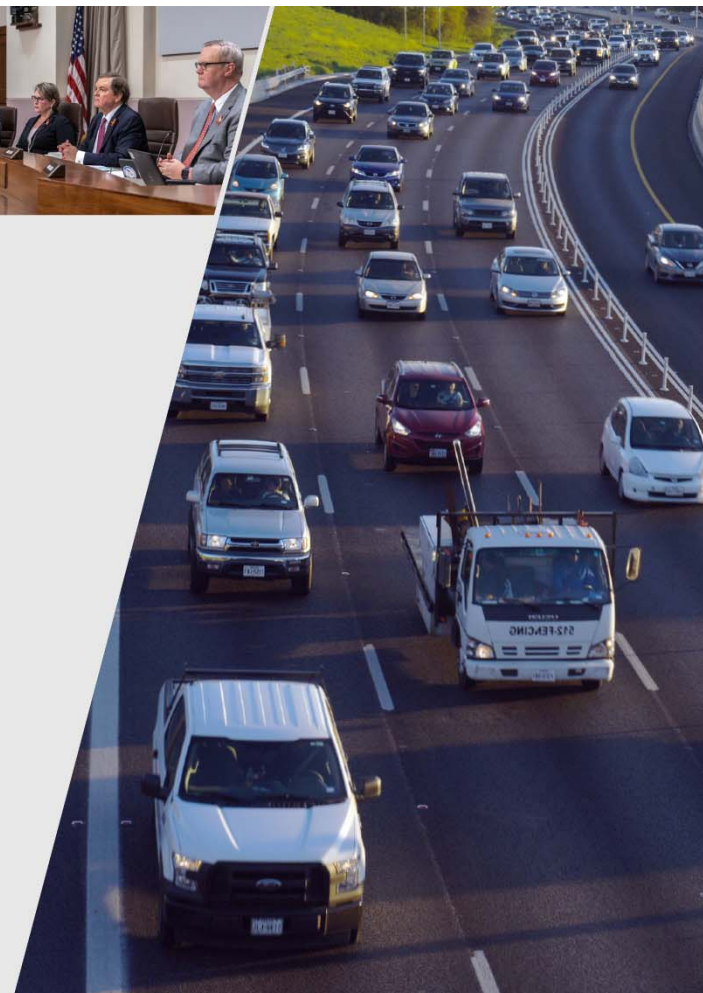# Transportation Systems Management and Operations (TSMO)

DFW Traffic Signal Management

October 14, 2020

Virtual Workshop Housekeeping Items

1. If you haven't already, please type the name and the agency you represent into the chat box. This will serve as our virtual meeting sign-in sheet.

2. For this presentation, please make sure that you are on mute when not speaking.
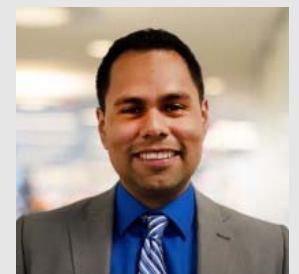
Kimley-Horn

Othon

Kent Kacir Tom Fowler Kelly Nicholas Khushboo Patel Beth Shelton Jorge Mendoza

TxDOT Dallas District Team

Chris Blain – TxDOT

Craig Burgan– TxDOT

Workshop Objectives

1. Overview of Traffic Signal Management

    - Provide general overview of TSMO and define Traffic Signal Management.

2. Traffic Signal Management State of Practice

    - Describe national and statewide programs.

3. Discuss which Traffic Signal Management activities are of interest

    - Identify which areas of Traffic Management are of interest to stakeholders and roadblocks to implementation.

Table of Contents

TSMO Traffic Signal Management

FHWA's 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.

TxDOT Goals and Objectives:

Optimize System Performance – Develop and operate an integrated transportation system that provides reliable and accessible mobility, and enables economic growth.

Promote Safety – Champion a culture of safety.

TSMO Traffic Signal Management

TRB's Traffic Management Definition: involves the planning, design, integration, maintenance, and proactive operation of a traffic signal system in order to achieve policy based objectives to improve the efficiency, safety and reliability of signalized intersection operations.

Sources of Congestion

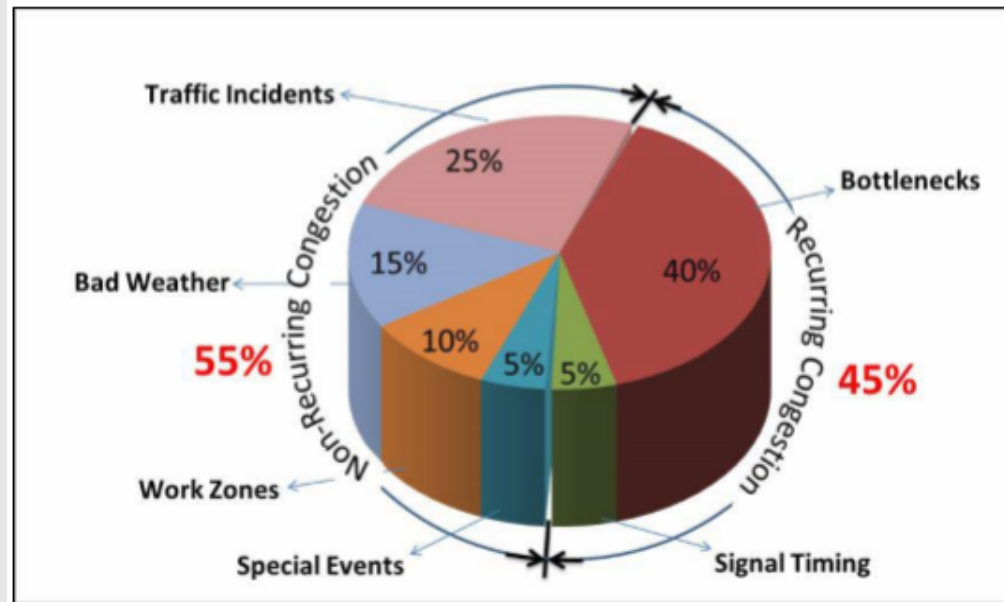### Sources of Congestion in Urban Areas

Traffic Incidents — 25%
Bottlenecks — 40%
Bad Weather — 15%
Work Zones — 10%
Special Events — 5%
Signal Timing — 5%
Non-Recurring Congestion — 55%
Recurring Congestion — 45%

Source: AZDOT

TSMO Traffic Signal Management – Regional Practices and Programs

National Operations Center of Excellence:

- The National Operations Center of Excellence (NOCoE) is composed of professionals from the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the Intelligent Transportation Society of America (ITSA) with support from FHWA.

- NOCoE's goal is to "raise awareness of the importance of and investment in the management and operations of traffic signal programs with public, policymakers, transportation agency leadership, management and staff."

U.S. Department of Transportation
Federal Highway Administration

Texas Department of Transportation

N●CoE
National Operations Center of Excellence

TSMO RESOURCE CONNECT
N●CoE
National Operations Center of Excellence
TSMO Resource Connect
Take advantage of this new resource to get what you need for your TSMO program. Read More ›

TSMO Traffic Signal Management – Regional Practices and Programs

Example Programs:

- NCTCOG Regional Transportation Systems Management (TSM)
  - Intersection and signal improvements (retiming)
  - Freeway bottleneck removal
  - Data collection
  - Special Events Management Strategies
- GDOT's Regional Traffic Operations Program (RTOP)
  - http://www.dot.ga.gov/DriveSmart/SafetyOperation/Pages/RTOP.aspx
- UDOT's Traffic Signal Management Plan
  - https://www.udot.utah.gov/connect/business/traffic-signals/traffic-signals-maintenance-timing/

How would you rate your knowledge of and involvement with NCTCOG's Transportation Systems Management (TSM)?

No awareness of the program.

I am aware of the programs but have not participated.

I am aware and have participated in the program.

The program needs to be expanded.

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

Phase 2 RTOP June 2020:

- 1,600 signals
- 185 ramp meter locations
- Regional deployment
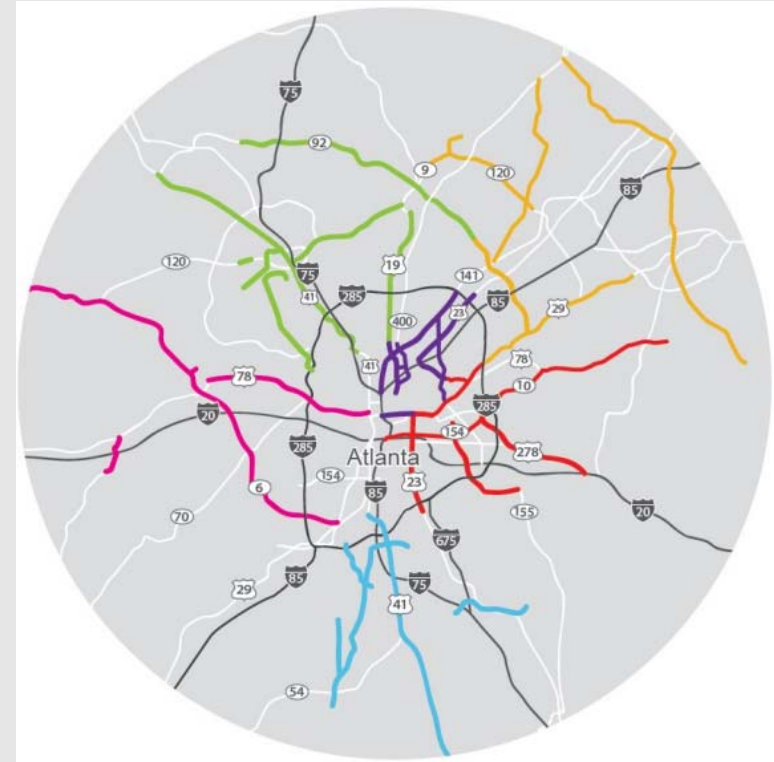
TSMO Traffic Signal Management – Regional Practices and Programs

Automated Traffic Signal Performance Measures (ATSPMs):

- Every Day Counts Initiative (EDC-4)
- Technology used to leverage Data Collection
- Retime signals every 3 to 5 years

- Benefits
  - Targeted Maintenance
  - Improve Operations
  - Increased Safety

Five basic ATSPM system components
Source: FHWA
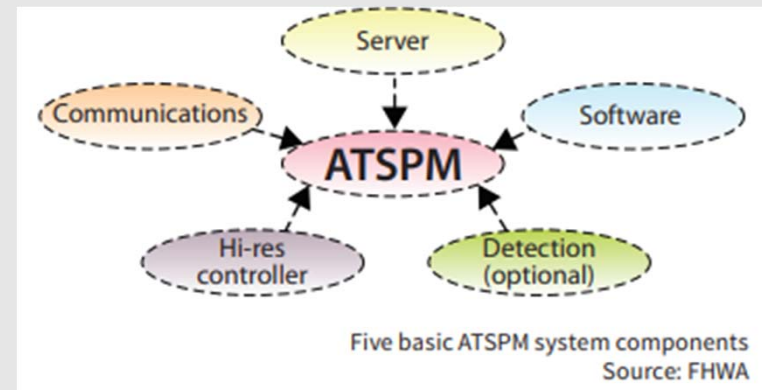
Does your agency use Automated Traffic Signal Performance Measures (ATSPMs)?

No knowledge of ASTPMs.

I understand ATSPMs but my agency doesn't use them.

My agency is in the process of implementing ATSPMs.

My agency uses ATSPMs.

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

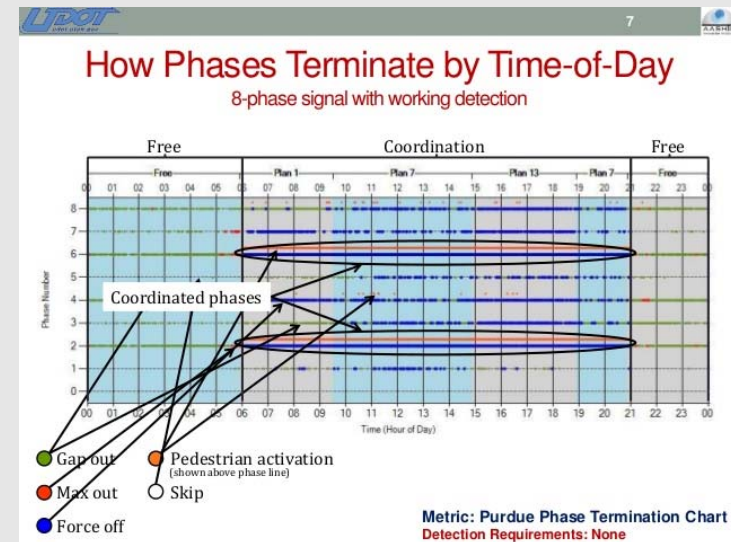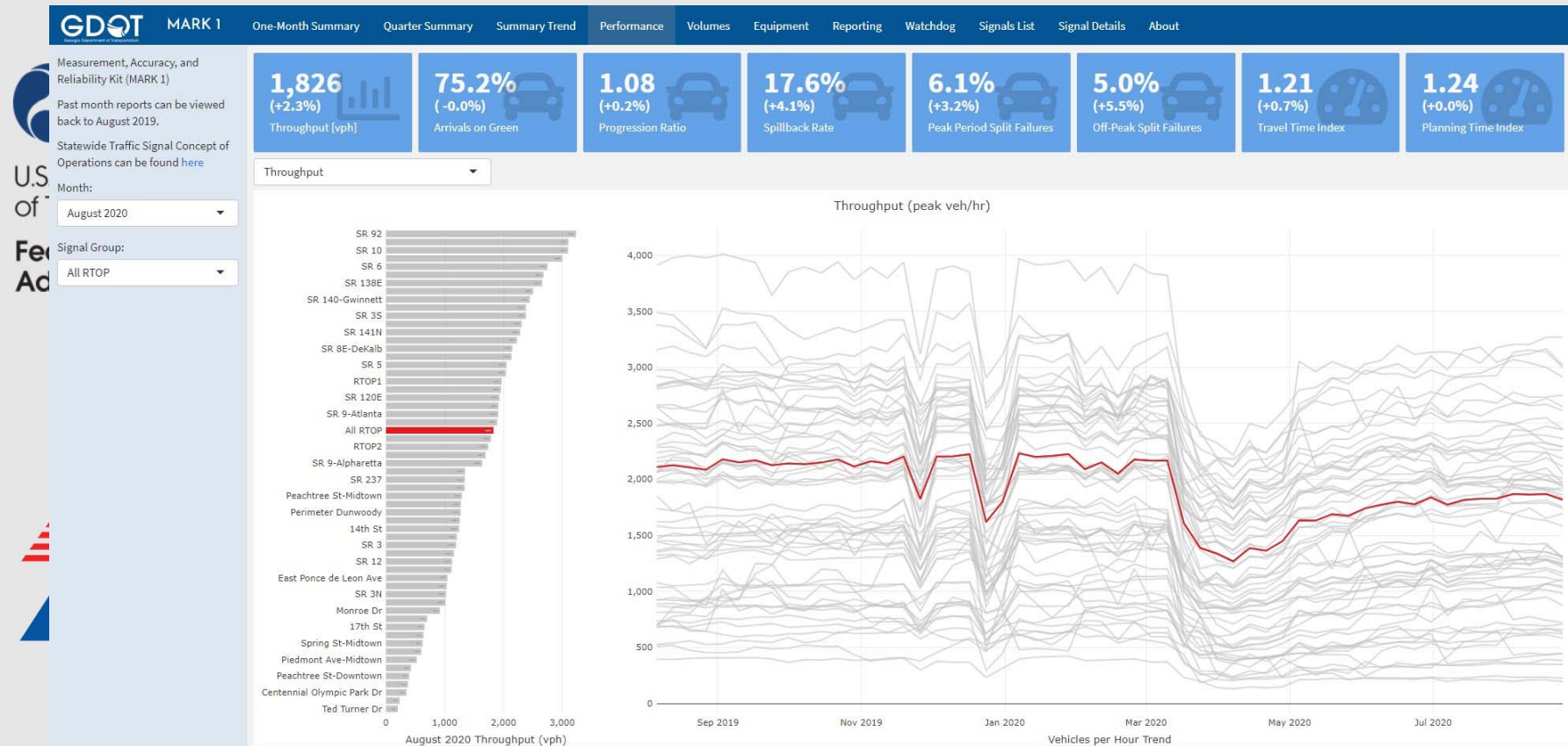# TSMO Traffic Signal Management – Regional Practices and Programs

Examples of Performance Metrics:

- Automatic Reports
  - Force Offs, Max outs, low advance detector counts, & stuck peds
- Purdue Diagrams – Phase Termination, Coordination, Split Failure
- Yellow and Red Actuations
- Adaptive Traffic Control

TSMO Traffic Signal Management – Regional Practices and Programs

TSMO Traffic Signal Management – Regional Practices and Programs

TSMO Traffic Signal Management – Coordination

Planned Events:

- Construction
  - North Tarrant Expressway
- Multi-Jurisdiction
  - Texas Motor Speedway
  - Cowboys & Rangers Games
- Equipment Turnover/Training
- Special Events

Unplanned Events:

- Incident Re-routing

TSMO Traffic Signal Management – Coordination

Available Training:

- FHWA
    - 12 case studies
    - 5 agencies with Advanced Training Programs
- ITS Heartland TSMO University
- Regional Operations Leadership Forum (ROLF)

Is training an issue?

No training is provided.

Training is available upon request.

My agency is interested in providing training, but has not found appropriate training.

Adequate training is provided.

Start the presentation to see live content. For screen share software, share the entire screen. Get help at **pollev.com/app**

TSMO Traffic Signal Management – Dynamic Lane Signing

Advantages:

- Immediate traffic control for emergencies or special events
- Delay onset of congestion
- Permits selective shoulders traffic
- Reduces accidents

Disadvantages:

- Infrastructure Development & Cost
- Enforcement & Compliance
- Public Support & Education
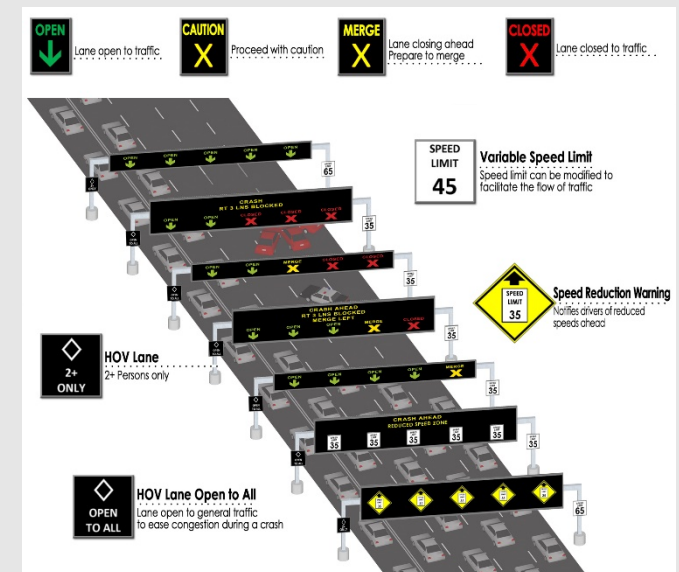
Source: NevadaDOT

TSMO Traffic Signal Management - Detection

Advantages:

- Increased Safety
- Increased Capacity
- Queue Management
- Traffic Progression

Source: iTSS Lab University of Waterloo

Potential Issues:

- Selection of Detection Types
- Maintenance Cost
- Detection Failures

TSMO Traffic Signal Management – Detection Types
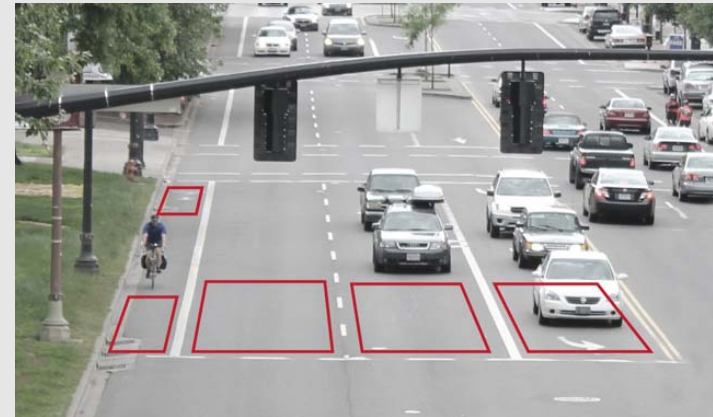
Pavement Invasive Detectors:

- Inductive Loops

- Magnetometer

- Magnetic

Non-Pavement Invasive Detectors:

- Microwave

- Active Infrared

- Passive infrared

- Ultrasonic

- Acoustic

- Video Image Processor

Source: National Association of City Transportation Officials

U.S. Department of Transportation
Federal Highway Administration

Texas Department of Transportation

TSMO Traffic Signal Management – Detection Uses

- Traffic Signals
  - Coordination
  - Adaptive
- Emergency Vehicle Preemptions
  - FHWA Evaluation of St. Paul
    - 70% Crash Reduction
    - Response Times
- Transit Signal Priority
- Freight or Truck Signal Priority

1. Opticom IR emitter sends a secure, encoded priority request to the intersection.

HOW IT WORKS

2. Opticom detector receives IR signal and relays the request to Opticom phase selector.

3. Opticom phase selector validates request from GPS receiver and alerts the traffic control system to request a green traffic signal.

2. As vehicle enters radio range, Opticom GPS intersection equipment relays the request to Opticom phase selector.

1. Opticom GPS vehicle equipment transmits vehicle speed, direction and turn signal status to GPS intersection equipment.

Source: Bloor

TSMO Traffic Signal Management - Detection

Examples:

- Wavetronix - SmartSensor Advance

- GridSmart

- FLIR – Traffic Sense

- The Glance™

- OptiCom

- IRIS Open-Source ATMS Project

- ITERIS

TSMO Traffic Signal Management - Detection

Examples Signal Coordination Efforts Requiring Detection:

- Adaptive Split VTRC (Virginia Transportation Research Council)
  - Synchro confirm Performance
  - B/C ratio of 461.3
- City of Bloomington's Signal Timing Optimization and Coordination Project
  - Annual Benefit $2.7 million
  - Saved 112,600 gallons of gasoline
- Special Event Management

TSMO Traffic Signal Management

What areas are you interested in?

- Regional Programs

- Signal Performance Measures (ATSPMs)

- Coordination Efforts

  - Construction

  - Multi-jurisdiction

  - Equipment Turnover/Training

  - Special Events

  - Incident Management

- Detection

Source: Metro Plan Orlando

What TSMO areas interest you?

Regional Programs

Signal Performance Measures

Coordination Efforts

Detection

Training

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Contacts

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TxDOT TSMO Webpage:
www.txdot.gov/insidetxdot/division/traffic/tsmo.html