective of this test is to demonstrate the RICMS can display DMS data on the map.	1.1.1.3

Test Script

Test Start Date and Time

Step	Instruction	Expected Result	Pass/Fail	Req #
1	Enter the RICMS URL address into a browser: http://10.1.80.71/	The RICMS login page is displayed		
2	Enter Valid credentials and select Login	The system validates the credentials and the landing page is displayed		
3	Navigate to the Layers widget	The widget expands and the layer groups are displayed		
4	Select the Dynamic Data-DMS layer on the map	DMS device icons are displayed on the map		
5	Verify the DMS icons are displayed on the map	DMS icons are displayed on the map	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.3
6	Select a DMS icon from the map	The system displays an info window for the selected icon		
7	Verify the info window is displayed	The info window displays data for the selected icon	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.3
8	Access the SunGuide Operator Map http://10.32.90.43 Right click off the map and choose Configuration>DMS>Signs	Sample data is available		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
	Select 3 DMS devices and record the Lat/Long coordinates for each device			
9	Enter the Lat/Long coordinate for each device and verify the DMS icon is displayed at the correct location	DMS icon is displayed correctly	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.3

Test End Date and Time	11/6/18 1:06 PM
Test Result (Pass/Fail)	Pass
Tester	<i>[Signature]</i>
Approver	<i>[Signature: Jay Patel]</i>

3.9 Test Case: Verify icons representing devices shall display the status of the device they represent.

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T102	Verify icons representing devices shall display the status of the device they represent.	The objective of this test is to demonstrate RICMS can display an icon with the status of the device they represent.	1.1.1.8

Test Script

Test Start Date and Time	
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Step	Instruction	Expected Result	Pass/Fail	Req #
	Redirect the producer to connect to the Sunguide Test Environment	Sunguide test data is available		
1	Enter the RICMS URL address into a browser	The RICMS login page is displayed		
2	Enter Valid credentials and select Login	The system validates the credentials and the landing page is displayed		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
3	Navigate to the Layers widget	The widget expands, and the layer groups are displayed		
4	Expand the Dynamic Data Category details	The sub category details are displayed		
5	Select the DMS layer on the map	DMS device icons are displayed on the map		
6	Verify that the status of the DMS devices are displayed	OpStatus - 1: Active (green); OpStatus - 2: Failed (blue); OpStatus - 3: Error (yellow); OpStatus - 4: Out of Service (red); OpStatus - 5: Others (pink)	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.8
7	Modify the opStatus of a DMS in SunGuide	Verify new status is displayed in RICMS	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.8
8	Modify the message on sign in SunGuide	Verify new message is appropriately displayed in RICMS	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	1.1.1.8

Need to test in various browsers

Test End Date and Time	11/6/14 1:20 PM
Test Result (Pass/Fail)	Pass
Tester	<i>[Signature]</i>
Approver	<i>[Signature]</i>

3.10 Test Case: Demonstrate the RICMS can expand the capacity of data stores

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T109	Demonstrate the RICMS can expand the capacity of data stores	The objective of this test is to demonstrate the RICMS can expand the capacity of data stores.	2.1.4.6

Test Script

Test Start Date and Time	
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Step	Instruction	Expected Result	Pass/Fail	Req #
1	Open Cloudera Manager: http://10.1.80.5:7180	Cloudera Manager is available		

Regional Integrated Corridor Management System Test Procedures Iteration 1

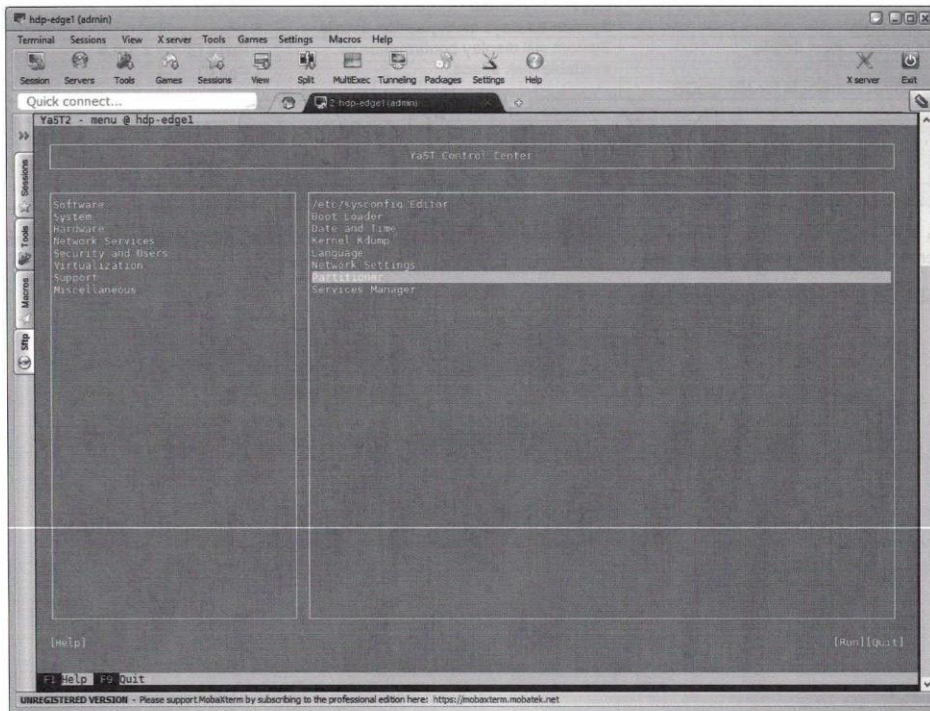
Step	Instruction	Expected Result	Pass/Fail	Req #
2	Select "All Hosts"	System displays configuration details		
3	Validate configuration details Refer below screenshots for MongoDB	System will display confirmation of available disk space.	Pass <input type="checkbox"/> Fail <input type="checkbox"/>	2.1.4.6

Test End Date and Time	
Test Result (Pass/Fail)	Defer to Iteration 2
Tester	<i>[Signature]</i>
Approver	<i>Justin Patel</i>

Expanding Data Capacity of MongoDB: Storage configuration and expandability with Disk partitioner utility in Linux, which enables storage management to add and modify the storage.

1. Open YaST Control Center and select Partitioner

Regional Integrated Corridor Management System Test Procedures Iteration 1



R-ICMS-TPD-0.1.docx

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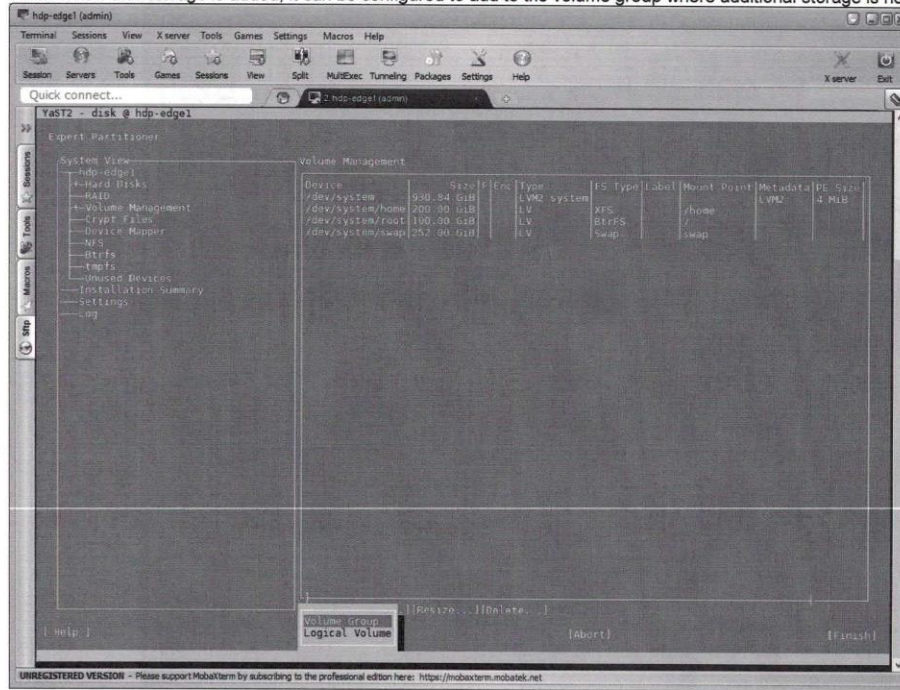
Regional Integrated Corridor Management System Test Procedures Iteration 1

The following screenshot displays the current configuration of the existing storage.



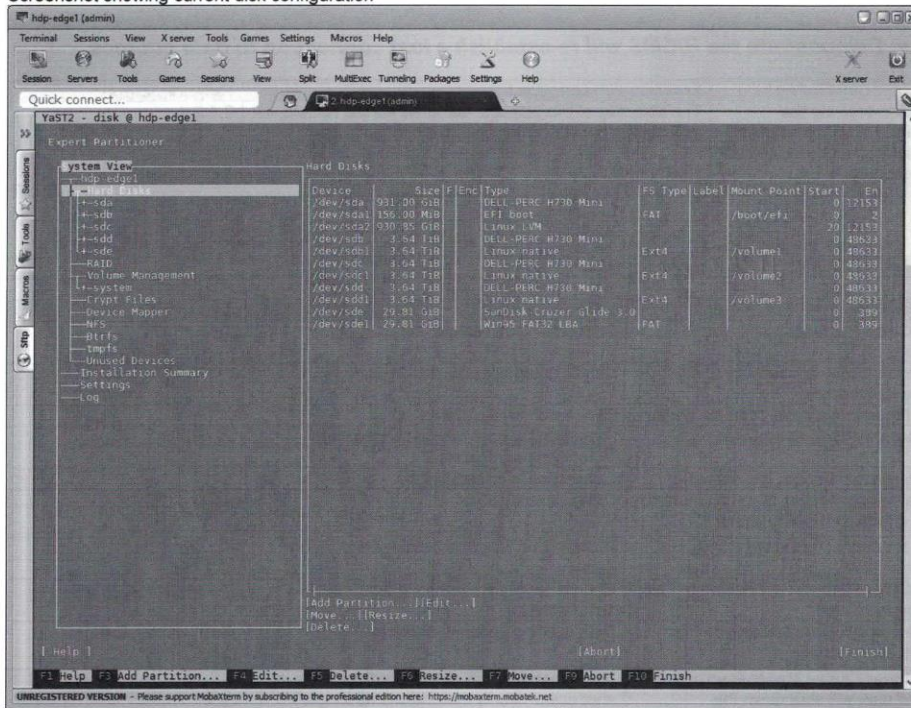
Regional Integrated Corridor Management System Test Procedures Iteration 1

When a new disk storage is added, it can be configured to add to the volume group where additional storage is needed.



Regional Integrated Corridor Management System Test Procedures Iteration 1

Screenshot showing current disk configuration



Regional Integrated Corridor Management System Test Procedures Iteration 1

3.11 Test Case: Demonstrate the RICMS will re-establish a lost connection to data sources.

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T105	Demonstrate the RICMS will re-establish a lost connection to data sources.	The objective of this test is to demonstrate the RICMS will re-establish a lost connection to the data sources.	2.1.2.4

Test Script

Test Start Date and Time | 11/6/2018 2:22 PM

Step	Instruction	Expected Result	Pass/Fail	Req #
1	Run SunGuide Producer connected to Production.	Connection established		
2	Verify there is active connectivity to the SunGuide data source	Data is being updated real time.		
3	Remove the ethernet cable from the server	Connection is interrupted.		
4	Verify disconnection has occurred.	Exception log captures lost connection: "Attempting to reconnect"		
5	Insert ethernet cable back into server	Connection is re-established.		
6	Verify that the connection is re-established, and data is actively flowing again.	Data is available	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.2.4
7	Redirect the connection to the SunGuide Test environment	RICMS is no longer accessing Production data.		
8	Run SunGuide Producer connected to Test environment.	Connection is established in the Test environment.		
9	Verify there is active connectivity to the SunGuide data source	Data is being updated real time.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.2.4
10	Using Failover Cluster Manager an authorized user will shut down the SunGuide DMS subsystem.	Verify that the DMS process in SunGuide is shut down. Verify that DMS is no longer available in the SunGuide user interface.		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
11	Using Failover Cluster Manager an authorized user will start the SunGuide DMS subsystem.	Verify that the DMS process in SunGuide is running. Verify that DMS is available in the SunGuide user interface.		
12	Validate in RICMS that the DMS subsystem is re-established	Data is being updated real time.	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.2.4

Test End Date and Time	11/6/2018 3:04 PM
Test Result (Pass/Fail)	Pass
Tester	[Signature]
Approver	[Signature]

3.12 Test Case: Demonstrate the RICMS can store data across reboots

Test Case ID	Test Case Name	Test Case Description	Requirement(s)
RICMS-T107	Demonstrate the RICMS can store data across reboots	The objective of this test is to demonstrate RICMS can preserve stored data across system reboots.	2.1.4.1

Test Script

Test Start Date and Time	11/6/2018 3:06 PM
--------------------------	-------------------

Step	Instruction	Expected Result	Pass/Fail	Req #
1	Login to the same network where the database is located			
2	Open the test script get_mongodb_record_counts.py file and run (Precondition: 1. Download python 3.70 to computer to run the python script.)	The script will automatically connect to MongoDB, retrieve the data for collection and counts and writes the report to the output file		
3	Reboot the MongoDB server	The server will go through a shutdown sequence and restart sequence.		

Regional Integrated Corridor Management System Test Procedures Iteration 1

Step	Instruction	Expected Result	Pass/Fail	Req #
4	Open the test script get_mongodb_record_counts.py file and run	The script will perform query on MongoDB, it retrieves collection and counts and writes report to output file.		
5	Compare both reports for collections and counts	The results of collection and counts for second query will be equal or greater than the first query results. (During the shutdown and reboot process the data will be not collected, it is lost)	Pass <input checked="" type="checkbox"/> Fail <input type="checkbox"/>	2.1.4.1

Test End Date and Time	11/6/2014 3:14 PM
Test Result (Pass/Fail)	Pass
Tester	<i>[Signature]</i>
Approver	<i>[Signature]</i>

4 Requirements

Requirement ID	Requirement Summary	Release Name	Detailed Components
1.1.1.3	The R-ICMS shall provide an authorized user the capability to view location, current status, and current message of DMS in the corridor as a selectable layer on a GIS-based map as available.	Iteration 1	SunGuide Driver, ITS Device Status Pipeline, DMS Source, GeoEvent DS, ArcGIS DS
1.1.1.8	The R-ICMS shall display the status of the device that the icons represent.	Iteration 1	MAP UI
1.1.1.14	The R-ICMS shall provide an authorized user the capability to view school, police, fire, and hospital locations on a GIS-based map as available.	Iteration 1	GeoEvent DS, ArcGIS DS
1.1.1.19	The R-ICMS shall provide authorized users the capability to view the vehicle locations of available bus provider agencies in the region as a selectable layer on a GIS-based map.	Iteration 1	GeoEvent DS, ArcGIS DS
2.1.1	The DFE shall receive data from external systems shown in the TSM&O Data Sources Table.	Iteration 1	GTFS Source, Base Map Source, RCI Source, School Location Source, School Zones Source, School Schedules Source,










Regional Integrated Corridor Management System Test Procedures Iteration 1










Requirement ID	Requirement Summary	Release Name	Detailed Components
			Emergency Responder Source, SunGuide Driver, DMS Source
2.1.2	The DFE shall ingest data from the data sources shown in the TSM&O Data Sources Table 7.	Iteration 1	SunGuide Driver
2.1.2.1	The DFE shall retrieve data from each data source specified in the TSM&O Data Sources Table 7.	Iteration 1	SunGuide Driver
2.1.2.1.1	The DFE shall support the validation defined for specified data sources in the TSM&O Data Sources Table.	Iteration 1	SunGuide Driver
2.1.2.1.1.1	Validation criteria to be specified by FDOT prior to Critical Design Review for each data source.	Iteration 1	SunGuide Driver
2.1.2.2	The DFE shall follow the protocol of each data source specified in the TSM&O Data Sources Table 7.	Iteration 1	SunGuide Driver
2.1.2.3	The DFE shall receive data from data sources specified in the TSM&O Data Sources Table 7 according to the update interval specified	Iteration 1	SunGuide Driver
2.1.2.4	The DFE shall re-establish a lost connection to the data sources specified in the TSM&O Data Sources Table where appropriate.	Iteration 1	SunGuide Driver
2.1.2.7	The DFE shall transform the data received from each data source into the format to be defined in the Critical Design Review.	Iteration 1	SunGuide Driver, ITS Device Status Pipeline
2.1.2.8	The DFE shall use the fields specified in the Critical Design Review.	Iteration 1	ITS Device Status Pipeline, SunGuide Driver
2.1.2.9	The DFE shall append the data with a date and time stamp that the data was received from the server's system clock.	Iteration 1	SunGuide Driver
2.1.2.10	The DFE shall append or associate the data with a geolocation reference or region corresponding to the location represented by the data when appropriate.	Iteration 1	SunGuide Driver
2.1.2.11	The DFE shall load the transformed data received from each data source into the Data store.	Iteration 1	NoSQL Store, GIS Store, GTFS Source, RCI Source, Base Map Source, School Location Source, School Zones Source, School Schedules Source, Emergency Responder










Regional Integrated Corridor Management System Test Procedures Iteration 1










Requirement ID	Requirement Summary	Release Name	Detailed Components
			Source, SunGuide Driver, ITS Device Status Pipeline, DMS Source
2.1.4	The DFE shall store specified transformed data received from external systems.	Iteration 1	NoSQL Store, GIS Store, ITS Device Status Pipeline
2.1.4.1	The DFE shall store data across reboots of the DFE equipment.	Iteration 1	NoSQL Store, GIS Store
2.1.4.5	The DFE shall store GIS data in a GIS data store.	Iteration 1	NoSQL Store, GIS Store, ITS Device Status Pipeline, SunGuide Driver
2.1.4.6	The DFE shall be able to expand the capacity of data stores.	Iteration 1	NoSQL Store, GIS Store
2.1.12	The DFE shall index data sets.	Iteration 1	NoSQL Store, GIS Store, DMS Source
2.1.12.1	Indexes to be specified for FDOT approval at Critical Design Review for each data source	Iteration 1	NoSQL Store, GIS Store, DMS Source
3.1.1	The DFE shall publish data.	Iteration 1	DMS DS
3.1.5	The DFE shall provide an interface to the transformed data.	Iteration 1	DMS DS, ITS Device Status Pipeline
3.1.5.1	The DFE shall provide an interface to the transformed data stored in the Data Store.	Iteration 1	GIS Store, NoSQL Store, DMS DS
3.1.5.2	The DFE shall provide an interface to the transformed data input streams.	Iteration 1	DMS DS, ITS Device Status Pipeline, SunGuide Driver
3.1.5.3	Transformed data format to be specified for FDOT approval at Critical Design Review for each data source.	Iteration 1	SunGuide Driver, ITS Device Status Pipeline, DMS DS
20.1.6	The R-ICMS shall provide the capability to optimize Signal Timing Plans for predefined corridors.	Iteration 1	SOT BS




Attachment C
Regional Integrated Corridor Management System Iteration 1
Test Case Captures

Test Case Capture File Name	Double Click to Open
T32_base_config1.xml	 T32_base_config1.xml
T32_input_xml1.xml	 T32_input_xml1.xml
T32_output_xml1.xml	 T32_output_xml1.xml
T32_step1.png	 T32_step1.png
T32_step8.png	 T32_step8.png
T32_step8_1.png	 T32_step8_1.png
T32_step11.png	 T32_step11.png
T99_step_1.JSON	 T99_step_1.JSON
T99_step_2.JSON	 T99_step_2.JSON

Test Case Capture File Name	Double Click to Open
<i>T99_step_12_a.pdf</i>	 T99_step_12_a.pdf
<i>T99_step_12_b.pdf</i>	 T99_step_12_b.pdf
<i>T99_step_12_c.pdf</i>	 T99_step_12_c.pdf
<i>T99_step_22_a.pdf</i>	 T99_step_22_a.pdf
<i>T99_step_22_b.pdf</i>	 T99_step_22_b.pdf
<i>T101-9_SunGuide Production Test DMS Verification.jpg</i>	 T101-9_SunGuide Production Test DMS Verification.jpg
<i>T101_step_9_a.pdf</i>	 T101_step_9_a.pdf
<i>T101_step_9_b.pdf</i>	 T101_step_9_b.pdf
<i>T103_gtfs_transit_avl_mongodb_sample_records_20181106095415.txt</i>	 T103_gtfs_transit_avl_mongodb_sample_records_20181106095415.txt

Test Case Capture File Name	Double Click to Open
T103_gtfs_transit_avl_mongodb_sample_records_20181106101323.JSON	 T103_gtfs_transit_avl_mongodb_sample_
T103_gtfs_transit_avl_mongodb_sample_records_20181106101323.txt	 T103_gtfs_transit_avl_mongodb_sample_
T103_mongodb_record_counts_20181106150835.txt	 T103_mongodb_record_counts_20181106150835.txt
T103_mongodb_record_counts_20181106151015.txt	 T103_mongodb_record_counts_20181106151015.txt
T103_mongodb_record_counts_20181106151244.txt	 T103_mongodb_record_counts_20181106151244.txt
T103_step1.xml	 T103_step1.xml
T103_sunguide_mongodb_sample_records_20181106095005.txt	 T103_sunguide_mongodb_sample_records_20181106095005.txt
T103_sunguide_mongodb_sample_records_20181106100525.txt	 T103_sunguide_mongodb_sample_records_20181106100525.txt
T105_12.txt	 T105_12.txt

Test Case Capture File Name	Double Click to Open
T105_12_logs.txt	 T105_12_logs.txt
T105_2.txt	 T105_2.txt
T105_4.png	 T105_4.png
T105_9.txt	 T105_9.txt
T106_step_4.pdf	 T106_step_4.pdf
T106_step_7.pdf	 T106_step_7.pdf
T106_step_8.pdf	 T106_step_8.pdf
T106_step_9.pdf	 T106_step_9.pdf
T107_step_3.pdf	 T107_step_3.pdf

Test Case Capture File Name	Double Click to Open
<i>T108_step_4_a.pdf</i>	 T108_step_4_a.pdf
<i>T108_step_4_b.pdf</i>	 T108_step_4_b.pdf
<i>T110_mongodb_index_list_20181106095901.txt</i>	 T110_mongodb_index_list_20181106095

Attachment D
Regional Integrated Corridor Management System Iteration 1
Hot Washup Presentation Slides

Regional Incident Corridor Management System

Hot Wash Up for R-ICMS Iteration 1

November 7, 2018



November 7, 2018

R-ICMS 1.0 HWU

1



Test Case Status

Test Case ID	Test Case Name	Test State
RICMS-T32	ITER1-Optimize Timing Plan Set for Single Intersection	Pass
RICMS-T99	Verify static bus provider data is available on the map	Pass
RICMS-T100	Verify school data and Emergency Responder locations are available on the map	Pass
RICMS-T101	Verify SunGuide DMS data is accessible on the map	Pass
RICMS-T102	Verify icons representing devices shall display the status of the device they represent.	Pass
RICMS-T103	Demonstrate data can be ingested / stored by the RICMS	Pass
RICMS-T105	Demonstrate the RICMS will re-establish a lost connection to data sources.	Pass
RICMS-T106	Demonstrate the RICMS can transform and store data source data.	Pass
RICMS-T107	Demonstrate the RICMS can store data across reboots	Pass
RICMS-T108	Demonstrate the RICMS can store GIS data from identified data sources	Pass
RICMS-T109	Demonstrate the RICMS can expand the capacity of data stores	Deferred
RICMS-T110	Demonstrate the RICMS can index data sets	Pass



Design Validation

- **Successfully demonstrated abilities:**
 - **DFE**
 - Ingest static and dynamic data
 - Store static and dynamic data
 - Store data across reboots
 - Reconnect after lost connections
 - **IEN**
 - Display static and dynamic data on map
 - Ability to invoke and receive status for SOT
 - **SOT**
 - Programmatically wrap and call the HCS7 Streets tool to run optimizations
 - **Deployment and Orchestration**
 - Use of Docker to “containerize” services
 - Use of Kubernetes to deploy and control pods/containers



Test Case T109 (Ability to expand the capacity of data stores)

- **Not to be accomplished in an ATP session**
- **Procedures relevant to satisfying the requirement to be developed when installing/reinstalling the environment**
- **Testing to add capacity to be shown (likely in screenshare)**
- **Adding capacity defined as adding computing power, memory, and disk space**
- **Instructions for future expandability of the system to be including in the Operations and Maintenance Plan**



Software Issues

These issues do not fail any current test cases but need to be addressed going forward:

- **Issues deferred to design:**
 - Icon display including overlaps
 - Info window fields
 - Indexes and filters per data source

- **Issues deferred for future iterations**
 - Config updates need screen refresh
 - retrieveDataResp messages do not “flush” out the config and status of DMS.



Testing Procedures Changes

- **Procedure document steps:**
 - Clear and concise
 - Separated steps
 - All steps necessary to satisfy requirement

- **Test Walkthrough**
 - One reader that states exactly what should be done
 - One “operator” then performs the action
 - Consider recording procedures for reference
 - Or provide screen captures as needed
 - Multiple visible screens when multiple computers are needed



Test Report

- **Test report to be generated including**
 - Pass/Fail of each Test Case
 - Pass/Fail of associated Requirement
 - Corrective Action Report (None needed currently)
 - Deviations (None needed currently)
 - Waivers (None needed currently)

- **Deliverable will include:**
 - Signed Test Procedure Document
 - Test Report
 - All associated files and screen captures

