North Central Texas
Regional Multimodal Transportation Operations Management Summit
North Central Texas Summit

• **Welcome**
  – Natalie Bettger, NCTCOG
  – Millie Hayes, FHWA-TX
  – Joe Gregory and Ralph Volpe, FHWA

• **Introductions**
  – Name
  – Agency
  – Role in TSMO
  – Expectations for Workshop
  – Top Priority Items to Address in Workshop
## NCT Summit Agenda Day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 – 9:00am</td>
<td>Welcome, Opening, and Participant Introductions</td>
</tr>
<tr>
<td>9:00 – 9:15am</td>
<td>Meeting Objectives</td>
</tr>
<tr>
<td>9:15 – 9:45am</td>
<td>Overview of Operations/Introduction to TSMO</td>
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<tr>
<td>9:45 – 10:00am</td>
<td>Break</td>
</tr>
<tr>
<td>10:00 – 10:30am</td>
<td>Update on TxDOT DFW Region TSMO Program Plan</td>
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<tr>
<td>10:30 – 11:30pm</td>
<td>DART Existing and Planned Systems/Deployments</td>
</tr>
<tr>
<td>11:30 – 12:30pm</td>
<td>NCTCOG Existing and Planned Systems/Deployments</td>
</tr>
<tr>
<td>12:00 – 1:00pm</td>
<td>Lunch</td>
</tr>
<tr>
<td>1:00 – 1:45pm</td>
<td>NCTCOG Existing and Planned Systems/Deployments Cont.</td>
</tr>
<tr>
<td>1:45 – 2:45pm</td>
<td>Facilitated Group Discussion – Regional Operations Strengths</td>
</tr>
<tr>
<td>2:45 – 3:00pm</td>
<td>Break</td>
</tr>
<tr>
<td>3:00 – 4:00pm</td>
<td>Facilitated Group Discussion – Regional Operations Challenges</td>
</tr>
<tr>
<td>4:00 – 4:15pm</td>
<td>Wrap-Up</td>
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</table>
MEETING OBJECTIVES
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OVERVIEW OF OPERATIONS

INTRODUCTION TO TSMO
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BACKGROUND – THE CHALLENGE
Transportation Systems Management & Operations (TSMO) is:

“An integrated program to optimize the performance of existing roadway infrastructure…

Specific coordinated systems and services…

Preserve capacity, improve reliability and safety, and enhance the environment.”
Challenges/Opportunities for TSMO

• Challenges
  – Congestion and delay
  – High value placed on reliability
  – Existing TSMO
    • unsystematic
    • “pockets of excellence”

• Opportunities
  – Unexploited potential of aggressive, integrated, collaborative TSMO applied to existing roadways
Focus of TSMO Planning

Causes of Congestion—Metro vs Rural

More Rural state

- Recurring Congestion: 23%
- Non-Recurring Congestion: 28%
- Special Events: 5%
- Bad Weather: 12%
- Work Zones: 16%
- Traffic Incidents: 27%

Metro Areas

- Recurring Congestion: 40%
- Non-Recurring Congestion: 15%
- Special Events: 5%
- Bad Weather: 16%
- Work Zones: 10%
- Traffic Incidents: 27%
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BACKGROUND—“SOLUTIONS”
Effective Application Potential

<table>
<thead>
<tr>
<th>TSMO Strategies</th>
<th>Potential Delay Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Control/Ramp Metering</td>
<td>7-8%</td>
</tr>
<tr>
<td>Traffic Responsive Signals</td>
<td>10-12%</td>
</tr>
<tr>
<td>Incident Management</td>
<td>10-15%</td>
</tr>
<tr>
<td>Work Zone Traffic Mgmt</td>
<td>3-4%</td>
</tr>
<tr>
<td>Weather Information</td>
<td>2-3%</td>
</tr>
<tr>
<td>Traveler Information</td>
<td>1-2%</td>
</tr>
<tr>
<td>Active Traffic Management</td>
<td>15%</td>
</tr>
<tr>
<td>Pricing</td>
<td>20%</td>
</tr>
</tbody>
</table>
TSMO – More than ITS – Systems and Technology

How: What Resources do we need to design and build the system?

Who: Who are the Stakeholders involved with the system?

Where: What are the geographical and physical locations of the system?

Why: What does your organization lock that the system will provide?

When: What is the time-sequence of activities that will be performed?

What: What are the known elements and the high-level capabilities of the system?
More Aggressive Strategies

- **Proactive Operational Management**
  - Predict and prepare for disruptions
  - Multiagency collaboration
  - Automated decision support
  - Interagency integration
  - Automated/Connected Veh. support

- **Real-Time Operational Management**
  - Real-time Operations to maintain performance
  - Involve multiple, synergizing strategies
  - New systems and technologies
  - Multiple players/roles

- **Static Supply**
  - Legacy Agency focus
  - Supply fixed capacity
  - Facility engineering
  - Set-it and forget it
  - Single agency control
## Comparing Traditional Highway Planning with TSMO Focus

<table>
<thead>
<tr>
<th>Highway Capacity</th>
<th>TSMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility or link project oriented</td>
<td>May be network facility-type wide</td>
</tr>
<tr>
<td>Capacity construction solutions – well understood</td>
<td>Operations management</td>
</tr>
<tr>
<td>Set and forget: 9-5</td>
<td>Continuing Real time reactions 24X7</td>
</tr>
<tr>
<td>Well-established planning/funding/programming process</td>
<td>Ad hoc project funding</td>
</tr>
<tr>
<td>Civil engineering project design/construction</td>
<td>Systems engineering-driven</td>
</tr>
</tbody>
</table>
## Comparing Traditional Highway Planning with TSMO Focus

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<tr>
<th>Highway Capacity</th>
<th>TSMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term/capital intensive projects (5-10 years)</td>
<td>Short-term /incremental development</td>
</tr>
<tr>
<td>Performance “obvious”: recurring peak period congestion</td>
<td>Concern with reliability, delay and incidents</td>
</tr>
<tr>
<td>Civil engineering culture, education, standards</td>
<td>Systems engineer, EE, “incident” management</td>
</tr>
<tr>
<td>Well-established organizational structure to develop/implement projects</td>
<td>Activities part of other units</td>
</tr>
<tr>
<td>Process largely controlled by DOT</td>
<td>Involves significant collaboration with partners</td>
</tr>
</tbody>
</table>
TSMO Has High B/C

Comparison of returns for different road investments
Average benefit-to-cost ratios

- "Traditional" road capacity: 2.7
- Electronic freight management system: 2.8 to 3.6
- Dynamic curve warning: 4.2 to 6.6
- Commercial vehicle information systems and networks: 2.0 to 7.5
- Maintenance decision support system: 1.3 to 8.7
- Intelligent traffic management: 14.0
- National real-time traffic information system: 25.0
- Road weather management technologies: 2.8 to 37.0
- Service patrols (traffic incident management): 4.7 to 38.0
- Integrated corridor management: 9.7 to 39.0
- Optimized traffic signals: 17.0 to 62.0

Differences in Achievement?

(As Reported)

Average Reduction in Incident Duration (%)

Fairfax, VA
Maryland
Atlanta, GA
Albuquerque, NM
San Antonio, TX
# Widely Varying State of the Practice

## Quick Clearance and Recovery Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Abandoned Vehicle Hazards</th>
<th>Lengthy Minor Incident Clearance</th>
<th>Lengthy Major Incident Clearance</th>
<th>Liability Concerns</th>
<th>Example Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abandoned Vehicle Legislation/Policy</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>21+ U.S. Metropolitan Areas, IN, NC</td>
</tr>
<tr>
<td>Safe, Quick Clearance Laws—Driver Removal</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>~25 States, including FL, GA, MD, NC, OH, SC, TN, TX, VA, WI</td>
</tr>
<tr>
<td>Service Patrols</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>130+ U.S. Metropolitan Areas, AZ (Phoenix), CA, FL, GA (Atlanta), IN, MD, MN, NM (Albuquerque), OR, TN, UT (Salt Lake City)</td>
</tr>
<tr>
<td>Vehicle-Mounted Push Bumpers</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>CA (Redding, Stockton), MD (Baltimore), NJ/PA (Delaware Valley Region), OH (Cincinnati), TN (Chattanooga), TX (Austin), UT (Salt Lake City)</td>
</tr>
<tr>
<td>Incident Investigation Sites</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>16+ U.S. Metropolitan Areas, TX (Houston)</td>
</tr>
<tr>
<td>Safe, Quick Clearance Laws—Authority Removal</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>AZ, CA, CO, FL, GA, IL, IN, KY, MO, NM, NC, OH, OR, SC, TN, TX, VA, WA</td>
</tr>
<tr>
<td>Quick Clearance/Open Roads Policy</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>35+ U.S. Metropolitan Areas, CA, FL, GA, ID, IN, IA, MD, NV, NH, TN, UT, WA, WI</td>
</tr>
<tr>
<td>Non-cargo Vehicle Fluid Discharge Policy</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>FL, MN</td>
</tr>
<tr>
<td>Fatality Certification/Removal Policy</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>PA, TN, TX (Austin), WA</td>
</tr>
<tr>
<td>Expedited Crash Investigation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>93+ U.S. Metropolitan Areas, FL, IN, TX (North Central Region), UT</td>
</tr>
<tr>
<td>Quick Clearance Using Fire Apparatus</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>TX (Austin)</td>
</tr>
<tr>
<td>Towing and Recovery Quick Clearance Incentives</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>FL, GA, WA</td>
</tr>
<tr>
<td>Major Incident Response Teams</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>DE, FL, IL (Chicago), LA, MD, NJ, OH (Cincinnati, Columbus), NY, TX (Dallas Co.), WA</td>
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[SHRP2 Strategic Highway Research Program](https://www.shrp2.colorado.edu)
Dramatic Change Possible

Time to Roadway Clearance 2007-2012

- **2012**
- **2011**
- **2010**
- **2009**
- **2008**
- **2007**

Time (Minutes):

- **Activate**
- **Arrival**
- **NTP**
- **Clearance**

Time to Roadway Clearance 2007-2012

STRATEGIC HIGHWAY RESEARCH PROGRAM
Developing the Business Case

- Internal motivation – Why is TSMO important for the agency?
- The value to customers – Why is TSMO important to the traveling public and communities?
- Issues:
  - Challenges facing the region.
  - Cost-effectiveness and benefits of TSMO strategies.
  - Anticipated future challenges.
  - Emerging opportunities, such as new data and technologies.

Florida DOT’s TSMO Business Case

TSMO Strategic Plan describes:
- Florida’s challenges, including population growth, traffic fatalities, and safety for older drivers in particular.
- Benefit-cost ratios of intelligent transportation system (ITS) technologies.
- Economic benefits associated with ITS investments due to technology sector job creation.

Developing a TSMO Vision and Mission

- Identifying a vision for TSMO.
  - Shared direction focused on high-level outcomes.
- Developing a description of the role of TSMO in supporting the agency’s mission.

Maryland DOT’s TSMO Program Vision and Mission

**TSMO Program Vision**
Maximize mobility and reliable travel for people and goods within Maryland by efficient use of management and operations of transportation systems.

**TSMO Program Mission**
To establish and maintain a TSMO program and implement supporting projects within Maryland State Highway Administration (SHA) improving mobility and reliability for all people and goods through operations of transportation facilities.

Source: Maryland DOT – State Highway Administration, Maryland Transportation Systems Management & Operations Strategic Implementation Plan, August 2016.
Developing Strategic Goals and Performance Objectives

- Focusing on outcomes to the customer.
- Common steps:
  1. Build off of agreed-upon planning goals.
  2. Gather data and understand baseline conditions.
  3. Collaborate internally and externally.
  4. Define performance targets.
Developing TSMO Programmatic Objectives

- Programmatic objectives focus on the effectiveness of delivering the TSMO program and business processes and procedures.

- Typically addresses:
  - Development of plans, programs, or services.
  - Gaining new staffing capabilities.
  - Customer service and responsiveness.
  - Resources.

Maryland TSMO Program Objectives (Portion)

Other programmatic objectives include:
- Implement a comprehensive, system level performance measurement program to monitor mobility and reliability targets by June 2017.
- Coordinate and ensure TSMO is considered in SHA’s asset management program.
- Include reliability in existing traffic analyses and travel forecasting modeling tools.

Source: Maryland SHA, Maryland Transportation Systems Management & Operations Strategic Implementation Plan, August 2016.
Integrating TSMO into Agency Planning

TSMO projects, services and activities should be coordinated and integrated with statewide and regional planning.

Source: Iowa DOT.
Message

• Much of delay and most of unreliability from non-recurring congestion
• One or more TSMO strategies for each cause of non-recurring congestion
• Strategies are cheap, quick, and non-disruptive
• States vary widely in TSMO Applications Effectiveness
QUESTIONS?
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TXDOT

DFW REGION TSMO

PROGRAM PLAN
PLACEHOLDER FOR UPDATE ON TXDOT DFW REGION TSMO PROGRAM PLAN SLIDES
DART
EXISTING AND PLANNED SYSTEMS/DEPLOYMENTS

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PLACEHOLDER FOR DART EXISTING AND PLANNED SYSTEMS/DEPLOYMENTS SLIDES
PLACEHOLDER FOR NCTCOG EXISTING AND PLANNED SYSTEMS/DEPLOYMENTS SLIDES
DFW REGION TSMO CURRENT AND DESIRED STATE
Facilitated Discussion

• What is working today in the DFW region with respect to systems response, operations, and maintenance activities?

• What challenges do you face?

• What are the gaps that you see today?

• What would an ideal TSMO program look like in the DFW region?