TxDOT TSMO Evaluation Tool

January 2021

Version 1.0

Prepared By

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DOCUMENT CONTROL		
Date	**Version**	**Description**
01-14-2021	1.0	First draft – for review by TxDOT
02-12-2021	1.1	Addresses minor formatting revisions.

List of Acronyms

Acronym	Definition
ITS	Intelligent Transportation Systems
MPPM	Modernize Portfolio and Project Management
PS&E	Plans, Specifications, and Estimate
SEA	Systems Engineering Analysis
TIM	Traffic Incident Management
TMC	Traffic Management Center
TMS	Traffic Management System
TSMO	Transportation Systems Management and Operations
TxDOT	Texas Department of Transportation
WZM	Work Zone Management

Introduction

Transportation Systems Management and Operations (TSMO) implementation requires coordination and actionable implementation steps. Through discussions with stakeholders since the publication of the TSMO Strategic Plan, TxDOT Districts without TSMO Program Plans have not yet adopted TSMO evaluation into their projects. This document will introduce a TSMO evaluation process, provide context for the tool in the Modernize Portfolio and Project Management (MPPM) initiative and present the existing TSMO Project Development Checklist.

The TSMO evaluation process provides questions for the project manager to answer at different steps of the life of a project. These questions are related to coordination and collaboration, safety, operations, technology, and project closeout. TxDOT should incorporate TSMO evaluation for every project by integrating the tool in TxDOTConnect, the project management tool developed through the Modernize Portfolio and Program Management (MPPM) initiative. In addition to the TSMO Evaluation Tool, TxDOT Districts should adopt a TSMO project development checklist as a means of tracking whether the project manager has completed TSMO evaluation at different stages of project development. The MPPM Initiative should also integrate TSMO project development checklists into TxDOTConnect.

The remainder of this report introduces the TSMO evaluation and TSMO project development checklist. Different districts of TxDOT may have different needs in a checklist due to differences in the district's geography, climate, demographics, systems and technology, and business processes. Each district should comply with the TSMO project development checklist presented herein as much as is feasible.

TSMO Evaluation Tool

The TxDOT Statewide TSMO Strategic Plan included a TSMO Evaluation Tool to provide project managers with a series of questions to address early in the project delivery phase to encourage a more holistic and innovative approach to project development. The tool includes questions related to TSMO and TSMO strategies in planning and scoping phases to determine whether projects can incorporate TSMO strategies, processes, and technologies as part of the project to improve its effectiveness. The TSMO Evaluation Tool contains a checklist for each phase of a project development from planning through closeout with recommended actions to include actions incorporating TSMO as a central business process.

During development of District TSMO Program Plans throughout the state, districts have shared concerns about a continuing lack of coordination among internal TxDOT divisions through project development. Additionally, external partner agencies shared the need for additional communication and coordination through external outreach meetings and Capability Maturity Model workshops. In developing and implementing a TSMO evaluation standard for each stage of the project development process, some of the coordination and communication will begin to become mainstreamed.

The following subsections were adapted and expanded from version 2.1 of the TxDOT TSMO Statewide Strategic Plan. Each section provides questions and background information for the TSMO Evaluation Tool. The TxDOT project manager should initiate the following evaluation. If during the project the project manager deems it acceptable to do so, they may delegate the TSMO evaluation process to another person associated with the project.

1. TSMO Evaluation - Planning

Coordination and Collaboration

The purpose of the coordination and collaboration section is to provide project managers with guidance on which stakeholders should be involved in the project delivery process based on the project type. Involving the right stakeholders early on in project planning promotes project acceptance, diversity of ideas for solving problems and allows different teams to voice their concerns prior to Plans, Specifications & Estimates (PS&E) design. The required stakeholders to complete the evaluation should be determined based on the type of facility, using Table 1.

Table 2 should be used to fill in the facility type and stakeholder names, and check each box upon notifying each of the upcoming project. When contacting each of the relevant stakeholders, invite them to a planning meeting. Additionally, use this opportunity to develop project messaging and description and a one-page summary describing the project limits, scope, and timeline.

Table 1: Project Stakeholders to Contact, by Facility Type

Stakeholders	Facility Type			
	Freeways	Arterials	Collectors	Local Streets
TPP Division	✓	✓	✓	✓
Director of Operations	✓	✓		
District Engineer	✓	✓	✓	
Area Engineers	✓	✓	✓	
Traffic Operations/Management Center	✓	✓		
Project Managers of Adjacent Projects	✓	✓		
Public Information Officers	✓	✓		
TIM Team Coordinator	✓	✓		
Federal Highway Administration	✓			
City/County Transportation Departments	✓	✓	✓	✓
Transit Agencies	✓	✓	✓	✓
City and County Public Works	✓	✓	✓	✓
School Districts	✓	✓	✓	✓
Metropolitan Planning Organizations	✓	✓	✓	
Councils of Governments or Regional Planning Commissions	✓	✓	✓	
Law Enforcement	✓	✓		
Office of Emergency Management	✓	✓	✓	✓
Local Businesses	✓	✓	✓	✓

Table 2: Stakeholder Coordination Checklist

Agency Type	Agency Name	Contact Name	Email	Phone
TPP Division				
Director of Operations				
District Engineer				
Area Engineers				
Traffic Operations/Management Center				
Project Managers of Adjacent Projects				
Public Information Officers				
TIM Team Coordinator				
Federal Highway Administration				
City/County Transportation Departments				
Transit Agencies				
City and County Public Works				
School Districts				
Metropolitan Planning Organizations				
Councils of Governments or Regional Planning Commissions				
Law Enforcement				
Office of Emergency Management				
Local Businesses				

Safety

The safety section of the TSMO Evaluation Tool requires the project manager to use available crash data or reports to identify safety issues within the project area. The project manager can make recommendations to include safety measures within the scope during the planning, design, and construction phases. Using available crash data will help stakeholders understand the need for improvements and implement solutions to directly address the project challenges. Answer the questions in Table 3 regarding safety issues and improvements associated with the project.

Table 3: Checklist for Planning - Safety

Safety Item	Response
1. Is there a safety problem in the project area, as documented through historic crash data, road safety audit, previous studies, application of video analytics (e.g., near miss algorithms), TMC observations, etc.?	i. ☐ Yes ii. ☐ No
a. If yes, what are the primary root causes?	Comments:
b. If yes, identify potential countermeasures.	Comments:
2. What additional safety elements are needed, If any, to improve the project's effectiveness?	i. ☐ Pavement markings, signing, and delineation ii. ☐ Advance warning signs iii. ☐ Button reflectors and guardrail reflectors iv. ☐ Sight distance v. ☐ Other (please provide details)
3. Use the following checklist to document the safety countermeasures / strategies / mitigation and other low-cost enhancements that will be implemented in this project:	i. ☐ Pavement Markings ii. ☐ Signing iii. ☐ Delineation iv. ☐ Advance Warning Signs v. ☐ Button and Guardrail reflectors vi. ☐ Sight Distance improvements vii. ☐ Chevrons viii. ☐ Advisory Speed signs ix. ☐ Lane width x. ☐ Curb height xi. ☐ Signal timing xii. ☐ Channelization xiii. ☐ Traffic Calming xiv. ☐ Wrong Way Detection System xv. ☐ Intelligent Transportation Systems xvi. ☐ Other (please provide details)
4. Which of the following smart work zone safety measures should be included in the scope of the project? Document the recommended safety measures using the checklist below:	i. ☐ Real-time traveler information ii. ☐ Temporary queue warning iii. ☐ Performance measurement iv. ☐ Entering/exiting construction vehicle notification v. ☐ Active Lane Closure information vi. ☐ Speed limit through work zone vii. ☐ Incident notification viii. ☐ Work Zone Intrusion Alert System ix. ☐ Other (please provide details) x. ☐ None

Operations

The purpose of the operations section is to provide project managers with an opportunity to improve the operations and mobility of a facility. By leveraging the Federal Highway Administration's National Highway System Travel Time Reliability Measures, the project manager can determine the types and scale of potential solutions required. Using operations data will also help develop the business case for recommendations and develop an understanding for the project's needs.

A mobility toolbox was created for TxDOT to provide project managers with ideas for improving mobility on projects. It includes strategies and solutions for all types of facilities to be recommended and scaled based on the project's needs. The Statewide TSMO Strategic Plan contains TSMO operations strategies such as Active Traffic Management, Traffic Incident Management, Integrated Corridor Management, Managed Lanes, and Service Patrols. The operations section also includes questions regarding traffic incident management and work zone management; two initiatives becoming increasingly important on construction projects for TxDOT for the value and service they provide for travelers. Please answer the following questions for operations and TSMO strategies to be implemented on the project.

Table 4: Checklist for Planning - Operations

Operations Item	Response
1. Does the study area meet travel time reliability performance targets? For Urban/metro areas, do Urban Congestion Index, Urban Reliability Index, Truck Reliability Index meet district and/or state target levels? For Rural areas, do Rural Reliability and Truck Reliability indexes meet target levels? Texas Transportation Commission approved 1.20 for urban congestion and 1.12 for rural reliability as the 2028 targets. The 2025 Truck Reliability Index Target is 2.31 for urban areas and 1.16 for rural areas.	i. ☐ Yes ii. ☐ No Comments:
a. If yes, can any of the strategies from the mobility toolbox be used to mitigate the congestion issues? If so, how?	Comments:
b. Document mobility strategies you plan to implement for this project from this checklist:	i. ☐ Work Zone Management ii. ☐ Traffic Signal Coordination iii. ☐ Traveler Information iv. ☐ Ramp Management v. ☐ Special Event Management vi. ☐ Managed Lanes vii. ☐ Road Weather Management viii. ☐ Active Traffic Management ix. ☐ Traffic Incident Management x. ☐ Service Patrols xi. ☐ Transit Management xii. ☐ Integrated Corridor Management xiii. ☐ Freight Management xiv. ☐ Low Cost Enhancements xv. ☐ Rural Emergency Response
2. Has a traffic incident management (TIM) plan been developed for operations during construction?	i. ☐ Yes ii. ☐ No
3. What coordination is required to maintain incident management during construction?	Comments:
a. If a TIM plan has not yet been developed, if on a freeway or arterial facility, would it be valuable for the project and can one be developed within the scope of the project?	Comments:
b. If a TIM plan has not and will not be developed, document which of the following TIM activities will be included within the scope of the project:	i. ☐ Safety Service Patrol / Courtesy Patrol ii. ☐ Traffic diversion plans and trailblazing iii. ☐ Data collection and integration iv. ☐ Traveler information v. ☐ Other (please provide details)
4. Has a work zone management plan been developed for operations during construction?	i. ☐ Yes ii. ☐ No
a. If not, which work zone management strategies will be considered to minimize adverse impacts of work zones on the public during project construction?	i. ☐ Smart Work Zones ii. ☐ Temporary queue warning systems iii. ☐ Traveler information iv. ☐ Other (please provide details)

Technology

The purpose of the technology section is to ensure that technology is appropriately considered and included in projects. Through the Traffic Management System (TMS) initiative, TxDOT recognizes the value of systems and technology to effectively operate and manage the transportation network. The technology section of the TSMO evaluation uses Traffic Management Systems guidance from memos written by Chief Engineer Bill Hale's memos to encourage project managers to consider including TMS in the project scope. Applicable memos include, "Statewide Procedures for Traffic Management Systems in Construction Projects," dated July 1, 2016, and "Statewide Procedures for Traffic Management Systems" dated April 7, 2017.

Table 5: Checklist for Planning - Technology

Technology Item	Response
1. Is there an innovative system or technology that can help improve traffic safety, operations, and reliability?	i. ☐ Yes ii. ☐ No
2. Are any improvements needed to achieve TMS uptime availability goals?	i. ☐ Yes ii. ☐ No
3. Is there an opportunity to include TMS improvements within the project to improve ITS coverage and network connectivity?	i. ☐ Yes ii. ☐ No
4. Is there an ITS technology or application that may be included within the project scope to monitor performance measures?	i. ☐ Yes ii. ☐ No
5. Are there any existing ITS infrastructure/devices within the project limits? Can they be operated better to provide benefit during construction and afterward?	i. ☐ Yes ii. ☐ No Comments:
6. Is the project implementing or replacing new ITS infrastructure/devices?	i. ☐ Yes ii. ☐ No
7. Will the Systems Engineering Analysis (SEA) process need to be initiated for this project?	i. ☐ Yes ii. ☐ No
8. Please check the appropriate technologies to be implemented as part of this project.	i. ☐ Vehicle Detectors ii. ☐ Dynamic Message Signs iii. ☐ Road Weather Information Systems iv. ☐ Fiber Optic or Wireless Communications v. ☐ Wrong Way Driver Detection Systems vi. ☐ Smart Work Zones vii. ☐ Dedicated Short Range Communications (DSRC) viii. ☐ Signal Phasing and Timing (SPaT) information ix. ☐ CCTV Cameras (wired or wireless) x. ☐ Advanced Traffic Controllers xi. ☐ Lane Control Signs xii. ☐ Radar Speed Feedback Sign xiii. ☐ LED Chevrons xiv. ☐ Static Signs with “Dynamic Travel Time” inserts ☐ Other (please provide details)

2. *TSMO Evaluation – Design*

This section presents a series of questions and checklists for the Project Manager to complete during the Schematic and Plans, Specifications, and Estimate (PS&E) Design phases. This should be completed at the beginning of the design phase and referenced throughout to ensure all TSMO processes and strategies are implemented in the project.

Preliminary Design Concept Conference

Fill out **Table 6** when conducting the first preliminary design concept conference of a project.

Table 6: Checklist for Design - Preliminary Design Concept Conference

Preliminary Design Concept Item	Response
1. Include Stakeholders identified during the planning phase of the project in a preliminary design concept conference to kick off the project design phase. Revisit the list developed in the coordination and collaboration section of TSMO Evaluation – Planning.	i. ☐ Completed ii. ☐ Not Completed Comments:
2. Define performance measures to be tracked in the project; e.g., travel time, delay, number of traffic incidents in the work zone, traffic incident response time, and urban/rural travel time reliability (before, during and after construction).	i. ☐ Completed ii. ☐ Not Completed Comments:
3. Coordinate with stakeholders regarding project scope, limits, timeline, and potential operational impacts.	i. ☐ Completed ii. ☐ Not Completed Comments:

Data Collection

Fill out Table 7 Checklist for TSMO data collection efforts during construction.

Table 7: Checklist for Construction - Data Collection

Data Collection Item	Response
1. Collect and evaluate traffic data to identify potential mobility issues within project limits or surrounding area and potential mitigation during construction.	i. ☐ Completed ii. ☐ Not Completed Comments:
2. Reference the ITS Master Implementation Plan to integrate ITS recommendations into the project plan for schematic design and carry through to PS&E phase.	i. ☐ Completed ii. ☐ Not Completed Comments:
3. Collect other existing documentation and plans, including but not limited to: Long Range Transportation Plan, Regional ITS Architecture, Active Transportation, and Transit Plans. Evaluate how the project integrates with these. Contact relevant stakeholders including agencies responsible for these plans to coordinate how the current project will integrate with other existing efforts.	i. ☐ Completed ii. ☐ Not Completed Comments:

Plans, Specifications, and Estimate (PS&E)

Fill out **Table 8** during PS&E phase to track TSMO activities.

Table 8: Checklist for Construction - PS&E

PS&E Item	Response
1. During 30%-60%-90% reviews, hold multi-discipline design concept conferences, including stakeholders from the PS&E team, schematic design team, construction, maintenance, traffic operations, and planning.	i. ☐ Completed ii. ☐ Not Completed Comments:
2. Consult district traffic engineer/project traffic leads to identify opportunities to improve mobility and safety in work zones. Consult smart work zone guidelines for traffic control plans.	i. ☐ Completed ii. ☐ Not Completed Comments:
3. During PS&E development, implement ITS identified in schematic phase (either from ITS Master Implementation Plan and/or other new ITS identified through project planning and design).	i. ☐ Completed ii. ☐ Not Completed Comments:
4. Coordinate with relevant stakeholder agencies in PS&E design to implement TSMO strategies, ITS devices and projected lane/road/ramp closures.	i. ☐ Completed ii. ☐ Not Completed Comments:

3. TSMO Evaluation - Construction

Construction is a critical period for implementation of TSMO strategies developed through the planning and design phases of a project. This section outlines the steps a project manager should take during the construction phase of a project.

Coordination

Fill out **Table 9** checklist for coordination during construction phase to track TSMO progress.

Table 9: Checklist for Construction - Coordination

Construction Phase Item	Response
1. In Construction review meetings, include PS&E team, operations, traffic safety, maintenance representatives.	i. ☐ Completed ii. ☐ Not Completed Comments:
2. Coordinate with external stakeholders early (before mobilization) with project schedule so they are aware of any closures, partial closures, alternative routes, etc.	i. ☐ Completed ii. ☐ Not Completed Comments:
3. Document meetings, communications, and action plans with both construction review stakeholders and external partners. Save meeting minutes and messages to document the communication/coordination that has taken place and follow up with action items.	i. ☐ Completed ii. ☐ Not Completed Comments:

Technology

Fill out **Table *10*** checklist to track technology incorporation during construction.

Table 10: Checklist for Construction - Technology

Technology Incorporation Item	Response
1. Implement and document ITS inclusion during the construction phase.	i. ☐ Completed ii. ☐ Not Completed Comments:
2. Reference appropriate technology standards and specifications.	i. ☐ Completed ii. ☐ Not Completed Comments:
3. Enter new technologies into the TxDOT asset management system, then use the system to monitor asset uptime during construction to verify if performance targets are being achieved.	i. ☐ Completed ii. ☐ Not Completed Comments:

Operations

Fill out **Table *11*** checklist to track TSMO operations strategies during construction.

Table 11: Checklist for Construction - Operations

Construction Phase Operations Item	Response
1. Reference TSMO operations strategies recommended in planning phase checklist and incorporate during construction. For example, if incorporating Active Traffic Demand Management, identify and document when, where, how, the process is working in construction and any relevant performance data.	i. ☐ Completed ii. ☐ Not Completed Comments:
2. Traffic Incident Management – If a plan is developed, document relevant performance data such as average incident response and clearance times. If no TIM plan is developed, reference relevant TIM strategies and coordinate with first responders. Identify hot spots related to project during construction and monitor/work to mitigate.	i. ☐ Completed ii. ☐ Not Completed Comments:
3. Work Zone Management – Include and document work zone management practices during the construction phase. Document relevant performance data.	i. ☐ Completed ii. ☐ Not Completed Comments:

4. TSMO Evaluation - Project Closeout

The project closeout section should be completed after the design stage to document which recommendations from the previous sections were implemented. If recommendations were not implemented, they may not have been funded. It is valuable to understand if an additional project should be developed or if it should be included on a future project. These recommendations can be queried at a later date to help develop projects or justify a business case for funding. Fill out the checklist in Table *12* during project closeout.

Table 12: Checklist for Project Closeout

Project Closeout Item	Response
1. Which recommendations were implemented?	Comments:
2. If some recommendations were not implemented, why not?	Comments:
3. If recommendations were not implemented, should they be added to a critical project list to be included in a future project? Why or why not?	Comments:
a. Should any of the recommendations be advanced on its own or considered next time on a future project?	Comments:

References

Texas Department of Transportation – Austin District, "Transportation Systems Management and Operations (TSMO) Austin District Program Plan," Version 1.1, June 28, 2018.

Texas Department of Transportation – Government Affairs, "Preliminary MAP-21 Texas Transportation System Performance Results: Freight," https://www.txdot.gov/government/legislative/federal-affairs/preliminary-performance/freight.html

Texas Department of Transportation – Traffic Safety Division, "Transportation Systems Statewide Strategic Plan," Version 2.1, July 18, 2018.