

# Applying TSMO at Southeast Michigan Transportation Operations Center



By Michigan Department of Transportation

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## Benefits Statement

The Michigan Department of Transportation (MDOT) Southeast Michigan Transportation Operations Center (SEMTOC) implemented Transportation Systems Management and Operations (TSMO) strategies, enhancing workforce skills and fostering a TSMO culture. These initiatives improved incident response, saved time through efficient operations, and saved money by optimizing resources. Staff morale and collaboration improved, leading to better mobility and safety outcomes. TSMO integration demonstrates the potential for cost-effective and life-saving transportation management.

## In this case study you will learn:

1. How MDOT's SEMTOC is shifting to network-based operations using TSMO strategies.
2. How SEMTOC focuses on workforce development, fostering a TSMO culture, and improving communication.
3. How these efforts result in staff specialization, enhanced collaboration, and improved traffic management, driving a cultural shift towards proactive transportation operations.

## BACKGROUND

The Michigan Department of Transportation (MDOT) Southeast Michigan Transportation Operations Center (SEMTOC) is transitioning from solely managing and operating freeways to incorporating state-owned arterial corridors to becoming a network-based operations center.

In 2018, MDOT created a Transportation Systems Management and Operations (TSMO) implementation and strategic plan document to identify direction, actions, and recommendations for managing and operating an optimized, integrated transportation network.

TSMO strategies are being incorporated into daily operations to develop a cohesive and well-integrated hub in the region capable of managing roadways through coordination, communication, and collaboration with stakeholders, and through utilizing ITS tools and technologies.

This case study documents some TSMO initiatives that SEMTOC deployed to create a TSMO culture, develop the workforce, and meet MDOT's overall TSMO vision in the MDOT control room and within the MDOT Safety Service Patrol (SSP) in the Metro Detroit area.

## TSMO PLANNING, STRATEGIES AND DEPLOYMENT

MDOT conducted a TSMO Capability Maturity Model (CMM) analysis and began incorporating TSMO strategies into operations by utilizing four of six dimensions (see CMM figure). This case study highlights advancements in two dimensions.

### Workforce Development

An important component to delivering a successful TSMO program is having a workforce that possesses skills required to manage and operate technological advancements in ITS.

- TSMO engineer was appointed in 2020 to lead the TSMO program at SEMTOC, including creating an arterial management system, and transition towards network-based operations.
- Control room operators received training in various communication, coordination, and TSMO functions to develop them into specialists. They are empowered to make real-time TIM decisions and provide recommendations regarding possible alternate operations. They also utilize data to make informed decisions to improve safety and mobility.
- SEMTOC also created a TSMO specialist position. They receive specialized training in freeway management systems and ITS solutions such as Advanced Traffic Management System (ATMS), Automated Incident Detection (AID), Wrong Way Driving (WWD), or Active Traffic Management (ATM) system. TSMO specialists support deployment of arterial management systems. Specialists improved signal timing on Jefferson Avenue to improve mobility during emergency construction; see Jefferson case study.

AECOM



Event: WB Jefferson Emergency Construction Signal Timing Changes	
Date:	03.03.2022
Approximate Time:	2:15 PM
Issue(s) Identified:	WB Jefferson Ave. Congestion/Backups
Stakeholder(s) Involved:	MDOT/Detroit TSC/Lansing Signals Unit/City of Detroit
Action(s) Taken:	Signal Timing Changes
Resolution/Outcome:	Congestion/Backups Alleviated Safer Travel Conditions

Description:  
DTE initiated emergency construction to repair a gas leak at Jefferson and Griswold on Monday, February 28<sup>th</sup>, that extended throughout the week. Initially, one lane was blocked, and no traffic impacts were observed. This construction escalated to blocking two lanes of traffic as seen below. On Thursday, March 3<sup>rd</sup>, the Southeast Michigan Transportation Operations Center (SEMTOC) received a phone call from the City of Detroit (COD) Traffic Management Center (TMC) at 2:15 PM reporting approximately 0.2 miles of backups. The COD TMC requested assistance in signal timing changes along Jefferson.



This closure heavily affected WB Jefferson, where it was observed that backups extended from Griswold to the Randolph intersection. Because this is a heavily traveled area in downtown Detroit, SEMTOC reacted quickly to help alleviate congestion.

The TSMO engineer and TSMO specialist reviewed the signal timings for the intersections along Jefferson between I-375 and M-10 for possible remote timing adjustments through the central software system (Centras). The TSMO engineer made recommendations to adjust the time-of-day schedule to implement the PM peak plan outside of its normal schedule. The PM peak plan has a 120 second cycle length instead of 90 seconds and adds 30 more seconds to the westbound approaches, which were the legs of the intersections impacted by the construction. The recommendation was to start the PM peak plan earlier in the day and allow it to run until construction was complete or traffic conditions no longer warranted the longer cycle length. The recommendations were discussed with the Michigan Department of Transportation (MDOT) traffic engineer from Lansing and the discussion concluded that the PM peak signal timing plans should be deployed on all the intersections in this area to provide consistency, progression, and coordination along the corridor. Signal timing changes were deployed at 2:30 PM and

## Outcomes of workforce development efforts include:

- A clearly defined and realistic path in advancing SEMTOC operations set forth by TSMO engineer.
- Improved data utilization by control room specialists to report on mobility metrics and make informed decisions when managing crashes.
- Developing a TSMO specialist improved SEMTOC's ability to oversee systems and identify areas of improvement in operations.

## TSMO Culture

Goals of a TSMO culture are to improve coordination, collaboration, and create an environment of knowledge sharing. This cultivates innovation, proactiveness and creativity.

- SEMTOC introduced the "TSMO Series," which consists of several 15-minute presentations defining TSMO, its goals, why TSMO is important, its history, and other valuable information. Target audiences are control room specialists, with goals of providing information on TSMO and apply it in all facets of daily operations.
- TSMO tidbits were added to internal newsletters highlighting various TSMO applications from across the country, referencing case studies collected by National Operations Center of Excellence (NOCOe).
- The "TSMO Talk" (videos emailed) videos are 20–30-minute discussions with a variety of experts (public and private) from TSMO-related fields where they are asked questions on a specific topic sparking casual conversation.

TSMO Talks aid in developing workforce staff at TOCs by growing knowledge and capabilities related to utilizing advancements in ITS. Providing the audience with answers on how TSMO concepts are perceived and applied from different perspectives.

These innovations improved knowledge and understanding of TSMO. Staff are taking proactive approaches in daily tasks by sharing knowledge, collaborating, and coordinating. TSMO Talk series greatly assisted in bridging gaps between SEMTOC staff and other stakeholders, as an example, staff are more cognizant of information that SSP deem necessary. Staff also has a better understanding of daily operations that SSP perform.

## COMMUNICATIONS PLANNING AND EXECUTION

Improving communication and coordination is crucial to create a cohesive and well-integrated TSMO program within operations. SEMTOC has been rigorously working on improving-outreach, communication, and collaboration initiatives with City of Detroit Traffic Management Center (TMC); Wayne, Oakland, and Macomb Counties; and many others.

**AECOM** **SEMTOC**

Event: **WB I-94 at 12 Mile Road Crash**  
Date: **08-13-2022** | Approximate Time: **08:15 AM**

Issue(s) Identified: **WB I-94 Congestion Increase and Safety Concerns**

Stakeholder(s) Involved: **MDOT/MSP/Macomb County/FCP/Local PD, EMS and Fire Department**

Action(s) Taken: **Improved Traffic Incident Management/Affected Nearby Arterial Traffic Management**

Resolution(s)/Outcome: **Congestion/Backups Alleviated**  
**Close Coordination/Inter-agency Coordination**

Description:  
At approximately 8:15 AM on Tuesday, September 13<sup>th</sup>, the Southeastern Michigan Transportation Operations Center (SEMTOC) received reports of a multi-vehicle crash involving a semi and a FedEx truck on westbound (WB) I-94 at 12 Mile Road. SEMTOC responded within three minutes of the received report and implemented the Traffic Incident Management (TIM) plan. The first steps in the TIM plan included:

1. Locating the crash on cloud-based television (CCTV) cameras
2. Creating an event in the Advanced Transportation Management System (ATMS)
3. Deploying messages to nearby Dynamic Message Signs (DMS)
4. Notifying the public through the Michigan Department of Transportation's (MDOT) social media webpage to warn drivers of the road closure
5. Notifying MDOT subsidiaries of the high-impact crash via text message
6. Macomb Transportation Service Center (TSC) incident responders were also notified via phone call

Figure 1 below illustrates the map view (left) of the crash location at 12 Mile Road and the actual crash (right).

An example of high-level coordination and communication of a freeway crash that led to a full closure. Successfully Managing this crash required high-level of collaboration.

SEMTOC created and coordinated a traffic management plan with MDOT, first responders, Michigan State Police (MSP), and Macomb County. The goal of this plan is to improve mobility and safety. SEMTOC coordinated and collaborated with SSP that blocked part of the intersection to direct traffic. Macomb County operations center were informed, and they deployed signal timing changes to accommodate the influx in traffic volumes at surrounding signalized intersections. MSP supplemented the plan by

directing traffic through the detour route. The high level of coordination and collaboration improved mobility and safety of the crash location and is a great example of multi-disciplinary and network-based operations. For more details, refer to the attached I-94 at 12 Mile case study.

SEMTOC witnessed enormous improvements in staff capabilities from efforts discussed in this document. As a lesson learned from this experience, improving the TSMO CMM dimensions in operations is vital to advance SEMTOC. Also, an environment of creativity and innovation will foster the advancement in operations.

## **OUTCOME, BENEFITS AND LEARNINGS**

Implementing the innovative solutions mentioned in this document had immense positive impacts on operations at SEMTOC. The mindset of the staff transitioned from the traditional approach of operating to specializing in TIM, thus more involvement in decision-making and utilizing data to tailor an improved, proactive approach.

SEMTOC has witnessed a shift in culture with the staff and the ability to have a broader impact on the roadway network. For example:

- Higher morale from the intangible impacts, for example, control room specialists are more enthusiastic about providing solutions that positively impact mobility.
- Higher level of willingness to communicate and coordinate across partner agencies.
- Confidence levels of the staff are improved in decision making.
- Noticeable improvements in proactive behavior of staff in operations such as increased capabilities to suggest improvements and recommendations.
- Improved stakeholder engagement.
- Overall trust relationships between SEMTOC and stakeholders are cultivated through proven efforts. For example, SEMTOC has the capacity to deploy real-time operational changes to the arterial network in response to various events.
- Higher level of mobility metrics understanding and usage.