

# Rhode Island's Transportation System Management & Operations (TSMO) Program



Deanna Peabody, P.E.



Catherine Burns, EIT

---

# Presentation Outline

- Background
- Project Goal
- Project Tasks
- RI TSMO Definition
- Program Objectives
- Multi-modal Performance Measures
- Reporting, Responsibilities, and Work Flows
- Conclusions

# Background

- **2013** – SHRP2 Grant to RIDOT *to improve TSMO and foster more reliable travel time through business and organization solutions*
- **2014** – Developed a prioritized 6 Step TSMO Implementation Plan
- **2015** – Completed Steps 1 and 2 involving developing a business case for TSMO in RI
- **2016** – Embarked on Step 3 to develop TSMO Performance Measures

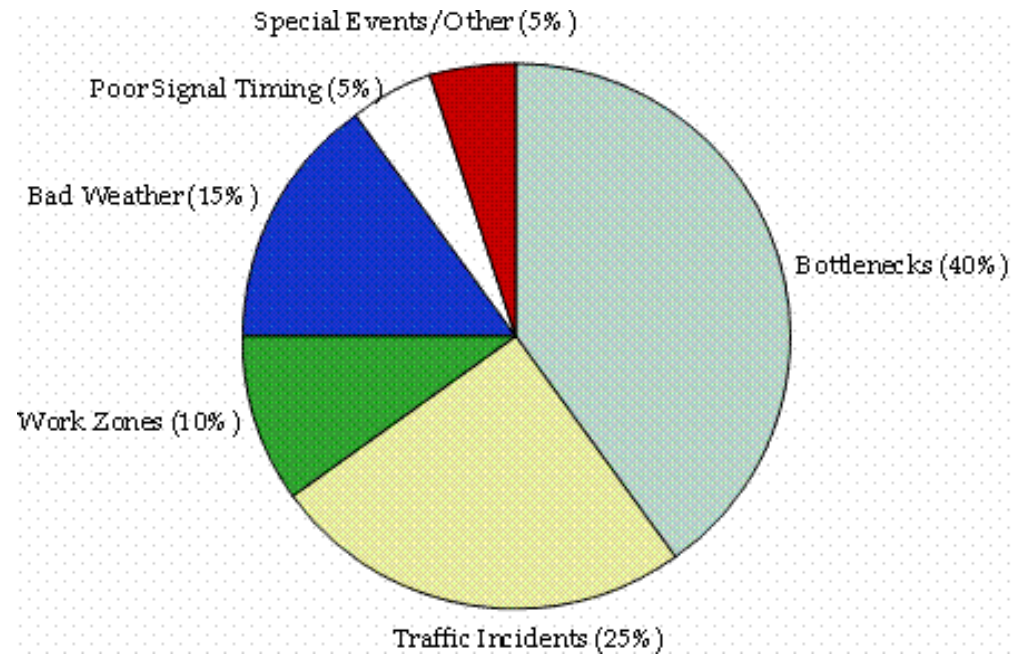
# Project Goal

- The objective of this project is to develop a TSMO Performance Measurement Plan and Work Program for RIDOT and RIDOA DSP that is based on a ***set of prioritized performance measures*** that is aligned with transportation ***system-user*** operational performance/***reliability*** for best alignment with ***federal regulations, state Policies/Plans***, and regional cost-effectiveness/consistency.

# Project Tasks

- Task 1 – Federal Requirements and Recommendations
- Task 2 – State Plans and Policies
- Task 3 – Review of Peer States
- Task 4 – Identify Performance Measures
- Task 5 – TSMO Performance Management Plan and Work Program

# Task 1 – Federal Requirements & Recommendations



Source: *Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation*  
Cambridge Systematics with TTI, 2004

- The only nationally-mandated PMs are those in the FHWA NPRM resulting from MAP-21 legislation and adopted in the FAST Act
- These do not assess all aspects of a TSMO program
- Reviewed guidance documents related to all sources of congestion including work zones and weather

# Task 2 – State Policies and Plans

- Review DOT and Statewide Planning Program **requirements, guidelines, goals, and objectives** that have been officially-adopted at the state level to date and
- Inventory the latest **data and metrics** that are being monitored, collected, and/or used

that are associated with monitoring/measuring **transportation system-user operational performance/reliability** (i.e., metrics and measures directly associated with system-user travel time, congestion, delay, or other closely-related measure such as incident clearance time).

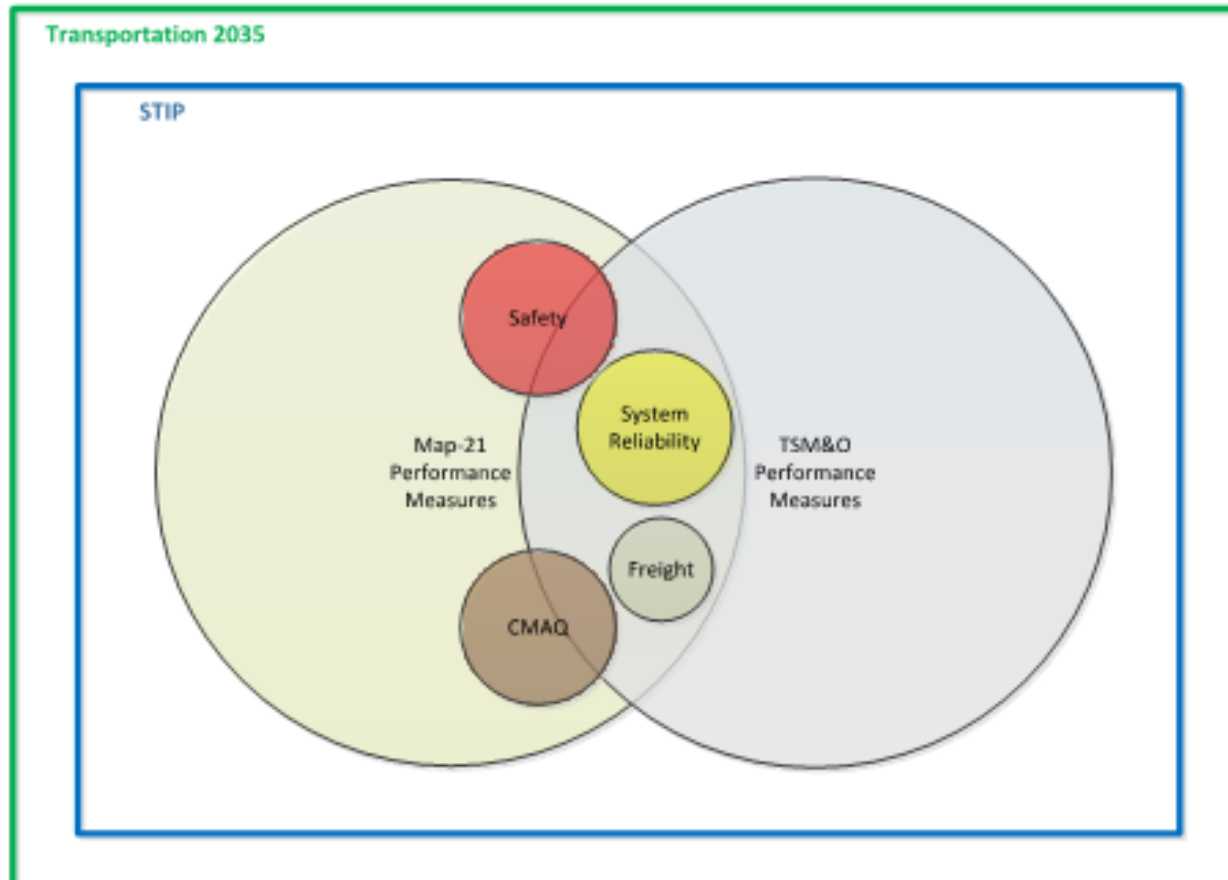
# Task 2 – State Policies and Plans

## Adopted State-Level Goals, Objectives, Requirements, and Recommendations Associated w/ Monitoring/Measuring Transportation System-User Operational Performance/Reliability (SUOPR)

Published Document	Goal(s) / Objective(s)	Requirement(s)	Recommendation(s)
<b>RIDOT 2015-2020 ITS Strategic Deployment Plan</b> May, 2015	Improve the “performance of the transportation system” throughout the state.	Performance metrics required to be tracked to monitor program and operational effectiveness include: - Reduction in incident response times - Reduction in incident clearance times - Secondary crash rates	Target a maximum incident clearance time of 30 minutes.
<b>RI Incident Management Task Force Incident Management Strategic Plan</b> September, 2017	- Improve Safe Quick Clearance Techniques - Facilitate Interagency Communications - Decrease Incident Clearance Times	No SUOPR requirements specifically identified.	- Track incident response and clearance times - Track secondary crash rates - Track percentage of first responders in RI trained for TIM
<b>RIDOT &amp; RIDOA/DOP State of RI Freight and Goods Movement Plan</b> September, 2016	- Improve operational efficiency and reliability while reducing emissions - Support economic growth / competitiveness in Rhode Island through strategic improvements to the freight system - Improve connectivity through policies and strategic investments that reduce congestion and increase reliability on the state’s roadways and its rail, marine, air, and intermodal systems	The state will continue to work with the FAC and other stakeholders to identify projects of importance to the freight infrastructure, policies that support freight movement, and other issues that are critical to Rhode Island and its freight transportation system.	- Establish performance measures and collect data to continuously monitor system effectiveness. - Identify long-term, sustainable state funding to support the operation, maintenance and expansion of freight facilities (e.g., tolls, registration fees and increased registration fees, diesel taxes, etc.). - Coordinate regionally on critical transportation corridors and related infrastructure investments (e.g., rail bridges on lines in MA coming into RI, improvements to I-295 interchange in MA that affects RI, etc.).



# Task 2 – State Policies and Plans



- A **Process Variable** is a dynamically changing feature of that dictates the amount of response or activity (Output) needed – for example the number of snow storms or the number of potholes on a road are Process Variables.
- An **Input Measure** is the amount of resources that are put into a process in order to achieve an output. For example the amount of salt and sand put on the road during a snow storm, or the number of plows being used.
- An **Output Measure** is a measure of activity - a calculation, recording, or tabulation of the results of an activity, effort, or process that can be expressed in quantitatively. Accordingly, the number of lane miles the snowplows have cleared or lane miles that have been cleared from the application of salt and sand are output measures.
- An **Outcome Measure** is used to measure the success of a process. In the snow storm example, it could be a measurement (improvement) of travel time or reduced number of weather related crashes.

**Performance Measures Program will need to focus attention on Outcome Measures as they focus on the results of activity and may measure effort effectiveness.**

# Task 3 – Review of Peer States

- Telephone Peer Review

- Iowa DOT
- Maryland Coordinated Highways Action Response Team (CHART)
- Florida DOT
- Oregon DOT
- North Carolina DOT
- Delaware Valley Regional Planning Commission (DVRPC)
- Massachusetts DOT
- North Jersey Transportation Planning Authority (NJTPA)
- New Hampshire DOT
- Pennsylvania DOT
- Washington State DOT

- Online Peer Review

- Connecticut DOT
- Vermont Agency of Transportation (VTrans)
- Maine DOT

# Task 3 – Review of Peer States

- Guidance and resources
- TSMO performance measures are **tailored** to the needs of each particular agency
- Leverage existing traffic signal, ITS devices, performance measures and **stakeholder input** to create TSMO program
- Differences in reporting (frequency, centralized/decentralized), safety metric inclusion, modes (highway, transit, boat, bike, pedestrian) and **availability of the data to the public**

# Task 4 – Identify Performance Measures

- Started with required/recommended Federal and State performance measures as identified in Tasks 1 and 2
- Identified measures that will help with understanding the MAP-21 overall state performance measures:
  - Break into the various congestion sources
  - Break each into individual highways
- TSMO performance measures major areas:
  - *Travel time reliability and Congestion Management*
  - *Incident management*
  - *Work zone management*
  - *Weather-related measures*
  - *Multi-modal measures (RIPTA, Ferry, Park-Ride, Bike, Ped)*

# Task 4 – Travel Time Reliability and Congestion Management Performance Measures

- **MAP-21 System Performance Measures**

- Percent of person-miles traveled on Interstate NHS that is reliable
- Percent of person-miles traveled on non-Interstate NHS that is reliable

Same PMs for Each Interstate, Each Other Freeway & Expressway, and Each RIDOT Selected Principal Arterial

- **MAP-21 Freight Performance Measures**

- Truck travel time reliability index on Interstates

Same PM for the NHS Freight Corridors (Statewide), Each Interstate, and Each non-Interstate NHS Freight Corridor

- **MAP-21 CMAQ Performance Measures**

- Annual hours of peak hour excessive delay per capita – Statewide NHS
- Percent of non-single occupancy vehicle travel

- Travel Time Index – Each RIDOT Selected Highway
- Congestion Hot-Spots/Bottleneck Locations
- Automated Traffic Signal Performance Measures (ATSPM) – *to be implemented in future*
- Crash Rate

# Task 4 – Incident Management Performance Measures

- RIDOT TMC Performance Measures
  - Incident Clearance Time – Each Interstate and Other Freeways & Expressways
  - Roadway Clearance Time – Each Interstate and Other Freeways & Expressways
  - Percent of Secondary Incidents
  - Incident Rate – Each Interstate and Other Freeways & Expressways
- TMC's RhodeWAYS database logs every incident on the major highways

# Task 4 – Work Zone Performance Measurement

- Recommended Work Zone Performance Measures
  - Work Zone Travel Time Reliability – On Interstates and Other Freeways & Expressways
  - Work Zone PHED – On Interstates and Other Freeways & Expressways
  - Work Zone Queue Length – On Interstates and Other Freeways & Expressways
  - Work Zone Crashes
- TMC currently logs every planned work zone reported to RIDOT

# Task 4 – Road Weather Performance Measurement

- Recommended Road Weather Performance Measures
  - Interstate Travel Time Reliability During Adverse Weather - Statewide
  - Non-Interstate NHS Travel Time Reliability During Adverse Weather – Statewide
- Adverse weather defined as greater than 0.01” per hour of precipitation



# Task 4 – Travel Demand and Mode Specific Measures

- Travel Demand

- Commuter Rail Ridership
- RIPTA Bus Ridership
- Providence/Newport Ferry Ridership
- Percent of Non-Single Occupant Vehicle (SOV) Travel – Statewide
- Transit Mode Share (Commuter)
- Bicycle Mode Share (Commuter)
- Walk Mode Share (Commuter)

- Mode Specific Performance

- RIPTA Bus On-time Performance
- Providence/Newport Ferry On-time Performance
- Park-Ride Percent Occupancy
- Bicycle System Mileage
- Bicycle System Connectivity
- Bicycle Path Utilization
- Walk System Connectivity

# Task 5 – TSMO Performance Management Plan and Work Program

- Finalizes performance measures and formalizes recommendations on data collection/use, work flows, and resource needs
- Defined TSMO Work Program
  - RI TSMO Definition
  - Goals & Objectives
  - Program Manager
  - Stakeholders

# RI TSMO Definition

- MAP-21 TSMO Definition:

*Integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services and projects designed to preserve capacity and improve security, safety and reliability of the transportation system*

- AASHTO TSMO Definition:

*Set of strategies to anticipate and manage traffic congestion, and minimize the other unpredictable causes of service disruption and delay, thereby maintaining roadway capacity while improving reliability and safety*

- RIDOT Final TSMO Definition:

*Use of strategies, systems, and/or services in real- or near to real-time to reduce transportation system congestion and delay and/or improve the safety, security and/or reliability of the network, without adding new capacity (lanes, bridges, etc.).*

# TSMO Goal

- Monitor surface transportation operations (in real or near to real-time) in such a way as to best facilitate the programming of and support for multi-modal projects and strategies that provide improved but cost-effective surface transportation system-user operational performance/reliability in Rhode Island.

# TSMO Objectives

- Monitor operations of the surface transportation system
- Assess the transportation system through TSMO performance measures
- Disseminate TSMO performance measures among stakeholder
- Review TSMO performance measures and assess/develop TSMO strategies
- Coordinate with other RIDOT and RIDOA DSP programs
- Update TSMO performance measures as necessary

# Program Manager Responsibilities

- Coordinate with RIDOT TMC Manager
- Compile performance measures from each agency/responsible party
- Organize periodic meetings with stakeholders
- Develop potential strategies based on performance measure results for consideration by stakeholders
- Receive input from stakeholder on the relevance and utility of performance measures and update performance measures
- Track TSMO strategies implemented and effectiveness based on performance measure results

# TSMO Stakeholders

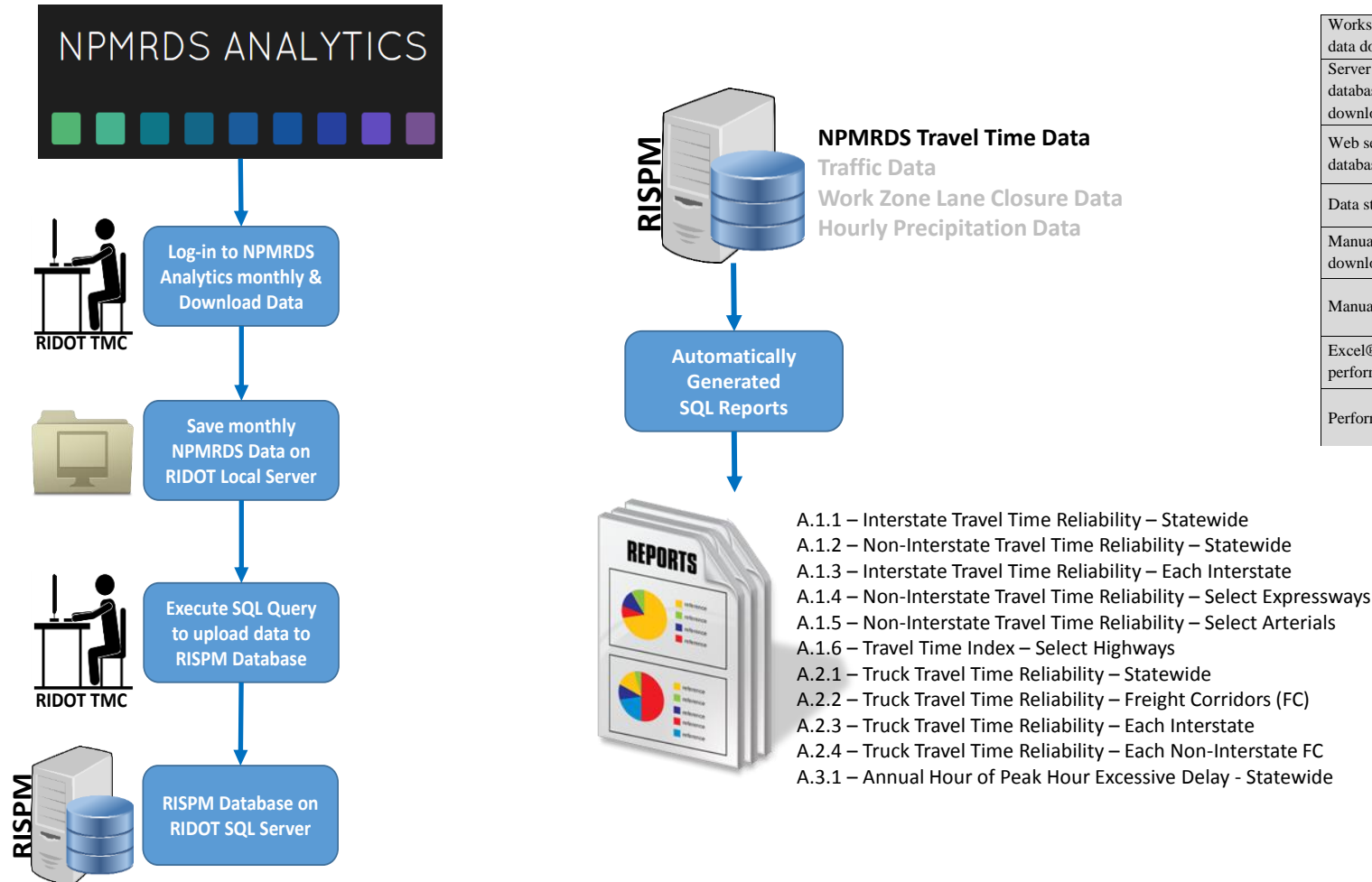
- RIDOA Division of Statewide Planning
- RIDOT Office of Performance Management
- RIDOT Transportation Management Center
- RIDOT Office of Safety
- RIDOT Division of Planning
- RIDOT Office of Transit, New Starts, Operations, and Transportation Alternatives
- RIDOT Maintenance
- RIDOT Division of Information Technology
- RIPTA
- RIDEM
- FHWA

# TSMO Work Program

- **Real-time Transportation System Monitoring**
- **Performance Measures Reporting Procedures**
  - Reporting Frequency – Monthly, Quarterly, Bi-annually, Annually
  - Report Dissemination to Stakeholders
  - Developing a web-based portal to view TSMO performance measures
- **TSMO Working Group**
  - Purpose – Review performance and assess/develop TSMO strategies
  - Members (RIDOT OPM, RIDOT TMC, RIDOT Transit, RIDOA DSP, RIPTA)
  - Meet on quarterly basis
  - Adopt process to review and update performance measures
- **Interface with other Federal, RIDOT, and RIDOA Initiatives (PM3 National Reporting, Truck Freight Bottleneck National Reporting, LRTP/TIP, IMTF, CMP, CMTF)**



# Data Collection and Work Flows



Workstation running a software program that automates either the data download or processing	
Server system that is used either to store data as part of a SQL database system or run a software program that automates the data download or processing	
Web server system hosted by a 3 <sup>rd</sup> party with software and database systems to store and process data	
Data stored on a file (as opposed to within a database system)	
Manual operation by a RIDOT or RIDOA DSP personnel to download data or process it	
Manual data collection in the field	
Excel® spreadsheet software to process data and compute performance measures	
Performance measures report	

# Conclusions

- RIDOT TSMO performance measures are multi-modal
- Assess all sources of congestion
- The TSMO Work Program includes a process to:
  - Real-time monitoring
  - Regularly report the performance
  - Update the measures as necessary
  - Review the performance to develop TSMO strategies
  - Assess the effectiveness of TSMO strategies