

**Regional Integrated Corridor Management System – Iteration 4**

**System Test Plan**

**Version: R-ICMS-STP-4.0**

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Table of Contents

1 Introduction 1

1.1 Purpose 1

1.2 Overview 1

1.2.1 Release Scope 2

2 Integration and Testing 3

2.1 Test Participants 3

2.2 Test Environment 4

2.3 Test Dependencies 5

2.3.1 Iteration 4 R-ICMS Software 6

2.3.2 Windows/Linux Servers 6

2.3.3 Deployment Folder Setup 8

2.3.4 Data Stores (SQL, MongoDB, HDFS) 8

2.3.5 ESRI ArcGIS environment 9

2.3.6 ESRI Workstation 9

2.3.7 HCS7 Streets Software 9

2.3.8 SunGuide 7.2 Test System 9

2.3.9 SunGuide 7.2 Truck Parking Simulator 9

2.3.10 Aimsun Live and Next Server 9

2.3.11 Test User List 10

2.4 Test Schedule 10

2.5 Test Preparation Tasks 10

2.6 Test Cases 12

3 Requirements 23

3.1 Requirements Traceability Verification Matrix 23

4 Notes 39

List of Tables

[Table 1 - Iteration 4 Data Sources 2](#_Toc55298982)

[Table 2 - Test Participants 3](#_Toc55298983)

[Table 3 - Test Dependencies 5](#_Toc55298984)

[Table 4 - Iteration 4 Test Servers 6](#_Toc55298985)

[Table 5 - Iteration 4 Deployment Folder Setup 8](#_Toc55298986)

[Table 6 - Test Schedule 10](#_Toc55298987)

[Table 7 - Test Cases 12](#_Toc55298988)

[Table 8 - RTVM 23](#_Toc55298989)

List of Figures

[Figure 1 - High Level Architecture 2](#_Toc55298990)

[Figure 2 - Physical Diagram 5](#_Toc55298991)

**List of Acronyms and Abbreviations**

AAM Active Arterial Management

AM Ante Meridiem

API Application Program Interface

AST Agency for State Technology

ATMS Advanced Traffic Management System

AVL Automatic Vehicle Location

AWS Amazon Web Services

CCTV Closed Circuit Television

CLI Command Line Interface

COTS Commercial Off the Shelf

CSV Comma Separated Variable

DFE Data Fusion Environment

DMS Dynamic Message Signs

DOT Department of Transportation

DSS Decision Support System

ERD Entity Relationship Diagram

ETL Extract, Transform, Load

FCS Florida Cybersecurity Standards

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

HCS7 Highway Capacity Software

HDFS Hadoop Distributed File System

HTTPS Hyper Text Transfer Protocol Secure

ICD Interface Control Document

ID Identifier

IEN Information Exchange Network

IMC Intersection Movement Counts

IT Information Technology

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

MOE Measure of Effectiveness

MS SQL Microsoft SQL

MVC Model View Controller

OAS OpenAPI Specification

PD Preliminary Design

PDF Portable Document Format

PDR Preliminary Design Review

PM Post Meridiem

RCI Roadway Characteristics Inventory

RDBMS Relational DataBase Management System

REST Representational State Transfer

R‑ICMS Regional Integrated Corridor Management System

RP Response Plan

RPE Response Plan Element

SDD System Design Document

SHS State Highway System

SLES SUSE Linux Enterprise Server

SOT Signal Optimization Tool

SQL Structured Query Language

SSL Secure Sockets Layer

TBD To Be Determined

TGDC Time Grouped Demand Cluster

TLS Transport Layer Security

TSMO Transportation Systems Management and Operations

UI User Interface

UML Unified Modeling Language

URL Uniform Resource Locator

XML Extensible Markup Language

# Introduction

This document provides an overview of the test plan for the Regional Integrated Corridor Management System (R‑ICMS).

## Purpose

This document presents a detailed plan for setting up and conduct testing to verify if Iteration 4 release of the R‑ICMS software meets system requirements allocated to this Iteration. The first sections of this document describe the software and resource management needed to conduct the test; the remaining sections of this document specify the requirements to be verified by this test.

Immediately following the test events, latent defects and other issues found will be documented and shared between the contracted agencies. These will be addressed by requirement waivers, test procedure corrections, or R‑ICMS software corrections. A test report will be produced to list the final results of the testing events. Acceptance of the test report by FDOT concludes the Iteration 4 Acceptance Test.

## 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

### Release Scope

Iteration 4 of 4 focused on finalizing all data sources.the initial R-ICMS event management user interface, implementation of DSS rules for evaluating SunGuide events, and integration with the external traffic simulation tools for both DSS and SOT. Additionally, new and updated data pipelines were developed, and the SOT user interface was expanded. This test plan will include testing of the following.

Table - Iteration 4 Data Sources

|  |  |
| --- | --- |
| **Data Source** | **Functionality Tested** |
| SunGuide TMDD | Ingestion / Storage / Retrieval |
| SunGuide Ramp Meter | Ingestion / Storage / Retrieval |
| SunGuide Connected Vehicle (RSE) | Ingestion / Storage / Retrieval |
| SunGuide Truck Parking  | Ingestion / Storage / Retrieval |
| SIIA | Ingestion / Storage / Retrieval |
| Response Plans | Storage |

# Integration and Testing

Provides the details of the planned integration and acceptance testing.

## 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 (Location)** | **Test Report** |
| --- | --- | --- | --- | --- | --- |
| Clay WestonSwRI | cweston@swri.edu(210) 867-7353 | Oversight | Conductor | Conductor (SwRI) | Developer |
| Angela BosSwRI | abos@swri.edu(210) 522-5969 | SwarmADDatabasesDeploymentTester | Conductor | Attendee (SwRI) | Developer |
| Adam DyllaSwRI | adylla@swri.edu(210) 522-5341 | Tester | Conductor | Attendee (SwRI) | Developer |
| Sam BurnettSwRI | sburnett@swri.edu(210) 522-3586 | Tester | Conductor | Attendee (SwRI) | Developer |
| Patrick MartinezSwRI | sburnett@swri.edu(210) 522-2910 | Tester | Conductor | Attendee (SwRI) | Developer |
| Natalie CoggeshellSwRI (EPIC) | natalie@epicgroupllc.com(407) 381-3742 |  | Conductor | Conductor (EPIC) | Developer |
| Gary MillerSwRI (EPIC) | gary@epicgroupllc.com(407)545-1973 | Oversight | Attendee | Attendee (EPIC) | Oversight |
| Suresh SankaSwRI (EPIC) | suresh@epicgroupllc.com(407) 381-3742 | System Setup | Conductor | Conductor (EPIC) | Developer |
| Sindhura PandrangiSwRI (EPIC) | sindhura@epicgroupllc.com407-381-3742 | GIS Setup | Attendee | Attendee (EPIC) | Attendee |
| Jared AllenSwRI (EPIC) | jared@epicgroupllc.com407-381-3742 | GIS | Conductor | Conductor (EPIC) | Developer |
| Sudhir LabhSwRI (EPIC) | sudhir@epicgroupllc.com407-381-3742 | DFE | Conductor | Attendee (EPIC) | Developer |
| Dinesh VardhanSwRI (EPIC) | dinesh@epicgroupllc.com407-381-3742 | System Setup(Sub Service / APIs) | Conductor | Attendee (EPIC) | Developer |
| Clay PackardFDOT(VHB) | cpackard@vhb.com(407) 901-2804 | SunGuide Prep | Witness | Witness (FDOT) | Reviewer |
| Claudia PaskauskasFDOT(Innovo Partners) | cpaskauskas@innovopartners.com407.432-4866 |  | Witness | Witness (FDOT) | Reviewer |
| Tim KlawaFDOT(Kapsch) | Timothy.Klawa@kapsch.net(540) 680-4890 |  | Witness | Witness (FDOT) | Reviewer |
| Kevin MillerFDOT(Kapsch) | Kevin.Miller@kapsch.net |  | Witness | Witness (FDOT) | Reviewer |
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| Jeremy DilmoreFDOT | Jeremy.Dilmore@dot.state.fl.us(386) 943-5360 |  | Witness | Witness (FDOT) | Reviewer |
| Jay WilliamsFDOT | Jay.Williams@dot.state.fl.us386-943-5329 |  | Witness | Witness (FDOT) |  |
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| Steve JohnsonFDOT | Steve.Johnson@dot.state.fl.usO: 321-257-7245C: 386-279-5469 |  |  | ITS Support(FDOT) |  |
| Aurelio GiovinazzoFDOT | Aurelio.Giovinazzo@dot.state.fl.usO: 321-257-7268 |  |  | ITS IT Support(FDOT) |  |
| Abram LittleFDOT | Abram.Little@dot.state.fl.usO: 321-257-7266 |  |  | ITS IT Support(FDOT) |  |
| Jake RutherfordMetric | Jake.Rutherford@metriceng.comO: 407-644-1898C: 407-795-0820 |  |  | ITS Network(Metric) |  |
| Christy FlickingerAECOM | Christy.Flickinger@dot.state.fl.usO: 386-943-5386 |  |  | GIS Program Manager(AECOM) |  |

## Test Environment

Testers will be remotely located and use personal District 5 VPN accounts and remote-desktop access to login to a system where remote screen-sharing will be used to demonstrate the test procedures.

A screen share and teleconference will be set up such that all parties will be able to view the test steps being run and the expected results. The test conductor (Clay Weston) will read the steps aloud while the appropriate personnel at SwRI, EPIC, and Aimsun will perform the steps. All steps and expected results will be visible to participants at FDOT through the screen share and any steps can be run again or any extra steps needed can be performed to ensure FDOT that the appropriate level of testing is being performed.

Figure 2 - Physical Diagram shows the physical configuration for this test. Some servers may run as Virtual Machines (VMs) and some services may be combined to run on a single server. The primary installation for the purposes of this test will be installed on servers located at FDOT RTMC.



Figure 2 - Physical Diagram

## Test Dependencies

Table 3 - Test Dependencies lists the resources needed to complete this test as well as the owner agency responsible for providing the associated resource. Additional description follows below

Table 3 - Test Dependencies

| **Resource** | **Owner** |
| --- | --- |
| Iteration 4 R‑ICMS Software | SwRI, EPIC |
| Windows/Linux Servers  | FDOT, SwRI, EPIC |
| Deployment Folder Setup | SwRI, EPIC |
| Data Stores (SQL, MongoDB, HDFS) | SwRI, EPIC |
| ESRI ArcGIS Environment | Jared AllenChristy FlickingerFDOT, SwRI, EPIC |
| ESRI Workstation | SwRI, EPIC, FDOT |
| HCS7 Streets Software | Angela BosSwRI |
| SunGuide 7.2 Test System  | Aurelio GionavazzoFDOT |
| SunGuide Simulators | Clay PackardFDOT |
| Aimsun Live and Next server | Matt JuckesFDOT |
| Test User List | Aurelio GionavazzoFDOT |

### Iteration 4 R-ICMS Software

This consists of all relevant R-ICMS software for this test event. At end of testing a final version of the source code will be provided.

### Windows/Linux Servers

The following table lists the servers that will be used as part of this installation and test.

Table - Iteration 4 Test Servers

| **Role** | **Name** | **IP** | **OS** |
| --- | --- | --- | --- |
| cloudera edge 0 | ITSSD5ICMSCDHE0 | 10.32.92.100 | linux |
| cloudera master 0 | ITSSD5ICMSCDHM0 | 10.32.92.120 | linux |
| cloudera master 1 | ITSSD5ICMSCDHM1 | 10.32.92.121 | linux |
| cloudera worker 0 | ITSSD5ICMSCDHW0 | 10.32.92.140 | linux |
| cloudera worker 1 | ITSSD5ICMSCDHW1 | 10.32.92.141 | linux |
| cloudera worker 2 | ITSSD5ICMSCDHW2 | 10.32.92.142 | linux |
| cloudera worker 3 | ITSSD5ICMSCDHW3 | 10.32.92.143 | linux |
| cloudera kafka 0 | ITSSD5ICMSCDHK0 | 10.32.92.110 | linux |
| cloudera kafka 1 | ITSSD5ICMSCDHK1 | 10.32.92.111 | linux |
| cloudera utility 0 | ITSSD5ICMSCDMU0 | 10.32.92.130 | linux |
| elastic 0 | ITSSD5ICMSES0 | 10.32.92.80 | linux |
| elastic 1 | ITSSD5ICMSES1 | 10.32.92.81 | linux |
| elastic 2 | ITSSD5ICMSES2 | 10.32.92.82 | linux |
| kubernetes linux worker 0 | ITSSD5ICMSKLW0 | 10.32.92.60 | linux |
| kubernetes linux worker 1 | ITSSD5ICMSKLW1 | 10.32.92.61 | linux |
| kubernetes linux worker 2 | ITSSD5ICMSKLW2 | 10.32.92.62 | linux |
| kubernetes linux worker 3 | ITSSD5ICMSKLW3 | 10.32.92.63 | linux |
| kubernetes linux worker 4 | ITSSD5ICMSKLW4 | 10.32.92.64 | linux |
| kubernetes linux worker 5 | ITSSD5ICMSKLW5 | 10.32.92.65 | linux |
| kubernetes master 0docker registry (image-repo.ricms) | ITSSD5ICMSKM0 | 10.32.92.50 | linux |
| kubernetes master 1docker swarm manager | ITSSD5ICMSKM1 | 10.32.92.51 | linux |
| kubernetes master 2 | ITSSD5ICMSKM2 | 10.32.92.52 | linux |
| kubernetes windows worker 0swarm workerbuild/deploy host | ITSSD5ICMSKWW0 | 10.32.92.70 | windows |
| kubernetes windows worker 0swarm worker | ITSSD5ICMSKWW1 | 10.32.92.71 | windows |
| kubernetes windows worker 2authenticationauthorizationWindows API Caller | ITSSD5ICMSKWW2 | 10.32.92.72 | windows |
| mongodb node 0 | ITSSD5ICMSMDB0 | 10.32.92.90 | linux |
| mongodb node 1 | ITSSD5ICMSMDB1 | 10.32.92.91 | linux |
| mongodb node 2 | ITSSD5ICMSMDB2 | 10.32.92.92 | linux |
| proxy for k8s | ITSSD5ICMSKP0 | 10.32.92.40 | linux |
| sql server | ITSSD5ICMSSQL1 | 10.32.92.30 | windows |
| D5 Aimsun |  | 10.32.1.30:8075 | linux |
| D5 GIS |  |  |  |
| ESRI VM (for ATP) | ITSTD5ARCPRO01 | 10.32.90.157 | windows |

### Deployment Folder Setup

The following table lists the deployment folder setup used for this installation and test

Table - Iteration 4 Deployment Folder Setup

| **Host Name** | **IP** | **OS** | **Folder** | **Role / Purpose** |
| --- | --- | --- | --- | --- |
| ITSSD5ICMSKM0 | 10.32.92.50 | Linux | /etc/kubernetes/ admin.conf | Kubernetes cluster config (for kubectl) |
| ITSSD5ICMSKWW0 | 10.32.92.70 | Windows | C:\Deploy | Kubernetes configs for FDOT and deployment script |
| ITSSD5ICMSKWW2 | 10.32.92.72 | Windows | C:\Deploy\Docker\ auth-docker-swarm | docker-compose.fdot. yml for authentication and authorization services |
| ITSSD5ICMSKWW2 | 10.32.92.72 | Windows | C:\Deploy\ WindowsApiCaller | Windows service for AD login (configured with FDOT API key) |
| ITSSD5ICMSKWW2 | 10.32.92.72 | Windows | C:\Program Files\filebeat | filebeat executable and configuration |
| ITSSD5ICMSSQL1 | 10.32.92.30 | Windows | C:\DataStores | Database create and seed scripts |
| ITSSD5ICMSKP0 | 10.32.92.40 | Linux | /etc/haproxy/haproxy.cfg | Kubernetes master proxy configuration |

### Data Stores (SQL, MongoDB, HDFS)

The relevant data stores have been set up pursuant to the Iteration 4 System Design Document. Instructions for data store installation can be found in the Iteration 4 Version Description Document.

### ESRI ArcGIS environment

The full ESRI ArcGIS environment setup can be found in the System Design Document - Table 3 - Third Party Components, Esri ArcGIS Enterprise Advanced Component

### ESRI Workstation

For the purposes of this test event, the FDOT ESRI workstation will be utilized. It is not necessary that it be this specific computer, rather, it was a resource on the network that all groups have access to.

### HCS7 Streets Software

The HCS7 Streets software will be installed and maintained by SwRI and used to run HCS7 optimizations.

### SunGuide 7.2 Test System

For this iteration, all SunGuide testing will be done utilizing the SunGuide 7.2 Test System which was setup and installed by FDOT.

### SunGuide 7.2 Truck Parking Simulator

For this iteration the system will need to be running the truck parking simulator to send status messages which can be consumed and shown on the RICMS user interface.

### Aimsun Live and Next Server

The system will test using the installed Aimsun Live and Next servers. Live will return response plan results and Next will provide SOT simulation results.

The Aimsun systems should implement the following interface defined in the R-ICMS source code repository

* Api\SimulationInterface.yaml

On the R-ICMS side, these interfaces must be implemented:

* Api\ResponsePlanSimulationCallback.yaml
* Api\SotSimulationCallback.yaml

### Test User List

For the purpose of this test event the following users have been entered into Active Directory with the following groups.

| **User** | **Member of Group** |
| --- | --- |
| SwriAdmin | gg\_RICMS\_operator, |
| EpicAdmin | gg\_RICMS\_operator,gg\_RICMS\_admin |
| SwriUser1 | gg\_RICMS\_operator,gg\_RICMS\_corr-mngr,gg\_RICMS\_event-admin |
| SwriUser2 | gg\_RICMS\_operator,gg\_RICMS\_event-oper,gg\_RICMS\_corr-apprv,gg\_RICMS\_signal-oper,gg\_RICMS\_signal-apprv |
| SwriUser3 | gg\_RICMS\_operator,gg\_RICMS\_event-oper,gg\_RICMS\_corr-apprv,gg\_RICMS\_signal-oper,gg\_RICMS\_signal-apprv |
| EpicUser1 | gg\_RICMS\_operator,gg\_RICMS\_corr-mngr,gg\_RICMS\_event-admin |
| EpicUser2 | gg\_RICMS\_operator,gg\_RICMS\_event-oper,gg\_RICMS\_corr-apprv,gg\_RICMS\_signal-oper,gg\_RICMS\_signal-apprv |
| EpicUser3 | gg\_RICMS\_operator,gg\_RICMS\_event-oper,gg\_RICMS\_corr-apprv,gg\_RICMS\_signal-oper,gg\_RICMS\_signal-apprv |

## Test Schedule

Table 6 - Test Schedule shows a schedule for the Iteration 4 testing activities.

Table 6 - Test Schedule

|  |  |
| --- | --- |
| **Activity** | **Date** |
| Finalize Test Plan | 11/9/2020 |
| Finalize Test Procedures | 11/12/2020 |
| Test Readiness Review Meeting | 11/16/2020 |
| Test Execution | 11/17/2020 |
| Hot Wash Up Meeting | 11/19/2020 |
| Corrective Action | 11/23/2020 |
| Finalize Test Report | 12/8/2020 |

## Test Preparation Tasks

1. Ensure SunGuide subsystems are running and producing messages.
2. Ensure ITSIQA current data feeds are available
3. Ensure SIIA data feeds are available
4. Ensure TMDD data feeds are available
5. Ensure GTFS Aggregator feeds are available
6. Ensure ArcGIS system is available
7. Ensure Aimsun Live/Next systems are available
8. Setup, seed, and test connections to R-ICMS SQL Server databases

## Test Cases

This section contains the Test Case identifiers and descriptions to be tested as part of the current iteration.

Table 7 - Test Cases

| **Test Case ID** | **Test Case Name** | **Test Case Description** | **Requirements Addressed** |
| --- | --- | --- | --- |
| RICMS-IEN-1 | Demonstrate the RICMS allows users to view the current status of the transportation network. | The objective of this test is to demonstrate the RICMS provides current status of the transportation network to authorized users. | 1.1.11.1.1.11.1.1.61.1.1.6.11.1.1.81.1.1.101.1.1.121.1.1.131.1.91.1.9.11.1.1.151.1.1.15.11.1.1.15.21.1.1.15.31.1.1.15.41.1.191.1.19.11.1.202.1.4.531.131.1.1 |
| RICMS-IEN-2 | Demonstrate the RICMS allows users to view current weather data on the map. | The objective of this test is to demonstrate the RICMS provides current weather data to authorized users on the map display. | 1.1.1.7.11.1.1.7.21.1.1.7.31.1.1.7.41.1.1.7.51.1.1.7.61.1.1.7.71.1.1.7.8 |
| RICMS-IEN-3 | Demonstrate the RICMS allows users to manage event list data. | The objective of this test is to demonstrate the RICMS provides users with the ability to sort, filter and export event list data. | 1.1.1.111.1.1.11.41.1.1.11.51.1.1.11.51.1.1.11.61.1.1.11.81.1.1.11.9 |
| RICMS-IEN-4 | Demonstrate the RICMS supports a data analytics toolset for querying data | The objective of this test is to demonstrate the RICMS provides users with dashboard, queries, and 6 identified reports. | 2.1.4.72.1.112.1.132.1.13.1~~2.1.13.2~~~~2.1.13.3~~~~2.1.13.4~~2.1.14 |
| RICMS-IEN-5 | Demonstrate the RICMS supports reporting and analytic functions. | The objective of this test is to demonstrate the RICMS provides users with dashboard, queries, and 6 identified reports. | 3.1.1.123.123.1.123.1.223.1.2.123.1.2.223.1.2.323.1.2.424.1.124.1.1.1 |
| RICMS-IEN-6 | Demonstrate the RICMS supports lane blockage diagrams for RICMS events. | The objective of this test is to demonstrate the RICMS provides users with the ability to create, and edit lane blockage diagrams for RICMS events. | SS2-001SS2-002SS2-003SS2-004SS2-005SS2-006SS2-007SS2-008SS2-009SS2-010SS2-011SS2-012SS2-013SS2-014SS2-015SS2-016SS2-017 |
| RICMS-IEN-7 | Demonstrate the RICMS supports CCTV video capabilities for available devices. | The objective of this test is to demonstrate the RICMS provides users with the ability to locate and view CCTV video from available devices for all RICMS and SunGuide events. | SS3-001SS3-002~~SS3-003~~~~SS3-004~~~~SS3-005~~SS3-006SS3-007SS3-008SS3-009SS3-010 |
| RICMS-IEN-8 | Demonstrate the RICMS supports Travel Advisory Messages (TAM) from the map display. | The objective of this test is to demonstrate the RICMS provides users with the ability to locate and view TAM characteristics from the map display. | SS4-001~~SS4-002~~SS4-003~~SS4-004~~SS4-005SS4-006~~SS4-007~~SS4-008SS4-009SS4-010SS4-011SS4-012SS4-013SS4-014SS4-015 |
| RICMS-IEN-9 | Demonstrate the RICMS supports event ownership and related event association. | The objective of this test is to demonstrate the RICMS provides the ability to transfer ownership of an event to an authorized user and create a relationship of an RICMS event to a SunGuide event. | 1.1.5.3.3.11.1.30 |
| RICMS-DFE-1 | 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. | 2.1.12.1.22.1.2.12.1.2.22.1.2.32.1.2.5 |
| RICMS-DFE-2 | 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. | 2.1.2.72.1.2.92.1.2.102.1.2.112.1.42.1.92.1.9.12.1.12 |
| RICMS-DFE-3 | Demonstrate that transformed data can be filtered and accessed by data consumers through a representational state transfer (REST API) web services interface | The objective of this test is to demonstrate the RICMS provides the ability for internal and external consumers to request and receive data using filtered parameters on an individual basis. | 2.1.13.22.1.13.32.1.13.43.1.13.1.1.13.1.1.113.1.1.11.13.1.1.11.23.1.53.1.5.13.1.5.23.1.63.1.6.13.1.6.23.1.6.349.1 |
| RICMS-DFE-4 | Demonstrate that transformed data can be accessed by data consumers through a subscription service | The objective of this test is to demonstrate the RICMS provides the ability for internal and external consumers to request and receive data using filtered parameters on a subscription basis. | 3.1.6.43.1.6.4.1 |
| RICMS-DFE-5 | Demonstrate the RICMS supports data source activity logging and statistics for maintenance support. | The objective of this test is to demonstrate the RICMS provide access to data source logs and history by support personnel. | 2.1.1.13.1.73.1.7.23.1.7.33.1.7.43.1.83.1.8.23.1.8.33.1.8.4 |
| RICMS-DFE-6 | Demonstrate the RICMS supports data availability status information. | The objective of this test is to demonstrate the RICMS collection and logging of availability and errors in the data stores. | 2.1.52.1.5.22.1.5.32.1.5.4 |
| RICMS-DFE-7 | Demonstrate the RICMS supports data capacity expansion. | The objective of this test is to demonstrate the RICMS can support additional data capacity storage as needed. | 2.1.4.6 |
| RICMS-MON-1 | Fatal Error Monitoring | The objective of this test is to demonstrate the RICMS can monitor and alert when a severe error event occurs.  | 43.1 |
| RICMS-MON-2 | Invalid Data Monitoring | The objective of this test is to demonstrate the RICMS can monitor and alert when invalid data is retrieved by drivers. | 2.1.1.2 |
| RICMS-MON-3 | Data Store Monitoring | The objective of this test is to demonstrate the RICMS can monitor and alert when a data store is unavailable. | 43.1, 2.1.5.2 |
| RICMS-MON-4 | CPU Monitoring | The objective of this test is to demonstrate the RICMS can monitor and alert when a RICMS related server exceeds its designated CPU utilization. | 43.1 |
| RICMS-MON-5 | RAM Monitoring | The objective of this test is to demonstrate the RICMS can monitor and alert when a RICMS related server exceeds its designated RAM utilization. | 43.1 |
| RICMS-MON-6 | Disk Space Monitoring | The objective of this test is to demonstrate the RICMS can monitor and alert when a RICMS related server exceeds its designated Disk Space utilization. | 43.1 |
| RICMS-DSS-1 | Initial (Pre-simulation) Event Evaluation | The system will perform initial event evaluation for response plan consideration using the selection settings, including filtering of response plans based on device status. | 4.1.1.15.1.3.210.1.1.1223.224.5.1.1 |
| RICMS-DSS-2 | Simulation Engine Interaction | The system will send the applicable response plan data obtained from the GIS server to the Simulation Engine and await the score data callbacks from the Simulation Engine. | 5.1.3.35.1.3.45.1.3.55.1.3.65.1.3.75.1.3.85.1.3.916.1.1.516.1.1.616.1.1.718.118.1.1.118.1.1.218.1.1.318.1.1.423.324.524.5.1.224.5.1.324.5.1.4 |
| RICMS-DSS-3 | Suggestion of Response Plans to ICM Managers | Upon receiving the scores from the Simulation Engine, the system will notify ICM managers of the plans and allow for selection of a plan, including selection of the ‘do-nothing’ plan. | 5.15.1.3.1010.1.1.110.1.1.217.117.1.1.124.5.1.524.5.1.6 |
| RICMS-DSS-4 | Device Approval | Upon receiving the selected Response Plan from the ICM manager, the system will notify Device Owners as needed to allow approval of the device(s) to be included in the plan and automatically approve or reject devices for the selected plan based on the configured auto-approval profiles of the devices and device groups. | 1.2.5.6.31.2.5.6.41.2.5.6.51.2.5.6.61.2.5.710.1.1.310.1.1.410.1.1.510.1.1.610.1.1.724.5.1.724.5.1.8 |
| RICMS-DSS-5 | Plan Approval and Activation | Upon receiving device manager approvals needed for the plan, the system will allow the ICM manager(s) to approve the plan for activation. When activated, performance timestamps will be calculated and saved for later reporting. | 5.1.1.15.1.1.25.1.3.17.1.110.1.1.1010.1.1.1515.115.1.116.1.1.224.5.1.924.5.1.1024.5.1.1124.5.1.12 |
| RICMS-DSS-6 | Plan Override | Instead of waiting on approval of devices, the ICM manager(s) are able to select a plan to activate. | 10.1.1.8 |
| RICMS-DSS-7 | Limiting frequency of signal timing changes  | After activating a response plan, a new event evaluation will not recommend a plan that has signals in common with the active response plan if the plan has been activated within the last 15 minutes | 24.6 |
| RICMS-DSS-8 | Re-evaluation of Active Plan | Enacted plans are re-evaluated on a configurable interval and a return-to-normal plan is considered by the system. | 16.1.1.116.1.1.316.1.1.417.1.1.2 |
| RICMS-SOT-0 | Signal corridor measures of effectiveness | The system will demonstrate the detailed results of full signal corridor optimization and simulation that generated before ATP. | N/A |
| RICMS-SOT-1 | Multiple intersection signal corridor optimization | The system will demonstrate a multiple signal corridor configuration, optimization, review, modification, re-evaluation, and deployment. The system will demonstrate map integration, exports of timing reports and data, and imports of signed reports. | 19.1.2.119.1.2.319.1.4.219.1.2.419.1.4.519.1.4.319.1.2.619.1.4.419.1.2.819.1.2.219.1.1.219.1.1.319.1.1.619.1.1.719.1.1.819.1.1.919.1.1.1019.1.1.1119.1.1.1219.1.1.1319.1.1.1419.1.4.119.1.8.119.1.8.219.1.8.419.1.3.219.1.3.319.1.3.419.1.6.419.1.2.819.1.3.519.1.6.519.1.3.619.1.6.619.1.3.819.1.6.719.1.6.319.1.8.319.1.3.719.1.8.519.1.3.919.1.9.119.1.3.919.1.3.1019.1.4.619.1.4.719.1.4.819.1.4.919.1.4.1019.1.7.119.1.7.219.1.2.619.1.9.219.1.9.319.1.9.419.1.9.5 |
| RICMS-SOT-2 | Single intersection signal corridor optimization | The system will demonstrate a single signal corridor configuration with automatic day-plan generation, optimization, and review. | 19.1.3.1 |
| RICMS-SOT-3 | Recurring signal corridor optimization | The system will demonstrate a recurring signal corridor configuration, optimization, review, and deployment with conflicts that must be resolved. | 19.1.5.119.1.6.219.1.2.5 |
| RICMS-SOT-4 | Signal corridor map integration | The system will demonstrate integration of GIS map views for SOT corridors and signals. | 1.1.1.7.219.1.7.119.1.7.2 |
| RICMS-SOT-5 | Signal corridor restrictions per day of week and time of day | The system will demonstrate signal corridor configurations with respect to the following restrictions set in the SIIA system:1. Can’t Lag Left
2. Can’t Run Concurrent Lefts
3. Exclusive phases for pedestrians

Split phase side street | N/A |

#

# Requirements

This section identifies the requirements and relates them to the tests described in the plan. It does not restate the requirements.

## Requirements Traceability Verification Matrix

Table 8 - RTVM lists the requirements addressed in this test as well as the test case ID that satisfies the corresponding requirement.

Table 8 - RTVM

| **Req #** | **Requirement Text** | **TC ID** |
| --- | --- | --- |
| 1.1.1 | The R-ICMS shall provide authorized users the capability to view current status of the transportation network. | RICMS-IEN-1 |
| 1.1.1.1 | The R-ICMS shall provide authorized users the capability to view current status of managed lane facilities in the corridor. | RICMS-IEN-1 |
| 1.1.1.4.1.2 | The embedded CCTV image shall be displayed along with the event information as available. | RICMS-IEN-7 |
| 1.1.1.6 | The R-ICMS shall provide an authorized user the capability to view traffic signal status as a selectable layer on a GIS-based map as available. | RICMS-IEN-1 |
| 1.1.1.6.1 | The R-ICMS shall allow clicking on a traffic signal icon to display a menu option allowing the user to view the intersection as part of the SOT user interface. | RICMS-IEN-1 |
| 1.1.1.7.1 | The R-ICMS shall provide color coded National Weather Service weather alerts. | RICMS-IEN-2 |
| 1.1.1.7.2 | The R-ICMS shall provide an authorized user the capability to view a weather radar overlay as a selectable layer on a GIS map. | RICMS-IEN-2 |
| 1.1.1.7.3 | The R-ICMS weather radar overlay shall be provided in a motion loop, indicating changing weather conditions in real-time. | RICMS-IEN-2 |
| 1.1.1.7.4 | The R-ICMS shall include a legend describing the weather alert types, and associated color codes. | RICMS-IEN-2 |
| 1.1.1.7.5 | The R-ICMS shall provide configurable weather alert legend color codes to allow for changes to colors for the different conditions. | RICMS-IEN-2 |
| 1.1.1.7.6 | The R-ICMS shall include a legend describing the weather radar overlay rainfall intensities and associated color codes. | RICMS-IEN-2 |
| 1.1.1.7.7 | The R-ICMS weather radar overlay legend color codes shall be configurable in the system to allow for changes to colors for the different conditions. | RICMS-IEN-2 |
| 1.1.1.7.8 | The R-ICMS shall provide an authorized user with a National Weather Service weather alert. | RICMS-IEN-2 |
| 1.1.1.8 | The R-ICMS shall display the status of the device that the icons represent. | RICMS-IEN-1 |
| 1.1.1.10 | The R-ICMS shall provide a method to ensure that overlapping/clustered icons can be displayed appropriately. | RICMS-IEN-1 |
| 1.1.1.11 | The R-ICMS shall provide an event list that shall allow an authorized user the capability to view open, unconfirmed, and recently closed events in the region on the covered facilities. | RICMS-IEN-3 |
| 1.1.1.11.4 | The R-ICMS event list shall allow filtering on exposed columns. | RICMS-IEN-3 |
| 1.1.1.11.5 | The R-ICMS event list shall allow sorting on exposed columns | RICMS-IEN-3 |
| 1.1.1.11.5 | The R-ICMS event list shall allow for an authorized user to create custom filters to filter events into/from their event list. | RICMS-IEN-3 |
| 1.1.1.11.6 | The R-ICMS event list shall allow for an authorized user to search the event list for a specific string of text. | RICMS-IEN-3 |
| 1.1.1.11.8 | The R-ICMS shall allow an authorized user to create an event list report from the event list tab. | RICMS-IEN-3 |
| 1.1.1.11.9 | The R-ICMS shall allow an authorized user to filter the Event list to display only events that the user owns. | RICMS-IEN-3 |
| 1.1.1.12 | The R-ICMS shall provide an authorized user the capability to view bus routes as a selectable layer on a GIS-based map as available. | RICMS-IEN-1 |
| 1.1.1.13 | The R-ICMS shall provide an authorized user the capability to view location, and current status of RSUs in the corridor as a selectable layer on a GIS-based map as available. | RICMS-IEN-1 |
| 1.1.5.3.3.1 | The R-ICMS shall ensure that ownership of an event may only be transferred to an authorized user. | RICMS-IEN-9 |
| 1.1.1.15 | The R-ICMS shall allow a user to select global filtering options which will limit the data displayed on the GIS-based map as applicable. | RICMS-IEN-1 |
| 1.1.1.15.1 | The R-ICMS shall allow a user to select a global filter which limits the icons displayed by county. | RICMS-IEN-1 |
| 1.1.1.15.2 | The R-ICMS shall allow a user to select a global filter which limits the icons displayed by operating agency. | RICMS-IEN-1 |
| 1.1.1.15.3 | The R-ICMS shall allow a user to select a global filter which limits the icons displayed by contracted agency. | RICMS-IEN-1 |
| 1.1.1.15.4 | The R-ICMS shall allow a user to select a global filter which limits the icons displayed by device status. | RICMS-IEN-1 |
| 1.1.9 | The R-ICMS shall provide an authorized user the capability to view information layers on a GIS-based map. | RICMS-IEN-1 |
| 1.1.9.1 | The R-ICMS GIS-based map shall allow for static and dynamic layers to be added or removed as necessary from view. | RICMS-IEN-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. | RICMS-IEN-1 |
| 1.1.19.1 | The R-ICMS shall provide authorized users the capability to view transit vehicle locations as a selectable layer on a GIS-based map for transit providers, denoted as a unique icon located at the last known position of the vehicle. | RICMS-IEN-1 |
| 1.1.20 | The R-ICMS shall provide authorized users the capability to view the vehicle locations, denoted as a unique icon located at the last known position of the vehicle, of available rail provider agencies in the region as a selectable layer on a GIS-based map. | RICMS-IEN-1 |
| 1.1.30 | The R-ICMS shall allow authorized users to associate SunGuide events with R-ICMS events. | RICMS-IEN-9 |
| 2.1.1 | The DFE shall receive data from external systems shown in the TSM&O Data Sources Table. | RICMS-DFE-1 |
| 2.1.1.1 | The DFE shall support a maintenance mode that allows maintenance of the system while continuing to download data from data sources so that there is no data gap caused by the maintenance mode.  | RICMS-DFE-5 |
| 2.1.2 | The DFE shall ingest data from the data sources shown in the TSM&O Data Sources Table 7. | RICMS-DFE-1 |
| 2.1.2.1 | The DFE shall retrieve data from each data source specified in the TSM&O Data Sources Table 7. | RICMS-DFE-1 |
| 2.1.2.2 | The DFE shall follow the protocol of each data source specified in the TSM&O Data Sources Table 7. | RICMS-DFE-1 |
| 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 | RICMS-DFE-1 |
| 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.  | TBD |
| 2.1.2.5 | The DFE shall request data not received due to temporary lost connections if the data source supports such a request. | RICMS-DFE-1 |
| 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. | RICMS-DFE-2 |
| 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. | RICMS-DFE-2 |
| 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. | RICMS-DFE-2 |
| 2.1.2.11 | The DFE shall load the transformed data received from each data source into the Data store. | RICMS-DFE-2 |
| 2.1.4 | The DFE shall store specified transformed data received from external systems. | RICMS-DFE-2 |
| 2.1.4.1 | The DFE shall store data across reboots of the DFE equipment.  | RICMS-IEN-1 |
| 2.1.4.5 | The DFE shall store GIS data in a GIS data store. | RICMS-IEN-1 |
| 2.1.4.6 | The DFE shall be able to expand the capacity of data stores.  | RICMS-R13 |
| 2.1.4.7 | The DFE shall store unstructured data in an internal file system data store. | RICMS-DFE-1 |
| 2.1.5 | The DFE shall collect and store availability status information of each data source within the Data Store. | RICMS-DFE-6 |
| 2.1.5.2 | The DFE shall monitor and log the availability of the Data Store. | RICMS-DFE-6 |
| 2.1.5.3 | The DFE shall collect and store errors detected by each data store. | RICMS-DFE-6 |
| 2.1.5.4 | The DFE shall collect and store available data storage capacity for each data store. | RICMS-DFE-6 |
| 2.1.9 | The DFE shall store and provide data source metadata. | RICMS-DFE-2 |
| 2.1.9.1 | The DFE shall store a list of data source instances and history. Capture dates applicable, schema changes, etc. | RICMS-DFE-2 |
| 2.1.11 | The DFE shall provide a data analytics toolset. | RICMS-IEN-4 |
| 2.1.12 | The DFE shall index data sets. | RICMS-DFE-2 |
| 2.1.13 | The DFE shall provide the capability for a authorized user to query unstructured data. | RICMS-R5 |
| 2.1.13.1 | The DFE shall provide access to unstructured data via a User Interface. | RICMS-IEN-4 |
| 2.1.13.2 | The DFE shall provide the ability to query on a specified date range. | RICMS-IEN-4 |
| 2.1.13.3 | The DFE shall provide the ability to query on a specified time range. | RICMS-IEN-4 |
| 2.1.13.4 | The DFE shall provide the ability to query on a specified spatial range. | RICMS-IEN-4 |
| 2.1.14 | The DFE shall be modular and provide the capability for an administrator to install additional tools such as data analytics tools. | RICMS-IEN-4 |
| 3.1.1 | The DFE shall publish data. | RICMS-DFE-3 |
| 3.1.1.1 | The DFE shall provide a secure interface to TSM&O data resources using industry standard tools and best practices.  | RICMS-DFE-3 |
| 3.1.1.11 | The DFE shall have the configurable ability to log usage statistics for data consumers | RICMS-DFE-3 |
| 3.1.1.11.1 | The DFE shall have the configurable ability to log computer resource usage statistics for data consumers | RICMS-DFE-3 |
| 3.1.1.11.2 | The DFE shall have the configurable ability to log data transfer usage statistics for data consumers | RICMS-DFE-3 |
| 3.1.5 | The DFE shall provide an interface to the transformed data. | RICMS-DFE-3 |
| 3.1.5.1 | The DFE shall provide an interface to the transformed data stored in the Data Store. | RICMS-DFE-3 |
| 3.1.5.2 | The DFE shall provide an interface to the transformed data input streams. | RICMS-DFE-3 |
| 3.1.6 | The DFE shall provide a representational state transfer web services interface.  | RICMS-DFE-3 |
| 3.1.6.1 | The DFE shall return the data requested by a data access request. | RICMS-DFE-3 |
| 3.1.6.2 | The DFE shall support the specified filters defined for specified data sources in  the TSM&O Data Sources Table. | RICMS-DFE-3 |
| 3.1.6.3 | The DFE shall filter the data requested by the filter parameters used in the request. | RICMS-DFE-3 |
| 3.1.6.4 | The DFE shall provide a push interface to provide data feeds to data consumers | RICMS-DFE-4 |
| 3.1.6.4.1 | The DFE shall provide a subscription service interface to provide data feeds to data consumers | RICMS-DFE-4 |
| 3.1.7 | The DFE shall report status information of permitted data sources. | RICMS-DFE-5 |
| 3.1.7.2 | The DFE shall report the first date and time represented by the data loaded for each data source. | RICMS-DFE-5 |
| 3.1.7.3 | The DFE shall report the last date and time represented by the data loaded for each data source. | RICMS-DFE-5 |
| 3.1.7.4 | The DFE shall report the ranges of missing data for data sources based on temporal coverage. | RICMS-DFE-5 |
| 3.1.8 | The DFE shall report status information of permitted data feeds. | RICMS-DFE-5 |
| 3.1.8.2 | The DFE shall report the first date and time represented by the data loaded for each data feed. | RICMS-DFE-5 |
| 3.1.8.3 | The DFE shall report the last date and time represented by the data loaded for each data feed. | RICMS-DFE-5 |
| 3.1.8.4 | The DFE shall report the ranges of missing data for data feeds based on temporal coverage. | RICMS-DFE-5 |
| 23.1 | The R-ICMS shall provide the capability to generate and manage reports. | RICMS-IEN-5 |
| 23.1.1 | The R-ICMS shall allow an authorized user to run reports from templates. | RICMS-IEN-5 |
| 23.1.2 | The R-ICMS report component shall be accessible via main menu navigation. | RICMS-IEN-5 |
| 23.1.2.1 | The R-ICMS report component shall be initially configured with 6 report templates. | RICMS-IEN-5 |
| 23.1.2.2 | The R-ICMS report component shall allow for an authorized user to be able to add new report templates after the system is deployed. | RICMS-IEN-5 |
| 23.1.2.3 | The R-ICMS report component shall provide the capability for a user to apply filters to filter data when running a report in the system. | RICMS-IEN-5 |
| 23.1.2.4 | The R-ICMS report component shall provide the capability for a user to generate a report in PDF, Word, and Excel formats. | RICMS-IEN-5 |
| 24.1.1 | The R-ICMS shall provide the capability for a user to select a pre-defined dashboard. | RICMS-IEN-5 |
| 24.1.1.1 | The R-ICMS shall provide the capability for a user with the ability to configure the data displayed on a dashboard. | RICMS-IEN-5 |
| 31.1 | The R-ICMS shall be hosted in the FDOT D5 hosting environment. | RICMS-IEN-1 |
| 31.1.1 | The R-ICMS shall follow FDOT D5 standards for hosted systems.  | RICMS-IEN-1 |
| 49.1 | The DFE shall track system usage, including size/rate of data from external requests. | RICMS-DFE-3 |
| SS2-001 | The R-ICMS shall display the SunGuide Event lane blockage data as a dynamically created lane blockage diagram for each cardinal approach using the available event data ingested into the R-ICMS system. | RICMS-IEN-6 |
| SS2-002 | The R-ICMS shall display the lane blockage diagram to users within the event details for SunGuide events.  | RICMS-IEN-6 |
| SS2-003 |  The R-ICMS shall include the number of lanes, lane types and lane blockage status for each individual lane in the lane blockage diagram for SunGuide events.  | RICMS-IEN-6 |
| SS2-004 | The R-ICMS shall provide users the capability to create lane blockage diagrams for R-ICMS events within the event details. | RICMS-IEN-6 |
| SS2-005 | The R-ICMS event details shall display the lane blockage diagram with the default approach and number of lanes based on the roadway and direction specified by the R-ICMS event location. | RICMS-IEN-6 |
| SS2-006 | The R-ICMS shall update the lane blockage diagram when there is a change to the R-ICMS event location. | RICMS-IEN-6 |
| SS2-007 | The R-ICMS event shall include the capability to edit the number of approaches in the lane blockage diagram for R-ICMS events. | RICMS-IEN-6 |
| SS2-008 | The R-ICMS shall prevent the user from modifying the default approach in the lane blockage diagram for R-ICMS events. | RICMS-IEN-6 |
| SS2-009 | The R-ICMS shall provide the ability for the user to specify the Roadway, Direction and Number of Lanes when adding additional approaches in the lane blockage diagram for R-ICMS events. | RICMS-IEN-6 |
| SS2-010 | The R-ICMS shall provide the ability for a user to edit the number of lanes for additional approaches in the lane blockage diagram for R-ICMS events. | RICMS-IEN-6 |
| SS2-011 | The R-ICMS shall provide the capability to designate each lane type in the lane blockage diagram for R-ICMS events. | RICMS-IEN-6 |
| SS2-012 | The R-ICMS shall provide the capability to designate each lane status in the lane blockage diagram for R-ICMS events. | RICMS-IEN-6 |
| SS2-013 |  The R-ICMS shall include the capability to add/remove lanes in the lane blockage diagram for R-ICMS events.  | RICMS-IEN-6 |
| SS2-014 | The R-ICMS shall include the capability to add/remove approaches in the lane blockage diagram for R-ICMS events.  | RICMS-IEN-6 |
| SS2-015 | The R-ICMS shall include the capability to edit lane types in the lane blockage diagram for R-ICMS events.  | RICMS-IEN-6 |
| SS2-016 | The R-ICMS shall include the capability to edit lane blockage status in the lane blockage diagram for R-ICMS events.  | RICMS-IEN-6 |
| SS2-017 | The R-ICMS shall display the lane blockage diagram in the event location section of the event details. | RICMS-IEN-6 |
| SS3-001 | The R-ICMS shall receive CCTV video data from an external data source. | RICMS-IEN-7 |
| SS3-002 | The R-ICMS shall provide the ability to display the Nearest CCTV video for SunGuide events in the event details. | RICMS-IEN-7 |
| ~~SS3-003~~ | ~~The R-ICMS shall display a Nearest CCTV field in the event details for users to specify the camera for an R-ICMS event~~ | ~~RICMS-IEN-7~~ |
| ~~SS3-004~~ | ~~The R-ICMS shall perform a geospatial query to identify the available cameras based on the selected location of an R-ICMS event~~ | ~~RICMS-IEN-7~~ |
| ~~SS3-005~~ | ~~The R-ICMS shall provide a configurable distance parameter to perform a geospatial query of nearest CCTV based on event location.~~ | ~~RICMS-IEN-7~~ |
| SS3-006 | The R-ICMS shall display a tooltip message showing "Video Unavailable" over the disabled Display Camera button if the URL cannot be accessed. | RICMS-IEN-7 |
| SS3-007 | The R-ICMS shall link the CCTV IDs from SunGuide with the associated URL in CCTV configuration to provide CCTV video for SunGuide events | RICMS-IEN-7 |
| SS3-008 | The R-ICMS shall provide access to CCTV video from the event details page for SunGuide events. | RICMS-IEN-7 |
| SS3-009 | The R-ICMS shall provide access to CCTV video from the camera info window when displayed on the map. | RICMS-IEN-7 |
| SS3-010 | The R-ICMS shall provide access to CCTV video from the SunGuide event info window when displayed on the map. | RICMS-IEN-7 |
| SS4-001 | The R-ICMS shall ingest TAM data from the SunGuide Connected Vehicle Subsystem (CVS)  | RICMS-IEN-8 |
| ~~SS4-002~~ | ~~The R-ICMS shall display SunGuide Traveler Advisory Messages as a list on the map page of the R-ICMS system in a table format.~~  | ~~RICMS-IEN-8~~ |
| SS4-003 | The RICMS shall display active TAM messages on the map as a selectable GIS layer | RICMS-IEN-8 |
| ~~SS4-004~~ | ~~The RICMS shall include the message, start time, duration, and priority in the TAM List.~~ | ~~RICMS-IEN-8~~ |
| ~~SS4-005~~ | ~~The RICMS shall provide the capability for Users to select a TAM from the list to display that TAM presentation region(s) on the map.~~ | ~~RICMS-IEN-8~~ |
| SS4-006 | Th R-ICMS shall allow users to only select a single TAM at a time. | RICMS-IEN-8 |
| ~~SS4-007~~ | ~~Th R-ICMS shall allow users to select a TAM from the map and display that TAM as selected in the TAM list table.~~ | ~~RICMS-IEN-8~~ |
| SS4-008 | The R-ICMS shall display TAM data in an InfoWindow when the TAM presentation region is selected on the map. | RICMS-IEN-8 |
| ~~SS4-009~~ | ~~The R-ICMS will remove the presentation regions displayed on the map when users close the TAM list.~~ | ~~RICMS-IEN-8~~ |
| SS4-010 |  The R-ICMS will remove the presentation regions displayed on the map when user deselects the active TAM layer. | RICMS-IEN-8 |
| SS4-011 | The R-ICMS shall display the associated presentation regions for a unique TAM in the same color. | RICMS-IEN-8 |
| SS4-012 | The R-ICMS shall display each TAM presentation region polygon as semi transparent with an outline surrounding the spatial boundaries of the presentation region. | RICMS-IEN-8 |
| SS4-013 | The R-ICMS will display a single icon in the geographic center of the TAM polygon. | RICMS-IEN-8 |
| SS4-014 | The R-ICMS shall provide an API for external user access to the TAM data. | RICMS-IEN-8 |
| SS4-015 | The R-ICMS will display the active directionality or directionalities of a TAM (up to 8 different directions). | RICMS-IEN-8 |
| 4.1.1.1 | The R-ICMS shall evaluate the current performance of the network. | RICMS-DSS-1 |
| 5.1.3.2 | The R-ICMS shall determine if and which response plans should be evaluated by the External Modeling Engine.  | RICMS-DSS-1 |
| 10.1.1.12 | R-ICMS response plans originated from SunGuide events will include the original SunGuide event ID in the response plan to aid in R-ICMS/SunGuide event association. | RICMS-DSS-1 |
| 23.2 | The R-ICMS shall provide evaluation data to the DFE Subsystem. | RICMS-DSS-1 |
| 24.5.1.1 | The R-ICMS shall store the timestamp when a rule is triggered and a response plan is selected. | RICMS-DSS-1 |
| 5.1.3.3 | The R-ICMS shall send a set of recommended response plans to the External Modeling Engine for evaluation. | RICMS-DSS-2 |
| 5.1.3.4 | The R-ICMS shall request future network conditions for the "do nothing" case from the external Modeling Engine. | RICMS-DSS-2 |
| 5.1.3.5 | The R-ICMS shall request future network conditions for a set of proposed response plans from the external Modeling Engine. | RICMS-DSS-2 |
| 5.1.3.6 | The R-ICMS shall request predictions with a rolling horizon of 30 minutes in the future from the External Modeling Engine. | RICMS-DSS-2 |
| 5.1.3.7 | The R-ICMS shall provide MOEs for each evaluated response plan for specified time horizons. | RICMS-DSS-2 |
| 5.1.3.8 | The R-ICMS shall evaluate the predicted transportation network conditions to compute predicted performance. | RICMS-DSS-2 |
| 5.1.3.9 | The R-ICMS shall compute an aggregate score for each response plan prediction.  | RICMS-DSS-2 |
| 16.1.1.5 | The R-ICMS shall evaluate the impact on the transportation network of alternative response plans. | RICMS-DSS-2 |
| 16.1.1.6 | The R-ICMS shall receive the predicted response plan data from the External Modeling Engine for the alternative response plan scenarios. | RICMS-DSS-2 |
| 16.1.1.7 | The R-ICMS shall evaluate the measures of performance for the transportation network for response plans. | RICMS-DSS-2 |
| 18.1 | The R-ICMS shall coordinate the activation of traffic signal timing plans. | RICMS-DSS-2 |
| 18.1.1.1 | The R-ICMS shall evaluate traffic signal timing plans for specified arterial corridors. | RICMS-DSS-2 |
| 18.1.1.2 | The R-ICMS shall send recommended traffic signal timing plans to the External Modeling Engine for evaluation. | RICMS-DSS-2 |
| 18.1.1.3 | The R-ICMS shall provide the External Modeling Engine with identified corridors for optimization of traffic signal timing plans. | RICMS-DSS-2 |
| 18.1.1.4 | The R-ICMS shall support receiving results from the simulation of traffic signal timing plan recommendations from the External Modeling Engine. | RICMS-DSS-2 |
| 23.3 | The R-ICMS shall store model accuracy data. | RICMS-DSS-2 |
| 24.5 | The R-ICMS system performance, irrespective of the modeling engine, shall be in compliance with the KPI that is specified in the scope of work. | RICMS-DSS-2 |
| 24.5.1.2 | The R-ICMS shall store the timestamp when R-ICMS sends modelling tasks to the External Modelling Engine. | RICMS-DSS-2 |
| 24.5.1.3 | The R-ICMS shall store the timestamp when the External Modelling Engine sends results back to the R-ICMS. | RICMS-DSS-2 |
| 24.5.1.4 | The R-ICMS shall store the timestamp when R-ICMS evaluates results, calculates MOEs, and sends results to the DFE | RICMS-DSS-2 |
| 5.1 | The R-ICMS shall recommend response plans for the user to review. | RICMS-DSS-3 |
| 5.1.3.10 | The R-ICMS shall provide evaluated response plans which exceed the aggregated score threshold to authorized users. | RICMS-DSS-3 |
| 10.1.1.1 | The R-ICMS shall allow authorized users to select an evaluated response plan. | RICMS-DSS-3 |
| 10.1.1.2 | The R-ICMS shall present attributes and evaluation MOEs with the response plan during selection. | RICMS-DSS-3 |
| 17.1 | The R-ICMS shall send updated incident response plans which exceed the aggregated score threshold to authorized users. | RICMS-DSS-3 |
| 17.1.1.1 | The R-ICMS shall provide updated evaluated response plan lists to authorized users. | RICMS-DSS-3 |
| 24.5.1.5 | The R-ICMS shall store the timestamp when IEN displays results of simulation to authorized users. | RICMS-DSS-3 |
| 24.5.1.6 | The R-ICMS shall store the timestamp when an authorized user selects a plan | RICMS-DSS-3 |
| 1.2.5.6.3 | The R-ICMS shall provide an authorized user the capability to configure approval profiles to automatically approve a response plan request after a period of time defined by the user. | RICMS-DSS-4 |
| 1.2.5.6.4 | The R-ICMS shall provide an authorized user the capability to configure devices to automatically approve a response plan request during defined hours of the day after a period of time defined by the user. | RICMS-DSS-4 |
| 1.2.5.6.5 | The R-ICMS shall provide an authorized user the capability to configure approval profiles to automatically reject a response plan request during defined hours of the day after a period of time defined by the user. | RICMS-DSS-4 |
| 1.2.5.6.6 | The R-ICMS shall provide an authorized user the capability to configure devices to automatically reject a response plan request during defined hours of the day after a period of time defined by the user. | RICMS-DSS-4 |
| 1.2.5.7 | The R-ICMS shall provide the capability to assign devices to device groups. | RICMS-DSS-4 |
| 10.1.1.3 | The R-ICMS shall provide the selected proposed response plan elements to affected agencies. | RICMS-DSS-4 |
| 10.1.1.4 | The R-ICMS shall provide an interface to allow authorized users to approve proposed response plan elements. | RICMS-DSS-4 |
| 10.1.1.5 | The R-ICMS shall provide an interface to allow authorized users to reject proposed response plan elements. | RICMS-DSS-4 |
| 10.1.1.6 | The R-ICMS shall provide the ability for authorized users to track approval of proposed response plan elements. | RICMS-DSS-4 |
| 10.1.1.7 | The R-ICMS shall display attributes and status pertaining to the approval of response plan elements. | RICMS-DSS-4 |
| 24.5.1.7 | The R-ICMS shall store the timestamp when the IEN sends plan to affected agencies for approval | RICMS-DSS-4 |
| 24.5.1.8 | The R-ICMS shall store the timestamp when the last response plan approval is received | RICMS-DSS-4 |
| 5.1.1.1 | The R-ICMS shall receive agency status. | RICMS-DSS-5 |
| 5.1.1.2 | The R-ICMS shall provide agency status to authorized users. | RICMS-DSS-5 |
| 5.1.3.1 | The R-ICMS shall provide response plan lists for view and selection to authorized users. | RICMS-DSS-5 |
| 7.1.1 | The R-ICMS shall provide roadway event information through suggested response plans to SunGuide. | RICMS-DSS-5 |
| 10.1.1.10 | The R-ICMS shall send supported SunGuide response plan elements to SunGuide for activation. | RICMS-DSS-5 |
| 10.1.1.14 | The R-ICMS shall provide an interface to allow authorized users/systems to confirm enacted response plan elements. | RICMS-DSS-5 |
| 10.1.1.15 | The R-ICMS shall provide the ability for authorized users to track confirmation of enacted response plan elements. | RICMS-DSS-5 |
| 15.1 | The R-ICMS shall store history of enacted response plans. | RICMS-DSS-5 |
| 15.1.1 | The R-ICMS shall store the history of actions enacted during response plan implementation. | RICMS-DSS-5 |
| 16.1.1.2 | The R-ICMS shall store calculated performance measures. | RICMS-DSS-5 |
| 24.5.1.9 | The R-ICMS shall store the timestamp when an authorized user activates the response plan. | RICMS-DSS-5 |
| 24.5.1.10 | The R-ICMS shall store the timestamp when response plans are sent to SunGuide | RICMS-DSS-5 |
| 24.5.1.11 | The R-ICMS shall calculate and store delay. Delay is computed by summing the delays from 45.1 to 45.3, 45.4 to 45.5, 45.5 to 45.6, 45.10 to 45.11. | RICMS-DSS-5 |
| 24.5.1.12 | The R-ICMS shall provide a set of recommended response plans within  2 minutes of receiving a trigger to select alternative response plans from the modeling engine exclusive of time spent simulating the results of applying the response plans, | RICMS-DSS-5 |
| 10.1.1.8 | The R-ICMS shall allow authorized users to activate a response plan regardless of agency approval status. | RICMS-DSS-6 |
| 24.6 | The R-ICMS shall not recommend a change to a currently activated response plan containing a signal that has changed within the last 15 minutes | RICMS-DSS-7 |
| 16.1.1.1 | The R-ICMS shall reevaluate the performance of response plans on a configurable interval. | RICMS-DSS-8 |
| 16.1.1.3 | The R-ICMS shall evaluate the impact on the transportation network of returning to normal operations. | RICMS-DSS-8 |
| 16.1.1.4 | The R-ICMS shall receive predicted data from the External Modeling Engine for the return to normal operations scenario. | RICMS-DSS-8 |
| 17.1.1.2 | The R-ICMS shall include the updated alternate response plans and the return to normal operations scenario in the response plan list | RICMS-DSS-8 |
| 43.1 | The R-ICMS shall provide automated monitoring capabilities to alert operators of outages. | RICMS-MON-1 |
| 2.1.1.2 | The DFE shall alert when valid data is not received for a data source. | RICMS-MON-2 |
| 43.1 | The R-ICMS shall provide automated monitoring capabilities to alert operators of outages. | RICMS-MON-3 |
| 2.1.5.2 | The DFE shall monitor and log the availability of the Data Store. | RICMS-MON-3 |
| 43.1 | The R-ICMS shall provide automated monitoring capabilities to alert operators of outages. | RICMS-MON-4 |
| 43.1 | The R-ICMS shall provide automated monitoring capabilities to alert operators of outages. | RICMS-MON-5 |
| 43.1 | The R-ICMS shall provide automated monitoring capabilities to alert operators of outages. | RICMS-MON-6 |
| 19.1.1.1 | The R-ICMS shall allow authorized users to configure intersection optimization data. | RICMS-SOT-1 |
| 19.1.1.2 | The R-ICMS shall provide the capability to load intersection data necessary to calculate capacity of intersection movements | RICMS-SOT-1 |
| 19.1.1.3 | The R-ICMS shall provide the capability to load Intersection geometry data necessary to calculate capacity of intersection movements | RICMS-SOT-1 |
| 19.1.1.6 | The R-ICMS shall allow authorized users to specify which parameters should be optimized for an intersection during specific periods | RICMS-SOT-1 |
| 19.1.1.7 | The R-ICMS shall allow authorized users to specify whether phase sequencing should be optimized for an intersection for specific periods. | RICMS-SOT-1 |
| 19.1.1.8 | The R-ICMS shall allow authorized users to specify that phasing timing (splits) can be optimized while optimizing an intersection for specific periods. | RICMS-SOT-1 |
| 19.1.1.9 | The R-ICMS shall allow authorized users to specify whether Dallas phasing is valid for optimizing an intersection for specific periods. | RICMS-SOT-1 |
| 19.1.1.10 | The R-ICMS shall allow authorized users to specify whether cycle length should be optimized for an intersection for specific periods. | RICMS-SOT-1 |
| 19.1.1.11 | If the user has elected to allow the optimization of the cycle time, the R-ICMS shall allow authorized users to specify a maximum cycle length for an intersection for specific periods. | RICMS-SOT-1 |
| 19.1.1.12 | If the user has elected to allow the optimization of the cycle time, the R-ICMS shall allow authorized users to specify a minimum cycle length for an intersection for specific periods. | RICMS-SOT-1 |
| 19.1.1.13 | The R-ICMS shall allow authorized users to specify which parameters should not be optimized. | RICMS-SOT-1 |
| 19.1.1.14 | The R-ICMS shall load default values for parameters to be optimized for an intersection during specific periods. | RICMS-SOT-1 |
| 19.1.2.1 | The R-ICMS shall allow authorized users to define corridors consisting of one or more adjacent connected signalized intersections with the same annotated direction | RICMS-SOT-1 |
| 19.1.2.2 | The R-ICMS shall allow authorized users to define a common cycle time for a corridor (a single cycle time for the intersections in a corridor) during specific time periods. | RICMS-SOT-1 |
| 19.1.2.3 | The R-ICMS shall provide the capability to load intersection connection data | RICMS-SOT-1 |
| 19.1.2.4 | The R-ICMS shall allow authorized users to configure the times for which corridors are active. | RICMS-SOT-1 |
| 19.1.2.6 | The R-ICMS shall provide the coordination schedule for an intersection, including corridor membership | RICMS-SOT-1 |
| 19.1.2.8 | The R-ICMS shall allow authorized users to select the master intersection for a corridor during a specific time period. | RICMS-SOT-1 |
| 19.1.3.2 | The R-ICMS shall display measures of effectiveness from the SOT tool (HCS7 Streets) for proposed sets of signal timing plans for an intersection | RICMS-SOT-1 |
| 19.1.3.3 | The R-ICMS shall display The "score" calculated from the modelling engine and the SOT tool for proposed sets of signal timing plans for an intersection | RICMS-SOT-1 |
| 19.1.3.4 | The R-ICMS shall display MOEs from the modelling engine for proposed sets of signal timing plans for an intersection | RICMS-SOT-1 |
| 19.1.3.5 | The R-ICMS shall allow authorized users to modify signal timing plans within the proposed sets of signal timing plans for an intersection | RICMS-SOT-1 |
| 19.1.3.6 | The R-ICMS shall allow authorized users to request the generation of measures of effectiveness for modified signal timing plans for an intersection | RICMS-SOT-1 |
| 19.1.3.7 | The R-ICMS shall allow authorized users to attach a comment to a signal timing plan | RICMS-SOT-1 |
| 19.1.3.8 | The R-ICMS shall allow users to approve signal timing plan sets. | RICMS-SOT-1 |
| 19.1.3.9 | The R-ICMS shall allow users to download a corridor report that will facilitate digital signing by a licensed PE. | RICMS-SOT-1 |
| 19.3.1.10 | The R-ICMS shall allow users to upload a signed corridor report to an optimization. | RICMS-SOT-1 |
| 19.1.4.1 | The R-ICMS shall allow authorized users to initiate optimization of a pre-defined corridor | RICMS-SOT-1 |
| 19.1.4.2 | The R-ICMS shall allow authorized users to select the pre-defined corridor to be evaluated | RICMS-SOT-1 |
| 19.1.4.3 | The R-ICMS shall allow authorized users to select the temporal pattern from which data will be used to evaluate the corridor | RICMS-SOT-1 |
| 19.1.4.4 | The R-ICMS shall allow authorized users to determine whether special days will be included in data used to evaluate the corridor | RICMS-SOT-1 |
| 19.1.4.5 | The R-ICMS shall allow authorized users to determine which days of the week equivalent to the corridor activation period will be included in data used to evaluate the corridor | RICMS-SOT-1 |
| 19.1.4.6 | The R-ICMS shall allow authorized users to define special days | RICMS-SOT-1 |
| 19.1.4.7 | The R-ICMS shall allow authorized users to select a contiguous date range relative to the optimization run time from which data will be used to evaluate the corridor | RICMS-SOT-1 |
| 19.1.4.8 | The R-ICMS shall use the contiguous time period equivalent to the corridor activation period from which data will be used to evaluate the corridor. | RICMS-SOT-1 |
| 19.1.4.9 | The R-ICMS shall allow authorized users to select the parameters to be optimized for a corridor. | RICMS-SOT-1 |
| 19.1.4.10 | The R-ICMS shall allow authorized users to configure the optimization parameters. | RICMS-SOT-1 |
| 19.1.5.2 | The R-ICMS shall allow authorized users to configure the temporal pattern with a relative date range at which a pre-defined corridor will be evaluated. | RICMS-SOT-1 |
| 19.1.5.3 | The R-ICMS shall make a generated signal timing plan set available for review if it offers a system-wide configurable level of improvement in corridor performance. | RICMS-SOT-1 |
| 19.1.6.3 | The R-ICMS shall allow authorized users to select a recommended corridor signal timing plan set to evaluate | RICMS-SOT-1 |
| 19.1.6.4 | The R-ICMS shall display measures of effectiveness for sets of signal timing plans and proposed offsets for corridors | RICMS-SOT-1 |
| 19.1.6.5 | The R-ICMS shall allow authorized users to modify the offsets for intersections within a corridor | RICMS-SOT-1 |
| 19.1.6.6 | The R-ICMS shall allow authorized users to request that modified corridor optimizations be simulated to produce updated measures of effectiveness | RICMS-SOT-1 |
| 19.1.6.7 | The R-ICMS shall allow authorized users to attach a comment to a signal timing plan set | RICMS-SOT-1 |
| 19.1.7.1 | The R-ICMS shall be capable of displaying a map highlighting corridors with recommended signal timing plan sets | RICMS-SOT-1 |
| 19.1.7.2 | The R-ICMS shall be capable of displaying a map with a selected corridor highlighted | RICMS-SOT-1 |
| 19.1.8.1 | The R-ICMS shall notify selected users that a signal timing plan set is available for review | RICMS-SOT-1 |
| 19.1.8.2 | The R-ICMS shall notify logged on users that a signal timing plan set is available for review via the R-ICMS alerting capability. | RICMS-SOT-1 |
| 19.1.8.3 | The R-ICMS shall notify selected users that a signal timing plan set is available for review via email. | RICMS-SOT-1 |
| 19.1.8.4 | The R-ICMS shall allow authorized users to navigate from a signal timing plan set alert to the signal timing plan recommendation. | RICMS-SOT-1 |
| 19.1.8.5 | The R-ICMS shall allow authorized users to reject a recommended signal timing plan set | RICMS-SOT-1 |
| 19.1.9.1 | The R-ICMS shall allow authorized users to generate a summary report of the signal timing plans for a corridor | RICMS-SOT-1 |
| 19.1.9.2 | The R-IMCS shall allow authorized users to generate output files. | RICMS-SOT-1 |
| 19.1.9.3 | The R-IMCS shall allow authorized users to generate signal timing plan output files. | RICMS-SOT-1 |
| 19.1.9.4 | The R-ICMS shall provide the capability to generate output files in a format which will facilitate the generation of comparable signal timing plan sets in Synchro. | RICMS-SOT-1 |
| 19.1.9.5 | The R-ICMS shall provide the capability to generate output files in a format which will facilitate the generation of comparable signal timing plan sets in TruTraffic. | RICMS-SOT-1 |
| 19.1.3.1 | The R-ICMS shall provide the capability to optimize Signal Timing Plans for individual intersections | RICMS-SOT-2 |
| 19.1.5.1 | The R-ICMS shall conduct periodic optimization of selected pre-configured corridors. | RICMS-SOT-3 |
| 19.1.2.5 | The R-ICMS shall provide capabilities to ensure that no intersection is a part of two deployed corridors at the same time. | RICMS-SOT-3 |
| 19.1.6.2 | The R-ICMS shall display a list of corridors with recommended signal timing plan sets | RICMS-SOT-3 |
| 19.1.7.1 | The R-ICMS shall be capable of displaying a map highlighting corridors with recommended signal timing plan sets | RICMS-SOT-4 |
| 19.1.7.2 | The R-ICMS shall be capable of displaying a map with a selected corridor highlighted | RICMS-SOT-4 |

# Notes

The following requirements are being delivered but are not testable during a formal inspection or are met by documentation that is being provided.

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| --- | --- |
| **Req #** | **Requirement Text** |
| 2.1.1.1 | The DFE shall support a maintenance mode that allows maintenance of the system while continuing to download data from data sources so that there is no data gap caused by the maintenance mode.  |
| 41.1 | The R-ICMS shall provide 99.5 percent availability. |