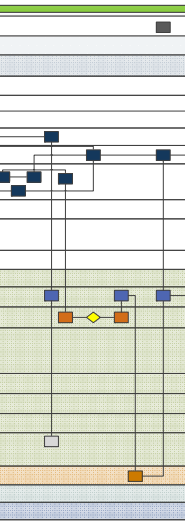
TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO)



EL PASO DISTRICT PROGRAM PLAN

December 2021

Texas Department of Transportation

Document Control

Version	Date	Description of Change	Author
1.0	10/21/2021	First draft for TxDOT Review	AECOM
1.1	12/13/2021	Addressed review comments for publishing on TxDOT TSMO webpage	AECOM

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List of Acronyms

Acronym	Definition
ADA	Americans with Disabilities Act
CCTV	Closed Circuit Television
CMF	Capability Maturity Framework
CMM	Capability Maturity Model
Con-Ops	Concept of Operations
DPS	Department of Public Safety
DSS	Decision Support System
FHWA	Federal Highway Administration
GIS	Geographic Information System
ISD	Independent School District
ITS	Intelligent Transportation Systems
M&O	Management and Operations
MAP-21	Moving Ahead for Progress in the 21st Century
MPO	Metropolitan Planning Organization
OM	Operations and Maintenance
OW	Organization and Workforce
PM	Performance Measurement
PPP	Public Private Partnership
PS&E	Plans, Specifications & Estimate
ROW	Right of Way
RWM	Road Weather Management
SOP	Standard Operating Procedure
ST	Systems and Technology
SWZ	Smart Work Zones
TIM	Traffic Incident Management
TMC	Traffic Management Center
TMP	Transportation Management Plan
TMS	Traffic Management System
TRF	Traffic Division
TSMO	Transportation Systems Management & Operations
TxDOT	Texas Department of Transportation
US CBP	United States Customs and Border Protection
US FMCSA	United States Federal Motor Carrier Safety Administration
VMT	Vehicle Miles Traveled
WZM	Work Zone Management

Executive Summary

The Texas Department of Transportation (TxDOT) is developing Transportation Systems Management and Operations (TSMO) Program Plans for each of its 25 districts to address the agency's ability to manage the safe mobility of the traveling public before building more capacity. This involves a process of data collection and analysis, prioritizing the needs of each individual district. Through stakeholder outreach and data collection process, the El Paso District Transportation Systems and Management Operations (TSMO) Program Plan documents the El Paso District's strategic vision and goals, current TSMO processes, and recommended actions to implement data-driven decisions to make the transportation network safer, more efficient, and reliable. Figure 1 shows benefits of implementing TSMO.

WHAT IS *TSMO*?

TSMO represents a philosophical shift in how agencies manage their transportation systems in recognition of the limits of traditional roadway capacity expansion for managing congestion and operations. It employs state-of-the-art traffic management practices coordinated across multiple jurisdictions, agencies, and modes.

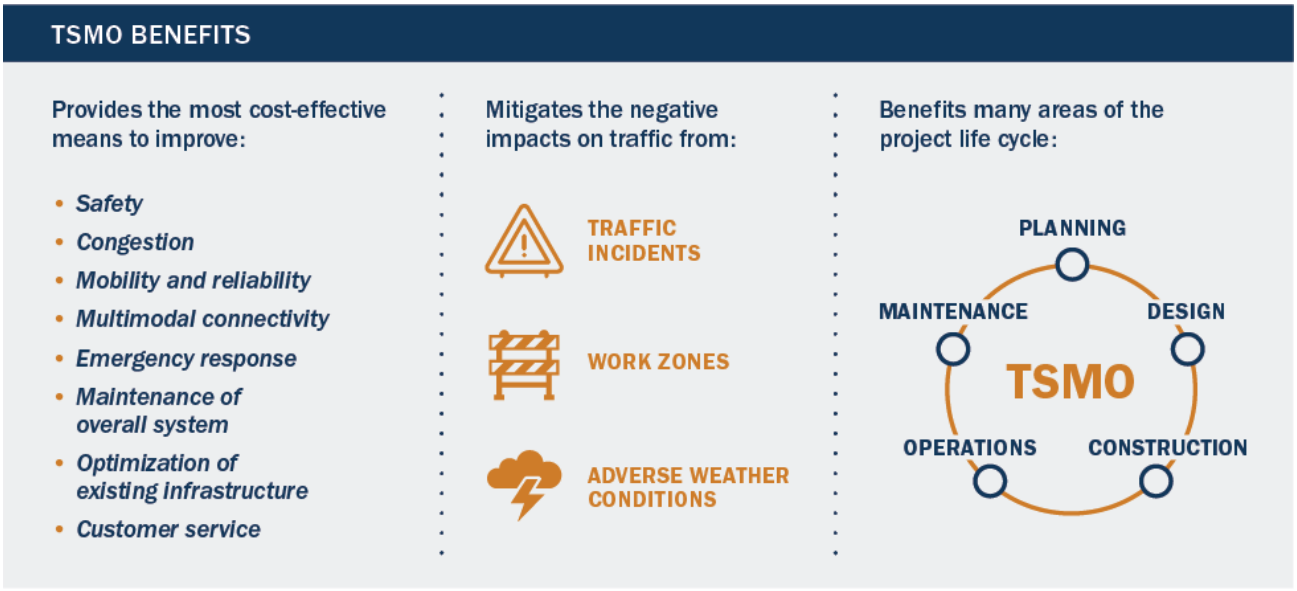
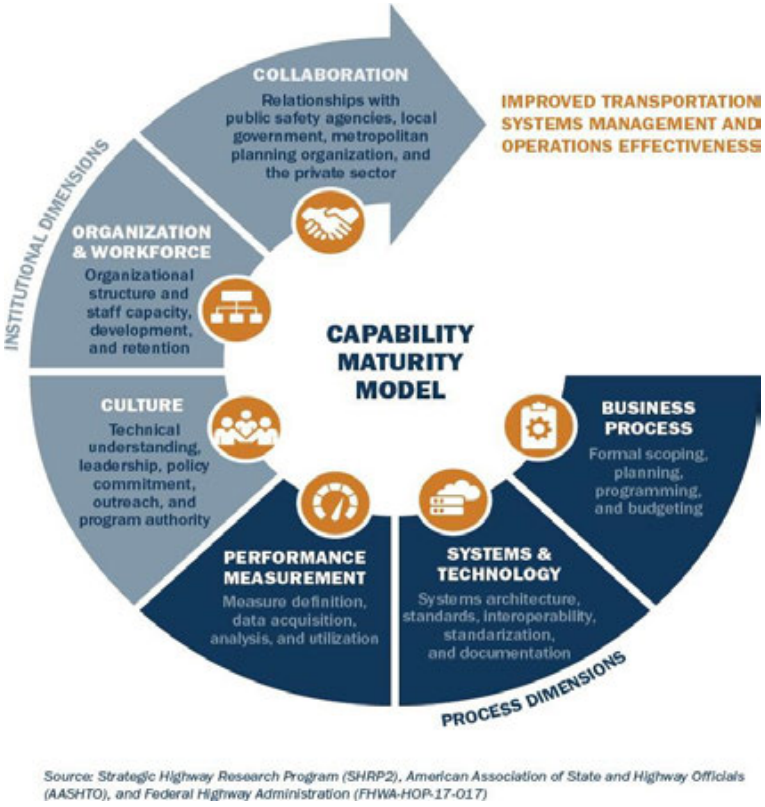


Figure 1: Benefits of TxDOT's TSMO Program

TSMO supports the safe, reliable, and efficient operation of the transportation system. Through integrating practices already in place in the El Paso District, along with additional strategies and processes outlined in this report, the region's transportation system operations will see increased collaboration, maximized project outcomes and result in cost-effective improvements.

To understand the District's TSMO processes and capabilities in a methodical manner, and to ensure that any recommendations and resulting improvements in practices align with the District's goals, TxDOT has instituted the capability maturity model (CMM) and corresponding capability maturity frameworks (CMF). These processes serve as both a means of assessment of current capabilities in processes and institutional strength as well as the opportunity to build recommendations for advancement of these capabilities.
The El Paso District Program Plan measured current performance (level) of six dimensions (shown in Figure 2) across six focus areas as listed below:

1. Planned Special Events (PSE): Ability to manage traffic impacts generated by events at permanent multi-use event venues, temporary venues, or ones that occur on the road network itself.
2. Road Weather Management (RWM): Ability to respond to adverse weather conditions through both maintenance and operations activities.
3. Traffic Incident Management (TIM): Ability to detect, respond to, and clear traffic incidents so that normal operations can be restored safely and quickly.
4. Traffic Management (TM): Ability to manage the movement of traffic on roadways within a region, including through corridor management
5. Traffic Signal Management (TSM): Ability to effectively design, operate, and maintain traffic signals.
6. Work Zone Management (WZM): Ability to assess and mitigate work zone impacts.



Source: Strategic Highway Research Program (SHRP2), American Association of State and Highway Officials (AASHTO), and Federal Highway Administration (FHWA-HOP-17-017)

Figure 2: Capability Maturity Model Summary

The El Paso District's goals and objectives in implementing TSMO were developed by steering the Statewide TSMO goals and homing in on how they can apply to the District. The District's priorities in implementing TSMO are aligned with the following goals:

- Safety
- Reliability
- Efficiency
- Innovation
- Access
- Collaboration
- Integration

Based on the input from internal and external stakeholders, for this version of TSMO Program Plan, the District chose to take an in-depth look at strategies related to traffic management, road weather management and work zone management. Table 1 through 3 highlight top 10 strategies in each of the mentioned focus areas.

TABLE 1: TRAFFIC MANAGEMENT TSMO STRATEGIES

Rank	Traffic Management Strategies (Top 10 by Priority)	Dimension(s)	Staff Effort	Cost
1	Determine System Platforms/Applications for Collaboration*	COL	Low	$
2	Create a Technical and Procedural Guidance Toolkit for Staff*	CUL, OW	Medium	$$
3	Improve Coordination with Traffic Management Team	BP, OW, COL	Low	$
4	Coordinate with City of El Paso (CoEP) Regarding Upgrade of ITS Equipment	BP, ST, COL	Low	$
5	Develop a Checklist/SOPs for ITS	PM, ST	Low	$
6	Joint Operations Agreement with CoEP	BP, PM, ST, COL	High	$$
7	Border Crossing Coordination Meetings	BP, COL	Low	$
8	Standardize Traffic Operations in Construction Projects	BP, OW	Medium	$
9	Develop Sidewalk Condition Inventory	PM, COL	Medium	$$
10	Action Plan for Performance Measures to Achieve Targets*	BP, PM	Medium	$$

*FHWA Strategy

TABLE 2: ROAD WEATHER MANAGEMENT TSMO STRATEGIES

Rank	Road Weather Management Strategies (Top 10 by Priority)	Dimension(s)	Staff Effort	Cost
1	Provide Situational Reports of Weather Proactively	BP, COL	Low	$
2	Develop Reporting Codes for Various Road Conditions*	COL	Medium	$$
3	Obtain Leadership Buy-In for Decision Support System*	BP	Low	$
4	Improve Weather Data Sharing	BP, COL	Medium	$
5	Establish Support Systems for Data Quality Assurance and Quality Control (QA/QC)*	ST	Medium	$$
6	Improve Linkage Between the RWM Program and Other Planning Activities*	BP	Low	$
7	Joint Response Between the TMC, Emergency Operations Center, and Weather Community*	BP	Low	$
8	Report Performance Measures During Weather Events*	BP, CUL	Low	$
9	Provide a Location/Data Feed for Media Partners*	COL	Low	$

Rank	Road Weather Management Strategies (Top 10 by Priority)	Dimension(s)	Staff Effort	Cost
10	Standard Operating Procedures for Winter Event Planning	BP, COL	Medium	$

*FHWA Strategy

TABLE 3: WORK ZONE MANAGEMENT TSMO STRATEGIES

Rank	Work Zone Management Strategies (Top 10 by Priority)	Dimension(s)	Staff Effort	Cost
1	Establish Proper Coordination Between Construction Contractor and Agency*	COL	Medium	$$
2	Law Enforcement Efforts for WZM*	COL	Medium	$$
3	Traffic Control Plan Training	BP, ST, PM, OW	Medium	$$
4	Traffic Control Permit Coordination	BP, COL	Low	$
5	Identify and Foster WZM Knowledge and Skills*	OW	Medium	$$
6	Stakeholder Involvement Checklist	BP, COL	Low	$
7	Develop Multi-Agency Multi-Project Coordination Tools for WZM*	BP, COL	Medium	$$
8	Develop and Update Work Zone Policies and Procedures*	PM	Medium	$$
9	Evaluate WZM Effectiveness*	PM	Medium	$$
10	Road User Cost Considerations*	BP	Medium	$$

*FHWA Strategy

Tactical Plans achieve broader set of objectives across multiple focus areas and help improve performance (level) of CMM dimensions. The results of CMM combined with input from the District and stakeholders, the following Tactical Plans are recommended for the El Paso District:

1. Maintain the Regional ITS Architecture for the TxDOT El Paso District. The previous update was completed in 2021 and the architecture should be kept up to date with the United States Department of Transportation Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT).
2. Develop training modules and resources to train staff for TSMO, existing and emerging ITS technologies, performance analysis, etc. Identify and provide training for tools and platforms for centralized communication and collaboration.

3. Establish regional performance measurement metrics and develop dashboards to monitor performance metrics across different transportation disciplines. Develop framework for data collection and sharing between agencies.

4. Develop framework to periodically update alternate routes in urban and rural areas to expedite decision-making during WZM and severe weather events. Update the district's 2011 Incident Management Plan (IMP) and keep current with changes to infrastructure and growth in the district. Create a repository of WZM resources and best practices.
5. Develop framework for weather data reporting and sharing for improved communication and consistent data sharing between agencies, and to aid in decision-making process during weather events and weather-dependent activities (construction, maintenance etc.). Develop dashboards for monitoring weather parameters and share with agencies. The framework would also help agencies in

1.0 Introduction

Ever-increasing congestion, fatalities and serious injuries, environmental pollution and economic considerations have exposed the need for a new paradigm of the management and operations of the transportation system in the State of Texas. This reality is not limited to the Texas Triangle or major interstates. The Texas Department of Transportation's El Paso District faces unique transportation challenges including aging infrastructure and ITS technology, less than optimal traffic management systems, and nascent inter-agency coordination in responding to managing traffic and traffic incidents. In the face of such challenges, the priorities of TxDOT are shifting from capacity-building first agency to one that efficiently manages and operates the transportation system.

1.1 What is TSMO?

Transportation Systems Management and Operations also called Management and Operations (M&O) strategies, are defined in the 2012 legislation "Moving Ahead for Progress in the 21st Century" (MAP-21) as "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."

1.2 Benefits of TSMO

TSMO provides agencies with the tools to manage and operate what they already own more efficiently and effectively before making additional infrastructure investments. Applying TSMO solutions that cost less than road expansion projects can yield a high return on investment. One major benefit for TSMO is that it can target the unexpected delays, reduce their impacts to the system, and regain much of the lost capacity. The benefits to TSMO can include:

- Improved quality of life
- Smoother and more reliable traffic flow
- Improved safety
- Reduced congestion
- Less wasted fuel
- Cleaner air
- Increased economic vitality
- More efficient use of resources (facilities, funding)

Figure 3 highlights additional benefits of TSMO across broader transportation disciplines.

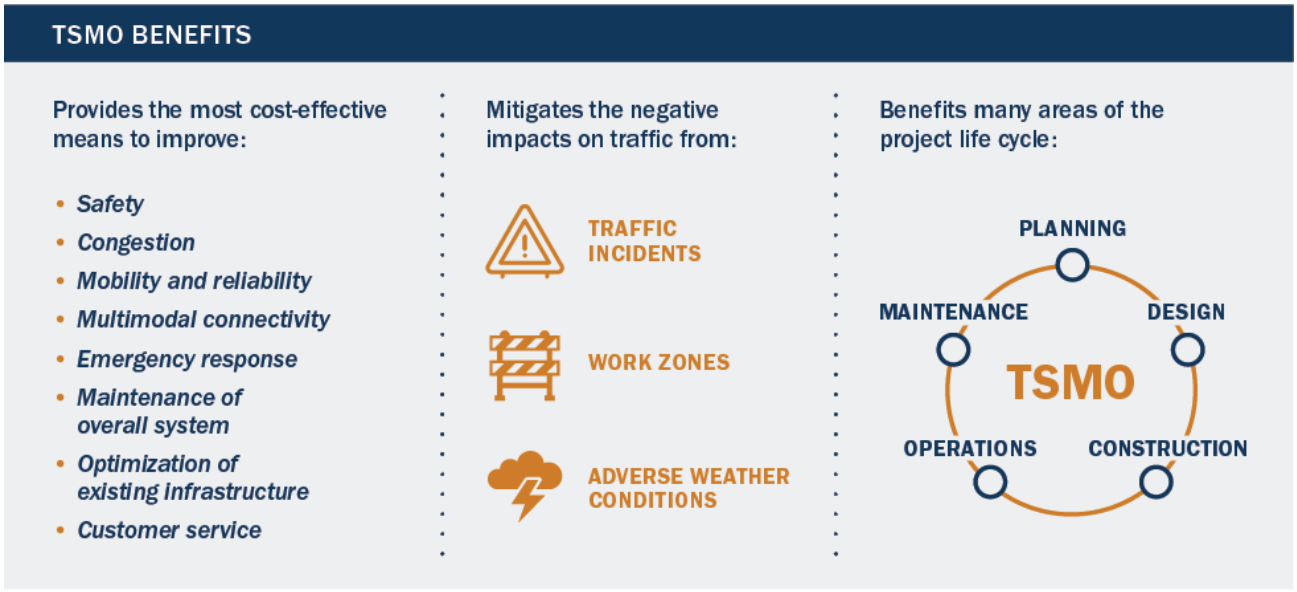


Figure 3: Benefits of TSMO

1.3 What is a TSMO Program Plan?

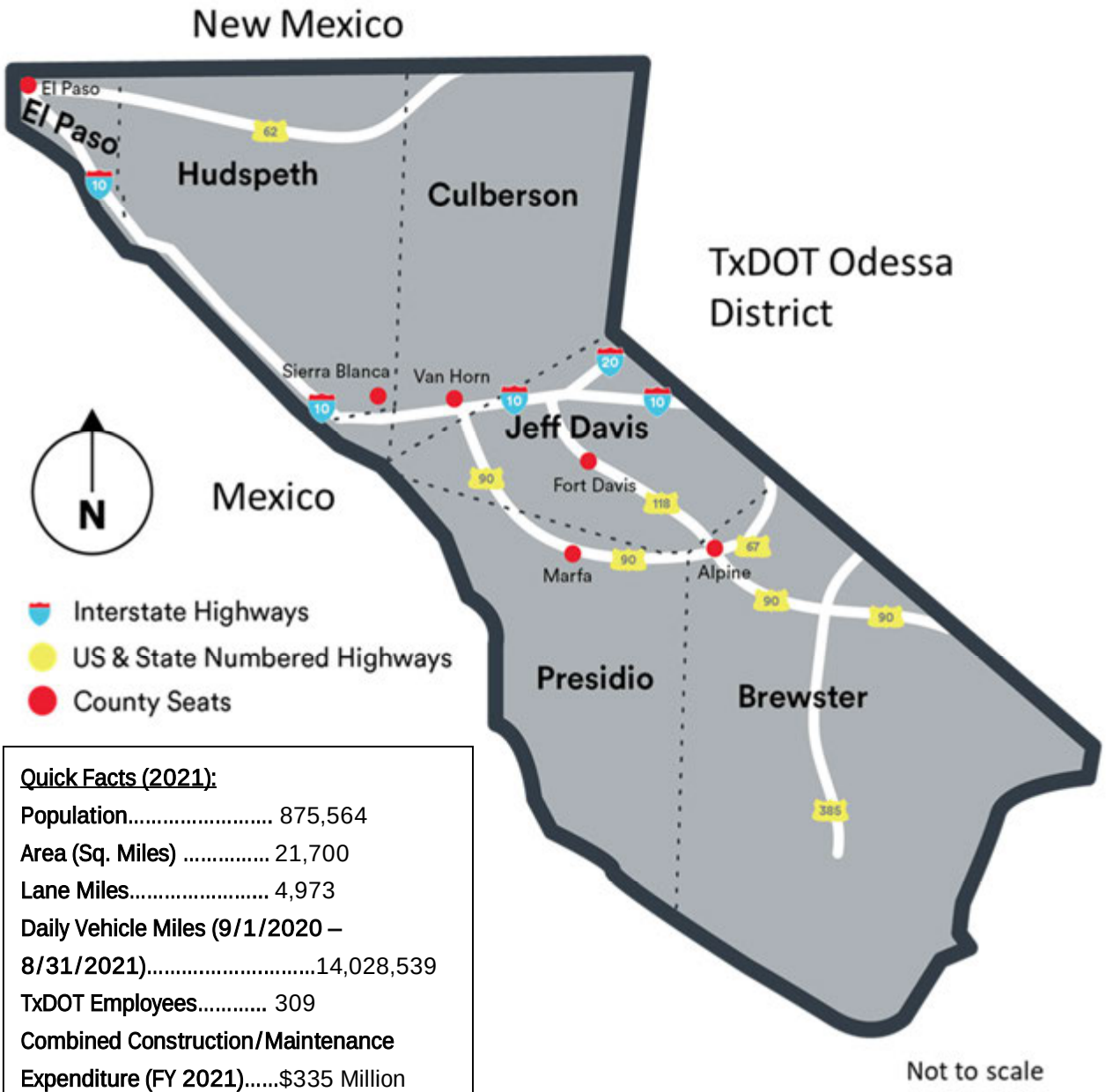
To reap benefits of TSMO, TxDOT is implementing a Statewide Strategic Plan for Transportation Systems Management and Operations (TSMO) in all 25 of the agency's geographic districts. As such, the El Paso District (shown in Figure 4) is developing a TSMO Program Plan to analyze the district's transportation system management and operations capabilities and make a plan to implement programs and strategies to mainstream management and operations into the district's processes.

Transportation agencies across the country, including Texas Department of Transportation, are moving from implementing ad hoc TSMO projects towards institutionalizing it as a core function of the agency. To structure and sustain this shift, many agencies have found it valuable to develop a TSMO program plan that outlines the strategic, programmatic, and tactical visions for TSMO, and the steps needed to achieve them. Management and operations stakeholders work together with transportation planners, designers, and other partners to develop this vision by finding agreement on:

- Strategic elements: business case for TSMO; TSMO program mission and vision; goals and performance measures
- Programmatic elements: organizational structure; staffing and workforce needs; leadership needs and roles; business processes
- Tactical elements: TSMO projects or services; policies for implementation.

TSMO program planning can help an agency increase the effectiveness of its TSMO efforts by providing a clear understanding of what the TSMO program entails, what it aims to achieve and how, and how it fits within the larger agency context. TSMO program plans can help stakeholders develop operations objectives to guide the

selection of management and operations strategies, integrate projects in the region's planning and programming processes, and identify performance measures that will enable them to track progress.



Quick Facts (2021):

Population..... 875,564
Area (Sq. Miles) 21,700
Lane Miles..... 4,973
Daily Vehicle Miles (9/1/2020 – 8/31/2021).....14,028,539
TxDOT Employees..... 309
Combined Construction/Maintenance Expenditure (FY 2021).....$335 Million
# of District CCTVs.....189
# of District DMS.....89
# of District and CoEP Traffic Signals....388

Source: TxDOT District and County Statistics (DISCOS)

Figure 4: TxDOT El Paso District Map

1.4 TSMO Program Plan Format

The plan includes the business case for TSMO; the vision, mission and goals for the District's TSMO program; the El Paso District's Capability Maturity Model; an implementation plan for TSMO; and an assessment of TSMO tactical plans for the District. The implementation plan for TSMO introduces a series of recommended strategies prioritized by District stakeholders and steering committee. The steering committee comprises leaders from each of TxDOT El Paso District's functional groups, including design, construction, transportation planning & development, and transportation operations. This group guided the development of the plan and assisted with the prioritization of strategies for implementation. The implementation plan serves as a series of actions that the District may take to improve the agency's capabilities in TSMO focus areas.

1.5 TSMO Hierarchy

In 2018, TxDOT released the first version of the Statewide Strategic TSMO Plan. This plan outlined the State's overall mission, vision and goals for improving the agency's capabilities in managing and operating the transportation system. This plan includes TSMO strategies, introduces and endorses the CMM tool, and demonstrates the agency's overall development of TSMO.

Each TxDOT district is developing an individual TSMO Program Plan to assess their management and operations capabilities, as well as developing recommended strategies/processes/institutional arrangements for implementation plans. Each plan summarizes the business case for TSMO, overview of priorities, CMM results, collaboration with stakeholders, prioritized strategies and actions for each district to get to the next CMM level. The CMM is a framework that allows for the assessment of an agency's capabilities in TSMO across the dimensions of business processes, systems and technology, performance measures, organization and workforce, culture, and collaboration. For each recommendation from the CMM and other feedback from each district, TSMO plans include performance measures and may also include recommended equipment and technology.

Many strategies can be enabled by a robust ITS system. TSMO does not include ITS implementation but may be supplemented by a district's ITS Master Implementation Plan to outline future planned ITS equipment upgrades for the district. If existing systems are not sufficiently integrated, districts may also update their regional ITS architecture. The FHWA defines regional ITS architecture as, "A specific, tailored framework for ensuring institutional agreement and technical integration for the implementation of ITS Projects or groups of projects in a particular region." Regional architectures are required for system integration and support regional objectives and ITS needs.

Finally, the TSMO Program Plan may reference other major initiatives that should be studied in additional plans to implement an array of strategies or processes to specifically address a priority issue and/or gap. For example, TSMO tactical plans may be recommended in a program plan to develop and implement a comprehensive incident management plan for the district. If this is a priority, the next step for the district is to study the issue in detail, including defining corridors for agency response and specific roles and responsibilities by geography, where/when/how to stage equipment, and location of alternate routes. Tactical plans should also include performance measures developed in conjunction with key stakeholders. The plans should also

define specific roles for staff, how to document and communicate objectives progression, and any additional organizational partnerships and agreements. Figure 5 shows a summary of the hierarchy of TSMO documents.

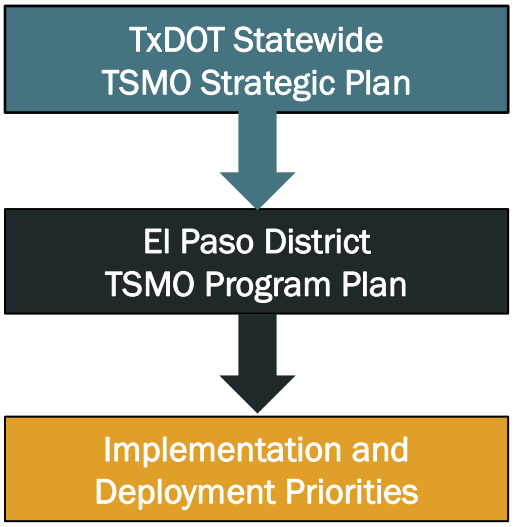


Figure 5: TSMO Program Plan Development

1.6 TSMO Leadership

TxDOT El Paso District leadership for the TSMO Program includes the TSMO Coordinator and TSMO Champion. The TSMO Coordinator is the point of contact for the District's TSMO program, key organizer of TSMO related meetings, and responsible for tactical planning of TSMO and implementation of TSMO Strategies.

The TSMO Champion shows support for the program at an agency-level and advocates for the program to stakeholder agencies. Also, district leaders of TxDOT's functional groups—including safety, public information office, construction, transportation planning and development, transportation operations, maintenance, traffic, and the area offices—comprise the steering committee. Leaders from stakeholder agencies such as the El Paso Metropolitan Planning Organization (MPO), cities and counties should be consulted in developing plan priorities and coordinated strategies.

TSMO is also enabled by a steering committee. As previously indicated, the steering committee comprises the functional area leaders in TxDOT, such as those from design, operations, and construction, as well as the public information officer (PIO) and safety coordinator in the district. The steering committee member's role in TSMO implementation is to advise and work with the coordinator and champion to implement, document, and improve TSMO strategies, processes, and low-cost enhancements related to their functional group. The rollout of TSMO includes a series of action items and their relation to a steering committee member's or staff's duties.

Figure 6 shows the El Paso District's Organizational Chart at a higher level. Generally, the TSMO steering committee includes at least one representative from each of a District's functional groups, and the champion and coordinator are key staff in operations, maintenance, and/or traffic.

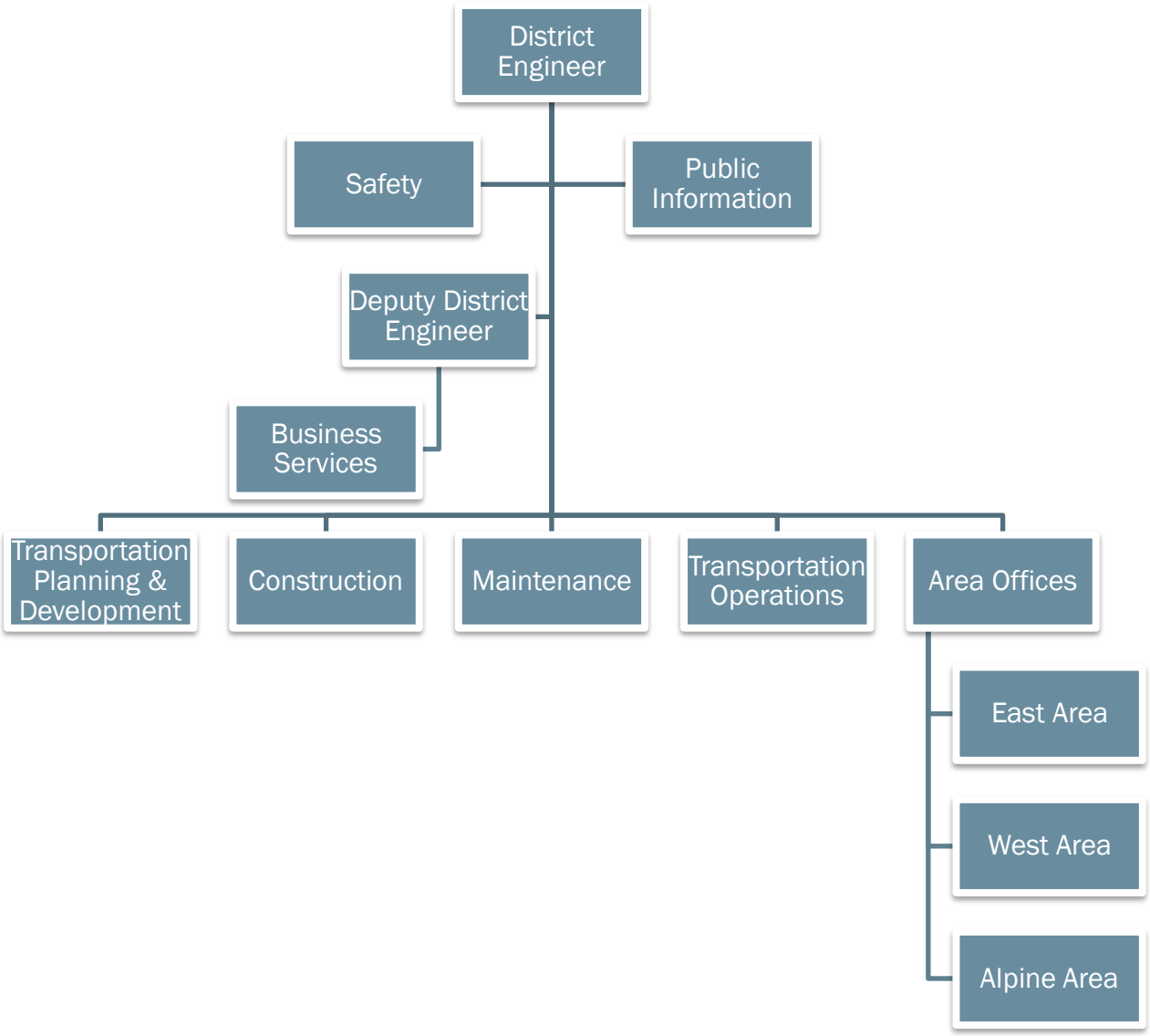


Figure 6: El Paso District Organization Chart

2.0 Business Case for TSMO

The business case for TSMO is built on providing TxDOT and its partners a robust set of strategies to maintain safety and reliability of the transportation system in the face of increased regional growth, severe weather, major construction projects, and limited resources and budget. TxDOT El Paso District is expected to necessitate optimized transportation infrastructure due to increase in population growth, congestion, safety, vehicle miles traveled (VMT), and trucks and freight movement. The following subsections describe these challenges and how TSMO can contribute to addressing these challenges.

2.1 Population Growth

Congestion levels are increasing rapidly due to the growth in population and increased demand on El Paso District roadways. The population for the District in 2020 was estimated at 877,000, with El Paso urban area hosting a majority of the population. The population is expected to continue to grow by up to 0.5% annually for the next decade, which can lead to even bigger transportation demands.

2.2 Congestion

According to the 2021 TTI Urban Mobility Report, delays from congestion resulted in an extra 17.5 million hours in travel time and the purchase of an extra 7.7 million gallons of fuel in 2020, totaling $394 million in congestion costs for El Paso urban area. Based on the TTI estimates, lost time and wasted fuel due to congestion cost an average commuter $688 (32 hours).

A primary function of TxDOT is to provide safe and reliable transportation to the system's end users. Congestion, particularly along the IH-10 corridor, has a negative impact on overall corridor mobility and safety, as well as the region's economic competitiveness (El Paso IH-10 Integrated Corridor Management Concept of Operations). Speeds along IH-10 are consistently under 45 mph during the AM and PM peak periods (El Paso IH-10 Integrated Corridor Management Concept of Operations). Mobility strategies, such as an optimized TOC, asset management, work zone management, and road weather management, can help to reduce congestion. Congestion can be broken down into recurring and non-recurring categories (Figure 7).

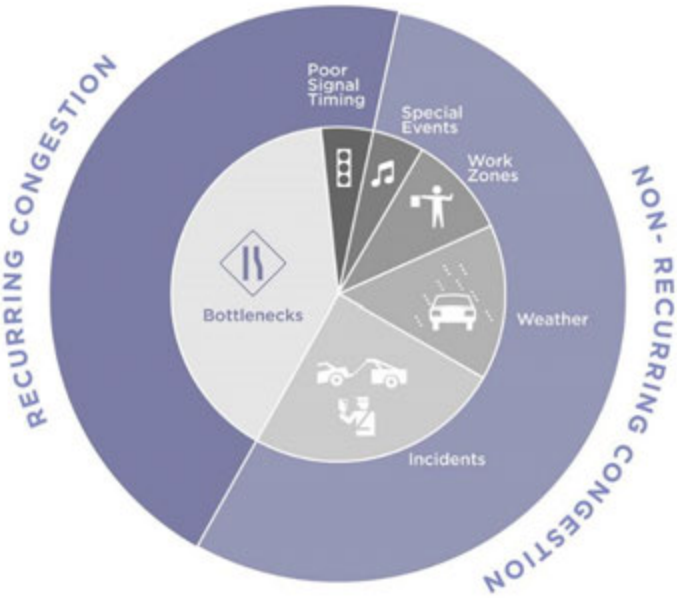


Figure 7: FHWA Causes of Congestion

Source: https://ops.fhwa.dot.gov/publications/fhwahop14034/ch1.htm

Recurring congestion occurs on a regular basis and typically is associated with roadway capacity and demand. The population of the El Paso metropolitan area will increase about 1 percent over the next 15 years (United Nations Population Prospects 2019).in addition to local commuters and heavy truck traffic, the El Paso region is visited by an estimated 9.25 million tourists annually (Visit El Paso 2016). Prior to the COVID-19 pandemic, border crossing traffic in the El Paso Sector of CBP included around 7 million pedestrian entries and 20 million personal vehicle passengers annually (Bureau of Transportation Statistics, 2021). As regional vehicle miles traveled continues to increase, recurring congestion also will grow unless innovative, proactive actions are taken.

Non-recurring congestion is not typical and occurs because of incidents, such as crashes, disabled vehicles, work zones, adverse weather conditions, and planned special events. It contributes to roughly half of overall congestion. Non-recurring congestion reduces the available capacity and reliability of the transportation system. Non-local commuters, including vacationers and freight travel, often are affected greatly by non-recurring events.

Important mobility statistics for the El Paso urbanized area include the following, taken from the of the Texas A&M Transportation Institute (TTI) 2021 Mobility report (https://mobility/tamu.edu/umr/congestion-data/).

- Annual Total Delay: 17.5 million hours
- Annual Delay per Auto Commuter: 32 hours
- Annual Truck Delay: 888,000 truck hours
- Annual Congestion Cost (Trucks): $47 million
- Annual Congestion Cost: $394 million

- Annual Congestion Cost per Commuter: $688
- Annual Excess Fuel Consumed: 7.7 million gallons
- Annual Wasted Fuel per Auto Commuter: 14 gallons

As an example of how TxDOT already is applying TSMO approaches to activities, opportunities as part of statewide freight projects have begun to be identified in the *Texas Freight Mobility Plan* to implement TMS or ITS devices. For more information on the *Texas Freight Mobility Plan*, refer to: http://ftp.dot.state.tx.us/pub/txdot/move-texas-freight/studies/freight-mobility/2017/plan.pdf.

Project development with a TSMO approach leads to inclusion of operations and management strategies that can result in the controlled management of incidents, work zones, weather, and special events and can reduce the impacts of these interferences on the transportation network. TSMO helps ensure congestion-related mobility challenges are mitigated through emphasizing integration of innovative strategies that maximize existing and future throughput.

Examples of TSMO strategies that can be implemented to mitigate the impact of non-recurring congestion include:

- Traffic Incident Management – Safe, quick clearance of traffic incidents on roadways reduces the occurrence of secondary incidents (incidents caused by the effects of the original incident). A FHWA study estimates that the chance of secondary incidents increases by 2.8 percent for each minute the initial incident continues to pose a hazard (FHWA Enhancing Transportation: Connecting TSMO and Safety, December 2018).
- Road Weather Management – Promotes safety by providing timely, accurate, and relevant information about roadway impacts of weather on travelers and transportation agencies, allowing agencies and drivers to make safe decisions during inclement weather. This is especially important in El Paso, where elevation differences result in greatly variable winter weather conditions.
- Traveler information before and within work zones and in advance of congested slowdowns and queues can alert drivers of upcoming hazards, enable drivers to re-route, and create safer driver behavior.
- Traffic Management – Active traffic management strategies such as dynamic speed limits and dynamic lane control on freeways can harmonize vehicle speeds when congestion is building and reduce erratic flow conditions that lead to crashes.

2.3 Funding

Funding requirements for highway improvements have drastically increased in the El Paso District in recent years. Apart from demand for more funding, there is a need to address every highway project from “right-of-way to right-of-way” meaning the funding should be robust enough to focus on traffic, maintenance and operational improvements, as well as pavement and bridge improvements.

Operational improvements such as those introduced in the El Paso District TSMO Program Plan have a higher benefit-to-cost ratio than highway construction projects alone. The approach presented in this plan supports TxDOT's effort to meet the funding gap in annual needs to actual funding. The annual needs and budget from the Texas Transportation Plan 2040 are presented in Figure 8. The TSMO approach to project development, planning, operations and maintenance results in cost-effective strategies that aim to address issues of safety, congestion and mobility before spending an additional dollar on new capacity projects.

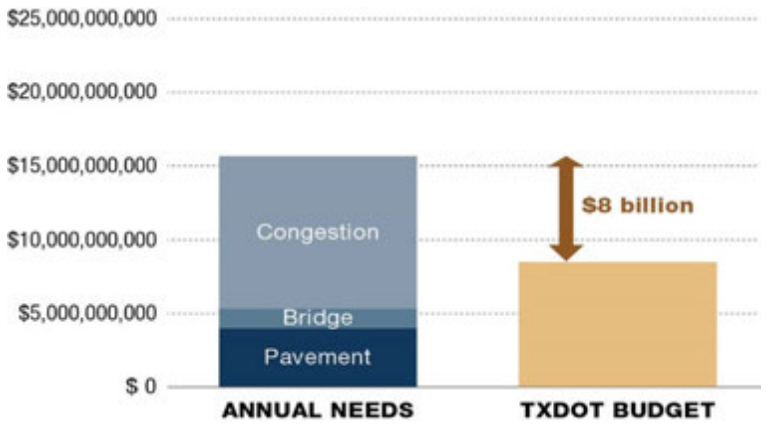


Figure 8: TxDOT Annual Transportation Needs and Budget

Source: Texas Transportation Plan 2040

Agencies that place importance on TSMO in long-range planning, project development, system completion, and system maintenance have a strong basis for devoting funding to these strategies because operations and management activities can improve congestion while minimizing or delaying the need for physical capacity improvements. Applying a TSMO approach in the early stages of project development can help establish procedures that lead to efficient and cost-effective implementation of management and operational strategies. Funding for TMS and mobility strategies can be lower if they are considered early in project development rather than added on or performed separately. Operational improvements can be made through cost-effective coordination among separate organizational units or separate agencies.

TSMO addresses funding constraints by placing an emphasis on maximizing the efficiency of existing and future transportation facilities versus traditional construction. TSMO strategies are not intended to cost a lot but to leverage existing sources and enhance the effectiveness of operations and management of the transportation system with documentation, formalized communication, and coordination. TSMO facilitates the required culture shift to modify the way projects are funded and the transportation network is enhanced and maintained. Through TSMO planning, funding is dedicated to include TMS in conventional construction, asset management techniques, upgrades to existing infrastructure, workforce resources, and other operational strategies. The TxDOT El Paso District has applied several TSMO strategies to address congestion and incident management. They have a significant investment in TMS including field device deployment and the TransVista Traffic Management Center (TMC). Investments to further improve TOC capabilities should be emphasized in the budgeting process. In June 2020, the District implemented the Highway Emergency Response Operator (HERO) Program to improve congestion by responding to and preparing for traffic incidents, expediting the incident recovery time.

2.4 Safety

Safety is a major concern on El Paso District roadways. There was a slight decrease in the number of crashes over the past few years however, there were 95 fatalities in 2019, a slight increase from the previous year as recorded by the El Paso District. Table 4 shows data for fatalities, suspected serious injury crashes, and total crashes for 2018 through 2020 as reported by CRIS.

TABLE 4: EL PASO DISTRICT CRASHES BY SEVERITY, 2018 - 2020

#EndTheStreakTX

Year	Fatalities	Suspected Serious Injury	Total Crashes
2018	103	246	24,197
2019	96	257	23,702
2020	87	207	18,630
Average	95	237	22,176

By improving mobility and reliability, safety is enhanced by reducing the likelihood of primary and secondary crashes. This can include vehicular crashes, special events, inclement weather, construction, disabled vehicles, debris in the road, or other non-recurring events. Operational strategies identified through TSMO integration, such as ITS in work zones and TIM plans, allow TxDOT to prepare for, track, respond to, and mitigate roadway incidents, thereby enhancing safety and mobility.

Improving safety for all modes of transportation is critical for a resilient transportation network. In 2016, 38 percent of fatal crashes included pedestrians and bicyclists, a 5 percent increase from the previous year. When TSMO activities are considered in project development, such as during planning for roadway maintenance, solutions to improve safety for other modes of transportation can be identified and implemented. Stakeholder outreach, including workshops and one-on-one meetings, revealed numerous opportunities to apply TSMO concepts and strategies including:

- Multiple stakeholders gave examples of recent incidents when improved data sharing and notification would improve their incident response capabilities. For example, law enforcement, TxDOT, and other stakeholders could compile a data sharing partnership to alert Sun Metro in real-time to traffic incidents that impact stakeholders such as Sun Metro to re-route buses away from an impacted route, reducing impact to bus service schedules and limiting the potential for secondary incidents.
- In rural areas, multiple agencies and TxDOT staff require clarification on their roles and responsibilities in managing incidents. Texas DPS controls the incident scenes, but additional planned responses from TxDOT and partner agencies to manage traffic incidents in the rural areas of the District could improve. TxDOT addresses most incidents on an ad-hoc basis and may consider developing and implementing a rural incident management plan to define responsibilities and incident response procedures in advance.
- The El Paso Office of Emergency Management discussed the need for additional coordination and real-time data sharing in response to emergency events such as snow and icing. TxDOT shares

information related to events when the Emergency Operations Center (EOC) asks but TxDOT can improve coordination by automating the delivery of the information.

2.5 Other Business Cases

This section outlines additional business cases for TSMO and strategic recommendations to effectively mainstream TSMO. Figure 9 lists additional business cases for TSMO in the El Paso District, highlighting the key drivers in the district, mobility challenges and opportunities resulting from these drivers, and relevant TSMO strategies to address them.

Figure 9: El Paso District Business Case for TSMO – Drivers, Challenges/Opportunities, and Strategies

Specific TSMO strategies to address current project life-cycle processes deficiencies may include:

- A Champion for the District's TSMO Program Plan would oversee fostering a culture that prioritizes TSMO and buy-in exists at the staff-level, which TxDOT could use in implementing and mainstreaming TSMO.
- TxDOT Traffic staff indicated the need to improve TMC operations training, including cross-training in the future with partners such as the City of El Paso who may be using the TMC jointly. Training plans and programs could include better education and would enable staff to implement new upgrades to the TMC, more efficient operations, and mainstreaming and/or accelerating the onboarding of new employees.
- TxDOT Traffic Systems Admin also expressed a desire to be more involved in the review of construction projects. Traffic Systems desires a greater level of input in design and construction especially when a

project requires ITS equipment and integration with the TMC. This would help improve TMC operations and benefit the design division in mainstreaming ITS into their projects.

2.6 Mainstreaming TSMO

Mainstreaming TSMO requires that TxDOT El Paso keeps operations and management as a core mission of the agency and requires a philosophical shift in TxDOT from an agency that builds more capacity to one that optimally operates and maintains the current system. A central champion for the District's TSMO Program Plan needs to oversee fostering a culture that prioritizes TSMO and buy-in at the staff level. Training plans and programs could include further education to enable staff to implement TSMO strategies, better document system performance leading to more efficient operations. TSMO strategies can include implementing training programs related to different functional areas, such as operations, maintenance, and traffic modeling. Formalizing the adoption and tracking employee progress with specific TSMO-related training materials, such as those being developed by TxDOT's Traffic Safety Division, can help mainstream and/or accelerate the onboarding of new staff and enable the District to have a TSMO-oriented workforce.

3.0 Challenges and Opportunities

To identify mobility challenges in the El Paso District, a performance-based framework, the CMM, was implemented as a process for data collection. The CMM includes a series of dimensions to assess TxDOT's abilities in business processes, systems and technology, organization and workforce, performance measures, culture and collaboration, all of which are discussed in detail in Capability Maturity Model section of this plan. This framework helped the El Paso District to identify its strengths, weaknesses, and opportunities for improvement. In addition to the CMM process, a series of one-on-one interviews with key stakeholders in the district with TxDOT and other agencies uncovered mobility challenges facing the El Paso District. These data collection processes uncovered mobility challenges such as, but not limited to:

- TSMO strategies are not considered early enough in the project development process to ensure traffic mitigation is considered by the time a project is designed and constructed. Stakeholders and the public may not always be made aware early enough of timelines for closures and alternate routes. Strategies in the implementation plan to consider when addressing this challenge include:
  - TM03: Improve Coordination and Collaboration with District's Traffic Management Team (TMT)
  - WZM06: Stakeholder Involvement Checklist
- Truck traffic and congestion due to lane closures in a work zone exacerbates mobility and safety issues and could potentially lead to traffic incidents, Strategies in the implementation plan to consider when addressing this challenge include:
  - TM08: Standardize Traffic Operations in Construction Projects
- TxDOT projects sometimes have overlapping timelines and plans, leading to redundant or conflicting work. Strategies in the implementation plan to consider when addressing this challenge include:
  - TM01: Determine System Platforms/Applications for Collaboration
- District staff may require additional training to be able to utilize some of the advanced strategies such as Advanced Traffic Signal Performance Measures (ATSPM) that helps to better manage and

incorporate signal timing plans in select corridors. Strategies in the implementation plan to consider when addressing this challenge include:

  - TM02 Create a Technical and Procedural Guidance Toolkit for Staff

- Reporting and sharing consistent weather data was deemed as critical by stakeholders, especially during weather events and also for weather-dependent construction and maintenance activities. Strategies in the implementation plan to consider when addressing this challenge include:
  - RWM01: Proactively Share Situational Reports of Weather
  - RWM04: Improve Weather Data Sharing
  - RWM06: Improve Linkage Between the RWM and Other Planning Activities

In addition to the strategies recommended in this plan, the TxDOT Statewide TSMO Strategic Plan identifies many statewide strategies being implemented relevant to these challenges, including:

- Statewide standard operating procedures to improve operational interoperability
- Emergency response plans to improve preparedness, response, and recovery
- Increase ITS systems support by the Traffic Safety Division (TRF) to the districts to improve asset uptime
- Develop enhanced traffic signal system implementation plans
- Implement performance dashboards for safety and travel reliability during construction
- Support rural operations that have limited resources to support TSMO goals
- Strengthen Traffic Incident Management teams to safely reduce incident clearance times

Through these and other strategies identified in this program plan, the El Paso District can have the tools to address its priority mobility challenges. The remaining sections of this plan lay out the District's vision, mission and goals for TSMO, identify the specific needs uncovered in the CMM process, and present a series of recommended steps to address these needs in the Implementation Plan. Finally, the plan recommends some additional tactical plans to address specific mobility or safety challenges.

This section summarizes mobility, safety and congestion challenges facing travelers on El Paso District's transportation systems. Most of the challenges are provided with appropriate TSMO strategies or reference other TxDOT plans, studies, and reports. Every challenge, no matter how daunting, offers an opportunity for improvement.

3.1 Challenges

3.1.1 CHALLENGE #1: TRAVEL RELIABILITY AND SAFETY

In the El Paso District, Interstate Highway (IH) 10, US 54, IH 110, and Loop 375 are the primary system roadways. IH 10 through the District is one of the most critical highway segments in the United States. Closures or delays on these facilities can result in long delays, long detour routes, and diversions of high traffic volumes

onto urban streets and rural roads lacking the capacity to carry such traffic loads. Bordered by the Franklin Mountains to the north and the international border to the south, there are few alternative routes for diverting IH 10 traffic, and some of those alternatives are so close to IH 10 that they may not be feasible, such as during a hazardous materials incident on IH 10. Loop 375 Transmountain Highway (Transmountain) can be considered a detour route for IH 10 but is more likely to be impacted by weather due to its elevation. In addition, Transmountain's steep grades would notably limit its capacity if large truck volumes were diverted to it. The next high traffic capacity corridor to the north is Interstate 40, over 200 miles to the north. The lack of feasible nearby alternative routes increases the critical nature of TSMO strategies to keep essential parts of the mobility system open to capacity.

3.1.2 CHALLENGE #2: HIGH VOLUME OF FREIGHT MOVEMENT

Truck traffic represents a major contributor to the Average Annual Daily Traffic (AADT) for several designated truck routes within the District. Based on information from the Statewide Planning map (https://www.txdot.gov/apps/statewide_mapping/StatewidePlanningMap.html), IH-10 has truck percentages from the 7 to 8% range in the urbanized areas to over 50% in the more rural areas. This is partly due to cross-country trucking on IH 10. Truck percentages on the TxDOT Freight Network within the El Paso metropolitan area range from below 2% to approximately 10%, with the lower values on non-controlled access roads.

Cross border truck traffic is vital to the local and State economy. This border cargo includes raw materials, produce, and manufactured goods. Prior to the COVID-19 pandemic, the cross-border truck traffic totaled over 700,000 trucks annually in the El Paso sector (BTS 2021). Another important element of this traffic is cargo related to maquiladoras, those businesses where manufacturing of products takes place on both sides of the border with the destination of most finished goods being in the United States. TSMO strategies to manage and operate the transportation system protect this supply chain and help meet just-in-time delivery schedules in a safe and timely manner. TSMO strategies include the following:

- New transportation strategies make goods movements more predictable and efficient, translating into lower costs for goods and enhanced economic competitiveness.
- Quicker incident identification, quicker response time, and faster incident clearance all combine to reduce the duration of non-recurring congestion events.
- Real-time information about travel conditions, weather, and road work helps truck drivers and dispatchers to make informed, safe decisions about travel routes and schedules.
- Highways on the TxDOT Freight Network within the District include all or parts of IH 10, IH 110, SH 20, US 54, US 62, Loop 375, Loop 478, Airway Boulevard, Hawkins Blvd, FM 2316, FM 76, Delta Drive, and Spur 601. TSMO freight strategies include advanced technologies that optimize freight movement scheduling and dynamic route guidance. These strategies, if deployed, could use real-time information on traffic conditions and border crossing times on US 62, IH 110 and Zaragoza Street to recommend optimal truck routes.
- The District borders New Mexico on the west and north. TSMO strategies need to include communication and coordination with New Mexico local and state agencies wherever possible.

- Private logistics firms have their own data sources and needs. While these firms may already utilize on-line ITS data to augment their own data, there may be an opportunity for two-way data sharing, although it is possible that these companies will consider their data confidential.

3.1.3 CHALLENGE #3: IMPROVING TRAVELER INFORMATION RELATED TO NON- RECURRING DELAY

Many of the travel decisions, especially for freight and long-distance through travel, are made in Mexico, New Mexico, or other locations outside the regional boundaries. Consequently, travelers and truck traffic arriving in the El Paso District may not be aware of work zones, lane closures, or weather-related capacity restrictions. TSMO strategies like predictive traveler information, especially for long-distance travel (e.g., the IH 35 Work Zone Project), might be particularly useful in combination with statewide resources. Projects including the El Paso Intelligent Transportation System Ports of Entry Concept of Operations should be referenced by TxDOT and partner agencies to address port of entry needs and implementation of ITS to address needs and ITS improvements to El Paso Ports of Entry.

Over ten years ago, the El Paso District developed an Incident Management Plan (IMP) to deal with lane and complete freeway closures due to planned or unplanned incidents. The IMP is no longer used due to being obsolete. An updated and modernized IMP would be a useful and effective tool for incident management. IMPs should cover all counties in the District, and the District may consider developing separate IMPs for both the urban and rural areas. Staff reported the need for improved performance measurement, better collaboration, traffic management training, and advances in work zone management methods.

3.1.4 CHALLENGE #4: MAKING DATA- DRIVEN DECISIONS TO MAXIMIZE TXDOT'S RETURN ON INVESTMENT AND VALUE TO CUSTOMERS

TSMO strategies are generally low-cost compared to capacity investments. More importantly, they are extremely cost-effective in terms of the benefits produced. By utilizing the data generated by TSMO and combining it with existing TxDOT resources, investments for both TSMO or for other transportation investments can be based on performance and cost-benefit analysis, including social costs. TSMO is a catalyst to establish and ensure the availability of reliable real-time data sources, expert staff, and clear performance measures to effectively collect, report, and share data and to monitor performance for the region.

3.2 Opportunities:

3.2.1 OPPORTUNITY #1: IMPROVING SAFETY AND RELIABILITY ON ROADWAYS

The El Paso District is committed to the formal Road to Zero goal adopted by the Texas Transportation Commission to achieve zero fatalities on roadways by 2050 and to cut fatalities in half by 2035. According to a Crash Records Information System (CRIS) query for 2018 through 2020, highways and streets in the El Paso District averaged approximately 22,176 total crashes, 95 fatalities, and 237 suspected serious injury crashes per year. The District was awarded funds in 2020 primarily to improve safety on roadways. The projects include sidewalk illumination, wrong-way driver detection system, median concrete barriers, pedestrian hybrid beacons, queue detection system and etc.

TSMO strategies improve safety by addressing unpredictable congestion. Strategies that provide information to travelers and allow quicker incident response are becoming more widely available:

- Road weather information systems can reduce traveler delay and lower crash rates by 7 to 83 percent.
- Traffic incident management can decrease incident duration by 30 to 40 percent.
- Traffic signal optimization can decrease delay substantially (13 to 94 percent) while improving safety at a fraction of the cost of infrastructure capacity expansion.
- Smart work zone management results in improved safety to both the traveling public and construction workers.

3.2.2 OPPORTUNITY #2: IMPROVING THE ABILITY OF TXDOT TO PLAN, RESPOND, COLLABORATE, AND RECOVER FROM EMERGENCIES

Flooding was noted as a concern and an on-going challenge due to the occasional heavy rainfall, ice, and snow events. Ice storms, snow, and short-term flooding from heavy rainfall events have an impact on emergency response times. In an interview, District ITS staff reported the need for better systems for remote weather monitoring. District staff reported the need to send personnel to Transmountain Highway to determine the presence of snow or ice. Remote monitoring is also needed for highway segments that are simply too far from staffed offices for in-person observations to be practical.

District staff also noted the need for more robust and reliable ITS communications. Currently, there are not enough cameras, flood gauges, or access for reliable remote assessment (extent of snow or ice, roadway water depth measurement and verification) of flooding and operational issues. TSMO capabilities including improved monitoring of facilities, interoperable systems, enhanced field-to-center communication links, and data sharing will help the El Paso District with greater preparedness, situational awareness, and the ability to manage the roadway system.

3.2.3 OPPORTUNITY #3: PROVIDING TSMO LEADERSHIP FOR THE REGION

As the primary agency responsible for the most important travel corridors in the region, it is logical that TxDOT would lead regional TSMO efforts. This leadership includes recognizing the roles of other important agencies and partners, educating them of the benefits of TSMO, collaborating with them, and creating a regional TSMO that is greater than the sum of its parts. This role may not be formally recognized or widely appreciated, but the District has already achieved a measure of prestige through its past ITS success. This prestige may result in opportunities to expand funding for TSMO if regional leaders recognize the level of TxDOT effort needed and the value that would accrue to TxDOT, partner agencies, and the travelling public.

Compared to other large urban districts, El Paso may have advantages in terms of skilled workforce available to staff TSMO. The University of Texas at El Paso includes engineering and other specialties needed for TSMO planning, deployment, and operations. While the region's economy experiences cycles, similar to other regions, there may be less local competition for skilled employees than in larger metro areas, especially during positive economic times.

On new projects and major reconstruction projects in the District, TSMO is integrated on ad-hoc basis into the overall project development process. However, making TSMO as a standard policy could result in better inter-departmental and inter-agency coordination for the projects, thus reducing delays due to permits coordination or lack of communication with appropriate stakeholders.

4.0 TSMO Vision, Mission, Goals, and Objectives

The El Paso District TSMO Program Plan is guided by the TxDOT statewide TSMO Mission, Vision, and Goals (Figure 10). The statewide mission, vision, and goals were confirmed by the steering committee on February 23, 2021.

Figure 10: TSMO Mission, Vision, and Goals

4.1 District Specific TSMO Vision, Mission, Goals and Objectives

4.1.1 El Paso District TSMO Vision

Enhance quality of life and contribute for sustainable economic growth by delivering optimized, safe, and reliable transportation system.

4.1.2 El Paso District TSMO Mission

Connect people and goods to destinations by delivering a safe, reliable, and efficient transportation system through performance-based planning, building, and operation.

4.1.3 El Paso District Goals and Objectives

TxDOT El Paso District has set the goals and objectives for the region as described in Table 5 and Table 6.

TABLE 5: TXDOT EL PASO DISTRICT TSMO SYSTEM-LEVEL GOALS AND OBJECTIVES

Goal	District TSMO Objectives	Strategic El Paso District Objectives
System Level Objectives		
Safety	Reduce crash frequency and severity	▪ Reduce number of overall crashes and severity ▪ Reduce frequency of crashes ▪ Reduce the number of fatalities
Reliability	Improve transportation system reliability, increase system resiliency, and optimize travel time along critical corridors.	▪ Reduce incident clearance time ▪ Improve free flow travel time on TxDOT freeways ▪ Reduce congestion and bottlenecks ▪ Optimize travel time reliability on major freight corridors
Efficiency	Minimize traffic delay and maximize transportation system efficiency to keep traffic moving.	▪ Reduce work zone related traffic delays ▪ Optimize signalized corridors ▪ Expand TMC surveillance and management capabilities
Innovation	Utilize technology and innovation to facilitate TSMO	▪ Integrate and standardize all TxDOT data systems. ▪ Seek strategic pilot project deployment opportunities

TABLE 6: TXDOT EL PASO DISTRICT PROGRAM-LEVEL GOALS AND OBJECTIVES

Goal	District TSMO Objectives	Strategic El Paso District Objectives
Program Level Objectives		
Access	Provide ease of access and mobility choices to customers.	▪ Accommodate alternative modes of travel (transit, rail, bike, ped) into transportation management and operations ▪ Provide accurate, timely and comprehensive information to customers ▪ Provide mode specific information (commercial vehicles, transit)
Collaboration	Engage all TxDOT El Paso disciplines and external partners to proactively manage and operate the transportation system.	▪ Increase efficiency by internal and external partnership opportunities ▪ Increase the scope of Regional Traffic Incident Management Program activities. ▪ Proactively manage and operate an integrated transportation system through multi-jurisdictional coordination, and cooperation between core stakeholders. ▪ Provide consistent incident response and management across urban and rural areas. ▪ Promote data-sharing across transportation jurisdictions.
Integration	Incorporate TSMO strategies throughout TxDOT El Paso transportation planning, design, construction, maintenance, and operations activities.	▪ Include TSMO strategies in TxDOT projects and regional transportation plans ▪ Implement integrated corridor management strategies to manage traffic across multiple jurisdictions.

5.0 Capability Maturity Model

This section includes an introduction to the Capability Maturity Model (CMM) process and an assessment of how each of the six dimensions applies to the El Paso District. The six dimensions are business processes, systems and technology, performance measurement, organization and workforce, culture, and collaboration.

5.1 Introduction to the CMM Process

The American Association of State Highway and Transportation Officials and FHWA recommend that transportation agencies adopt the CMM and CMF methodology to provide guidance about where current TSMO processes stand and how they can be improved. The CMM assessed current capabilities of TxDOT as the first step in building a CMF that developed consensus on proposed goals, and then identified corresponding actions to realize proposed goals. TxDOT El Paso District and stakeholders self-evaluated the District's capabilities using an online CMM survey. Appendix B lists the stakeholders involved in completing the CMM Surveys, outreach meetings, one-on-one conversations, and CMF Workshops. The six dimensions of the CMM include three process-oriented dimensions and three institutional dimensions as shown in Figure 11.

Source: Strategic Highway Research Program (SHRP2), American Association of State and Highway Officials (AASHTO), and Federal Highway Administration (FHWA-HOP-17-017)

Figure 11: Capability Maturity Dimensions

5.1.1 *Process-oriented Dimensions*

- Business Processes (BP): Includes scoping, planning, programming, budgeting, procurement, and project development. By ensuring financial and institutional support, business processes can help integrate TSMO into existing agency actions.
- Systems and Technology (ST): Includes the use of systems engineering, standards, systems architecture, interoperability, standardization, and documentation.
- Performance Measurement (PM): Includes definition of measurements, data acquisition and utilization of data. Performance measures help to evaluate the effectiveness of strategies and determine how successful a program is.

5.1.2 *Institutional Dimensions*

- Organization and Workforce (OW): Includes programmatic status, staff development, recruitment and retention and organizational structure. The focus of this section is how technically qualified staff and an effective organizational structure integrates TSMO activities into various projects.
- Culture (CUL): Includes technical understanding, leadership, outreach, and program legal authority.
- Collaboration (COL): Includes relationships with stakeholders, public agencies, local governments, and private sector.

Consistent with the Strategic Highway Research Program 2 (SHRP2) guidance and other federal CMM and CMF guidance (see References), the capabilities for each dimension are described as a matrix that defines the process improvement areas and levels (from Level 1, ad-hoc, to Level 4, optimized level of capability). Figure 12 depicts the Capability Maturity Model levels. Table 7 below includes this matrix, which shows how each of the six dimensions is assessed for each level.

TABLE 7: EL PASO DISTRICT CAPABILITY MATURITY FRAMEWORK ASSESSMENT RESULTS

Dimension	Level 1 – PERFORMED	Level 2 – MANAGED	Level 3 – INTEGRATED	Level 4 – OPTIMIZED
 Business Processes	Processes related to TSMO activities ad hoc and un-integrated	Multi-year, statewide TSMO plan and program exists with deficiencies, evaluation, and strategies	Programming, budgeting, and project development processes for TSMO standardized and documented	Processes streamlined and subject to continuous improvement
 Systems & Technology	Ad hoc approaches outside systematic systems engineering	Systems engineering employed and consistently used for ConOps, architecture, and systems development	Systems and technology standardized, documented, and trained statewide, and new technology incorporated	Systems and technology routinely upgraded and utilized to improve efficiency performance
 Performance Measurement	No regular performance measurement related to TSMO	TSMO strategies measurement largely via outputs, with limited after-action analyses	Outcome measures identified and consistently used for TSMO strategies improvement	Mission-related outputs/ outcomes data is routinely utilized for management, reported internally and externally, and archived
 Organization & Workforce	Fragmented roles based on legacy organization and available skills	Relationship among roles and units rationalized and core staff capacities identified	Top level management position and core staff for TSMO established in central office and districts	Professionalization and certification of operations core capacity positions, including performance incentives
 Culture	Value of TSMO not widely understood beyond champions	Agency-wide appreciation of the value and role of TSMO	TSMO accepted as a formal core program	Explicit agency commitment to TSMO as key strategy to achieve full range of mobility, safety, and livability/ sustainability objectives
 Collaboration	Relationships on informal, infrequent, and personal basis	Regular collaboration at regional level	Collaborative interagency adjustment of roles/ responsibilities by formal interagency agreements	High level of operations coordination institutionalized among key players –public and private

Source: Strategic Highway Research Program (SHRP2), American Association of State and Highway Officials (AASHTO), and Federal Highway Administration (FHWA-HOP-17-017)

5.1.3 TSMO Focus Areas

The CMM Survey assessed the current maturity levels of TSMO of transportation agencies in the El Paso District. For the maturity level assessment, TxDOT El Paso District identified six focus areas:

1. Planned Special Events:
   Ability to manage traffic impacts generated by events at permanent multi-use event venues, temporary venues, or ones that occur on the road network itself.
2. Road Weather Management:
   Ability to respond to adverse weather conditions through both maintenance and operations activities.
3. Traffic Incident Management:
   Ability to detect, respond to, and clear traffic incidents so that normal operations can be restored safely and quickly.
4. Traffic Management:
   Ability to manage the movement of traffic on roadways within a region, including through corridor management
5. Traffic Signal Management:
   Ability to effectively design, operate, and maintain traffic signals.
6. Work Zone Management:
   Ability to assess and mitigate work zone impacts.

5.1.4 CMM Data Collection

The project team identified capabilities, issues, and opportunities for improvement through responses from the Capability Maturity Model Survey, one-on-one meetings, and CMF Workshops. Due to the COVID-19 pandemic, the project team collected CMM data electronically through the SurveyMonkey platform and met with stakeholders in virtual one-on-one meetings to discuss agency capabilities among the six CMM dimensions. The CMM Summary Report for the El Paso District summarized CMM Data, recognizes some existing capabilities and areas for improvement and provides a standard way to report capabilities for aggregation at the state-level.

In the CMM survey, stakeholders self-assessed the capabilities of their agencies by selecting a level 1 through 4. From a TSMO perspective, Level 1 represents ad-hoc processes, Level 2 represents standard processes available but not consistently used, Level 3 represents standard institutionalized processes, and Level 4 represents continual improvement to institutionalized processes via monitoring and documentation. Figure 12 shows the CMM levels.

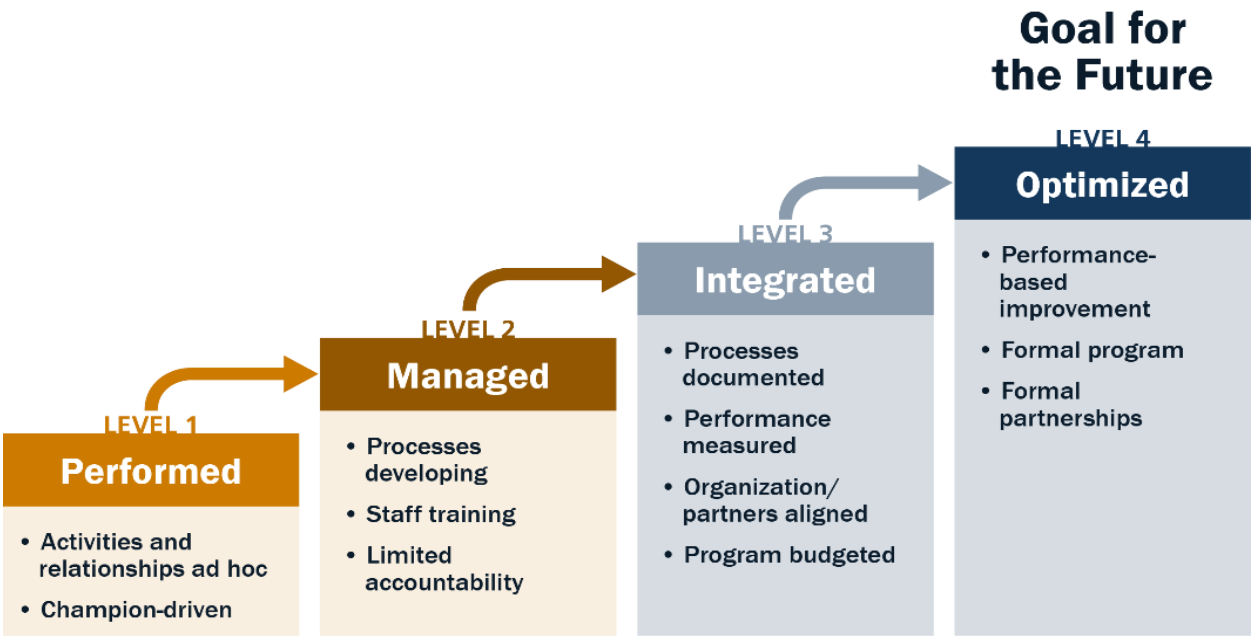


Figure 12: Capability Maturity Model Levels

A detailed report of the CMM Survey results was completed and shared with TxDOT El Paso TSMO Steering Committee staff members. CMM levels for each dimension are summarized in Appendix A.

Table 8 presents the average results of the levels at which CMM Survey participants assessed TxDOT El Paso District Performance in each dimension. Results in all dimensions on average indicated a Capability Level around 2 for most dimensions. Within certain TSMO focus areas, there was more variability in capability levels, but the general results indicate much room for improvement for the capability dimensions of the El Paso District.

TABLE 8: EL PASO DISTRICT CAPABILITY MATURITY MODEL ASSESSMENT RESULTS

Dimension	Average Level
Business Processes	2.27
Systems and Technology	2.07
Performance Measures	2.10
Organization and Workforce	2.08
Culture	2.23
Collaboration	2.26

Table 9 presents the average results of the levels at which CMM Survey participants assessed TxDOT El Paso District Performance in each of focus areas. Results in all dimensions on average indicated a Capability Level around 2 for most dimensions. Within certain TSMO focus areas, there was more variability in capability levels,

but the general results indicate much room for improvement for the capability dimensions of the El Paso District.

TABLE 9: EL PASO DISTRICT CAPABILITY MATURITY FRAMEWORK ASSESSMENT RESULTS

Functional Area	Average Level
Work Zone Management	2.12
Planned Special Events	2.38
Traffic Management	2.01
Traffic Signal Management	2.48
Traffic Incident Management	2.07
Road Weather Management	2.22

5.2 Capability Components

This section outlines the components of capability assessed in the CMM and CMF process for the El Paso TSMO Program Plan. Through the course of data collection and assessment, additional feedback was culled from one-on-one meetings for the El Paso District in addition to those discussed herein. These areas of improvement and district priorities will be described in subsequent sections of the report. The capability components of this TSMO Program Plan are based on the six capability dimensions:

- Business Processes
- Systems and Technology
- Performance Measurement
- Culture
- Organization and Workforce
- Collaboration

These dimensions were used as the framework for identifying opportunities to institutionalize TSMO within the El Paso District and identify action items for implementation. A systematic approach was taken to develop this Program Plan by evaluating the existing conditions and future opportunities of TxDOT internal processes within the six key dimensions. Additional information can be found in the CMM Summary Report, CMF Summary Report, One-On-One Meeting Minutes, State of the Practice Report, El Paso IH-10 Integrated Corridor Management Concept of Operations, Texas Freight Plan, Permian Basin Freight and Energy Sector Transportation Plan, Ft. Bliss Gate Consolidation Study, and the 2021 TTI Urban Mobility Report.

5.2.1 Business Processes

Business Processes is the first of the six dimensions comprising the Capability Maturity Model and Framework for the El Paso District. This dimension includes planning, programming, budgeting, project development, and implementation of TSMO strategies and processes. The CMM survey results indicate that the El Paso District is performing at a Level 2 in business processes, indicating there is some management of TSMO processes and staff training, and limited documentation, accountability, and maintenance of TSMO activities.
Although there are multiple initiatives in progress in the El Paso District to improve regional mobility and engage stakeholders, additional steps must be taken to formalize these practices, including incorporating TSMO activities in project execution and delivery, planning for TSMO, programming and budgeting, and creating a culture of continuous improvement.

The subsections below briefly describe existing processes in the District and then describe how TSMO will improve those processes.

i. Revised Project Delivery Process

The project development process at the TxDOT El Paso District is comprised of six steps: Planning, Programming, Design, Construction, Operations, and Maintenance. While this process has typically been used to develop more traditional capital improvement projects, it also supports the development of projects that use TSMO strategies. Projects are identified through the planning process and prioritized projects progress through the process as funding and resources permit. Figure 13 illustrates that successes or challenges experienced in the process are communicated back to groups responsible for earlier stages so that practices are improved. Some performance metrics are also used to support the project development cycle. In the TxDOT El Paso District, this feedback loop is functional, especially for larger projects.

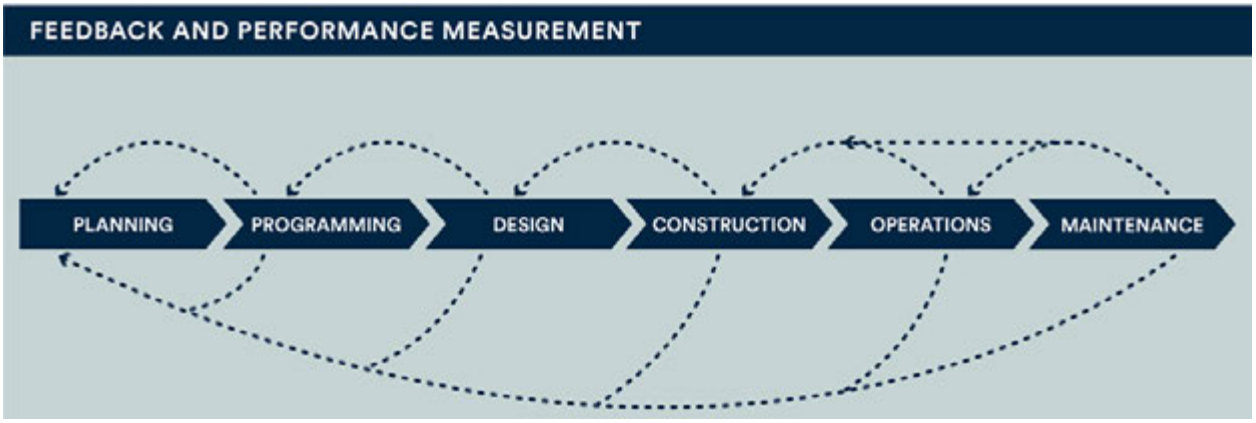


Figure 13: Project Development and Feedback Loop

Project development processes and checklists are defined by the TxDOT Project Development Process Manual. Existing and recommended project development tasks from the TxDOT Project Development Process Manual include interdisciplinary collaboration at various milestones during project development, alterations to existing ITS processes, and increasing stakeholder involvement.

Many TxDOT projects are delivered by engineering consultants. The District should develop a scoping language to be used in all projects to ensure TSMO considerations are made in every project. Examples of items that could be added to consultant scope of work include:

- Require that all ITS and TMS devices are easily accessible for maintenance personnel
- Require consultation with regional ITS Architecture and Plans
- Perform Systems Engineering Analysis (SEA) before including ITS
- Follow TxDOT TSMO Checklists
- Encourage multi-discipline collaboration to identify opportunities for improving mobility and safety
- Require ITS testing after project construction

Formalizing TSMO will not necessarily be a dramatic change from existing processes, but it will standardize processes and reduce the chance for critical project elements to be missed early in the project development process.

ii. Planning for TSMO

Traditional transportation planning has focused primarily on long-range mobility issues faced by specific corridors and roadways through planning for roadway or capacity construction. As metropolitan congestion and population continue to increase, transportation agencies are increasingly implementing operations strategies such as incident management, integrated corridor management, and evaluating alternative construction methods to mitigate mobility issues in the short-term, maximize the utility of infrastructure, reduce capital costs, and take the greatest advantage of capital investments. TSMO activities provide the tools necessary to enhance long-range planning, including the operation and management of transportation infrastructure, which maximizes existing facilities and enables funding to be spent on areas with the most need. As these short-term operations and management mobility solutions are implemented and integrated, more funding will be made available for other long-range planning efforts.

The TxDOT 2015–2019 Strategic Plan identifies TxDOT's operational goals and strategies, which include:
Develop an organizational structure and strategies designed to address the future multimodal transportation needs of all Texas.
Enhance safety for all Texas transportation system users.
Maintain the existing Texas transportation system.
Promote congestion relief strategies.
Enhance system connectivity.
Facilitate the development and exchange of comprehensive multimodal transportation funding strategies with transportation program and project partners.

These objectives set the framework for the development of TxDOT's Unified Transportation Plan (UTP), the Statewide Long-Range Transportation Plan 2035 (SLRTP), the Texas Transportation Plan (TTP), and the Rural Transportation Improvement Program. The UTP is a listing of projects and programs that are planned to be constructed and/or developed within the first 10 years of the 24-year SLRTP. Project development includes activities such as preliminary engineering work, environmental analysis, right-of-way acquisition, and design.

Despite its importance to TxDOT as a planning and programming tool, the UTP is neither a budget nor a guarantee that projects will or can be built.

The SLRTP 2035 is structured to support the goals of the TxDOT Strategic Plan and has identified three strategies to achieve the established goals: Maximize Available Resources, Manage Demand, and Leverage Partnerships. The TTP 2040 uses performance-based methods to select improvements for the existing transportation network by aligning UTP objectives with the goals of the TxDOT Strategic Plan. In addition to statewide planning documents, regional transportation stakeholders, such as the District, the City of El Paso, Sun Metro, the RMA, and MPO. The El Paso MPO is responsible for producing the long-range Regional Transportation Plan (RTP) and the short-range Transportation Improvement Program (TIP). Through these plans, the MPO identifies which regional projects are qualified to be funded through federal funds by aligning performance measures with plan goals. The MPO scores projects based on three elements: Project Readiness, Planning Factors, and Cost-Benefit Analysis. Each of the identified planning documents compare the needs of the state or region with available funding and uses a prioritization process to determine which projects to add to the respective plan(s). Currently, there are 12 funding categories, shown in Figure 14, from which projects can be funded. These funding categories are a mixture of federal funds, controlled by the MPO, and state funds, controlled by TxDOT.

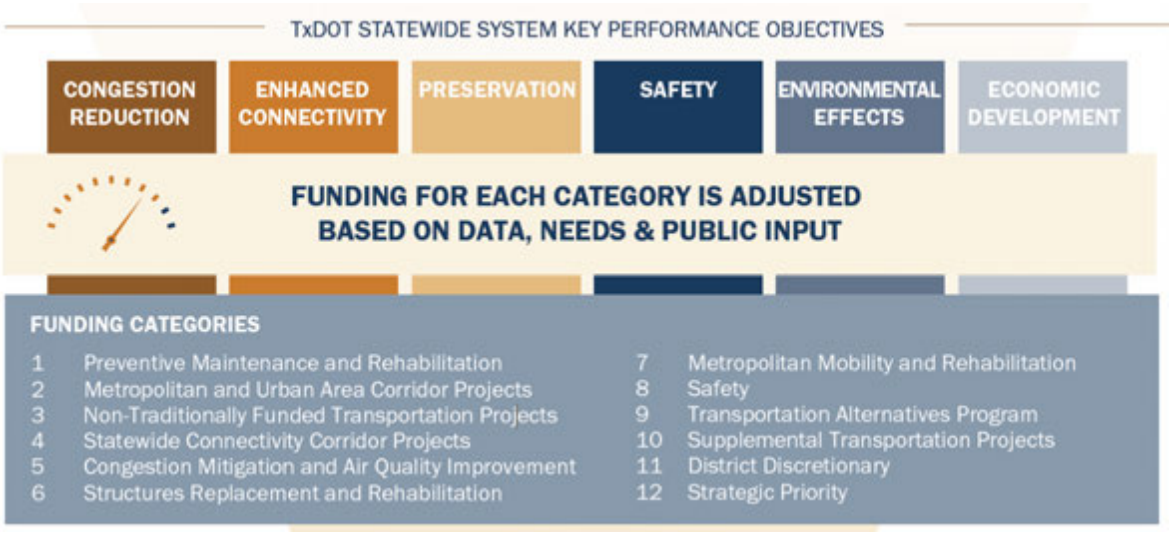


Figure 14: Funding Categories for TxDOT Projects

Source: Unified Transportation Plan 2018, TxDOT

Including TSMO processes in project prioritization, planning, and design enables the production team to identify collaborative, cost-effective, and innovative strategies at project inception. Using the strategies provided herein, the El Paso District will be able to better streamline project selection with available funding mechanisms and optimize project selection for the referenced transportation plans to align project goals and strategies with statewide strategic goals.

iii. Programming, Budgeting, and Funding

The Traffic Safety Division, with support from the Information Technology Division (ITD), is improving and growing TMS statewide. As per Chief Engineer William Hale's 2017 directive to consider ITS needs early in project development, design, and construction, a TSMO approach to existing processes will help all districts realize opportunities early in project development to include ITS and TMS in projects and provide operational needs to maintain and optimize use of these investments.

Historically, deployment of TMS has been funded through roadway construction projects under Category 1 (Preventive Maintenance and Rehabilitation) funds. TMS must compete with other needs of each district—for example, highway expansion and maintenance—which often can be so costly that funding is no longer available for TMS and these systems will be removed from the project. The directives from Chief Engineer William Hale encourage the districts to begin prioritizing TMS solutions over conventional construction solutions and balancing their funds accordingly. TSMO formalizes activities such as collaborative discussions, alternative design reviews, benefit-cost scenarios, and identifying service gaps to implement the prioritization process needed to achieve this goal.

The capabilities of ITS technology and TMS have increased greatly over the years. Because of this growth, more funding categories can support the design and deployment of these systems. Table 10 illustrates who controls the 12 funding categories and how the funding categories can support TMS. The El Paso District is encouraged to use this information to supplement its existing budget when applicable.

TABLE 10: CONTROL OF THE 12 FUNDING CATEGORIES

Category	Description	Opportunities for ITS Funding in Projects		
		Sole ITS	Flexible Use	Roadway Construction
1	Preventive Maintenance and Rehabilitation			
2	Metropolitan and Urban Area Corridor Projects			
3	Non-Traditionally Funded Transportation Projects			
4	Statewide Connectivity Corridor Projects			
5*	Congestion Mitigation and Air Quality Improvement			
6	Structures Replacement and Rehabilitation			
7	Metropolitan Mobility and Rehabilitation			
8	Safety			
9	Transportation Alternatives Program			
10*	Supplemental Transportation Projects			
11	District Discretionary			
12	Strategic Priority			

Legend
- Controlled by MPO
- Controlled by TxDOT Districts
- Controlled by TxDOT Commission

**Denotes funding may not apply in all TxDOT districts*

Sources for these funding categories can be found here: Transportation Funding in Texas (https://ftp.dot.state.tx.us/pub/txdot-info/fin/funding-sources.pdf)

When TMS and ITS are deployed, the effective management and operations of these systems is critical to ensure optimized performance of the transportation system. A budget should be developed to identify operational funding gaps and needs to position the District to achieve the action items and objectives recommended in this TSMO Program Plan. The following items should be considered for the resources budget:

- Dedicated staff to manage and improve TSMO activities, as outlined in the Organization and Workforce section.
- Staff or contracted support for ITS research and development, as outlined in the Systems and Technology section.
- Internal staff and external stakeholder engagement activities, as outlined in the Culture section.
- Internal staff training, as outlined in the Organization and Workforce section.
- Data acquisition, as outlined in the Performance Measures section.
- Staff or contracted support for tactical plan, as outlined in the Tactical Plan Assessment section.

Again, using TSMO techniques, the El Paso District will be able to better streamline project selection with available funding mechanisms and optimize project selection for the referenced transportation plans to align project goals and strategies with statewide strategic goals.

iv. Continuous Improvement

To maintain a continuous cycle of improvement and growth in TSMO activities, the following activities should be performed:

- The El Paso District TSMO Program Plan should be reviewed annually and completed in coordination with one of the biannual TMS reports to TxDOT administration.
- A CMM assessment should be completed every five years. This formal, in-depth review of processes and practices will help identify opportunities for improvement and quantify the progress of the District's TSMO program.

A concept to consider for enhancing the Business Process capability in the District is to conduct, after a project is constructed and in use for at least six months, performance-based audits to quantify the effectiveness of implemented mobility strategies. Selection of projects to be audited could occur randomly and could be based on defined criteria. Audits will verify whether the TSMO resulted in improved cost-benefit ratios and raises the District's Business Process capability maturity level. Maintaining a high profile for TSMO principles is essential for the benefits of TSMO to accrue to the El Paso district.

5.2.2 Systems and Technology

The effective and optimized use of systems and technology for management and operational needs is essential to integrate TSMO within TxDOT. Systems and technology are the vehicle to ensure the activities identified in the Program Plan are carried out in an efficient and seamless manner. The District is actively engaged in projects to improve the maturity of this dimension, including updating the ITS Implementation Plan and ITS Regional Architecture. The following sections describe activities to continue to improve the District's technology capabilities.

i. Systems Engineering Analysis Process

The FHWA defines Systems Engineering Analysis as, "… an interdisciplinary approach and means to enable the realization of successful systems." The analysis is a collaborative method for executing ITS projects in an efficient and cost-effective manner. Other benefits include more resilient systems, shorter project cycles, and improved system management. The value of systems engineering is realized by professionals from a wide variety of businesses, including the FHWA. Some funding sources, such as the Highway Trust Fund, require that an SEA is completed for ITS-related projects. The advantage that SEAs can bring to the District, whether through funding or project efficiency, should be considered on all applicable projects. Figure 15 represents the systems engineering process.

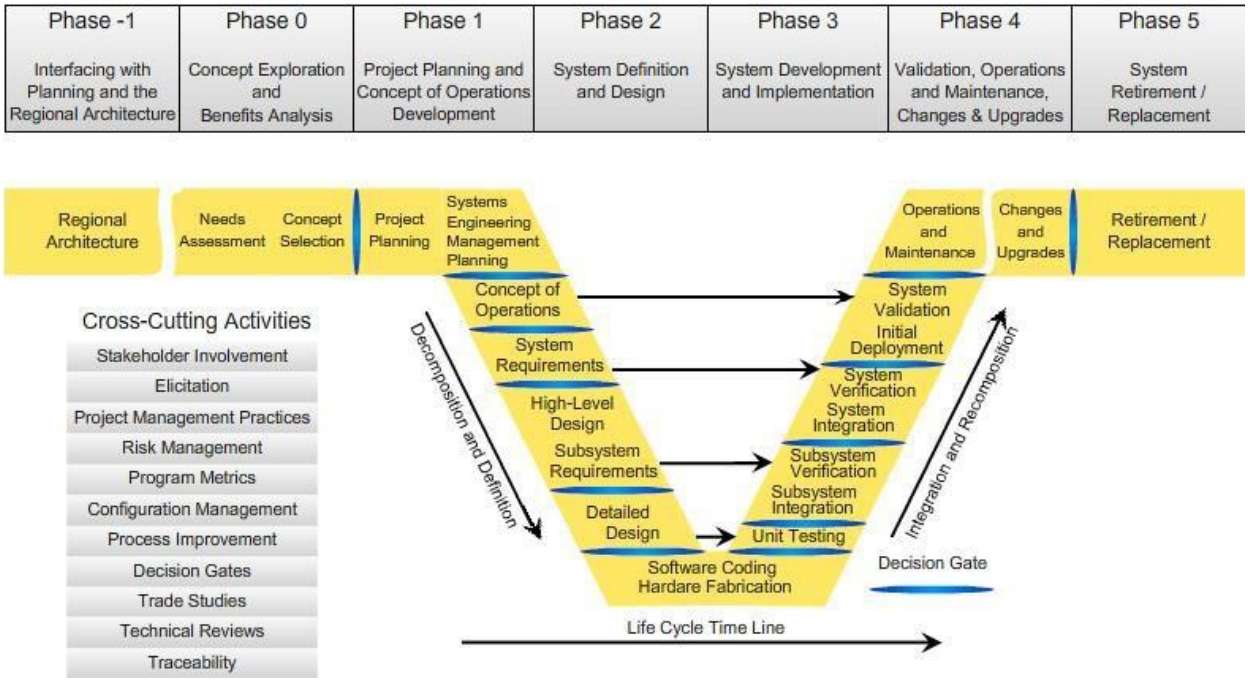


Figure 15: System Engineering "V" Diagram (Source: FHWA)

The District deployed an Incident Management Plan to divert and guide vehicles in the event of a main lane closure, but the plan has not been updated for approximately ten years.

The El Paso District has identified, and prioritized, the following safety strategies:

1. Wrong Way Driver Detection
2. Traffic Signal Operations, Connected Vehicles
3. Information Dissemination, TMC Operational Improvements, Emergency Response Routing
4. Lane Control Systems for Interchange Routing
5. Roadway Monitoring (CCTV Cameras) and Traffic Detectors (Microwave Vehicle Detectors)
6. Queue Detection at CBP Checkpoint Locations
7. Road Weather Information Systems
8. Travel Time Estimation and Prediction
9. Managed Lanes

In addition to the above-mentioned strategies, the District has identified the following Priority Projects:

1. Wrong Way Driver Detection
2. Radar Speed Feedback Signs
3. Extend Fiber network
4. TMC Upgrades
5. Center-to-to Center Protocol
6. CCTV
7. Dynamic Message Signs for Lane Management System
8. Weather Stations

9. Traffic Incident Management Plan Update
10. Work Zone Management
11. Static Travel Time Displays

ii. Regional ITS Architecture

The El Paso Regional ITS Architecture illustrates and documents the integration of regional ITS systems to allow for coordinated and organized ITS planning and deployment. This section is a high-level overview of some components of the ITS Architecture as it relates to TSMO. For more information, reference the El Paso Regional ITS Architecture Report (December 2020). The architecture facilitates stakeholder coordination, reflects the current state of ITS, provides a high-level planning framework for using current and future ITS technologies, and allows for regional conformity to the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) and FHWA Final Rule 940 and FTA Final Policy on ITS Architecture and Standards.

The El Paso Regional ITS Architecture describes coordination of overall system operations by defining interfaces between equipment and systems which have been or will be deployed by different organizational or operating agencies in the region. The Architecture identifies the current ITS deployment and how these systems interact and integrate with each other. It also builds on the existing systems and addresses the additional components deemed necessary to grow the ITS systems in the region over the next 20 years to accommodate specific needs and issues of participating stakeholders.

A high-level interconnect diagram for the El Paso Regional ITS Architectures, also referred to as a subsystem diagram as shown in Figure 16, illustrates the architecture subsystems and primary types of interconnections (or communications) between these subsystems. The diagram was customized to reflect the systems of the El Paso Regional ITS Architecture. The areas with clear text indicate the functions and services that currently exist as well as are desired in the region. Areas without clear text indicate other possible functions and services that do not exist and are not planned for the region.

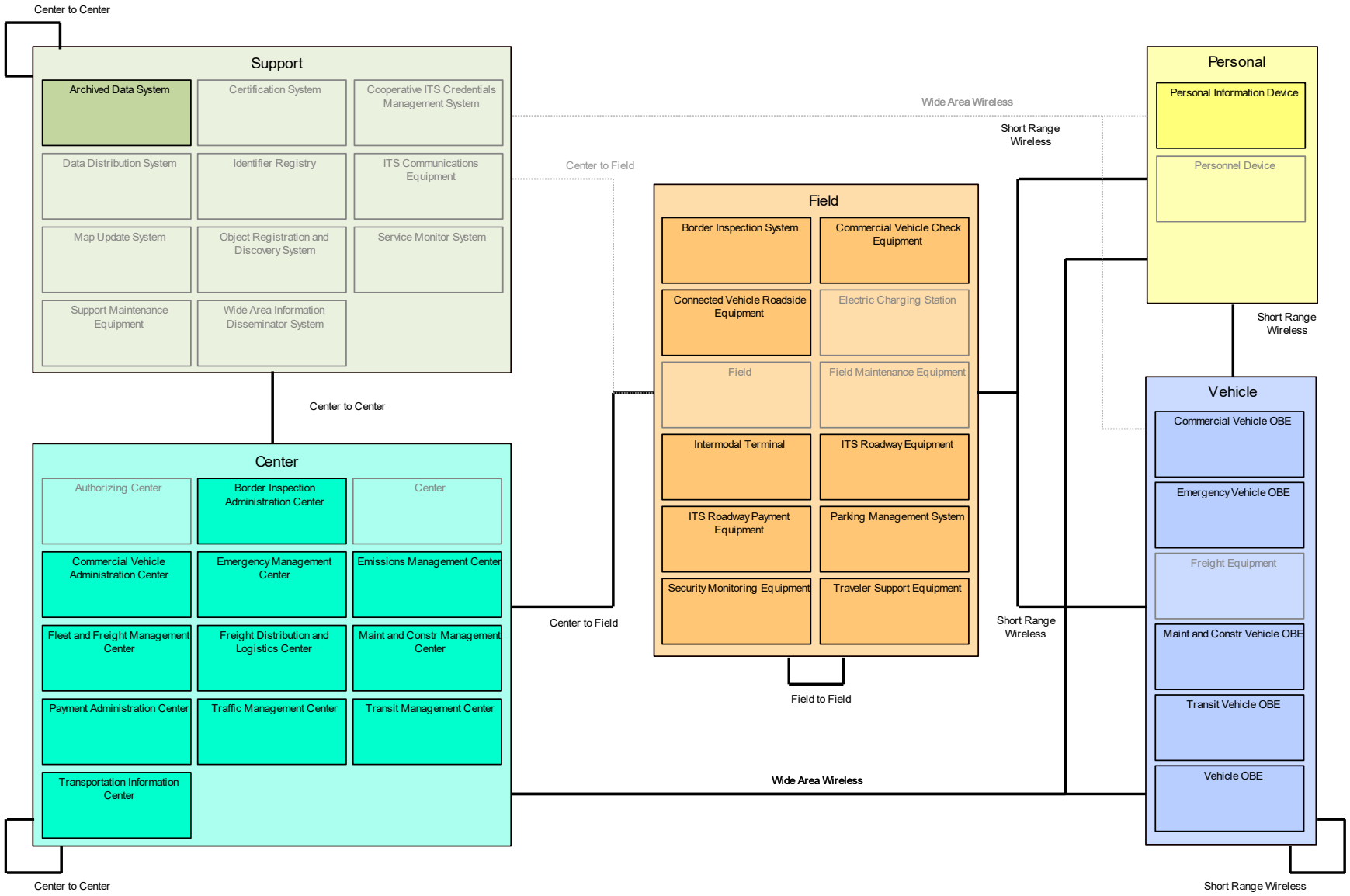


Figure 16: High-Level Interconnect or Subsystem Diagram

Table 11 lists common types of agreements for data sharing, establishing common procedures, supporting regional operations, cost effective maintenance arrangements, and personnel training. More formalized agreements are necessary when agencies integrate interconnections and integrations of their systems. Formal agreements also ensure funding and/or financial arrangements are defined. They can sustain stakeholders' expectations when personnel and administration changes occur.

TABLE 11: TYPE OF AGREEMENTS

Type of Agreement	Description
Handshake Agreement	▪ Early agreement between one or more partners ▪ Not recommended for long term operations.
Memorandum of Understanding (MOU)	▪ Initial agreement used to provide minimal detail and usually demonstrating a consensus. ▪ Used to expand a more detailed agreement like an Interagency Agreement that may be broad in scope but contains all the standard contract clauses required by a specific agency. ▪ May serve as a means to modify a much broader Master Funding Agreement, allowing the master agreement to cover various ITS projects throughout the region and the MOUs to specify the scope and differences between the projects.
Interagency Agreement	▪ Between public agencies (i.e., transit authorities, cities, counties, etc.) for operations, services, or funding ▪ Documents responsibility, functions, and liability at a minimum.
Intergovernmental Agreement	▪ Between governmental agencies (i.e., Agreements between universities and State DOT, MPOs and State DOT, etc.)
Operational Agreement	▪ Between any agency involved in funding, operating, maintaining, or using the right of way of another public or private agency. ▪ Identifies respective responsibilities for all activities associated with shared systems being operated and / or maintained.
Funding Agreement	▪ Documents the funding arrangements for ITS projects (and other projects) ▪ Includes at a minimum; standard funding clauses, detailed scope, services to be performed, detailed project budgets, etc.

Type of Agreement	Description
Master Agreements	▪ Standard contract and / or legal verbiage for a specific agency and serving as a master agreement by which all business is done. These agreements can be found in the legal department of many public agencies. ▪ Allows states, cities, transit agencies and other public agencies that do business with the same agencies over and over (i.e., cities and counties) to have one Master Agreement that uses smaller agreements (i.e., MOUs, Scope of Work and Budget Modifications, Funding Agreements, Project Agreements, etc.) to modify or expand the boundaries of the larger agreement to include more specific language.

5.2.3 Performance Measures

Agency-wide and District-wide performance measures enable management of safety and mobility strategies to ensure work efforts are contributing to the improvement of the program. To successfully integrate TSMO activities into agency processes, performance measures should be developed to continually track progress. These metrics should align with objectives established by TxDOT's mission, vision, and goals. The El Paso District measures uptime on dynamic message signs and response time to traffic signal (maintenance) calls. The District noted that while they measure different parameters related to TSMO, performance measurement is not fully utilized and could be improved by pulling the data together to inform decisions on a systematic basis. Detailed crash data is available but capabilities to query and utilize the data is still emerging in the region.

The El Paso District intends to work toward adding district-level performance measures for safety, mobility, traveler information, and collaboration. Initially, the available data sources and data collection methods will be identified to develop the performance measures of interest to the District. Performance measurement data can be used to create a data clearing house and the performance metrics can be used to promote success stories to share among other TxDOT districts and the public. The District can rely on statewide efforts at performance measure definition to ensure that its measures are consistent with statewide needs, particularly for traffic incident management, MAP-21 reporting, reliability, and safety-related measures. In addition, TTI is developing a new safety-driven data tool to support safety analysis statewide.

i. Measures Definitions

The "Transportation Systems Management and Operations (TSMO) Statewide Strategic Plan" requires performance measures to be used to evaluate the effectiveness of mobility strategies and whether additional changes need to be made to achieve mobility goals. Per the Chief Engineer's April 2017 memo, districts are required to track and report the following performance measures: TMS asset operation uptime, incident clearance times, travel time reliability, and TMS system coverage. Definitions of these performance measures,

taken from the Statewide Strategic Plan, are provided below. In addition to these performance measures, other performance measures will be monitored, depending on the needs of the district. The El Paso District will work with TRF and IMD to expand these definitions to know exactly how to record and analyze the measures.

- TMS asset operation uptime – a measure of how Districts maintain their traffic management equipment, the most critical metric to improve in the short term
- Incident clearance times - a measure of mobility on the system, driven by District incident management processes in collaboration with regional partners
- Travel time reliability - an FHWA MAP-21 recommendation, to measure impact on the public from traffic management strategies applied to on-system roads e.g. work zone management, DMS, etc.
- TMS system coverage – a measure used to measure and understand what portion of on-system roadways are adequately covered with ITS equipment and communications, or where coverage needs to be expanded

ii. Agency Performance-Based Initiatives

TxDOT recently has deployed a Performance Measures Dashboard to provide the public with information. This dashboard provides information and performance values as listed below. TxDOT intends to use this information in the planning process and focuses on performance values that will identify opportunities for improvement in the future. The Performance Measures Dashboard can be found online here: http://www.dot.state.tx.us/dashboard/index.htm. Some values in the performance dashboard relate directly to another agency-based performance value initiative.

- Optimize System performance
- Deliver the Right Projects
- Promote Safety
- Preserve our Assets
- Focus on the Customer
- Value our Employees
- Foster Stewardship

The TxDOT division offices require the districts to monitor and report on specific performance measures through the TMS program. These items are mandated by two memos from Chief Engineer William Hale to improve the transportation network system-wide and include:

- Incident clearance time
- Travel time reliability
- Asset uptime
- TMS system coverage

Additionally, the Information Technology Division (ITD) is currently working to pilot automated traffic signal performance measures in six TxDOT districts of TxDOT. ITD is working with TRF, the districts, and TTI to evaluate connectivity options and performance measures. Nationally, MAP-21 and the FAST Act require that State DOTs and MPOs report operations performance metrics to FHWA annually, beginning in June 2018. These include performance measures in categories such as:

- Travel Reliability
- System Performance
- Safety
- Assets
- Environmental

While there is no current national requirement to use these performance measures outside of reporting to FHWA, they promote and motivate a performance driven approach to transportation planning and management. Improving TSMO culture within TxDOT will facilitate the process of effectively measuring performance and including this data into planning, maintenance, and project delivery. For more information on MAP-21 and FAST Act performance measures, visit FHWA's Transportation Performance Measurement Implementation Page at https://www.fhwa.dot.gov/tpm/rule.cfm.

iii. District-Wide (or Project-Specific) Performance Measures

Performance measures the El Paso District already monitors are required by federal guidance or to receive federal funding, and include:

- Crashes and fatalities
- Project delivery status
- Air quality
- Freight reliability
- Road surface conditions

The El Paso District monitors and reports on specific performance measures through the TMS program:

- Incident Clearance Time
- Travel Time Reliability
- Asset Uptime
- TMS Coverage

To determine if TSMO is effective in the El Paso District, operations and reliability data can be gathered. Using probe data, performance measures such as the travel time index, planning time index, and buffer index for TxDOT facilities can be gathered. This information will inform stakeholders if the mobility strategies and TSMO activities are effective in reducing congestion. This will provide an understanding of how widespread TSMO culture is throughout the District and how much the El Paso District TSMO Program Plan is being followed.

iv. Regional Performance-Based Initiatives

The TxDOT HERO Program is a performance-based, vendor-operated incident and emergency response program. The fundamentals of this program require the vendor to monitor local roadways and respond to any congestion occurrence that is caused by unforeseen circumstances. A few key performance indicators are as follows:

- Total number of incidents managed by HERO operators
- Average number of incidents per eight-hour shift
- Light tow truck roadway clearance times—collected by TMC

- Heavy tow truck roadway clearance times—collected by TMC
- Incident clearance times—collected by TMC
- Current versus previous HERO performance
- Satisfaction with HERO performance among TMC operators, first responders, and other TIM partners based on annual survey

For more information on TxDOT's HERO Program, refer to HERO Roadside Assistance Program.

v. TMS Status Report Required Performance Measures

The TMS Status Report includes the following performance measures, updated twice per year, which are tied to the District Engineer's performance evaluation:

- TMS asset operational uptime
- Incident clearance times
- Level of travel time reliability
- TMS system coverage

vi. Utilization Strategy

The "Transportation Systems Management and Operations (TSMO) Statewide Strategic Plan" requires the districts to develop a strategy to determine reporting frequency, coordination with other divisions, output functions, and other protocols. It also states that "The centralized office will maintain and revise accountability and reporting policies, as necessary. Existing and potential statewide technology solutions for performance measurement and reporting will be developed and maintained by centralized divisions. The El Paso District will complete its Measures Utilization Strategy at such time as the Austin offices provide technology solutions for performance measurement and reporting to the El Paso District.

5.2.4 Organization and Workforce

The existing organizational structure of the TxDOT El Paso District is comprised of members from business, operations, planning and development, construction, and maintenance. Many of these District employees already perform TSMO activities; however, standardizing collaboration in all projects will promote TSMO, and defining the person responsible for ensuring this activity is performed as intended will further enable the success of TSMO in the District. The current organizational chart is shown in Figure 17.

The TxDOT El Paso District is challenged with retaining staff due to the competitive market and a younger generation of staff with different needs and expectations. Currently, TSMO activities are diffused across many positions within TxDOT. To promote retention, a career path for operations within TxDOT could be identified more broadly across TxDOT. Currently, the District implements a program that rotates junior staff into the four core discipline areas and Area Offices. This allows staff to cross-train and collaborate between sections, which is critical to successful TSMO practice and supports the implementation of TSMO across program areas. The TxDOT El Paso District plans to focus on internal training to develop a TSMO-competent workforce that continues beyond individual champions and grows roots in the organization. Additionally, the District intends to evaluate its role as a training clearinghouse for capacity building and to share information and opportunities with stakeholder agencies.

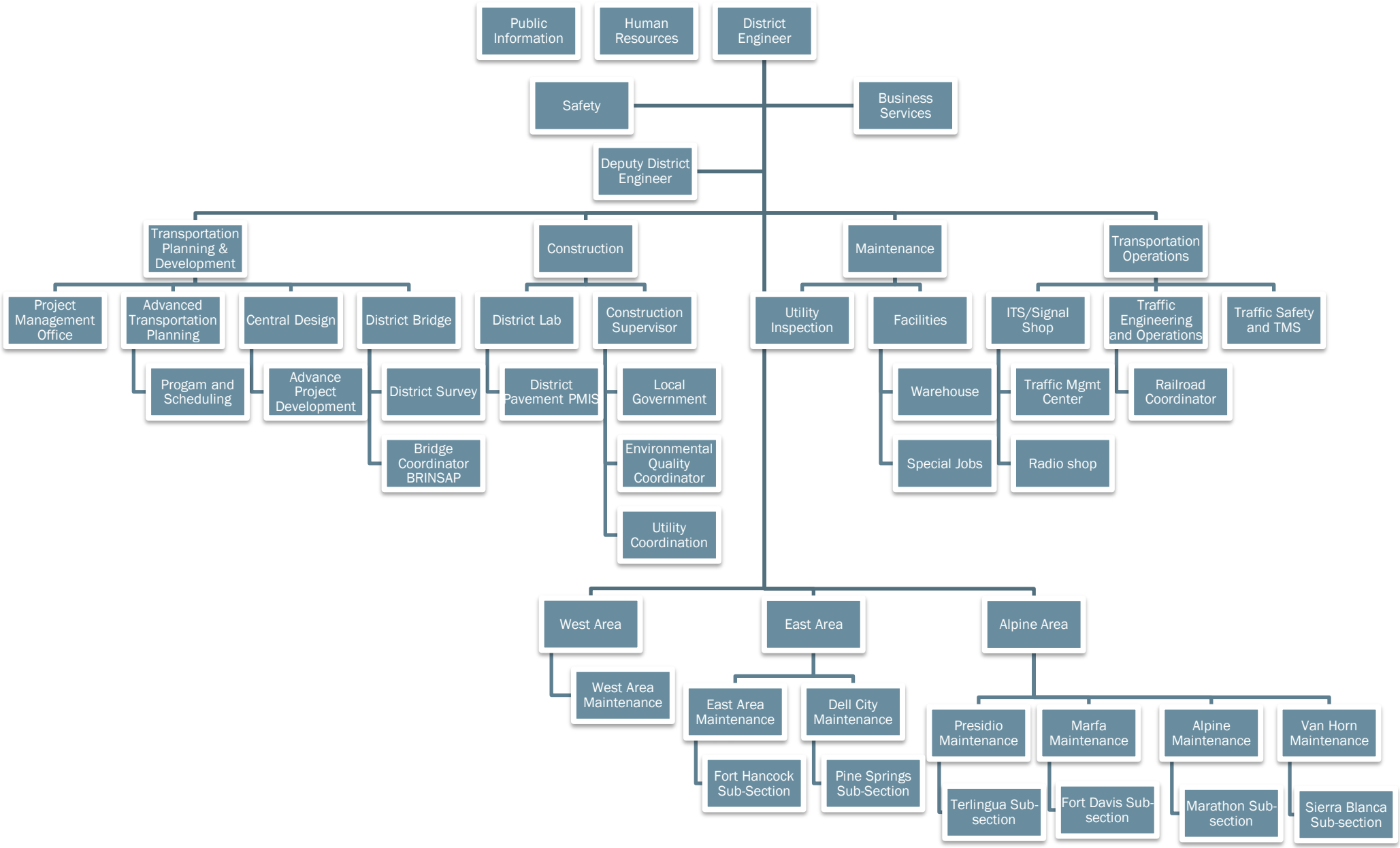


Figure 17: El Paso District Organizational Chart

i. Revise Organization Structure to Accommodate TSMO

From a statewide perspective, the Traffic Safety Division reports to TxDOT's Chief Engineer and is organized to oversee the design and placement of traffic control and ITS devices and items; and is responsible for planning highway safety programs and initiatives. TRF also provides support to all 25 districts with development of statewide standards, specifications, and policy guidance. TRF works closely with the ITD to develop statewide technology solutions that support TMS and TSMO. TRF-TM assigns a TRF-TM Engineer and a TRF-TM ITS Analyst as division-level points of contact to the El Paso District for engineering and technical guidance.

ii. Key TSMO Roles

Organizational roles to ensure implementation of TSMO must be established. As recommended in the Statewide TSMO Strategic Plan (August 2017), the El Paso District selected the District TSMO champion as Mr. Eduardo Perales, P.E., Director of Transportation Operations. A TSMO Coordinator for the region, Eduardo Adame, P.E., was also selected. The District Safety Officers are Jason Herrera, Oscar Pilhoefer, and Robert Reyes.

To complement these roles, several teams could be established, under the guidance of a liaison(s), to ensure necessary actions for success are being carried out. These liaison responsibilities could be performed initially by existing TxDOT staff. As TSMO matures within the organization, it may be necessary to hire additional staff to fulfill these roles. Based on the District TSMO goals, the District has identified an expanded role for the following position.

TSMO Coordinator – TxDOT District employee involved in day-to-day operations, traffic, and technology elements. The responsibilities of the TSMO Coordinator are:

- Point of contact for TSMO questions and activities
- Liaison to the Champion
- Liaison to other districts and sharing best practices and current activities
- Managing the development and continuous improvement of the TSMO Program Plan
- Organizing the regional TSMO committee meeting
- Attending the statewide TSMO committee meeting
- Leading tactical plan development efforts
- Coordinate District progress toward mainstreaming TSMO including integrating TSMO into all stages of project development and delivery
- Manage funding request and TSMO budgets
- Oversee TSMO training initiatives

In addition, the district has identified the need for the following additional position.

ITS Analyst – District or TRF employee responsible for the following:

- Coordinate and review data
- Manage operations and performance measurement
- Assist TSMO Coordinator as needed

TxDOT El Paso District TSMO Working Group — The working group will be comprised of the District's executive leadership, the TSMO Champion, TSMO Coordinator, ITS Analyst and TSMO liaisons from planning, design, construction, operations, maintenance and the TMC. Additional qualified staff also should be included, as necessary. The working group will meet regularly to discuss opportunities for including TSMO activities and existing TxDOT processes. The working group will define strengths and weaknesses of the TSMO program and funnel challenges and opportunities to executive leadership through the TSMO Coordinator. Potential topics for the committee to discuss are as follows:

- Progress on TSMO activities and implementation plan
- FHWA's CMM frameworks for mobility strategies
- Opportunities for external collaboration
- Updates to TSMO Program Plan and Tactical Plans
- Addressing TMS performance metrics

The following tables describe various TSMO roles that an organization can incorporate.

a. District TSMO Champion

Description	Main Responsibilities Include
Support the District's responsibilities related to TSMO culture and collaboration. Show support for the initiative from management and advocate for TSMO to a wide range of audiences, including internal departments and staff as well as external stakeholders.	▪ Advocate for TSMO activities during executive and/or leadership meetings ▪ Lead requests for resources and funding to support TSMO activities ▪ Communicate value of successful TSMO strategies to solve traffic safety, congestion relief and mobility problems.

b. District TSMO Coordinator

Description	Main Responsibilities Include
Support the District's responsibilities related to collaboration and organization of the workforce. Serve as a leader and connection to other resources for technical expertise. Encourage thoughtful discussion, advocate for innovative project ideas, and be a point of contact to centralized TxDOT divisions for support.	▪ Be available as the point of contact for TSMO questions ▪ Organize regional TSMO committee meetings ▪ Lead tactical planning activities ▪ Coordinate with agency staff that support TSMO areas.

c. District TSMO Support Staff – Project Planning/Programming Support

Description	Main Responsibilities Include
Support the District's responsibilities related to business processes. Work with the District TSMO Coordinator on carrying out the action steps identified in District TSMO Program Plan.	▪ Identify list of projects & budget where TSMO strategies can be added over the next 10 years to include in the UTP. ▪ Develop budget for training, staffing, data acquisition, and other resources. ▪ Review/revise project manuals and protocols to include TSMO activities & tools.

d. District TSMO Support Staff – Design/Delivery Support

Description	Main Responsibilities Include
Support the District's responsibilities related to systems, technologies and performance measures. Work with the District TSMO Coordinator on carrying out the action steps identified in the District TSMO Program Plan.	▪ Implement Systems Engineering Analysis process on complex projects, as necessary. ▪ Consider re-evaluating current ITS processes based on emerging technologies. ▪ Develop performance measure definitions, targets and data acquisition plan.

e. District TSMO Support Staff – Construction Support

Description	Main Responsibilities Include
Support the District's responsibilities related to systems and technology integration. Work with the District TSMO Coordinator on verifying that TSMO projects are constructed according to approved plans and specifications and that systems are properly integrated.	▪ Provide oversight of TSMO projects under construction. ▪ Verify TSMO systems are properly integrated and operational. ▪ Maintain project documentation related to as-builts from contractors. ▪ Coordinate with other agency staff on project status updates.

f. District TSMO Support Staff – Maintenance/Asset Management Support

Description	Main Responsibilities Include
Support the District's responsibilities related to maintaining systems and technologies in achieving a targeted uptime availability and replacing component systems as they approach the end of their service life. Work with the District TSMO Coordinator on carrying out the action steps identified in the District TSMO Program Plan	▪ Perform preventive maintenance where needed on systems and technologies. ▪ Perform repairs in a timely manner where needed on system components to maintain system uptime availability targets. ▪ Replace system components as they approach their end of service life. ▪ Coordinate with TRF to apply statewide standards in procuring replacement equipment. ▪ Communicate observations with Project Planning and Project Design TSMO Support Staff.

A summary of the responsibilities of the District staff roles and responsibilities as it relates to TSMO is presented in Figure 18.

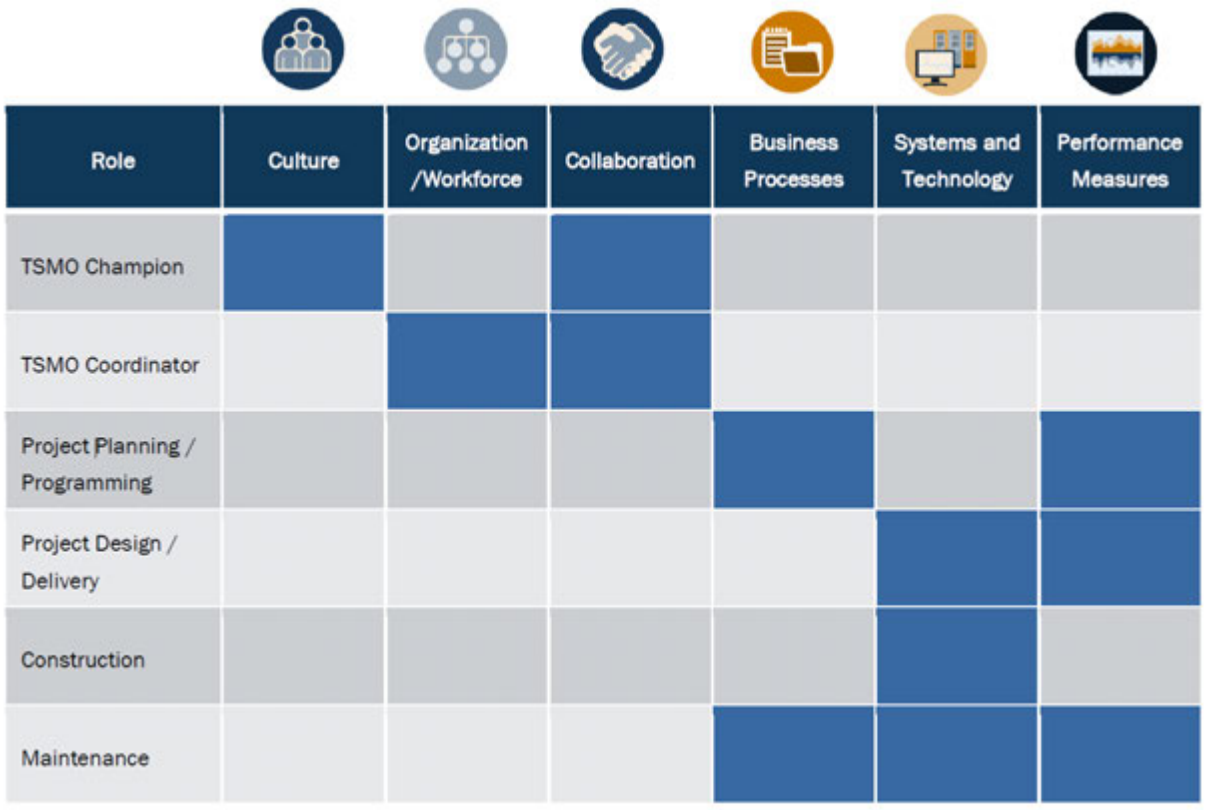


Figure 18: TSMO Staff Roles and CMM Responsibilities

iii. Staffing Plan for Recruitment, Retention, and Revised Position Responsibilities to Accommodate TSMO Activities

From the staff interviews conducted during development of the Program Plan, it is apparent that many TSMO activities currently are being performed. However, these activities are completed on an ad-hoc basis and are not streamlined into common practices across the District. As TSMO activities and eventually culture grow within the District, each of the liaisons identified above may choose staff members to support his/her TSMO responsibilities. TSMO activity status should be included in the bi-yearly TRF-TMS Status Report. As TMS and TSMO capabilities within the District grow, additional ITS maintenance and TMC support staff will also be required.

iv. Training Plan

Technically trained staff are essential to the success of TSMO within an agency. Day-to-day tasks and operational responsibilities rely on the expertise and capabilities of the agency's staff. A training plan is recommended that encompasses the following elements:

- General TSMO familiarization for all employees
- TSMO Project Development Process Training for Planning, Design, Construction and Maintenance liaisons.
- TSMO Technical Training including field device and communication systems operations, troubleshooting, and maintenance.

In addition to internal District training, several programs are facilitated by external agencies to promote TSMO-related activities. Agencies such as the National Highway Institute (NHI) and the Transportation Research Board (TRB) provide online transportation management training. Also, the National Operations Center of Excellence (NOCoE) has several publications, webinars, TSMO roundtable discussions, case studies, and research that all provide insight for developing and implementing TSMO-related activities.

5.2.5 Culture

TSMO culture within an agency is contingent on the realization of the agency's objectives by engaged staff and how the staff considers and improves daily activities to meet these objectives. Raising awareness through institutionalized processes is crucial to successfully integrating TSMO in day-to-day operations. This includes TxDOT staff who are directly involved in implementing TSMO activities, as well as representatives from tangential departments or local agencies. The TxDOT El Paso District has a strong relational culture, and it is important to supplement the personal communication with technology, organized coordination, and performance-based collaboration.

In 2016, TxDOT evaluated the state of TxDOT TMS. The assessment covered five topics:

- Spending
- Data and Performance Management
- Traffic Management Centers
- Assets and Operations
- Organization

Strengths and deficiencies were noted for each of the topics and best practices were provided.

As research and lessons learned became available during the evaluation, Chief Engineer William Hale released a memo explaining the importance of TMS in project planning and design. He discussed how TMS solutions are a more cost-effective approach to managing congestion. William Hale's memo resulted in raised awareness throughout the districts on the importance of TMS. TSMO facilitates this culture shift by outlining the processes and action items to enhance the way all districts view, plan for, and use mobility strategies and TMS.

Workshop participants rated Culture at 2.60 due to El Paso's strong relational culture and close and long-standing working relationships with partner agencies. Supplementing this personal communication with technology would notably move the District closer to Maturity Level 3. For details on the CMM data, reference the El Paso District's Capability Maturity Model Summary Report.

i. Engagement Opportunities

Table 12 describes some activities and responsibilities for institutionalizing TSMO into mainstream interactions and gaining a wide range of participation in TSMO activities.

TABLE 12: WAYS TO INSTITUTIONALIZE TSMO

Engagement Activity	Frequency	Point of Contact Responsibility	Oversight Responsibility
Meeting Opportunities	Various, as needed	Project Managers, TSMO Working Group & Regional TSMO Stakeholders	TSMO Coordinator
Case Studies	Biannually	TSMO Working Group	TSMO Coordinator
TSMO Newsletter	Quarterly	TSMO Coordinator & Public Information Officer	TSMO Working Group
General Notes	Various, as needed	Project Managers	TSMO Working Group
Annual Report	Annually	TSMO Coordinator	TSMO Champion

ii. Meetings Opportunities

In accordance with the recommended project development procedures, input from all departments and external agencies will be engaged earlier in the project development stages. There also are existing standing meetings held by TxDOT and local agencies where TSMO activities can be discussed to identify opportunities for improvements and to institutionalize TSMO processes. Meetings that are recommended for involvement include, but are not limited to:

- Project-specific stakeholder meetings
- Quarterly District Planning meetings
- TIM meetings
- Design Concept Conference

iii. Case Studies

Case studies may be developed featuring local projects that leveraged TSMO activities or integrated mobility strategies. The case studies can be distributed to administration and all levels of the District easily to provide examples of how TSMO adds value. They could be used during presentations to stakeholders or to help advocate for additional funding or resources by providing examples of successful high-benefit, low-cost improvements.

iv. General Notes

When projects move into construction phases, TSMO activities can be relayed through General Notes in the plan sheets. The District can develop template General Notes to be added to every project's design schematics or construction plans. Such TSMO-related general notes may include references to the district's incident management plan, smart work zone technologies and strategies, and road weather management strategies . TSMO-related general notes should include the specific operational improvements that relate to design and construction activities. This will allow designers to provide information to the area office, developers, contractors, and other stakeholders involved in construction regarding who to coordinate with during construction, which departments to involve, and any additional feedback identified during design phases to help carry forward lessons learned.

v. Annual Report

It is recommended that the El Paso District develop an annual report to track TSMO accomplishments, opportunities, and the status of achieving activities identified in the El Paso District TSMO Program Plan. It also will provide information on potential revisions or additions to the Program Plan, as necessary. This document will be valuable to keep administration informed of the many activities in the District and help advocate for additional funding as necessary.

5.2.6 Collaboration

The ability of divisions, districts, partner agencies, and other stakeholders to work together to achieve goals is a defining characteristic for TSMO programs. Workshop participants rated Collaboration at Level 2.63 once again, due to strong longstanding relationships in the District. These relationships support coordinated construction traffic management planning, traffic control, and strategic assistance by law enforcement. Currently, collaboration between internal departments, as well as external agencies, is sometimes on an as-needed basis. The group identified the need for supplementing communication with more proactive partnerships and data to improve situational awareness among agencies.

i. Internal Partnerships

Internal collaboration provides input from all disciplines and streamlines the project development process, focusing on efficiency and mobility-specific strategies. Several subtasks for internal collaboration are included in TxDOT's project development process. These relationships are critical to ensure projects meet the needs of the region and are delivered on time. During design development, designers from different disciplines collaborate to make sure the design is constructible. Designers also meet with planners during design concept

meetings and site visits. To improve project delivery and efficiency, opportunities to elevate internal collaboration include:

- Creating 30/60/90/100 Milestone meetings that include all design disciplines, maintenance, and construction (the El Paso currently does this well)
- Engaging multi-disciplinary teams to review value engineering studies
- Engaging project managers from adjacent projects to discover lessons learned
- Collaborating between traffic engineers and planners to identify projects in which congestion can be mitigated without adding capacity

Internal partnerships from different divisions of TxDOT also are critical to ensure inter-operability and TSMO capabilities within the District. State-level division support should be used to help identify needs and provide solutions for the District. Internal partners can be seen in Figure 19.

Figure 19: Internal TxDOT TSMO Partners

The Public Information Office is part of the Communications Division of TxDOT and can support the District by coordinating internal and external communications. They provide news releases and media communications to the public and internal TxDOT employees.

ii. External Partnerships

Many regional stakeholders are responsible for transportation operations, management, safety, and maintenance within the El Paso District (see Figure 20). Collaborative activities among these stakeholders is critical to optimizing the existing transportation network. Defined collaboration between TxDOT and other stakeholders promotes the formality of interagency relationships and properly aligns common regional mobility goals between agencies. The El Paso District will establish a Regional TSMO Committee that will include representatives from all regional stakeholders. This committee will meet regularly to discuss challenges and lessons learned. The Regional TSMO Committee also will provide support and guidance for mobility strategies discussed herein.

Ad-hoc collaboration should be formalized. An example of ad-hoc or as needed collaboration and coordination includes El Paso District maintenance crews assisting law enforcement agencies and local jurisdictions on a routine basis in responding to traffic incidents including helping protect a crash scene with temporary traffic control devices, clearing debris, and checking conditions during inclement weather.

A key advantage of formal interagency partnerships is the ability to improve project planning, consistent with regional strategies. In the regional transportation plan, the following roadway improvement strategies often determine if projects are qualified to receive federal funding. Mobility strategies that TxDOT can use include:

- Congestion management
- Access management
- TMS and ITS
- Operational strategies (such as road weather management, traffic monitoring, traffic incident management and work zone management).

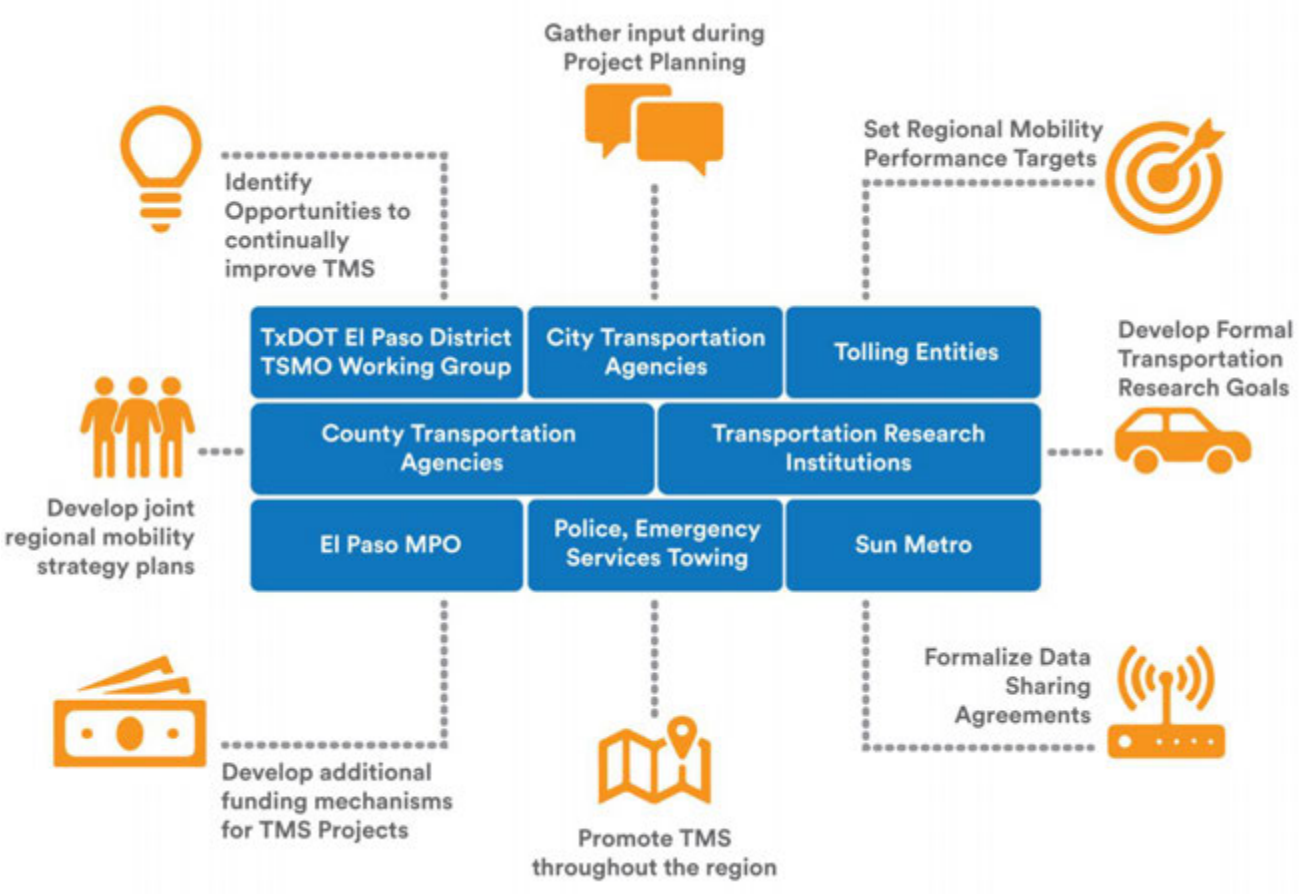


Figure 20: External Collaborative Activities

Formal interagency agreements also can support El Paso District Program Plan goals, such as safety. Collaborative activities, such as TMC coordination and transportation data sharing, support TSMO success. Regional stakeholders include county and municipal governments, MPO, RMA, law enforcement, and emergency services. TxDOT should continue interagency collaboration and coordination that currently exists

with these agencies during project planning and development. To properly align formal partnership agreements across the District, TxDOT should consider the following opportunities for stakeholder collaboration.

- MPO – Regional Transportation Plans, Mobility Initiatives, Multimodal Initiatives, Data Sharing
- City of El Paso – Regional Transportation Plans, Multimodal Initiatives, Data Sharing, Public Transit Plans, Project Planning and Development, Traffic Incident Management Initiatives
- County Transportation Agencies – Regional Transportation Plans, Multimodal Initiatives, Data Sharing, Public Transit Plans, Project Planning and Development, Traffic Incident Management Initiatives
- Sun Metro – Regional Transportation Plans, Public Transit Plans, Mobility Initiatives, Data Sharing
- Local/Regional Government, Law Enforcement, Emergency Services, Towing – Project Planning and Development, Traffic Incident Management Initiatives, Data Sharing

The TSMO Working Group along with regional stakeholders are encouraged to include opportunities for active partnerships in regional TSMO discussions. Additionally, TRF will facilitate statewide TSMO meetings to encourage collaboration across the state.

iii. Adjacent Districts

The El Paso District borders only the Odessa District in Texas. The El Paso District will share this TSMO Program Plan with the Odessa District and will formalize collaboration and data exchange with Odessa staff. The El Paso District also borders two Districts in the New Mexico Department of Transportation (NMDOT), and the State of Chihuahua, Mexico. The El Paso District will formalize lines of communication with staff in these two Districts and in Chihuahua, and will discuss the need, benefits, and feasibility of data sharing. If this contact needs to be at the division level instead of District to District, the El Paso District will ask for help from the appropriate offices.

iv. Public-Private Partnerships

The main TSMO opportunities for Public-Private Partnerships are likely to be in data collection and technology infrastructure. Private sector data providers are actively promoting their data for a variety of transportation-related uses. The present and ever-increasing volume of “big data” from these sources could probably never be economically duplicated by a separate, ITS-specific data collection process. The District will continue to investigate private sector data sources and use them as appropriate and will rule them out if needed due to issues such as cost, reliability, or timely availability. The District will investigate any available private sector technology infrastructure if it meets ITS needs. The District will weigh the attributes of provide sector vs. in-house technology, considering availability, reliability, first cost, and operating cost. In the event the District has surplus bandwidth and there is an opportunity to lease the bandwidth to the private sector or trade the bandwidth for other services, the District will enter discussions with the party making the request.

6.0 TSMO Implementation Plan

This section lays out a plan for advancing TSMO priorities in the TxDOT El Paso District over the next few years. Its contents are based on the existing strengths and needs that the El Paso District and regional stakeholders identified over the course of the TSMO Plan's development. The Implementation Plan is shown in Table 13.

The implementation plan table includes the following information for each recommended action item:

- Action Number: An identifier for each recommended action item, organized by CMF focus area. There are 10 action items each for work zone management, traffic management, and traffic incident management.
- Action Description: Provides a brief description of the action, which may include multiple steps.
- Dimensions: Columns with identifiers for which CMM dimension is supported by implementing the action item.
- Supports District TSMO Goals: Identifies which of the District's TSMO goals the action item supports: Safety, Reliability, Efficiency, Customer Service, Collaboration, or Integration.
- Priority/Timeline: Priority provides an indication of the priority of the action items based on District stakeholder and TxDOT steering committee feedback. Timeline gives a qualitative estimate of the timeframe in which the action item will be undertaken by the District.
- Lead Agency/Support: Identifies the agency that will take ownership of the action and will oversee that implementation progresses as planned.
- Staff Effort/Cost: Provides a semi-quantitative opinion of the level of effort that TxDOT would need to dedicate to implement the recommended action item. Provides a semi-quantitative opinion of the level of fiscal resources that TxDOT would need to commit to implement the recommended action item.

The TxDOT El Paso District TSMO Program Plan is an unconstrained planning document focused on near-term implementation priorities. While all action items listed could potentially be implemented within the next five years, no funding is currently allocated for any of these action items unless otherwise specifically stated in this plan. Action items will be implemented as District resources permit.

TABLE 13: EL PASO DISTRICT TSMO IMPLEMENTATION PLAN

Action No.	Action Description	Dimensions						Supports District TSMO Goals							Priority / Timeline	Lead Agency / Support	Staff Effort / Cost
		Business Processes (BP)	Systems and	Performance Measurement	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Customer Service	Collaboration	Integration	Innovation			
Traffic Management (TM) Strategies																	
TM01	Determine System Platforms/Applications for Collaboration: * Identify specific applications for pursuing collaboration and draft standard operating procedures specifying roles and responsibilities for agencies to review. This can help to identify the next steps in an orderly fashion for Traffic Management efforts.						X			X		X	X		High Priority / Medium Term	TxDOT El Paso District	Low Effort / $
TM02	Create a Technical and Procedural Guidance Toolkit for Staff: * Help provide hands-on and useful resources about 'How and What' of traffic management efforts at all levels and it can also help establish consistent response for joint operations as well.				X	X				X		X			High Priority / Short Term	TxDOT El Paso District	Medium Effort / $$
TM03	Improve Coordination and Collaboration with District's Traffic Management Team (TMT): Periodically update TMT meeting invite list to include additional and relevant stakeholders. Ensure appropriate stakeholders are included in TMT meetings to improve coordination and collaboration for any existing/planned projects and operations.	X			X		X					X			High Priority / Short Term	TxDOT El Paso District	Low Effort / $
TM04	Coordinate with CoEP, MPO and Partner Agencies Regarding Upgrade of ITS Equipment: Initiate and encourage communication and coordination between TxDOT, CoEP and partner agencies for regional ITS equipment compliance. Ensure that any ITS equipment to be upgraded, is compliant with regional ITS architecture/standards and is also compatible with TxDOT and/or partner agencies ITS equipment to leverage improved integration and functionality.	X	X				X					X	X		High Priority / Short Term	TxDOT El Paso District	Low Effort / $

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Action No.	Action Description	Dimensions						Supports District TSMO Goals							Priority / Timeline	Lead Agency / Support	Staff Effort / Cost
		Business Processes (BP)	Systems and	Performance Measurement	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Customer Service	Collaboration	Integration	Innovation			
TM05	Develop a Checklist/SOPs for ITS: Create checklist/SOP for existing, planned and emerging ITS technology for implementation in the District. Utilize checklist/SOP during project development stage to help assess the requirements for implementation and maintenance of ITS technology, especially for PS&E projects. The checklist/SOP can also help to review and provide feedback for design, construction, and maintenance staff.		X	X								X			High Priority / Medium Term	TxDOT El Paso District	Low Effort / $
TM06	Joint Operations Agreement with CoEP: Coordinate with CoEP and partner agencies leadership to develop a staff sharing agreement and conduct joint operations on key corridors to integrate and improve transportation system performance.	X	X	X			X			X		X	X		High Priority / Medium Term	TxDOT El Paso District / City of El Paso	High Effort / $$
TM07	Border Crossing Coordination Meetings: Maintain a roster of key traffic operations personnel from TxDOT, CoEP, CBP, USFMCSA, DPS, ISDs and Juarez (Mexico) counterparts and attend periodic meetings to improve collaboration, cross-border traffic operations, safety, and customer service.	X					X		X		X	X	X		High Priority / Short Term	TxDOT El Paso District / City of El Paso International Bridges / USCBP	Low Effort / $
TM08	Standardize Traffic Operations in Construction Projects: Develop traffic operations handbook that standardizes procedures and protocols among stakeholders for communication and coordination for construction projects. Include key stakeholders during the project development stage especially if ITS is involved in a project.	X	X				X		X	X	X	X			High Priority / Medium Term	TxDOT El Paso District / City of El Paso	Medium Effort / $
TM09	Develop Sidewalk Condition Inventory: Conduct periodic inventory and condition assessment of sidewalks within TxDOT ROW. Prioritize and perform maintenance and/or reconstruction to meet pedestrian safety and ADA standards. Consider creating a pedestrian safety plan for the District and including sidewalk inventory as a component. This effort can also include non-traditional time saving approaches i.e. PPP, Manager-at-Risk etc. to improve accessibility and safety.			X			X	X			X				Medium Priority / Medium Term	TxDOT El Paso District	Medium Effort / $$

Action No.	Action Description	Dimensions						Supports District TSMO Goals							Priority / Timeline	Lead Agency / Support	Staff Effort / Cost
		Business Processes (BP)	Systems and	Performance Measurement	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Customer Service	Collaboration	Integration	Innovation			
TM10	Action Plan for Performance Measures to Achieve Targets: * Create an action plan to review current performance level against set targets and identify where the improvements are needed. Such list of action items can improve reliability and efficiency to manage the system to achieve target performance.	X		X					X	X				X	Medium Priority / Short Term	TxDOT El Paso District / El Paso MPO / City of El Paso	Medium Effort / $$
Road Weather Management Strategies																	
RWM01	Proactively Share Situational Reports of Weather: El Paso OEM can further benefit from active sharing of information about road weather responses from TxDOT and key stakeholders. TxDOT can share situational reports to additional key stakeholders during weather events to improve overall coordination and effectiveness of response.	X					X	X	X	X	X	X	X		High Priority / Short Term	TxDOT El Paso District / City of El Paso	Low Effort / $
RWM02	Develop Reporting Codes for Various Road Conditions: * Develop a set of accepted common reporting codes for conditions surveying that are used across the agency. Field personnel also need to be trained and retrained on what each reporting code means which can ensure consistency between reports from different field observers.						X		X						High Priority / Short Term	TxDOT El Paso District / NWS	Low Effort / $
RWM03	Obtain Leadership Buy-In for Decision Support System: * Establish protocol for DSS on the system due to weather triggers among key agency leaders. DSS facilitates data-driven decisions, supporting enhanced road weather OM. It can help an agency move towards proactive operations during adverse weather.	X										X			High Priority / Medium Term	TxDOT El Paso District / City of El Paso / El Paso OEM	Low Effort / $
RWM04	Improve Weather Data Sharing: Implement an NWS situational awareness tool for more relevant road weather information that TxDOT and key stakeholders can monitor and review relevant weather-related parameters. The tool can also be used to provide feedback to NWS, support in decision making process during weather events. Access to TxDOT cameras would further help NWS to improve the functionality and operability of the tool.	X					X	X	X	X	X	X	X	X	High Priority / Short Term	TxDOT El Paso District / NWS	Medium Effort / $

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Action No.	Action Description	Dimensions						Supports District TSMO Goals							Priority / Timeline	Lead Agency / Support	Staff Effort / Cost
		Business Processes (BP)	Systems and	Performance Measurement	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Customer Service	Collaboration	Integration	Innovation			
RWM05	Establish Support Systems for Data QA/QC: * Develop a system to handle data quality and data conflicts before use to enable clear decisions that maximize operational response based on data validity. Conflicting information may lead to bottlenecks in the decision process.		X						X	X		X			High Priority / Short Term	TxDOT El Paso District	Low Effort / $
RWM06	Improve Linkage Between the RWM and Other Planning Activities: * Prioritize projects and funding in the agency or region and pipeline new sources of transportation funding for the RWM program with existing investments to supplement current RWM capabilities. This can help share the economic and personnel burden of projects, optimize resource utilization (economic, staff, and tools) i.e. increased linkage with a Statewide or Regional TSMO plan or STIP.	X								X		X			High Priority / Short Term	TxDOT El Paso District	Low Effort / $
RWM07	Joint Response Between the TMC, EOC, and Weather Community: * Link the emergency operations stakeholders with the TMC, maintenance, and weather community which can improve regional responsiveness to large-scale events.	X						X				X			High Priority / Short Term	TxDOT El Paso District / NWS / City of El Paso / El Paso OEM	Low Effort / $
RWM08	Report Performance Measures During Weather Events: * Help calculate outcome and impact measures during an event in terms of incident clearance times, LOS, crash data, and traffic conditions. This can help combine traffic operations and maintenance data to develop a clear picture of performance, as well as traveler experience and promote the culture, program structure, and leadership of RWM program.	X				X			X	X	X				High Priority / Short Term	TxDOT El Paso District	Low Effort / $
RWM09	Provide a Location/Data Feed for Media Partners: * During weather events, provide access of ongoing updates to the media via a data feed at the operating management centers. Media serves as major sources of mass information dissemination related to road conditions during adverse weather.						X		X		X				High Priority / Short Term	TxDOT El Paso District	Low Effort / $

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Action No.	Action Description	Dimensions						Supports District TSMO Goals							Priority / Timeline	Lead Agency / Support	Staff Effort / Cost
		Business Processes (BP)	Systems and	Performance Measurement	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Customer Service	Collaboration	Integration	Innovation			
RWM10	Standard Operating Procedures for Winter Event Planning: Ensure that all stakeholders are contacted and included in winter event planning. This includes data sharing through a situational awareness dashboard which also ensures consistent data is shared with stakeholders. Address ITS infrastructure gaps in rural areas to provide surveillance and dissemination of information.	X					X	X	X	X		X			Medium Priority / Medium Term	TxDOT El Paso District	Medium Effort / $
Work Zone Management Strategies																	
WZM01	Establish Proper Coordination Between Construction Contractor and Agency: * Formalize contractor feedback system for increasing WZM knowledge transfer throughout the agency and emphasize sharing lessons learned from successful WZM innovations by the private sector.						X					X			High Priority / Short Term	TxDOT El Paso District	Medium Effort / $$
WZM02	Law Enforcement Efforts for WZM: * Ensure that funding criteria are balanced with resources available to fund efforts and coordinate law enforcement use with other TMP strategies. Establish necessary MOUs between law enforcement and the agency for WZM purposes related to the support to be provided, expenses to be covered, training and documentation to be required, etc.						X	X							High Priority / Short Term	TxDOT El Paso District / State and Local Law Enforcement Agencies	Medium Effort / $$
WZM03	Traffic Control Plan Training: Enhance training provided for implementation of TCP to cope with the District's needs. Both classroom and hands-on training need to address safety in TCP implementation for TxDOT staff, stakeholders, and traffic control contractors.	X			X			X				X			High Priority / Short Term	TxDOT El Paso District	Medium Effort / $$
WZM04	Traffic Control Permit Coordination: TxDOT can share traffic control permits in advance with all stakeholders that potentially get impacted due to construction activities. Coordinating and communicating schedules will help the District to experience fewer construction-related delays and less-than-optimal safety.	X					X					X			High Priority / Short Term	TxDOT El Paso District / City of El Paso / Municipalities / Counties	Low Effort / $

*FHWA Strategy

Action No.	Action Description	Dimensions						Supports District TSMO Goals							Priority / Timeline	Lead Agency / Support	Staff Effort / Cost
		Business Processes (BP)	Systems and	Performance Measurement	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Customer Service	Collaboration	Integration	Innovation			
WZM05	Identify and Foster WZM Knowledge and Skills: * Determine WZM training needed by staff in the various functional groups within TxDOT. Develop a WZM training program focused on necessary skills and knowledge and regularly assess lessons learned. Incorporate commonly learned lessons as best practices into the project development process.				X							X		X	High Priority / Short Term	TxDOT El Paso District	Medium Effort / $$
WZM06	Stakeholder Involvement Checklist: Develop a checklist for every PS&E project, closure, routine maintenance operation, etc. and implement as a standard operating procedure for when, who, and where to contact stakeholders.	X					X					X			High Priority / Short Term	TxDOT El Paso District / City of El Paso	Low Effort / $
WZM07	Develop Multi-Agency Multi-Project Coordination Tools for WZM: * Develop methods for communication, analysis, and display of WZ impacts that are relevant to multiple agencies across multiple jurisdictions.	X					X			X		X	X		High Priority / Medium Term	TxDOT El Paso District / City of El Paso	Medium Effort / $$
WZM08	Develop and Update Work Zone Policies and Procedures: * Include a review process to help agencies assess how well they are meeting their stated WZM goals and targets. Utilize outcome-based measures to review work zone procedures which provide direct indication of effectiveness of WZM efforts and in turn make updates to the policies and procedures based on review results.			X					X	X		X			High Priority / Medium Term	TxDOT El Paso District / City of El Paso	Medium Effort / $$
WZM09	Evaluate WZM Effectiveness: * Define outcome-based performance measures and identify how they support the broader goals of regional operations (EG: air quality, safety, planning). This helps maximize ROI and increase the level of buy-in from all levels within TxDOT for TMP development and evaluation.			X				X	X	X		X			High Priority / Medium Term	TxDOT El Paso District / City of El Paso	Medium Effort / $$

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Action No.	Action Description	Dimensions						Supports District TSMO Goals							Priority / Timeline	Lead Agency / Support	Staff Effort / Cost
		Business Processes (BP)	Systems and	Performance Measurement	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Customer Service	Collaboration	Integration	Innovation			
	Road User Cost Considerations: *																
WZM10	Formalize agency policy and processes for road user cost considerations on WZM which can help better identify and execute WZM project selection. This is currently done on most medium to large size projects and TxDOT can work towards including RUC in maintenance decisions and processes.	X								X	X	X			Medium Priority / Medium Term	TxDOT El Paso District	Medium Effort / $$
Traffic Incident Management																	
	Develop Urban and Rural Incident Management Plans:																
TIM01	Update the existing Incident Management Plan to include new roadways built within the City of El Paso. Develop Incident Management Plan for rural areas, especially for Hudspeth and Culberson counties to detour traffic away from the incident and enable quicker reaction from first responders.	X				X	X	X			X	X			High Priority / Short Term	TxDOT El Paso District / El Paso OEM / Municipalities / Counties	Medium / $$

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7.0 TSMO Tactical Plans Assessment

TSMO Tactical Plans allow the TxDOT El Paso District to accomplish objective (s) of a single or multiple recommended action items included in the TSMO Program Plan. TSMO Tactical Plan also helps to achieve a higher level of capability maturity by impacting multiple dimensions. Tactical Plans can establish project details, assign responsibilities, and include cost and staff estimates for specific initiatives. Often, Tactical Plans establish further direction regarding a specific TSMO capability dimension (for example, Performance Measurement), focus area (for example, TIM), or a service within the scope of a TSMO focus area (for example, winter road management, within the Road Weather Management focus area).

7.1 Tactical Plan Criteria

Based on the transportation challenges in the region, and priorities identified by regional stakeholders, five Tactical Plans are recommended for the TxDOT El Paso District. These recommended Tactical Plans are shown below in Table 14. Plans are displayed according to the following criteria:

1. Alignment with the TxDOT El Paso District TSMO Goals: Safety, Reliability, Efficiency, Access, Collaboration, Innovation and Integration.
2. Stakeholder partnerships required for successful implementation.
3. Level of anticipated initial and ongoing costs and staff effort anticipated for successful implementation
4. Expected return on investment anticipated, pending successful implementation
5. Action items addressed from this TSMO Program Plan within the Tactical Plan's scope

7.2 Tactical Plan Components

The following components are typically included in TSMO Tactical Plans:

- A detailed account of existing activities within the District and region, including who is responsible, a schedule of when and how the activities are executed, and other considerations
- Recommendations for new activities, or changes to existing activities that would support the aim of the Tactical Plan
- A description of how the recommended activities will be integrated with existing business processes
- A detailed schedule for up-front and ongoing recommended activities
- Up-front and ongoing cost estimates for implementation of recommended activities
- Performance measures that would allow for tracking the progress of recommended activities

The following section details above mentioned key components of a tactical plan.

7.2.1 Description of the Prioritized Service, Activity, or Project

Describe the initiative and how it supports the district's TSMO goals and objectives. Describe existing services such as devices and systems, staffing, priorities, and stakeholder coordination. Perform a gap analysis to review how emerging technologies, operating models, data acquisition and utilization, resources and staffing, and business process relate to the initiative. Describe the future of the initiative.

7.2.2 Supporting Implementation Policies and Guidelines

Identify the relevant TxDOT, district, or federal policies and guidelines needed for the specific service or strategy. Examples include standards and specifications for communications technologies, guidelines for selection or deployment of ITS devices, policies and guidance on public/private data sharing initiatives, decision-making guidelines for implementation, and service levels standards for devices.

7.2.3 Investment/Financial Plan

Effective planning for TSMO involves identifying the costs associated with deployment of services, which may include new infrastructure investments, technology purchases, staff time and resources, or other resources. Use benefit/cost or other criteria analysis methods to support project prioritization and funding requests. Identify current funding resources for the deployment and any potential funding sources that could be matched to the initiative or each action item or project.

7.2.4 Annual Action Plans

Drawing from funding resources and opportunities to integrate TSMO in other activities and projects, develop a set of specific actions for deployment, on an annualized timeframe. These annual plans should be developed in coordination with larger district or agency planning efforts and integrated in standard programs, which often have a four-year timeframe.

7.2.5 Tracking Progress: Performance Assessment

Finally, the TSMO Tactical Plan should address how performance analysis will be conducted to measure the effectiveness of tactics in meeting program objectives. Select from the metrics identified earlier in this Program Plan to be used to conduct on-going monitoring of system performance and project evaluation. Clearly identify how we will measure how well we are meeting the program's stated objectives. Also identify what data are currently available and what additional data is still needed. Finally, consider ways that data can be used to tell success stories to justify future TSMO investments and to promote a TSMO culture within the District.

TABLE 14: EL PASO DISTRICT TSMO TACTICAL PLANS

Action No.	Tactical Plan with Key Activities	Supports District TSMO Goals							Key Stakeholders	Staff Effort / Cost	Return on Investment	TSMO Action Items Related/ Addressed
		Safety	Reliability	Efficiency	Access	Collaboration	Integration	Innovation				
01	**Develop Urban and Rural Incident Management Plans:** Update the existing Incident Management Plan to include new roadways built within the City of El Paso. Develop Incident Management Plan for rural areas, especially for Hudspeth and Culberson counties to detour traffic away from the incident and enable quicker reaction from first responders.	X		X	X	X			TxDOT El Paso District, FHWA, El Paso MPO, City of El Paso, El Paso OEM	Medium Effort / $$	| | |	TM03, TM06, TM10, RWM08, RWM09
02	**Tools and Skills Training** Develop training modules and resources to tackle limited TxDOT staff and high turnover. Training modules can be related to TSMO, existing and emerging ITS technology, data and performance analysis, current inter-departmental procedures, etc. Identify and provide training for tools and platforms for centralized communication and collaboration.			X		X		X	TxDOT El Paso District, FHWA, NWS, Cities, Counties	High Effort / $$$	| | |	TM01, TM02, TM04, TM05, TM06, RWM02, RWM05, RWM09, WZM03, WZM05, TIM01
03	**Regional Performance Measurement** Develop dashboards to monitor performance metrics across different transportation disciplines. Develop framework for data collection and sharing between agencies.		X	X			X		TxDOT El Paso District, El Paso MPO, City of El Paso	Medium Effort / $$	| | |	TM03, TM06, TM07, TM08, TM10, RWM01, RWM04, RWM08, WZM09, TIM01
04	**Work Zone Management and Alternate Route Framework** Update alternate routes for construction activities and severe weather events for both urban and rural freeways. Develop WZM resource repository and periodically update best practices.	X	X	X	X	X			TxDOT El Paso District, Cities, Counties	Medium Effort / $$	| |	TM01, TM07, TM08, WZM03, WZM04, WZM06, WZM10

Action No.	Tactical Plan with Key Activities	Supports District TSMO Goals							Key Stakeholders	Staff Effort / Cost	Return on Investment	TSMO Action Items Related/ Addressed
		Safety	Reliability	Efficiency	Access	Collaboration	Integration	Innovation				
05	**Framework for Weather Data Reporting and Sharing** In collaboration with NWS, establish weather data reporting and sharing policy for improved communication and consistent data sharing between agencies. Develop dashboards for monitoring weather parameters and share with agencies. The framework would also help agencies in decision-making process during weather events and weather-dependent activities (construction, maintenance etc.)	X	X	X	X	X	X	X	TxDOT El Paso District, FHWA, NWS, Cities, Counties	Medium Effort / $$	I I I	TM01, TM07, TM10, RWM01, RWM02, RWM04, RWM05, RWM08, RWM09, RWM10

8.0 TSMO Update Cycle

TxDOT is facing more mobility and safety challenges than ever before. With ever growing population and economic activity in the El Paso District requires a paradigm shift and additional efforts in managing and operating the transportation system. The success of this paradigm shift is dependent upon the buy-in of both TxDOT El Paso District staff and their counterparts in partner agencies such as El Paso MPO, City of El Paso, law enforcement agencies, counties, and other transportation and planning agencies. Though the business case for TSMO, goals and objectives for the TSMO program are clear, the TSMO program plan is a living document that the District should revisit as needed to track its progress in implementation and to reassess the priorities laid out in the TSMO Implementation Plan and series of tactical plans. Figure 21 shows TxDOT's recommended metro and urban district update process for TSMO.

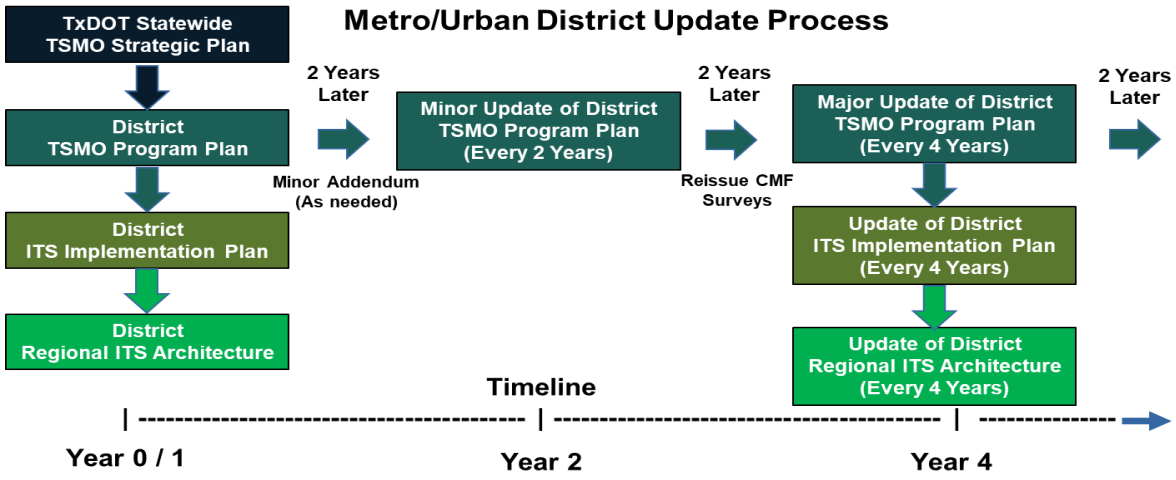

Figure 21: TxDOT District's Update Process for TSMO

The El Paso District TSMO Program Plan is the District's first formalized TSMO Program. As such, the levels of capability maturity identified with the most need for improvement are addressed with specific action items in this program plan document. The District's initial TSMO efforts focus on action items related to work zone management, traffic management, and traffic incident management. The action items laid out in this plan, if followed, can enable the District to reach a higher level of organizational maturity and capability the next time this is assessed. The recommended tactical plans, including the development of a regional ITS master implementation plan and regional ITS architecture, are designed to work in concert with and enable further development in the TSMO focus area prioritized by the District's stakeholders and steering committee.

As TxDOT strives to manage and operate a transportation system shaped by safety, reliability, efficiency, innovation, access, collaboration, and integration, the agency should strive to keep TSMO as a central agency focus. By incorporating strategies and processes recommended in this report, championing these efforts across the District, collaborating, communicating, and coordinating with regional partners, TxDOT El Paso District can emerge as an agency with TSMO mainstreamed as a fundamental agency focus.

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TxDOT El Paso District TSMO Program

Program Plan

Appendices

Appendix A – One-Page Summary of TSMO Implementation Plan Action Items

TRAFFIC MANAGEMENT STRATEGIES

Action #TM01

Determine System Platforms/Applications for Collaboration: *

Identify specific applications for pursuing collaboration and draft standard operating procedures specifying roles and responsibilities for agencies to review. This can help to identify the next steps in an orderly fashion for Traffic Management efforts.

DIMENSIONS

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency | Collaboration | Integration

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TM02

Create a Technical and Procedural Guidance Toolkit for Staff: *

Help provide hands-on and useful resources about 'How and What' of traffic management efforts at all levels and it can also help establish consistent response for joint operations as well.

DIMENSIONS

Culture | Organization & Workforce

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency | Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

TRAFFIC MANAGEMENT STRATEGIES

Action #TM03

Improve Coordination and Collaboration with District's Traffic Management Team (TMT):

Periodically update TMT meeting invite list to include additional and relevant stakeholders. Ensure appropriate stakeholders are included in TMT meetings to improve coordination and collaboration for any existing/planned projects and operations.

DIMENSIONS

- Business Processes
- Collaboration
- Organization & Workforce

ALIGNMENT WITH SUPPORTED TSMO GOALS

- Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TM04

Coordinate with CoEP, MPO and Partner Agencies Regarding Upgrade of ITS Equipment:

Initiate and encourage communication and coordination between TxDOT, CoEP and partner agencies for regional ITS equipment compliance. Ensure that any ITS equipment to be upgraded, is compliant with regional ITS architecture/standards and is also compatible with TxDOT and/or partner agencies ITS equipment to leverage improved integration and functionality.

DIMENSIONS

- Business Processes
- Systems & Technology
- Organization & Workforce

ALIGNMENT WITH SUPPORTED TSMO GOALS

- Collaboration
- Integration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC MANAGEMENT STRATEGIES

Action #TM05

Develop a Checklist/SOPs for ITS:

Create checklist/SOP for existing, planned and emerging ITS technology for implementation in the District. Utilize checklist/SOP during project development stage to help assess the requirements for implementation and maintenance of ITS technology, especially for PS&E projects. The checklist/SOP can also help to review and provide feedback for design, construction, and maintenance staff.

DIMENSIONS

- Systems & Technology
- Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

- Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TM06

Joint Operations Agreement with CoEP:

Coordinate with CoEP and partner agencies leadership to develop a staff sharing agreement and conduct joint operations on key corridors to integrate and improve transportation system performance.

DIMENSIONS

- Business Processes
- Systems & Technology
- Perfomance Measurement
- Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

- Efficiency
- Collaboration
- Integration

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC MANAGEMENT STRATEGIES

Action #TM07

Border Crossing Coordination Meetings:

Maintain a roster of key personnel from TxDOT, CoEP, CBP, USFMCSA, DPS, ISDs and Juarez (Mexico) counterparts and attend periodic meetings to improve collaboration, cross-border traffic operations, safety, and customer service.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Collaboration

Customer Service

Integration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso International Bridges / USCBP

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TM08

Standardize Traffic Operations in Construction Projects:

Develop traffic operations handbook that standardizes procedures and protocols among stakeholders for communication and coordination for construction projects. Include key stakeholders during the project development stage especially if ITS is involved in a project.

DIMENSIONS

Business Processes

Systems & Technology

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Efficiency

Collaboration

Customer Service

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC MANAGEMENT STRATEGIES

Action #TM09

Develop Sidewalk Condition Inventory:

Conduct periodic inventory and condition assessment of sidewalks within TxDOT ROW. Prioritize and perform maintenance and/or reconstruction to meet pedestrian safety and ADA standards. Consider creating a pedestrian safety plan for the District. This effort can also include non-traditional time saving approaches i.e. PPP, Manager-at-Risk etc. to improve accessibility and safety.

DIMENSIONS

- Perfomance Measurement
- Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

- Safety
- Customer Service

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TM10

Action Plan for Performance Measures to Achieve Targets:

Create an action plan to review current performance level against set targets and identify where the improvements are needed. Such list of action items can improve reliability and efficiency to manage the system to achieve target performance.

DIMENSIONS

- Business Processes
- Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

- Reliability
- Efficiency
- Innovation

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / El Paso MPO / City of El Paso

STAFF EFFORT

LOW — HIGH

COST $ $ $

TxDOT EL PASO TSMO IMPLEMENTATION PLAN

ROAD WEATHER MANAGEMENT STRATEGIES

Action #RWM01

Proactively Share Situational Reports of Weather:

El Paso OEM can further benefit from active sharing of information about road weather responses from TxDOT and key stakeholders. TxDOT can share situational reports to additional key stakeholders during weather events to improve overall coordination and effectiveness of response.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Safety

Customer Service

Efficiency

Collaboration

Integration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #RWM02

Develop Reporting Codes for Various Road Conditions: *

Develop a set of accepted common reporting codes for conditions surveying that are used across the agency. Field personnel also need to be trained and retrained on what each reporting code means which can ensure consistency between reports from different field observers.

DIMENSIONS

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / NWS

STAFF EFFORT

LOW — HIGH

COST $ $ $

*FHWA Strategy

TxDOT EL PASO TSMO IMPLEMENTATION PLAN

ROAD WEATHER MANAGEMENT STRATEGIES

Action #RWM03

Obtain Leadership Buy-In for Decision Support System: *

Establish protocol for DSS on the system due to weather triggers among key agency leaders. DSS facilitates data-driven decisions, supporting enhanced road weather OM. It can help an agency move towards proactive operations during adverse weather.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso / El Paso OEM

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #RWM04

Improve Weather Data Sharing:

Implement an NWS situational awareness tool for more relevant road weather information that TxDOT and key stakeholders can monitor and review relevant weather-related parameters. The tool can also be used to provide feedback to NWS, support in decision making process during weather events. Access to TxDOT cameras would further help NWS to improve the functionality and operability of the tool.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Safety

Innovation

Customer Service

Efficiency

Collaboration

Integration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / NWS

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

ROAD WEATHER MANAGEMENT STRATEGIES

Action #RWM05

Establish Support Systems for Data QA/QC: *

Develop a system to handle data quality and data conflicts before use to enable clear decisions that maximize operational response based on data validity. Conflicting information may lead to bottlenecks in the decision process.

DIMENSIONS

Systems & Technology

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Collaboration

Efficiency

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #RWM06

Improve Linkage Between the RWM and Other Planning Activities: *

Prioritize projects and funding in the agency or region and pipeline new sources of transportation funding for the RWM program with existing investments to supplement current RWM capabilities. This can help share the economic and personnel burden of projects, optimize resource utilization (economic, staff, and tools) i.e. increased linkage with a Statewide or Regional TSMO plan or STIP.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

ROAD WEATHER MANAGEMENT STRATEGIES

Action #RWM07

Joint Response Between the TMC, EOC, and Weather Community: *

Link the emergency operations stakeholders with the TMC, maintenance, and weather community which can improve regional responsiveness to large-scale events.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / NWS / City of El Paso / El Paso OEM

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #RWM08

Report Performance Measures During Weather Events: *

Help calculate outcome and impact measures during an event in terms of incident clearance times, LOS, crash data, and traffic conditions. This can help combine traffic operations and maintenance data to develop a clear picture of performance, as well as traveler experience and promote the culture, program structure, and leadership of RWM program.

DIMENSIONS

Business Processes

Culture

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency

Reliability

Customer Service

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

ROAD WEATHER MANAGEMENT STRATEGIES

Action #RWM09

Provide a Location/Data Feed for Media Partners: *

During weather events, provide access of ongoing updates to the media via a data feed at the operating management centers. Media serves as major sources of mass information dissemination related to road conditions during adverse weather.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Customer Service

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #RWM10

Standard Operating Procedures for Winter Event Planning:

Ensure that all stakeholders are contacted and included in winter event planning. This includes data sharing through a situational awareness dashboard which also ensures consistent data is shared with stakeholders. Address ITS infrastructure gaps in rural areas to provide surveillance and dissemination of information.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Reliability

Efficiency

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

TxDOT EL PASO TSMO IMPLEMENTATION PLAN

WORK ZONE MANAGEMENT STRATEGIES

Action #WZM01

Establish Proper Coordination Between Construction Contractor and Agency: *

Formalize contractor feedback system for increasing WZM knowledge transfer throughout the agency and emphasize sharing lessons learned from successful WZM innovations by the private sector.

DIMENSIONS

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZM02

Law Enforcement Efforts for WZM: *

Ensure that funding criteria are balanced with resources available to fund efforts and coordinate law enforcement use with other TMP strategies. Establish necessary MOUs between law enforcement and the agency for WZM purposes related to the support to be provided, expenses to be covered, training and documentation to be required, etc.

DIMENSIONS

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / State and Local Law Enforcement Agencies

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

TxDOT EL PASO TSMO IMPLEMENTATION PLAN

WORK ZONE MANAGEMENT STRATEGIES

Action #WZM03

Traffic Control Plan Training:

Enhance training provided for implementation of TCP to cope with the District's needs. Both classroom and hands-on training need to address safety in TCP implementation for TxDOT staff, stakeholders, and traffic control contractors.

DIMENSIONS

Business Processes

Organization & Workforce

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZM04

Law Enforcement Efforts for WZM: *

TxDOT can share traffic control permits in advance with all stakeholders that potentially get impacted due to construction activities. Coordinating and communicating schedules will help the District to experience fewer construction-related delays and less-than-optimal safety.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso / Municipalities / Counties

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

WORK ZONE MANAGEMENT STRATEGIES

Action #WZM05

Identify and Foster WZM Knowledge and Skills: *

Determine WZM training needed by staff in the various functional groups within TxDOT. Develop a WZM training program focused on necessary skills and knowledge and regularly assess lessons learned. Incorporate commonly learned lessons as best practices into the project development process.

DIMENSIONS

Organization & Workforce

ALIGNMENT WITH SUPPORTED TSMO GOALS

Collaboration

Innovation

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZM06

Stakeholder Involvement Checklist:

Develop a checklist for every PS&E project, closure, routine maintenance operation, etc. and implement as a standard operating procedure for when, who, and where to contact stakeholders.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

WORK ZONE MANAGEMENT STRATEGIES

Action #WZM07

Develop Multi-Agency Multi-Project Coordination Tools for WZM: *

Develop methods for communication, analysis, and display of WZ impacts that are relevant to multiple agencies across multiple jurisdictions.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency

Collaboration

Integration

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZM08

Develop and Update Work Zone Policies and Procedures: *

Include a review process to help agencies assess how well they are meeting their stated WZM goals and targets. Utilize outcome-based measures to review work zone procedures which provide direct indication of effectiveness of WZM efforts and in turn make updates to the policies and procedures based on review results.

DIMENSIONS

Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Efficiency

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso

STAFF EFFORT

LOW — HIGH

COST $ $ $

**FHWA Strategy*

TxDOT EL PASO TSMO IMPLEMENTATION PLAN

WORK ZONE MANAGEMENT STRATEGIES

Action #WZM09

Evaluate WZM Effectiveness: *

Define outcome-based performance measures and identify how they support the broader goals of regional operations (EG: air quality, safety, planning). This helps maximize ROI and increase the level of buy-in from all levels within TxDOT for TMP development and evaluation.

DIMENSIONS

Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Reliability

Efficiency

Collaboration

PRIORITY

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / City of El Paso

STAFF EFFORT

COST $ $ $

Action #WZM10

Road User Cost Considerations: *

Formalize agency policy and processes for road user cost considerations on WZM which can help better identify and execute WZM project selection. This is currently done on most medium to large size projects and TxDOT can work towards including RUC in maintenance decisions and processes.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency

Customer Service

Integration

PRIORITY

TIMELINE: Medium Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District

STAFF EFFORT

COST $ $ $

**FHWA Strategy*

TRAFFIC INCIDENT MANAGEMENT STRATEGIES

Action #TIM01

Develop Urban and Rural Incident Management Plans:

Update the existing Incident Management Plan to include new roadways built within the City of El Paso. Develop Incident Management Plan for rural areas, especially for Hudspeth and Culberson counties to detour traffic away from the incident and enable quicker reaction from first responders.

DIMENSIONS

- Business Processes
- Culture
- Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

- Safety
- Collaboration
- Customer Service

PRIORITY

LOW — HIGH

TIMELINE: Short Term

LEAD AGENCY/SUPPORT: TxDOT El Paso District / El Paso OEM / Municipalities / Counties

STAFF EFFORT

LOW — HIGH

COST $ $ $

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Version 1.1

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