VDOT TSMO PLANNING

VASITE 2026

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Agenda

- Why TSMO?
- TSMO Screening Methodology and Tool for Interstates
- Panel Discussion – VDOT TSMO Planning

OVERVIEW OF PLANNING FOR TSMO

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TSMO???

Transportation Systems Management and Operations (TSMO)

Purpose

- Optimize performance of **existing infrastructure**.
- Improve **safety**, **reliability**, and preserve **capacity** of the system.

Implementation may involve

- Multimodal and intermodal.
- Cross-jurisdictional systems, services, and projects.
- Advanced Technology and AI/ML.

*based on 2012 legislation "Moving Ahead for Progress in the 21st Century" (MAP-21) and real-world practice

Why are State DOTs Planning for TSMO?

- Interagency agreements and coordinated response plans.
- Growing user and agency demand for system reliability has accelerated TSMO adoption.
- Requires a cohesive, collaborative, and integrated approach using tools agencies have relied on for decades.

*NCHRP Synthesis 567 – National Academies of Sciences, Engineering, and Medicine. 2021. *"Summary State DOT Practices for Developing and Implementing TSMO Plans"*. Washington, DC: The National Academies Press.

Successful TSMO Implementation by State DOTs*

Include few **Key Elements**:

- Use of **performance metrics** and **project selection tools** to optimize outcomes.
- **Coordination** with partners and regional entities.
- Outreach to the **public** and **stakeholders**.
- Strategic, programmatic, and tactical planning.
- Workforce development

*NCHRP Synthesis 567

Key Process and Policy Needs*

- Formal processes for planning, prioritizing, programming, and iterating TSMO projects.
- Integrate with established planning programs and processes
- Reliable and diversified funding to support implementation AND maintenance & operation for long-term sustainability.
- Effective use of data, analytics, and partner data-sharing to guide decisions and evaluate outcomes.
- Integration of emerging technologies and expansion of ITS/TSMO capabilities to enhance system reliability and safety.

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TSMO SCREENING METHODOLOGY AND TOOL

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Katie Felton, P.E.

6/2/2026

Why TSMO Strategy Screening (TSMOSS)?

- **Objective:**
  - Proactive response for Planning for Operations
  - Prioritize using network screening:
    - Appropriate TSMO strategy for a location
    - Optimal Performance Measure and Strategy Benefit
  - Leverage innovation with optimal Return on Investment
- **Consistent Planning Level Methodology to Screen and identify:**
  - Safety, Congestion, Reliability
  - For Systemic TSMO Initiative
- **Repeatable process for:**
  - Integrating with Projects from other Programs
  - Funding Applications

Detailed Evaluation after Screening

Development Team

- **Katie Felton**, P.E., Senior Engineer
- **Sanhita Lahiri**, P.E., Planning for Operations Manager
- **Simona Babiceanu**, Data Scientist
- **Mena Lockwood**, P.E., Assistant Division Administrator
- **Paul Szatkowski**, P.E., Assistant Division Administrator
- **Mike Fontaine**, P.E., PhD, Associate Director

TSMOSS Methodology for Interstates

1. **Assess Performance** on corridor sections
2. **Score** each corridor section
3. Assign **benefit scores** to strategies
4. Combine performance scores with **strategy scores**
5. Develop **list of optimal strategies** on corridor sections

Step 1: Calculate Performance Measures

Incident Rate
Number of Lane Impacting Crash and Disabled Vehicle Incidents per mile per year

Unreliable Delay
Total Vehicle Hours of Delay per mile when the 80th % Travel Time / Free Flow Travel Time is greater than 1.5

Crash Rate
Crashes per 100 million vehicle miles traveled

Unreliability
Percent of Month / DOW / Hours with 80th Percentile Travel Time Index > 1.5

Step 2: Score each Corridor Section

- The Scoring Models represent a sample set for prioritization and the scale for a measure is different in each scoring model.

Example: I-95S MM 89.5-98.4

	Crash Rate Score	Incident Rate Score	Unreliability Score	Delay Score
Scoring Model	59 crashes/100M VMT	11 incidents/mile	13% Hours TTI80>1.5	34K Hours of Delay
District	2	2	5	3
Area Type (rural v. urban)	3	4	5	3
Statewide	2	2	3	2

High Performing
1
2
3
4
5
Low Performing

Step 3: Assign Benefit Scores to Strategies

- Benefit scores were assigned to each strategy on a scale of 0 to 3
- Benefits scores were assessed in the same four areas as the performance measures: Incident Management, Safety, Congestion, and Reliability
- Score values were assigned based on:
  - Available research
  - Engineering Judgement
  - Crash Modification Factors

0 – No Benefit

1 – Low/Little Benefit

2 – Medium Benefit

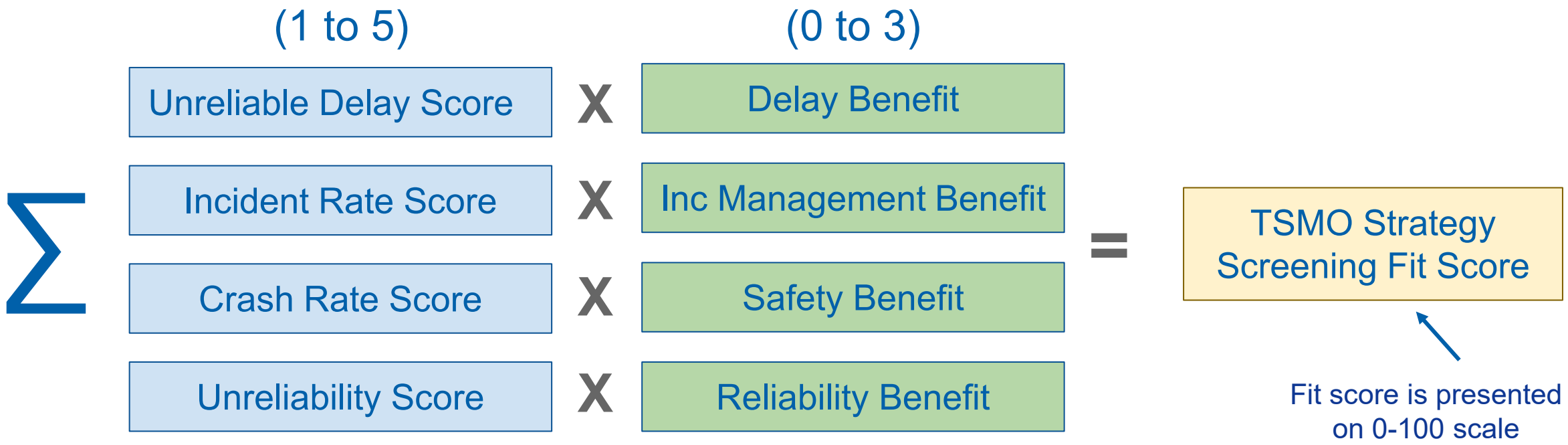
3 – High/Significant Benefit

List of Strategies (currently)

A. Aggressive Incident Clearance
B. Dynamic Merge Control
C. Dynamic Rerouting
D. Queue Warning
E. Ramp Flow Control
F. Special Event Management
G. Temporary Shoulder Use
H. Traveler Information Systems
I. Truck Lane Restrictions
J. Variable Speed Limits

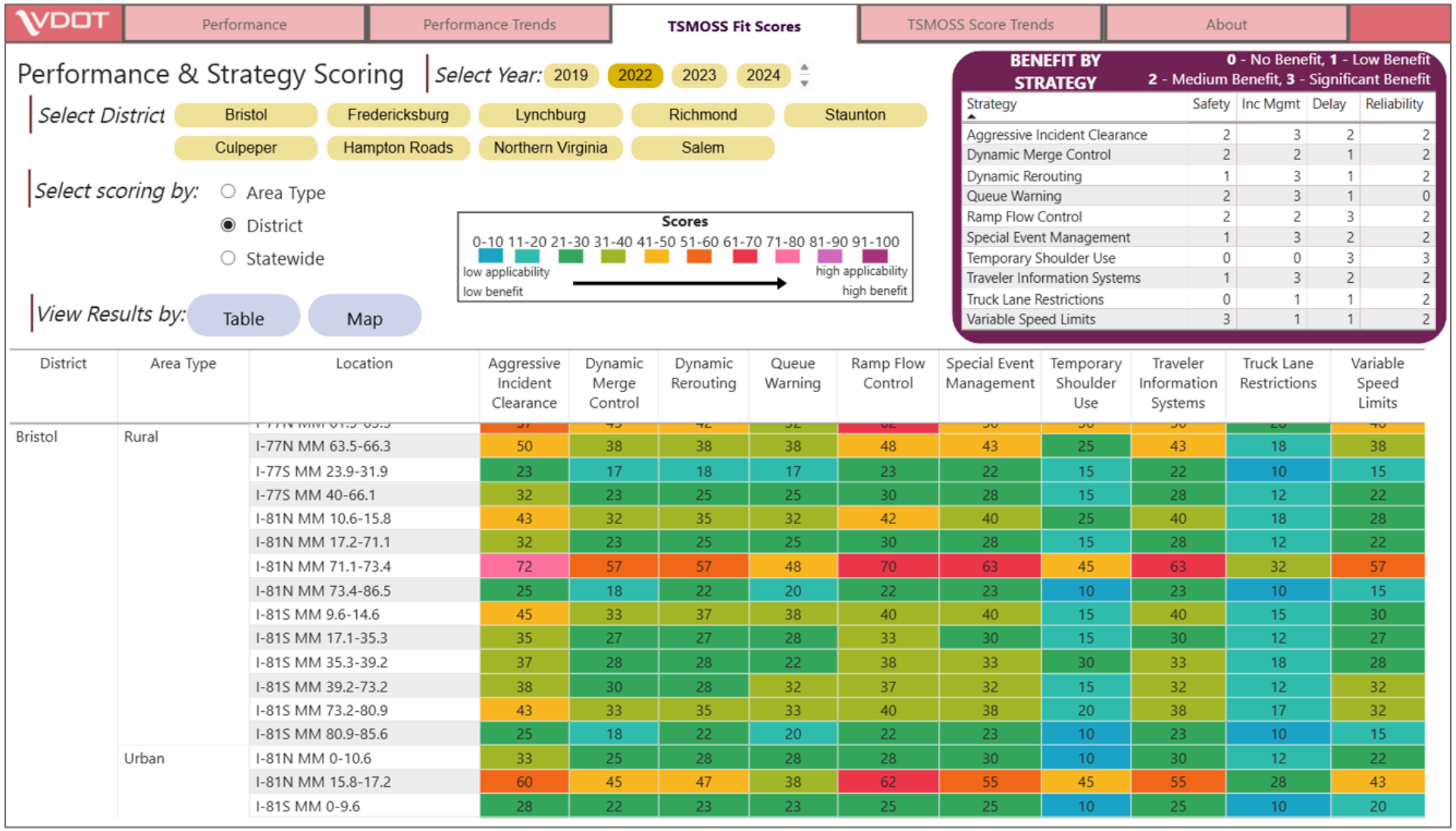
Step 4: Combine Performance Scores with Strategy Scores

- Each performance score is multiplied by the related strategy score and then they are added together to get a final score



Step 5: Develop list of optimal strategies on corridor sections

An Interactive Power BI tool was developed to monitor each step in the methodology and visualize the results: a **TSMO Strategy Fit Score for every Segment & Strategy Combination** which allows for prioritization and systematic evaluation.



Strategy	Safety	Inc Mgmt	Delay	Reliability
Aggressive Incident Clearance	2	3	2	2
Dynamic Merge Control	2	2	1	2
Dynamic Rerouting	1	3	1	2
Queue Warning	2	3	1	0
Ramp Flow Control	2	2	3	2
Special Event Management	1	3	2	2
Temporary Shoulder Use	0	0	3	3
Traveler Information Systems	1	3	2	2
Truck Lane Restrictions	0	1	1	2
Variable Speed Limits	3	1	1	2

District	Area Type	Location	Aggressive Incident Clearance	Dynamic Merge Control	Dynamic Rerouting	Queue Warning	Ramp Flow Control	Special Event Management	Temporary Shoulder Use	Traveler Information Systems	Truck Lane Restrictions	Variable Speed Limits
Bristol	Rural	I-77N MM 63.5-66.3	50	38	38	38	48	43	25	43	18	38
		I-77S MM 23.9-31.9	23	17	18	17	23	22	15	22	10	15
		I-77S MM 40-66.1	32	23	25	25	30	28	15	28	12	22
		I-81N MM 10.6-15.8	43	32	35	32	42	40	25	40	18	28
		I-81N MM 17.2-71.1	32	23	25	25	30	28	15	28	12	22
		I-81N MM 71.1-73.4	72	57	57	48	70	63	45	63	32	57
		I-81N MM 73.4-86.5	25	18	22	20	22	23	10	23	10	15
		I-81S MM 9.6-14.6	45	33	37	38	40	40	15	40	15	30
		I-81S MM 17.1-35.3	35	27	27	28	33	30	15	30	12	27
		I-81S MM 35.3-39.2	37	28	28	22	38	33	30	33	18	28
		I-81S MM 39.2-73.2	38	30	28	32	37	32	15	32	12	32
		I-81S MM 73.2-80.9	43	33	35	33	40	38	20	38	17	32
		I-81S MM 80.9-85.6	25	18	22	20	22	23	10	23	10	15
	Urban	I-81N MM 0-10.6	33	25	28	28	28	30	10	30	12	22
		I-81N MM 15.8-17.2	60	45	47	38	62	55	45	55	28	43
		I-81S MM 0-9.6	28	22	23	23	25	25	10	25	10	20

Wrap Up

- How will the TSMO Strategy Screening (TSMOSS) for Interstates be used?
  - With Corridor Studies to determine improvement projects
  - Federal and State Grant Opportunities including – e.g. IOEP, ATTAIN, ITTF, HSIP, Potentially SMART SCALE
- Detailed Evaluation for strategy refinement is needed after the Screening Level.
- The TSMOSS tool does not yet combine benefits from different TSMO strategies at a segment or aggregated level, e.g. Benefit of Traveler Information with Aggressive Incident Management – we are working on it

Public Tool
Link: https://app.powerbigov.us/view?r=eyJrIjoiY2VkNjRmYzUtMTcxMS00YzIyLTkzY2UtYTA4ZGRmODA5NmQzIiwidCI6IjYyMGFlNWE5LTRlYzEtNGZhMC04NjQxLTVkOWYzODZjNzMwOSJ9

PANEL DISCUSSION – VDOT TSMO PLANNING

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Panelists

VDOT

- **Liz McAdory**
  - Richmond District Planning Manager
- **Robert Cochrane, P.E.**
  - TCD & ITS Engineering Program Manager
- **Robert Vilak, P.E.**
  - Richmond District Traffic Engineer
- **Stephen Read, P.E.**
  - State Highway Safety Engineer

Industry Partner

- **Shankar Natarajan, P.E., PTOE**
  - Jacobs | Virginia Transportation