U.S. Department of Transportation
Federal Highway Administration

Mainstreaming TSMO:
Making the Business Case

INTRODUCTION

This case study highlights practices in making the business case for transportation systems management and operations (TSMO) at several State departments of transportation (DOTs). DOTs have developed a TSMO business case to help leaders, managers, technical professionals, stakeholders, and partners understand how TSMO can support and advance a DOT's mission, goals, and objectives. A business case ties TSMO strategies and initiatives to the challenges the DOT faces, illustrating how TSMO can address those challenges in a timely and cost-effective way.

A business case for TSMO can be made formally and informally to educate agency leadership, management, and staff about what TSMO includes, how it can support agency goals, how it interfaces with different DOT functions, and why staff in those functional areas should care. A TSMO business case enhances agency commitment to TSMO as a way of doing business and supports the adoption of TSMO strategies across the agency. It tells a compelling story about how things are, how they could or should be, and the ways in which TSMO can be applied to get there.

TSMO applies operational improvements to maximize system performance on existing transportation facilities and stretch limited funding. TMSO is a set of strategies that enables transportation agencies to implement low-cost solutions, balance supply and demand, provide flexible solutions to meet changing conditions, and benefit more areas and customers. TSMO benefits can include improved safety and

DEFINITION OF MAINSTREAMING TSMO

Mainstreaming TSMO within an organization makes management and operations strategies readily understood, considered, attractive, and available to relevant agency leadership and staff regardless of where they sit in the organization. Mainstreaming formalizes a TSMO program through comprehensive collaboration among a broad group of transportation management stakeholders (e.g., State and local DOTs, cities, counties, metropolitan planning organizations [MPOs], transit authorities, first responders, law enforcement, and legislators). This allows input based on knowledge, skills, and techniques from individuals in all programs that have a stake in improving the multimodal transportation system. Success in TSMO is not dependent on just one champion.

RATIONALE FOR MAINSTREAMING

Mainstreaming TSMO helps transportation agencies align, rather than compete, across programs to accomplish long-term system performance goals for the transportation system. Mainstreaming TSMO integrates a broader range of strategies throughout transportation departments and related agencies and organizations. It engages planners, designers, operators, and construction and maintenance staff, and it touches all aspects of mobility, including congestion, air quality, sustainability, safety, security, reliability, and related quality-of-life concerns. The goal of mainstreaming is to routinely include TSMO strategies as an equal player to address transportation needs within a community or region, along with other options to improve transportation system performance.

reliable traffic flow, which result in reduced congestion, better quality of life, less wasted fuel, cleaner air, and economic advantages.

Mainstreaming TSMO across functional and geographic units of DOTs requires making the case for how TSMO benefits all aspects of a DOT and helps it meet its goals and the needs of its customers. A business case for TSMO helps gain support and funding for deploying TSMO strategies, modifying business processes to better integrate TSMO, making organizational changes to better deliver TSMO, integrating TSMO into standard training programs, and allocating more staff to TSMO activities. These outcomes can all advance the mainstreaming of TSMO within transportation agencies.

Transportation agencies have traditionally focused on design, construction, and maintenance of transportation facilities. TSMO is intended to expand this focus by looking at operational improvements to existing facilities to maintain and restore system performance before adding physical capacity. TSMO can also benefit construction or maintenance projects when it is included in project design or in work zone management plans. By explaining and making the case for these benefits, TSMO can become part of an agency's toolbox of solutions when developing and executing project designs and plans.

EXAMPLES OF HOW DEPARTMENTS OF TRANSPORTATION ARE MAKING THE BUSINESS CASE FOR TSMO

This section provides examples of DOTs that have made TSMO business cases. These agencies include the Michigan Department of Transportation (MDOT), Nevada Department of Transportation (NDOT), Pennsylvania Department of Transportation (PennDOT), and Utah Department of Transportation (UDOT).

MICHIGAN DEPARTMENT OF TRANSPORTATION

MDOT developed its business cases for outreach and education to familiarize stakeholders with the wide variety of TSMO benefits. The agency identified five audience or stakeholder groups: the public, legislators, partners, MDOT decisionmakers, and technical staff. MDOT presents the TSMO business case in a series of documents tailored to each of these audiences. The business case is built around the concept of "adding advanced technologies and partnerships to our traditional practices—from construction to clearing crashes to plowing snow—increasing mobility, reliability, and safety along the way."[1] More specifically, MDOT anticipates benefits from TSMO, as mentioned in the business case for the public: [2]

- Efficient commutes
- Reliable commutes
- Safer roads
- Easier-to-use traveler information
- Michigan's reputation as a leader
- Fewer wasted gallons of gas
- Better, faster, cheaper, safer, and smarter

1 Michigan DOT. 2023. "Transportation Systems Management and Operations" (website). https://www.michigan.gov/mdot/0,4616,7-151-9621_84998---,00.html, last accessed June 29, 2021.

2 Michigan DOT. "Tired of Sitting in traffic? Us Too." https://www.michigan.gov/documents/mdot/TSMO_Public_612991_7.pdf, last accessed June 29, 2021.

The MDOT business cases (figure 1) can be accessed online via the links below:

- Public: an introduction to TSMO for the general public
- Legislators: information designed to foster understanding of TSMO concepts by lawmakers who are considering transportation policy
- Partners: TSMO information that targets transportation partners, such as consultants, universities, municipalities, and other DOTs and agencies
- MDOT decisionmakers: a TSMO discussion aimed at MDOT executives
- Technical staff: TSMO information for other MDOT technical staff[3]

MDOT = Michigan DOT.

Source: Michigan DOT.

Figure 1. Graphic. Michigan Department of Transportation (DOT) brief business cases for TSMO.

3 Michigan DOT. 2023. "Transportation Systems Management & Operations" (web page). https://www.michigan.gov/mdot/programs/tsmo, last accessed January 12, 2023.

NEVADA DEPARTMENT OF TRANSPORTATION

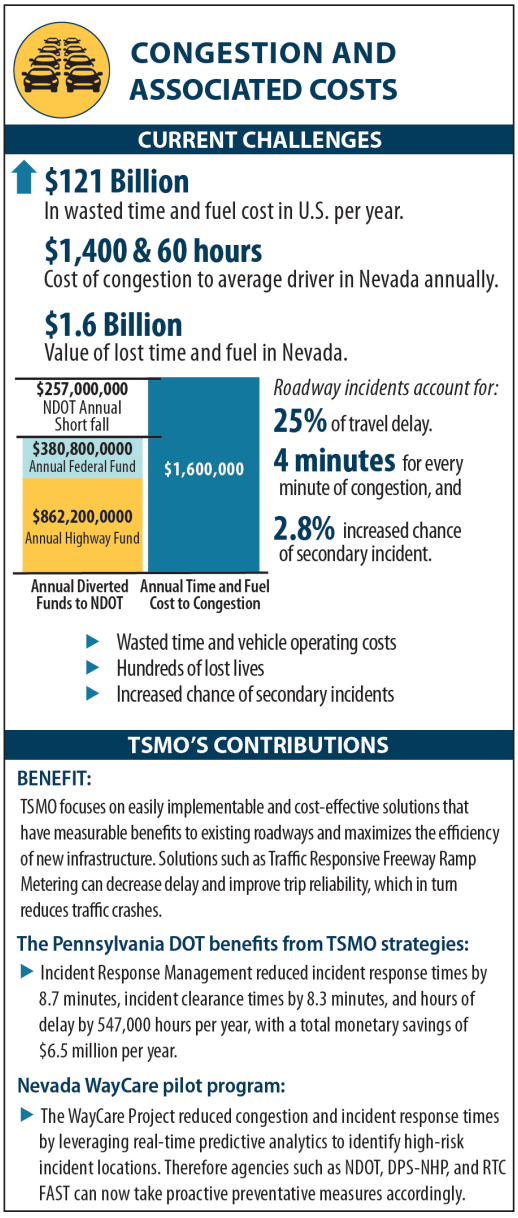
NDOT developed a business case for TSMO as part of its TSMO program-planning process. The business case looks at current transportation challenges in Nevada and the benefits of addressing those challenges with TSMO. The challenges include:

- Population growth
- Tourism-based economy
- Congestion and associated costs
- Increasing vehicle miles traveled
- Deficient roads and bridges
- Safety
- Truck and freight movement
- Asset and performance management

The business case is presented in a two-page document and a series of fact sheets aimed at different divisions within NDOT. The two-page document highlights the current need, TSMO benefits, and example DOT projects for each of the eight challenges. A segment of the business case is shown in figure 2.[4] Actual and predicted benefits include reduction in secondary crashes through timely and useful traveler information after incidents, improved incident detection and response, and greater access to real-time information on the conditions and performance of intelligent transportation system assets.

NDOT has also prepared a series of eight TSMO business case fact sheets for its divisions, focused on:

- Traffic safety engineering
- Planning
- Maintenance and asset management
- Freight planning
- Environmental initiatives
- Design
- Human resources
- Construction[5]



DPS-NHP = Department of Public Safety-Nevada Highway Patrol; NDOT = Nevada DOT; RTC FAST = Regional Transportation Commission Freeway and Arterial System of Transportation; TSMO = transportation systems management and operations.

Source: Nevada DOT, modified by Federal Highway Administration.

Figure 2. Screenshot. Element of Nevada Department of Transportation (DOT) TSMO business case summaries.

4 Nevada DOT. 2019. *TSMO Business Case Summaries*. https://nvtsmo.com/wp-content/uploads/2021/02/Business-Case-Summary-Sheets-091719.pdf, last accessed January 12, 2023.

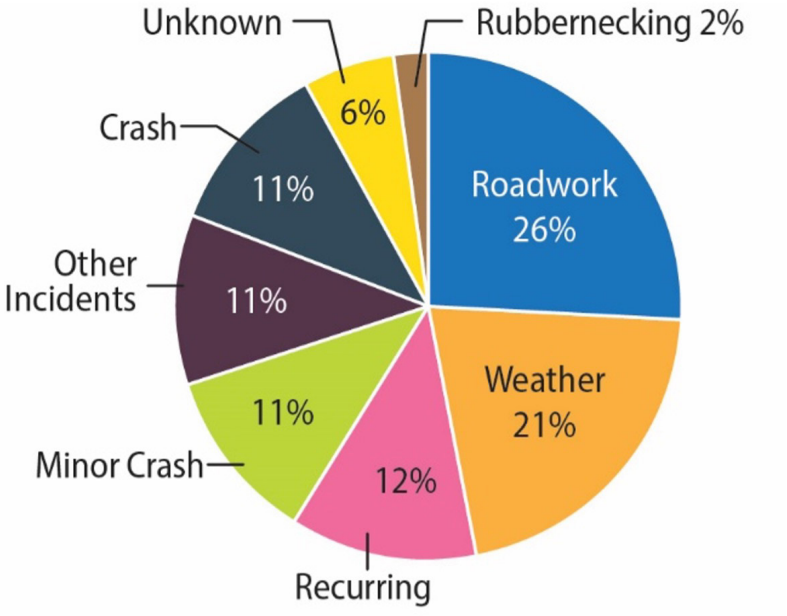
5 Ibid.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

PennDOT has made a TSMO business case based on mobility, traffic, environment, and urban and rural needs around traffic congestion.

PennDOT developed a congestion pie chart to reflect the nature of congestion in Pennsylvania statewide and to identify and focus on areas where TSMO investment would be productive (figure 3).[6] Using an interactive system that breaks down data to the desired level, the agency developed pie charts for each district. The district-specific pie charts show that recurring congestion was much greater in urban areas in some eastern (Philadelphia) and western (Pittsburgh) districts than in the more rural parts of the State. Roadwork, weather, and incidents created much of the delay in rural areas. Tailored congestion pie charts can help target solutions and show where TSMO strategies might be most useful. The agency is focusing efforts on TSMO business areas where improvements are needed and attainable through TSMO strategies.

PennDOT also makes the case for TSMO by highlighting the value of specific TSMO strategies. PennDOT created two infographics (figure 4 and figure 5) to illustrate the public benefits of a freeway service patrol on Penn-Lincoln Parkway in the Pittsburgh metropolitan area and traffic signal retiming along the Robinson Town Center and Summit Park Drive corridor in Allegheny County.[7]

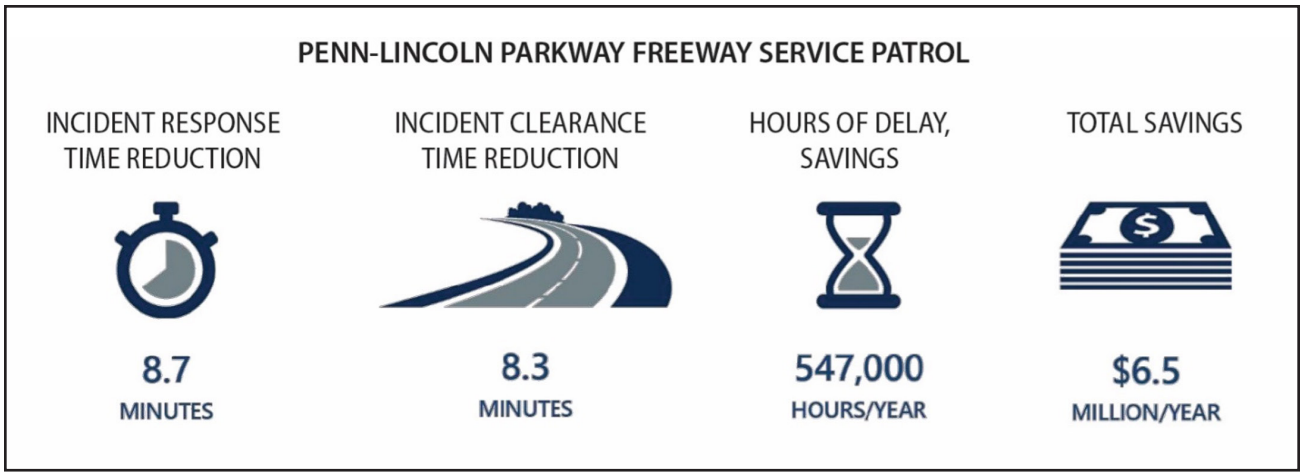


Source: Pennsylvania Department of Transportation.

Figure 3. Diagram. Pennsylvania congestion pie chart.

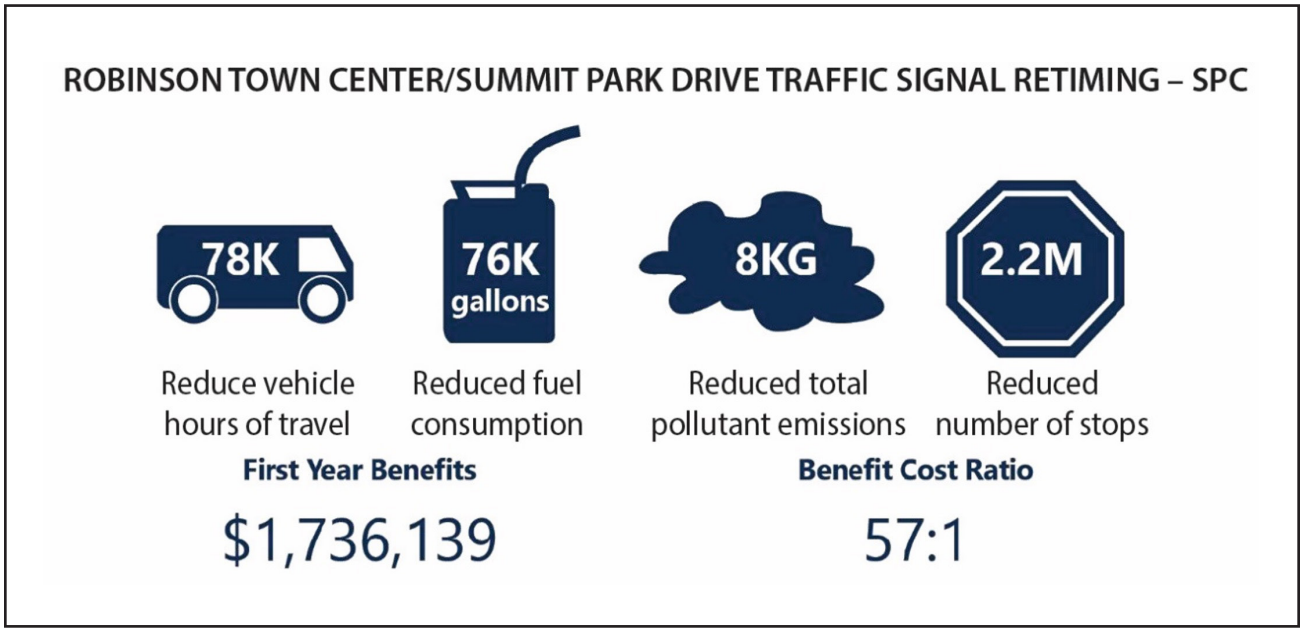
6 Pennsylvania DOT. 2020. *Transportation Systems Management and Operations Performance Report*, 4th edition. https://www.penndot.pa.gov/ProjectAndPrograms/operations/Documents/2020-January_TSMO-Performance-Report.pdf.

7 Pennsylvania DOT. 2018. *Pennsylvania TSMO Strategic Framework*. https://www.penndot.pa.gov/ProjectAndPrograms/operations/Documents/TSMO%20Strategic%20Framework.pdf, last accessed January 31, 2023.



Source: Pennsylvania DOT.

Figure 4. Diagram. Benefits of a freeway service patrol on Penn-Lincoln Parkway in Pennsylvania.



K = 1,000; KG = kilograms; M = million; SPC = Southwestern Pennsylvania Commission.

Source: Pennsylvania DOT.

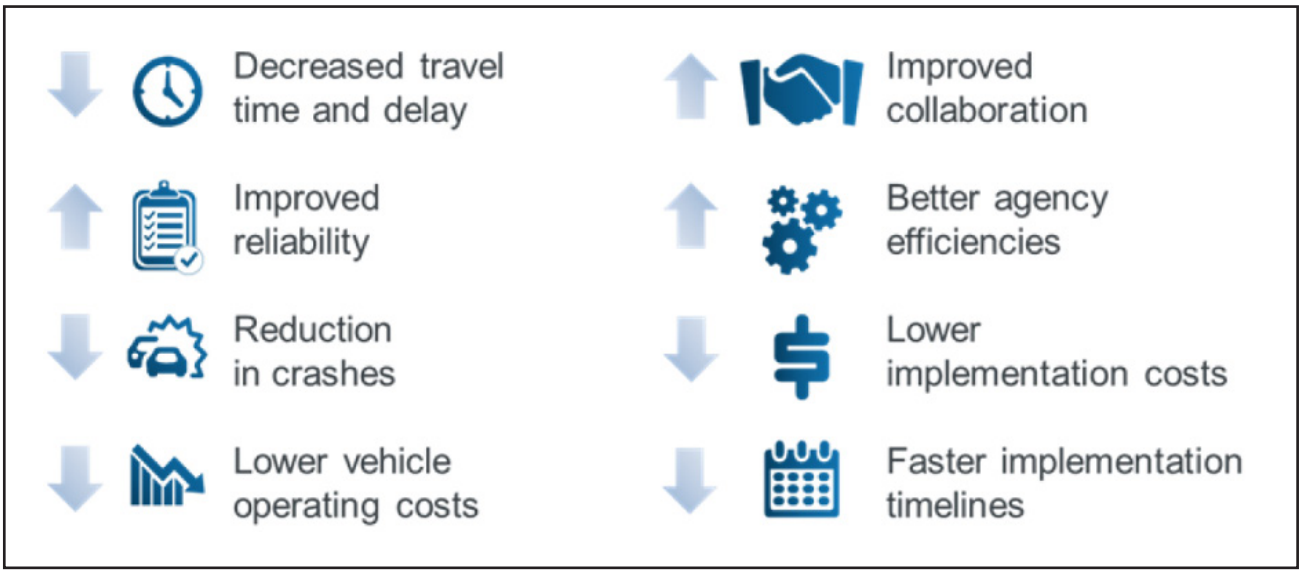
Figure 5. Diagram. First-year benefits and the benefit–cost ratio of traffic signal retiming along a corridor in Allegheny County.

UTAH DEPARTMENT OF TRANSPORTATION

UDOT recently completed its business case for TSMO as the first step toward developing its TSMO program plan. The six-page *Keeping Utah Moving by Advancing TSMO* document summarizes UDOT's TSMO approach in an overview section:

> UDOT is taking an integrated, agency-wide approach to continually improve our work by promoting TSMO solutions that leverage technology and partnerships to optimize network performance. This includes raising awareness of how *TSMO helps advance all UDOT work* and of the many opportunities to apply TSMO solutions to the full spectrum of UDOT projects to improve safety, reliability, and efficiency for all UDOT travelers. This document presents the UDOT-specific business case on the benefits of advancing TSMO solutions capabilities—and of "mainstreaming" TSMO solutions across the agency.[8]

UDOT makes the business case for TSMO by describing institutional, organizational, and procedural changes for improving TSMO; current DOT TSMO activities; how TSMO fits into the executive director's top 10 goals for UDOT; TSMO planning and outreach activities; and the benefits listed in figure 4.



Source: Utah DOT.[9]

Figure 6. Graphic. Anticipated benefits identified in Utah Department of Transportation TSMO business case.

UDOT recently rebranded TSMO as Operations Readiness in an effort to more clearly communicate what TSMO means at UDOT. Operations Readiness is defined as looking at operations as an integral part of the entire lifecycle of building and maintaining a transportation system where safety and reliability are key tenants. This includes standardizing optimization of operations and management of our transportation system in parallel with building out the system through traditional construction projects.

8 Utah DOT. 2019. *Keeping Utah Moving by Advancing TSMO, The Business Case for Mainstreaming UDOT's TSMO Activities*, unpublished.

9 Ibid.

SUMMARY

A business case for TSMO rests upon developing a compelling and clearly expressed justification for investments and activities that will enable a State DOT to achieve its objectives for the public it serves by using the transportation infrastructure that it owns and operates. One prerequisite for making the business case for TSMO is a coordinated and collaborative effort among leaders and stakeholders to identify the specific benefits TSMO brings to advancing the DOT's vision, mission, goals, and objectives. This review of TSMO business cases suggests several aspects as most common in making the case for the investments that agencies have made—and are making—in TSMO programs and strategies. In summary, the case studies suggest common features that State DOTs use to justify TSMO investments and programs including the following:

- Current system conditions and existing challenges, such as congestion, safety, reliable travel times, and fuel consumption
- Cost–benefit analysis and opportunities that TSMO strategies provide to address existing challenges
- Examples of how TSMO strategies have improved system performance

Using information meaningful to the intended audience, ensuring credible data, and choosing effective means for communicating the business case are critical to broad agreement and acceptance of the business case.

NON-BINDING CONTENTS

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