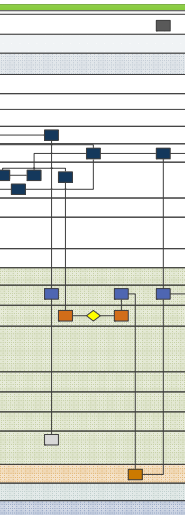
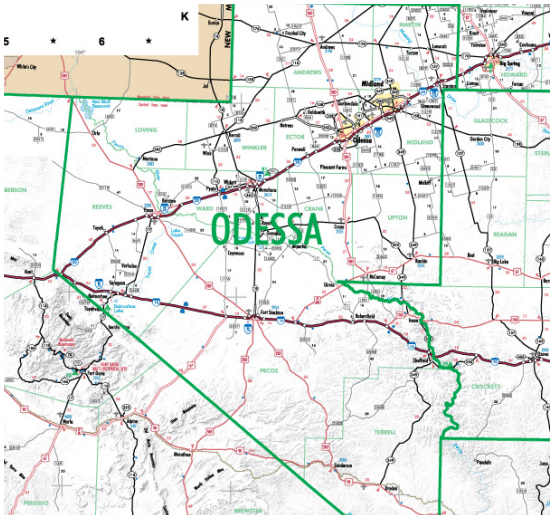
TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS (TSMO)





ODESSA DISTRICT PROGRAM PLAN

May 2021

Texas Department of Transportation

Document Control

Version	Date	Description of Change	Author
1.0	04-27-2021	First draft for TxDOT review	AECOM
1.1	05-07-2021	Final draft	AECOM

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List of Acronyms

Acronym	Definition
ADA	Americans with Disabilities Act
ATSPM	Advanced Traffic Signal Performance Measures
BP	Business Processes
CCTV	Closed Circuit Television
CMF	Capability Maturity Framework
CMM	Capability Maturity Model
COL	Collaboration
Con-Ops	Concept of Operations
CMP	Congestion Management Process
CRIS	Crash Records Information System
CUL	Culture
DISCOS	District and County Statistics
DPS	Department of Public Safety
DMS	Dynamic Message Sign
DSS	Decision Support System
EOC	Emergency Operation Center
FHWA	Federal Highway Administration
HSIP	Highway Safety Improvement Program
ICT	Incident Clearance Time
ITD	Information Technology Division
ITS	Intelligent Transportation Systems
MAP-21	*Moving Ahead for Progress in the 21st Century* legislation
MPO	Metropolitan Planning Organization
NOCoE	National Operations Center of Excellence
OM	Operations and Maintenance
OW	Organization and Workforce
PBHFN	Permian Basin Highway Freight Network
PIO	Public Information Officer
PM	Performance Measurement
PPP	Public Private Partnership
PRSC	Permian Road Safety Coalition
PS&E	Plan, Specification & Estimation
RCT	Roadway Clearance Time
ROW	Right-of-Way
RWM	Road Weather Management
SOP	Standard Operating Procedure

List of Acronyms Cont.

Acronym	Definition
ST	Systems and Technology
SWZ	Smart Work Zones
TIM	Traffic Incident Management
TM	Traffic Management
TMC	Traffic Management Center
TMP	Transportation Management Plan
TMS	Traffic Management System
TRF	Traffic Safety Division
TRIP	Towing and Recovery Incentive Program
TSMO	Transportation Systems Management & Operations
TTI	Texas A&M Transportation Institute
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. The Odessa District (the District) of TxDOT has developed this TSMO Program Plan through stakeholder outreach, the implementation of a formalized data collection, and analysis process. The result of this process culminates in this program plan: a living document with recommendations on the TSMO strategies, organizational and process improvements the District can undertake through the next half-decade to achieve a higher level of maturity in its processes. The plan also details the recommended tactical plans the District and stakeholders can develop to target systemic improvements to processes such as planning the intelligent transportation systems (ITS) network for the District and managing traffic incidents on major corridors in the District.

The business case for TSMO is clear—Odessa District's unique economic and geographic position lead it to experience higher daily vehicle miles, and thus, congestion from passenger and commercial vehicles, than all adjacent districts. Yearly crashes, including fatal crashes, according to TxDOT's crash records information system (CRIS) remain high. The District is already implementing many programs and practices that are aligned with the state's priorities in TSMO, including implementing smart work zones and training; however, some of these processes are yet to be unified in a documented, standardized manner. This program plan represents the opportunity to mainstream these processes as a central focus of TxDOT. The business case section and Odessa District's State of the Practice Report Document summarize existing processes and highlight opportunities where TSMO may be needed or already functioning well.

The Odessa 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

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 Capability

Maturity Model section of this report outlines both the major insights from the survey and recommendations and examples of process, technology, organizational and other improvements to achieve higher levels of capability. The capabilities of the District and partner agencies were assessed in business processes (BP), systems and technology (ST), performance measurement (PM), organization and workforce (OW), collaboration (COL), and culture (CUL).

The TSMO Implementation Plan section presents recommended action items for the Odessa District. These are designed to provide actionable steps to implement TSMO. They are prioritized based on feedback and input from District stakeholder and TxDOT's leaders. Three focus areas are the subject of the recommendations: work zone management (WZM), traffic management (TM), and traffic incident management (TIM). Recommended strategies and corresponding action items are presented in detail in the TSMO Implementation section. A summary of strategies is presented below, with corresponding dimensions of capability maturity.

No.	WZM Strategy (Top 10 by Priority)	Dimension	Staff Effort	Cost
1	Work Zone Training	OW	Medium	$$
2	Smart Work Zone Implementation	BP, ST	Low	$
3	Alternate Routes for Work Zones	BP, COL	High	$$
4	Utility Company Coordination	BP, COL	Low	$
5	Tie WZM Performance Measures to Regional Objectives *	PM	Low	$
6	Develop Procedures to Update WZM Processes *	PM	Low	$
7	Work Zone Driver Awareness Campaign	CUL, COL	Medium	$$
8	Improve the Assessment of Traffic Control Plans	BP	Medium	$
9	Work Zone Information Dissemination	BP	Medium	$
10	Work Zone Safety Enforcement	BP, COL	Medium	$
Rank	**TM Strategy (Top 10 by Priority)**	**Dimension**	**Staff Effort**	**Cost**
1	Low Cost enhancements to Improve Safety	BP, ST	Medium	$
2	ITS in Project Development	BP, ST	Low	$
3	Freight Traffic Data Collection	ST, PM	Medium	$$
4	Traffic Management Roles and Responsibilities	OW	Low	$
5	Identify Corridors for Traffic Management Performance	PM	Low	$
6	Share Traffic Impact Studies for Sites with Heavy Freight	COL	Low	$
7	ITS Asset Management	ST, PM	Medium	$$

* Federal Highway Administration (FHWA) Strategy

8	Closed Circuit Television (CCTV) and Dynamic Message Sign (DMS) Coverage (Freeways)	ST	Medium	$$$
9	Update Congestion Management Process for the Region	COL, BP	Medium	$$
10	Freight Operator Information Dissemination	BP, COL	Low	$
Rank	**TIM Strategy (Top 10 by Priority)**	**Dimension**	**Staff Effort**	**Cost**
1	Equipment Staging Standards (For Responders Upon Arrival) *	BP, COL	Low	$
2	Emergency Lighting Procedures *	BP, COL	Low	$
3	Hazardous Materials Procedures *	BP, COL	Low	$
4	Two-Way Voice Communications *	ST, COL	Low	$
5	After Action Reviews	BP, COL, OW	Medium	$
6	TIM Information Dissemination	BP, COL	Low	$
7	Fatal Crash Investigation Standards *	BP, ST	Low	$
8	Incident Management Plan	BP, COL, OW	High	$$
9	Regional Criteria for Emergency Operation Center (EOC) Activation	BP, COL	Low	$
10	Towing and Recovery - Formalize Coordination *	BP, COL	Low	$

Tactical plans for TSMO serve to address specific processes for which the District needs further attention. They establish in greater detail how to act upon some of the priority recommended action items included in the TSMO Program Plan. Tactical Plans can establish project details, assign responsibilities, and include cost and staff estimates for specific initiatives. The TSMO tactical plans recommended for development are:

- ITS Master Implementation Plan
- Traffic Incident Management Plan
- Tools and Skills Training
- Regional Performance Measurement
- Regional ITS Architecture Update
- Work Zone Management and Alternate Route Framework

Through implementing the recommendations in this TSMO Program Plan, coordinating and collaborating with regional partners, and documenting and measuring the progress of TSMO actions, the Odessa District can achieve a higher level of maturity in managing and operating its regional transportation network and provide for the safe mobility of all modes.

* FHWA Strategy

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 Odessa District faces unique transportation challenges, including rapid growth of vehicles on roadways in recent years, aging infrastructure that may not meet demand for both safety and capacity, higher demand for utilization of ITS equipment, 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 a capacity-building-first agency to one that efficiently manages and operates the transportation system.

1.1 What is TSMO

Transportation systems management and operations 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 multi-modal and intermodal, cross-jurisdictional systems, services, and projects designed to preserve capacity and improve security, safety and reliability of the transportation system.

1.2 Importance of TSMO for TxDOT Odessa District

In 2017, according to the Texas A&M Transportation Institute (TTI), the Odessa and Midland urban areas experienced annual hours of delay of about 3,710 and 2,950 hours respectively, resulting in a total congestion cost of about $139 million. On an average, a commuter experienced 27 hours of annual delays in the Odessa and Midland urban area. Adding more highway lanes to reduce traffic delays in the Odessa District—a traditional approach to solve congestion—is no longer an effective measure. Historically, congestion issues were primarily addressed by funding major capital projects, such as adding lanes or building new interchanges and roads to address physical constraints, such as bottlenecks. These expansion projects were based primarily on traffic volumes predicted far into the future. Operational improvements were typically an afterthought and considered after the new infrastructure was already added to the system.

Today, transportation agencies are facing trends such as increased urbanization that create a growing demand for travel with less funding and limited land to build on. As a result, TxDOT can no longer build the State's way out of congestion. Current trends include:

- **Limited funding:** The primary source of federal funding for the U.S. highway system is the federal gas tax, which has not changed since 1993. Since that time, the financial constraints for public agencies have increased due to:
  - Inflation: The cost to build roads and bridges has increased.
  - Fuel efficiency: Vehicles today can travel farther with fewer trips to the gas pump, decreasing revenue. The growing use of electric and plug-in hybrid cars has also reduced the purchase of fuel.
- **Advances in Technology:** Transportation agencies can leverage technology to develop solutions to address congestion issues; however, given the advancement in consumer technologies (e.g., smart phones, apps,

GPS), privately owned mobility services (e.g., Uber, Lyft), and the availability of more information, the traveling public expects that the products they use and the technologies they encounter will be "smart" and will ultimately improve their travel experience. They also expect that the information received will be accurate and reliable. This creates an added responsibility for the transportation community to provide the best customer service. Technology will likely have an even greater impact on the transportation network in the future with automation, connectivity and big data.

- **Changing Customer Needs and Expectations:** There is a greater demand for accountability for public officials to ensure that public funds are spent to maximize the performance of the transportation system in the most cost-effective way. This creates a trend toward performance-based programs. The traveling public is also becoming less tolerant of unexpected delays in their trips that can result from crashes, bad weather, work zones and special events. Such delays can be frustrating for drivers and can impact businesses as well. The traveling public expects to reach their destinations on time, regardless of the mode of travel or who owns the road. In urban areas, there is an additional expectation for multi-modal options and connectivity.
- **Better Understanding of the Causes of Congestion:** Research has shown that while some congestion may be caused by typical morning and evening rush hours, a substantial amount comes from non-recurring events, such as crashes, breakdowns, work zones, bad weather and special events. In many cases, roadway capacity is not lost due to bottlenecks or limited capacity, but due to these unexpected events. There may be opportunities to quickly apply low-cost TSMO improvements that are targeted toward these specific causes to reduce their impacts.

Given these trends, a different philosophy and approach is needed. Addressing congestion issues now requires transportation professionals to seek out solutions that involve optimizing the performance of existing facilities.

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 higher return on investment. One major benefit for TSMO is that it can target unexpected delays, reduce impacts to the system and regain much of the lost capacity. Benefits of TSMO 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)

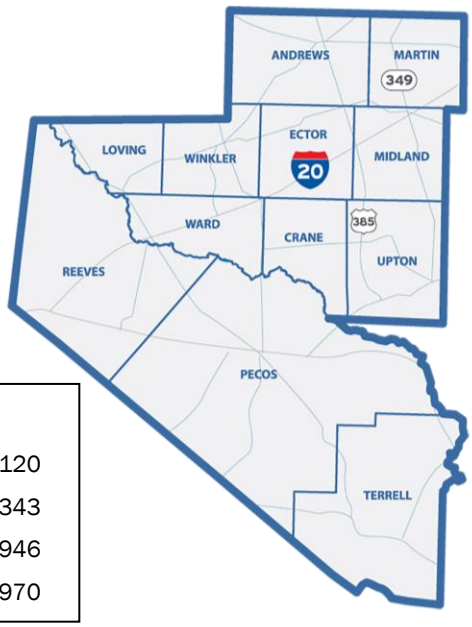
1.3 What is a TSMO Program Plan?

To reap the benefits of TSMO, TxDOT is implementing a Statewide Strategic Plan for Transportation TSMO in all 25 of the agency's geographic districts. As such, the Odessa District (Figure 1) is developing a TSMO Program Plan to analyze the District's TSMO capabilities and plan to implement programs and strategies to mainstream management and operations into the District's processes.

Transportation agencies across the country, including TxDOT, are moving from implementing ad hoc TSMO projects toward institutionalizing TSMO as a core function of the agency. To structure and sustain this shift, many agencies find it valuable to develop a TSMO program plan to outline 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 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 into their region's planning and programming processes, and identify performance measures to track progress.



Quick facts (2020):

Population	429,120
Area (Sq. Miles)	18,343
Lane Miles	8,226.946
Daily Vehicle Miles	16,678,970

Figure 1: TxDOT Odessa 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 Odessa 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 Odessa 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 develop an update to 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 2 shows a summary of the hierarchy of TSMO documents.

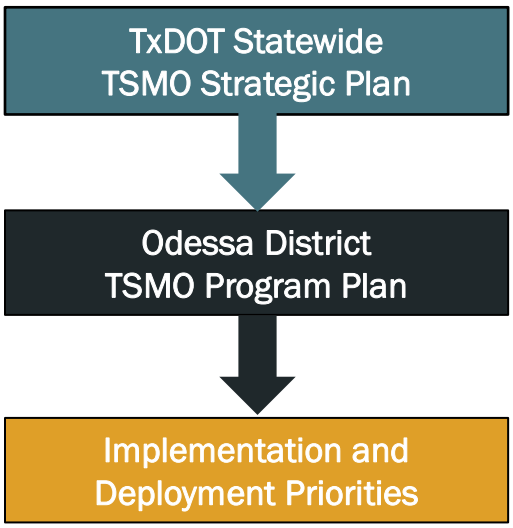


Figure 2: TSMO Program Plan Development

1.6 TSMO Leadership

TxDOT Odessa 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 Permian Basin Metropolitan Planning Organization (MPO) and cities (Midland and Odessa) 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 3 shows the Odessa District's Organizational Chart. 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.

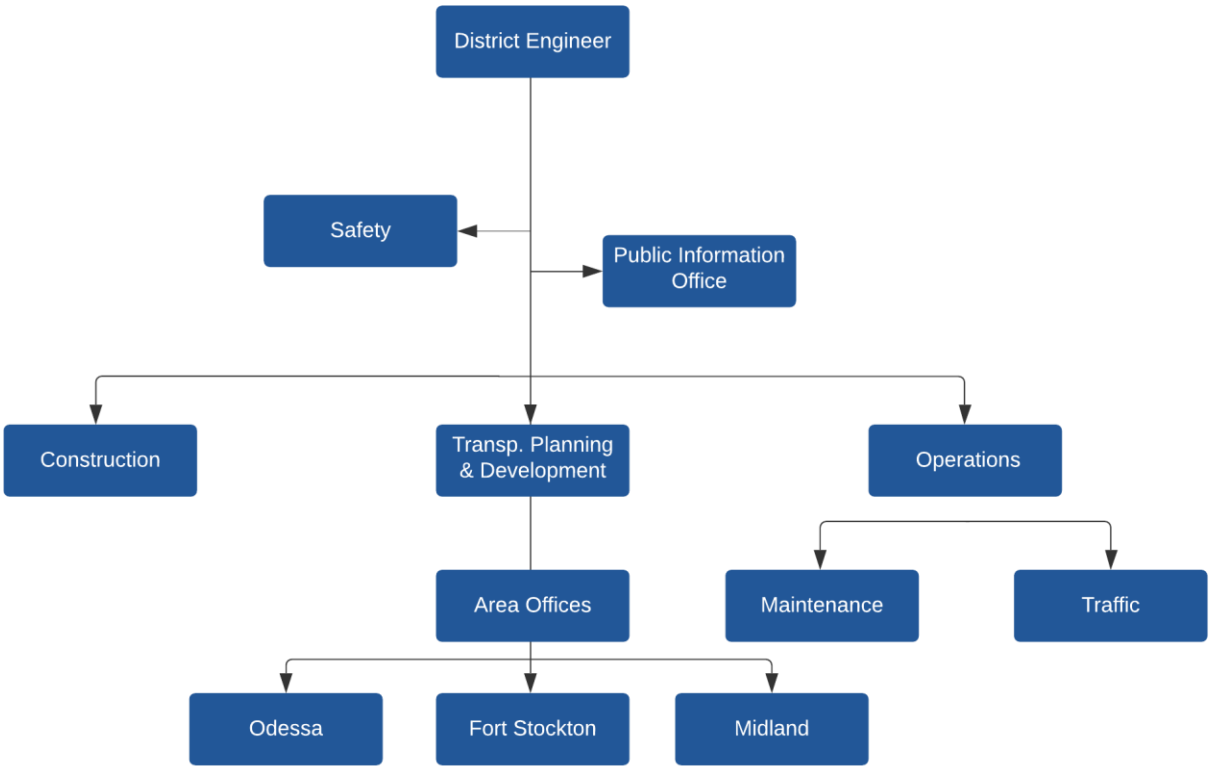


Figure 3: Odessa District Organizational Chart

2.0 Business Case for TSMO

TxDOT Odessa District is facing challenges associated with population growth, congestion, safety, increase in vehicle miles traveled (VMT), an energy sector-based economy, deficient roads and bridges, and trucks and freight movement. The following subsections describe these challenges and how TSMO can contribute in dealing with these challenges.

2.1 Business Case Topics

The following sub-sections include a breakdown of the challenges facing the Odessa District that may be solved by implementing TSMO.

2.1.1 Population Growth

Congestion levels are increasing rapidly due to the growth in population and increased demand on Odessa District roadways. The population for the District in 2020 was estimated at 430,000, with the Midland-Odessa metropolitan areas hosting a majority of the population. With rapid growth of the energy sector in the Permian Basin region, the population is expected to continue to grow by 1.5-2% annually for the next decade, which can lead to even bigger transportation demands and dilemmas.

2.1.2 Congestion

According to the TTI Urban Mobility Report, delays from congestion resulted in an extra 6.7 million hours in travel time and the purchase of an extra 3.1 million gallons of fuel in 2017, totaling $139 million in congestion costs for Midland-Odessa urban area. Based on the TTI estimates, lost time and wasted fuel due to congestion cost the average driver $467 (22 hours).

According to the Permian Basin Freight and Energy Sector Transportation Plan, major corridors in the region such as SH 128, SH 302, Loop 250, IH 20, US 285, SH 191 and SH 338 are impacted by truck-related congestion. Factors such as the lack of passing lanes, lack of dedicated truck lanes, short interstate ramps and heavy truck volumes contribute to congestion on these corridors.

2.1.3 Funding

Funding for highway improvements has drastically increased in the Odessa District in recent years. With more funding, there is a need to address every highway project from “right-of-way to right-of-way” meaning the funding is robust enough to focus on traffic, maintenance and operational improvements, as well as pavement and bridge improvements. The Odessa District submits any project that could be viable for Highway Safety Improvement Program (HSIP) funding through FHWA. With increased highway funding comes the opportunity to increase funding for operations in the Odessa District. The Permian Basin MPO identified the need to improve their institutional knowledge of operations to improve their own planning for operational improvements for TxDOT and the region. Even “low-hanging fruit” projects such as traffic safety devices, signage, striping and signal timing may be funded through existing or future funding sources.

Operational improvements such as those introduced in the Odessa 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 *4*. 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.

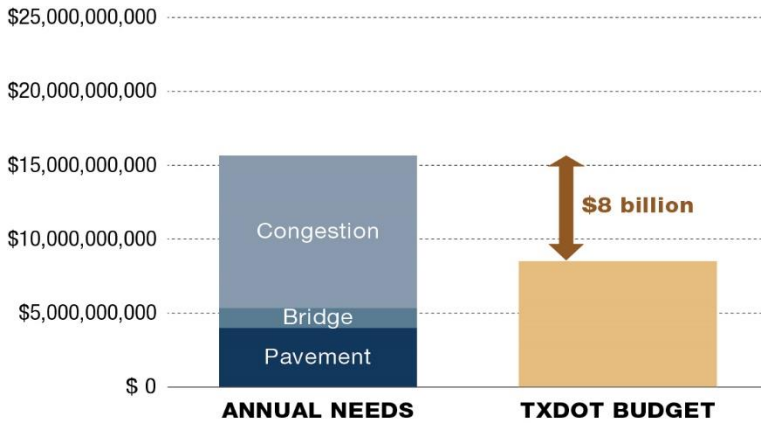


Figure 4: TxDOT Annual Transportation Needs and Budget

TSMO strategies, processes, institutional arrangements and tactical plans do not come with a high cost compared to highway build projects. This program plan leverages existing sources of funding to provide a high level of benefit through implementing the planned recommendations. Quantifying the benefits of incorporating TSMO strategies in traffic management, work zone management, road weather management, traffic incident management and other areas can show savings and potential for expanded investment in TSMO through traditional avenues of TxDOT funding.

2.1.4 Safety

According to the TxDOT Crash Records Information Systems, there were 9,588 crashes recorded in the Odessa District in 2020. Table 1 shows a breakdown of crashes by severity type. In 2020, there were at least 118 crashes with a fatality. From 2016-2019, there were an average of about 143 fatal crashes in the District per year. TxDOT has a statewide goal to cut fatalities in half by the year 2035 and eradicate roadway deaths by 2050. Targeted operational strategies, low-cost enhancements, public awareness and education can help TxDOT achieve this goal. The Odessa TSMO Program Plan prioritizes safety as a goal. Many TSMO strategies are designed to improve safety such as inter-agency traffic incident management training, queue warning and alternative routes.

Table 1: TxDOT Odessa District CRIS Crashes, 2020

Crash Type	K – Fatal Injury	A – Suspected Serious Injury	B – Suspected Minor Injury	C – Possible Injury	N – Not Injured	99 – Unknown
Frequency	118	239	1,097	1,020	6,511	603
Percent	1.23%	2.49%	11.44%	10.64%	67.91%	6.29%

In the development of the Odessa District TSMO Program Plan, stakeholders expressed many opportunities to improve safety throughout the District. For example, a systemic approach to safety in the District could start with the design of any project. TxDOT could track right-on-red crashes, barrier impacts, fatalities, skid issues and other safety issues before commencing the design of a project.

Projects should also incorporate the new safety scoring tool developed by TxDOT's Design Division. This can provide the District with an opportunity to identify where safety needs improvement as well as which improvements to incorporate. Data should also be collected after a project is implemented at the same locations to complete a before-and-after study to quantify the benefits of a project.

2.1.5 Vehicle Miles Traveled

From TxDOT's District and County Statistics (DISCOS) report published by TxDOT's Finance Division, the Odessa District has a much higher rate of VMT than bordering districts. Table 2 shows a comparison of the Odessa District to surrounding districts. The transportation management and operations challenges faced by the Odessa District are magnified by its disproportionate traffic for a district its size. Considering that the Odessa District has a population with a comparable size to Lubbock and Laredo districts, but a daily VMT comparable to the El Paso District, the Odessa District has a disproportionate potential for operations challenges compared to other districts its size. The high VMT reflects an increased rate of economic activity and/or living and working patterns that are highly reliant on vehicular travel.

Table 2: DISCOS Comparison

District Name	Square Miles	Daily Vehicle Miles	SDC Population Estimate	Centerline Miles
Odessa	18,343	16,678,978	429,120	3,416
El Paso	21,700	16,307,352	876,153	1,952
Lubbock	15,861	11,975,265	490,575	5,349
Abilene	11,805	9,285,220	264,279	3,746
San Angelo	19,061	7,089,640	164,028	3,249
Laredo	15,052	7,833,736	433,249	2,247

2.1.6 Energy Sector-Based Economy

The Permian Basin is the most significant oil and gas producing region in the U.S., producing more than one-third of the nation's oil and about 15% of the nation's natural gas. The importance of the region has increased significantly since 2010. In addition to oil and gas, the region is also the nation's largest supplier of alternative fuel energy, including wind and solar. The U.S. Energy Information Administration projects that the Permian Basin will continue to dominate domestic energy production for the next several decades. The growth in energy sector activity is driving rapid economic and population growth, resulting in significant growth in non-energy sector related freight movements in the region. Figure 5 shows key energy statistics of the Permian Basin.

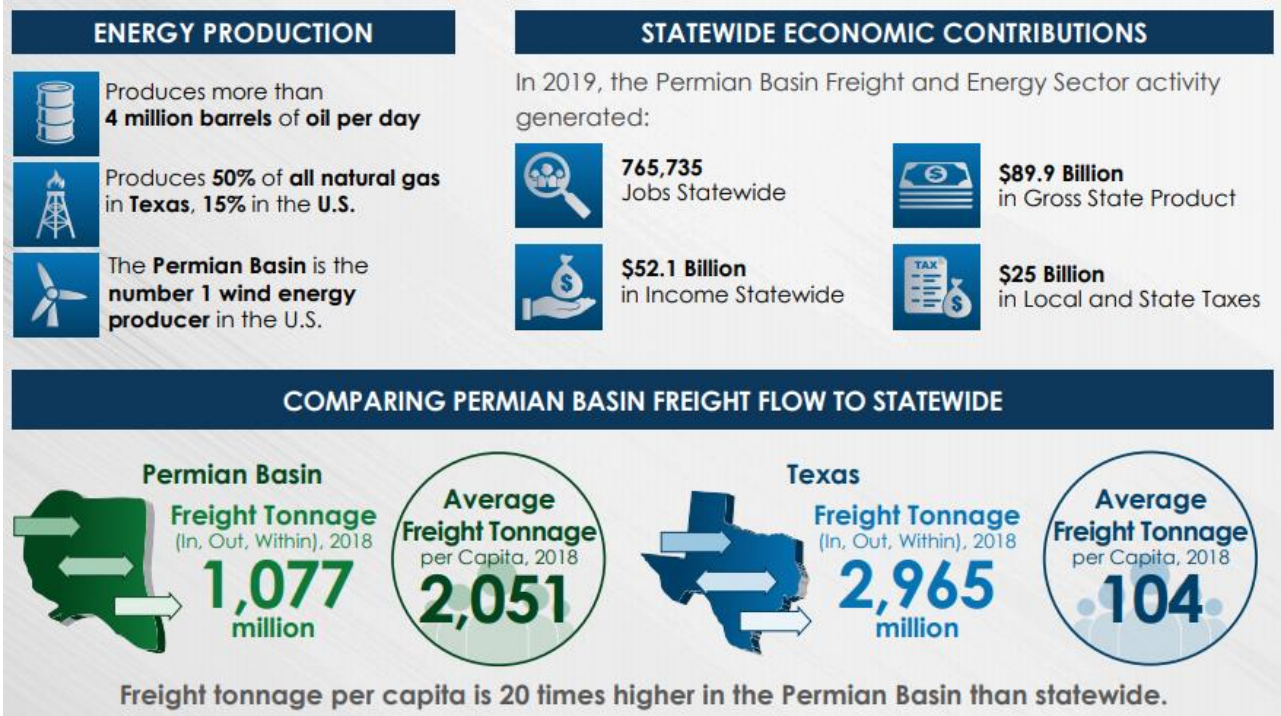


Figure 5: Permian Basin Statistics (*Source: Permian Basin Frieght and Energy Sector Plan Executive Summary*)

2.1.7 Trucks and Freight Movement

Managing the safe mobility of trucks and energy sector-related freight traffic is a key priority for the Odessa District. Per the Permian Basin Freight and Energy Sector Transportation Plan, an estimated 1,077 million tons of freight were moved in, out and within the Permian Basin region in 2018, compared to a total of 2,965 million tons in, out and within the State of Texas in the same year. Trucking accounts for most of this freight tonnage (92%) and value (61%). Transportation of crude oil and petroleum products accounts for much of the truck traffic, while natural gas occurs mostly through pipelines. The movement of commodities such as brine water, fresh water, sand and minerals as well as equipment account for much of the remainder of truck traffic.

Many facilities belonging to the Permian Basin highway freight network in the Odessa District face challenges related to capacity and mobility, safety, truck parking, asset preservation and modernization, oversize/ overweight issues and rural road connectivity. Though TSMO is not aimed at road capacity expansions, certain TSMO strategies can address some of these problems. Even strategies identified in the Freight and Energy Sector Transportation Plan work hand-in-hand with the TSMO recommendations in this report. For example, the plan recommends TxDOT integrate freight considerations into the transportation project development process. This TSMO strategy is central to improving TxDOT's capability in the business processes dimension and is referenced by this plan.

2.1.8 Mainstreaming TSMO

Mainstreaming TSMO requires that TxDOT Odessa 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.

2.2 Mobility Challenges and TSMO Strategies

To identify mobility challenges in the Odessa 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 Odessa 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 region with TxDOT and other agencies uncovered mobility challenges facing the Odessa 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:
  - WZ02: Smart Work Zone Implementation
  - TM02: ITS in Project Development
  - TIM08: Incident Management Plan
- Truck traffic and other congestion exacerbates mobility and safety issues around work zones and leads to traffic incidents, especially on the Permian Basin highway freight network. Strategies in the implementation plan to consider when addressing this challenge include:
  - WZ02 Smart Work Zone Implementation
  - WZ07 Work Zone Driver Awareness Campaign
  - WZ10 Work Zone Safety Enforcement
- Traffic incidents and work zones contribute to delays and urban access issues, especially in Midland and Odessa. There is a need to improve traffic incident management practices and implement early warnings of closures and notifications of alternative routes.
  - WZ09 Work Zone information dissemination
  - TIM01 Equipment Staging Standards (upon arrival)
  - TIM06 TIM Information Dissemination

- 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:
  - TIM02 ITS in Project Development
- District staff require more training for more to be able to utilize Advanced Traffic Signal Performance Measures (ATSPM) and to better manage and incorporate signal timing plans in select corridors. Strategies in the implementation plan to consider when addressing this challenge include:
  - TM04 Traffic Management Roles and Responsibilities
- "Low-hanging fruit" mobility challenges exist, such as signals, that require retiming and spots that require new signage, striping, or other low-cost enhancement. Strategies in the implementation plan to consider when addressing this challenge include:
  - TM01 Low Cost enhancements to improve safety

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 Odessa District can have the tools to address its priority mobility challenges. Opportunities to address challenges include current projects such as the IH 20 Corridor project and projects on other priority projects on US 67, SL 338, US 385 and US 285, among others. 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.

3.0 TSMO Vision, Mission, Goals and Objectives

The TxDOT Odessa District developed TSMO vision, mission, goals and objectives for the region to help advance TxDOT's guiding principles and core values and, therefore, reflect the District's transportation priorities. The TSMO vision, mission and goals and objectives for the District determine the strategic direction of the TSMO Program Plan and are described in the following subsections.

3.1 Odessa District TSMO Vision

Provide traveler-friendly transportation services through improved collaboration, advanced technology and optimized operations.

3.2 Odessa District TSMO Mission

Maximize the ability of TxDOT Odessa District's transportation system by implementing a sustainable TSMO program plan and consistently transport people and goods.

3.3 Odessa District Goals and Objectives

The TxDOT Odessa District set the following goals and objectives for the region.

Table 3: Odessa District TSMO Goals and Objectives

Goal	District TSMO Objectives	Strategic Odessa 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 state roads. ▪ Reduce congestion and bottlenecks. ▪ Increase the level of maintenance staffing to maintain all current and future assets. ▪ Optimize travel time reliability on energy and freight corridors.
Efficiency	Minimize traffic delay and maximize transportation system efficiency to keep traffic moving.	▪ Reduce work zone-related traffic delays and bottlenecks. ▪ Reduce delays caused by freight traffic. ▪ Augment the information dissemination process to provide real-time traffic information to the public. ▪ Increase the scope of joint operations and management between TxDOT and external partners.

Goal	District TSMO Objectives	Strategic Odessa District Objectives
Innovation	Utilize technology and innovation to facilitate TSMO.	▪ Integrate and standardize all TxDOT data systems. ▪ Seek strategic pilot project deployment opportunities.
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 more specific information to modes, such as commercial freight vehicles and transit.
Collaboration	Engage all TxDOT Odessa disciplines and external partners to proactively manage and operate the transportation system.	▪ Increase efficiency through internal and external partnership. ▪ 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. ▪ Promote data sharing across transportation jurisdictions with TRF support.
Integration	Incorporate TSMO strategies throughout TxDOT Odessa 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. ▪ Engage key planning stakeholders such as the Permian Basin MPO to address TSMO strategies in project planning.

3.3.1 How does TSMO relate to current plans and programs in the Odessa District?

Though the TSMO Program Plan development is new, needs and strategies to address them are not uncommon or unheard of in the Odessa District. Many other plans in the region incorporate TSMO, and the TSMO Program Plan represents the culmination of the District's work in bringing all operations and management strategies together. This program plan draws not only the CMM and other data collection relayed herein, but also relates to existing plans and programs in the Odessa District. This section presents a brief overview of plans and programs related to TSMO and the key recommendations or action items from each that are incorporated into the TSMO Program Plan for the Odessa District.

Permian Basin Freight and Energy Sector Transportation Plan

TxDOT's Permian Basin Freight and Energy Sector Transportation Plan is a regional plan that assesses energy sector-related freight transportation challenges, and identifies and develops regional freight strategies. This plan recommends many traffic management strategies that complement or are essential TSMO strategies. These include truck-only lane implementation, alternate route planning, and low-cost enhancements such as signing and striping. The Permian Basin Freight and Energy Sector Transportation Plan also recommends a truck-targeted strategy to assess the feasibility of off-peak truck operations. This strategy seeks to implement a pilot project to assess opportunities and challenges of off-peak energy-sector freight delivery operations. This finding, among other recommended congestion-related strategies from the TSMO CMF process, can be referenced in conjunction with each other during implementation of TSMO.

The Permian Basin Freight and Energy Sector Transportation Plan identifies several strategies that crossover with TSMO. The Odessa District TSMO program can incorporate and document these strategies. For example, the policy strategy of off-peak operations, operational strategy of increase signage and ITS on freight routes for locations of truck parking, safety hotspots, queue detection, and blocked rail crossings are TSMO actions that may be incorporated into the District's business processes. Also, operational strategies such as Operational Strategy #5 – Traffic Signal Management – Conduct Signal Timing Study on Urban Arterials, are efforts that the District may integrate with the recommendations in this TSMO Program Plan. A list of recommended strategies that can be referenced from the Freight and Energy Sector Plan to the District's TSMO Program include:

- TxDOT Led Policy Strategies
  - TxDOT Led Policy Strategy 2: Integrate freight considerations into the transportation project development process
  - TxDOT Led Policy Strategy 5: Develop truck traffic impact analysis guidelines to include freight considerations in urban and rural areas
- TxDOT Supported Policy Strategies
  - TxDOT Supported Policy Strategy 2: Assess the feasibility of off-peak truck operations
  - TxDOT Supported Policy Strategy 4: Collaborate with truck stop operators and local stakeholders to develop new or expand existing truck parking
  - TxDOT Supported Policy Strategy 5: Collaborate with regional and local stakeholders to encourage truck parking at non-TxDOT public facilities and private commercial and industrial sites
  - TxDOT Supported Policy Strategy 7: Establish sustainable funding for transportation investments in the Permian Basin
  - TxDOT Supported Policy Strategy 8: Explore opportunities for public-private partnerships for projects and programs
- TxDOT Led Program Strategies
  - TxDOT Led Program Strategy 1: Develop a freight data collection and repository program to address the Permian
  - TxDOT Led Program Strategy 3: Develop a regional technology-based freight safety and operations Transportation Systems Management and Operations (TSMO) program

- TxDOT Supported Program Strategies
  - TxDOT Supported Program Strategy 2: Implement comprehensive, multimodal regional freight planning
  - TxDOT Supported Program Strategy 5: Convene a biennial regional freight and energy sector transportation summit in partnership with regional stakeholders
- TxDOT Led Operational Strategies
  - TxDOT Led Operational Strategy 1: Ensure all roadways on the PBHFN have adequate road markings, lighting, and signage
  - TxDOT Led Operational Strategy 5: Conduct traffic signal timing study for urban arterials on the PBHFN
- TxDOT Led Technology Strategies
  - TxDOT Led Technology Strategy 3: Deploy incident management system
  - TxDOT Led Technology Strategy

I-20 Odessa-Midland Corridor Study

TxDOT Odessa District and Permian Basin MPO initiated the I-20 Odessa-Midland Corridor Study to develop improvements for a 40-mile stretch of I-20 in the Odessa-Midland area. Improvements include adding main lanes, constructing new interchanges, reconfiguring ramps, converting frontage roads from two-way to one-way capacity, operational, and drainage improvements for the corridor. The project was designed to address many of the same issues that TSMO strategies are aimed to address, including to improve safety, reduce congestion, enhance access, and address future growth. Throughout the project development process for this corridor, TxDOT Odessa District has the opportunity to implement TSMO strategies, processes and low-cost enhancements to optimize the corridor's ability to address safety, congestion and operational issues.

Forward 45 Metropolitan Transportation Plan

The Forward 45 is the Permian Basin MPO's metropolitan transportation plan, a document that addresses proposed plans, programs and projects in the region. It includes short- and long-term actions to support the transportation system to efficiently and safely move people and goods. The plan references the regional ITS architecture, congestion management process and other TSMO-related processes. It is also the first plan where the Permian Basin MPO has implemented performance-based planning. This process must incorporate many of the same performance measures that TxDOT tracks in order to assess the effectiveness of the congestion and safety improvements implemented through Forward 45.

The plan also incorporates a project prioritization process that could, in the future, incorporate the prevalence of TSMO strategies, processes and low-cost enhancements to better inform how each project could specifically address non-recurring congestion and operational safety. The process currently scores operational efficiency with a few elements. Projects that score higher in operations focus on higher capacity corridors with higher delays. There are many other measures including freight, community support and environmental factors.

Permian Basin MPO Congestion Management Process

The Permian Basin MPO congestion management process (CMP) is a framework to improve the transportation system performance and reliability by reducing congestion. The Permian Basin MPO aims to use the CMP as a framework to collect data, analyze congestion problems and needs, identify and assess congestion management strategies, and evaluate the effectiveness of projects once implemented. The CMP was last amended in 2014. The process of the CMP remains a beneficial, systematic process to provide safe and effective management of the multi-modal transportation system. This includes developing congestion management objectives, establishing performance measures, collecting data to analyze system performance, identify measures to address congestion, implement activities in accordance to an implementation schedule and evaluate the effectiveness of the strategies once implemented. Many performance measures in the CMP are exactly the kind of measures recommended to measure traffic management, including level of service, volume/capacity ratios, travel time and speed, transit travel metrics, crash frequency and severity, and traffic counts. TxDOT should work with PMMPO on the upcoming update of the CMP, referencing strategies in the TSMO program.

4.0 Capability Maturity Model

This section provides an overview of the CMM process and the current capabilities among CMM dimensions in the Odessa District. The CMM process included an assessment along six dimensions: business processes, systems and technology, performance management, organization and workforce, culture and collaboration. The Odessa District assessed these capabilities for six focus areas including traffic management, traffic signal management, work zone management, planned special events, road weather management and traffic incident management.

4.1 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 Odessa 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, including:

4.1.1 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.

4.1.2 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.

4.1.3 TSMO Focus Areas

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

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

4.1.4 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 Odessa 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 6 on the following page shows the CMM levels.

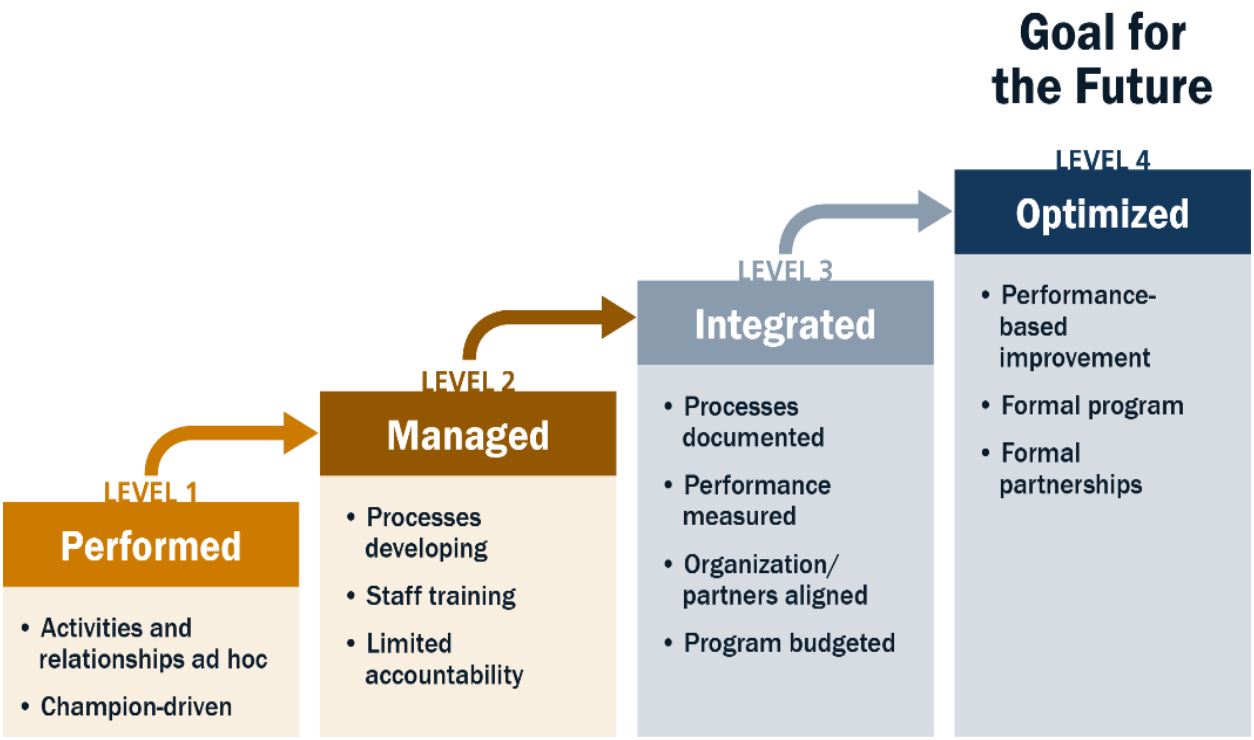


Figure 6: Capability Maturity Model Levels

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

Table 4 presents the average results of the levels at which CMM Survey participants assessed TxDOT Odessa 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 Odessa District.

Table 4: Overall CMM Results

Dimension	Level 1	Level 2	Level 3	Level 4
Business Processes		●		
Systems and Technology		●		
Performance Measures		●		
Organization and Workforce		●		
Culture		●		
Collaboration		●		

Table 5 presents the average results of the levels at which CMM Survey participants assessed TxDOT Odessa 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 Odessa District.

Table 5: CMM Results for Focus Area

Focus Area	Level 1	Level 2	Level 3	Level 4
Planned Special Events		●		
Road Weather Management		●		
Traffic Incident Management	●			
Traffic Management		●		
Traffic Signal Management		●		
Work Zone Management		●		

4.2 Capability Components

This section outlines the components of capability assessed in the CMM and CMF process for the Odessa TSMO Program Plan. Through the course of data collection and assessment, additional feedback was culled from one-on-one meetings for the Odessa District in addition to those discussed herein. These areas of improvement and District priorities are described in subsequent sections of the report in the TSMO Implementation Plan and Tactical Plan Assessment.

4.2.1 Business Processes

Business Processes is the first of the six dimensions comprising the Capability Maturity Model for the Odessa District. This dimension includes planning, programming, budgeting, project development, and implementation of TSMO strategies and processes. The CMM survey results indicate that the Odessa District is performing at a Level 2 in business processes, indicating there is some existing capability in management of TSMO processes and staff training, and room for improvement with documentation, accountability, and maintenance of TSMO activities.

i. Revised Project Delivery Process

The Odessa District currently follows the TxDOT Project Development Process Manual for traditional capital improvement projects. The process also can be applied to standalone ITS or projects that integrate TSMO strategies. It currently includes planning, programming, design, construction, operations, and maintenance. Figure 7 on the following page presents the feedback that those responsible for the latter phases of projects give to those responsible for preceding phases to improve.

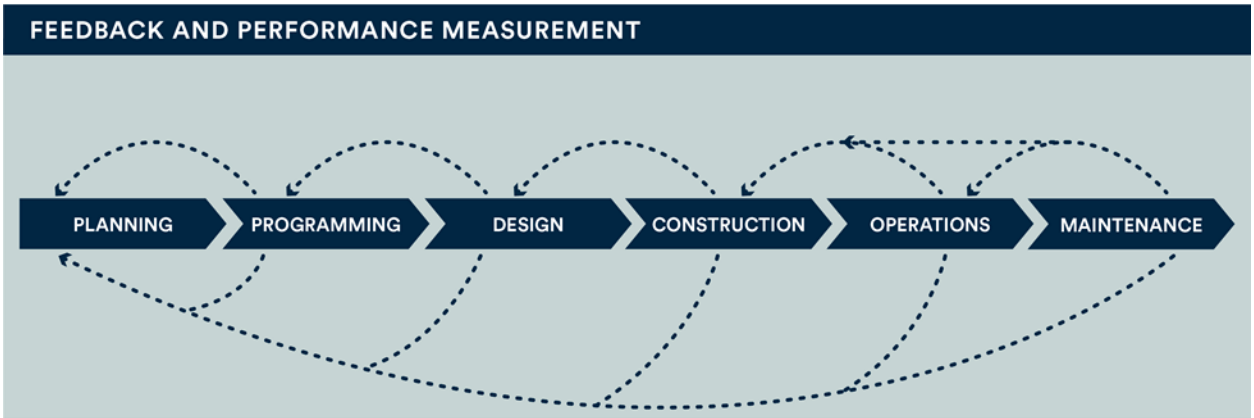


Figure 7: TxDOT Project Development Process Feedback Loops

This typical TxDOT delivery process should be followed through for TSMO strategies. At every stage of the project lifecycle, as TSMO strategies and low-cost enhancements are incorporated, the Odessa District should document what goes well, what needs improvement, and potential challenges to overcome in implementing TSMO. Through the capability maturity model process, one-on-one meetings with District staff and stakeholders, and recommendations from the FHWA's capability maturity framework, improvements to Odessa District's project delivery process were captured. Recommendations that the Odessa District can follow to improve the project development process include:

a. **Utility Company Coordination:** For every TxDOT project, coordinate early with utility companies. Procure maps and plan sheets with locations of subsurface utilities, and obtain locations of rural lines vital for rural 911 response. Develop a mechanism such as an email list, website, or other announcement for including utility companies in project meetings to discuss any traffic control plans and work zone coordination.

b. **Improve the Assessment of Traffic Control Plans:** Develop a process to streamline and improve the inspection of traffic control plans implemented by contractors on behalf of TxDOT. This includes check-ins, standard operating procedures, and involving traffic control contractors in project meetings.

c. **ITS in Project Development:** Incorporate ITS into project conceptualization. Before the schematic and plans, specifications, and estimate (PS&E) design is conducted, the District can include ITS equipment in the project, including, but not limited to, CCTV, DMS, and sensors. If the District develops an ITS master implementation plan, they can reference this plan by roadway segment to determine what ITS equipment is already in the District's plan. The District can also coordinate with stakeholders to determine placement of ITS equipment, and agreements and standards necessary to interoperate with existing equipment from other districts, counties, cities, and the MPO.

d. **Formalize a TSMO Evaluation Checklist:** Incorporate a TSMO checklist that the TxDOT project manager can use throughout the project development process. TRF is developing a TSMO project development checklist to keep track of coordination with stakeholders, incorporation of TSMO strategies, documentation of TSMO

strategies, and lessons learned/how to improve the next project that incorporates operations and management strategies. The TSMO evaluation checklist contains milestones to incorporate TSMO into every stage of a project, including planning, design, construction, and operations/maintenance. The Odessa District can start with the statewide TSMO Evaluation as a guideline for all projects and modify it to meet the District's needs.

ii. Planning for TSMO

This program plan document is the Odessa District's first step in the process of incorporating and mainstreaming TSMO into all agency processes. This program plan contains recommended action items to aid TSMO incorporation into the District's planning and project development processes, centering operations and management of the transportation system as a central focus of TxDOT. From the CMM and CMF analysis, the current level of capability for the District to plan for management and operations can be improved by implementing the strategies in this program plan.

The District is following the recommendations laid out in the statewide strategic plan for TSMO. This includes working with stakeholders both internal to TxDOT and external to identify areas of improvement, following the CMM/CMF process as a structured method to achieve higher levels of operations and management capability.

The District can start with the recommendations laid out in this plan. They can decide which recommendations to implement based on priorities and goals of the TSMO program and follow the action items in the implementation plan. After three years, in line with TxDOT's rural district update process for TSMO, the District can check in and examine progress against the plan. Then, after another three years, the district can undergo a renewal cycle, including a new CMM and CMF process. The District then determines whether the priorities and action items from the last plan were met, or need to be updated with new priorities and action items for the next period.

The keys to TSMO planning are communication, collaboration, and documentation. Though all TSMO strategies in this plan are focused on implementation by TxDOT, there is a need to communicate many efforts to stakeholders and to the traveling public. Even many TSMO strategies explicitly call for improving sharing information with the public and stakeholders. TSMO keys are further defined as:

- **Communicate:** Share or exchange information among the District staff, TxDOT TRF, external local stakeholders, and the public.
- **Coordinate:** For strategies that include working with others, such as improving the management of traffic incidents, need to make sure that the District brings in all elements of a TSMO strategy into their relationships with external partners such as the MPO, Cities of Midland and Odessa, and Permian Basin Regional Planning Commission.
- **Document:** Many strategies require documenting, or keeping track through an organized data system, to ensure that they are being implemented successfully and meeting the proper goals through the District's performance measures. The documentation process is essential for the District to understand how their capabilities are improving for the next cycle of CMM/CMF analysis and TSMO planning updates.

iii. Programming, Budgeting, and Funding

As documented in the state of the practice report, there are many funding opportunities for incorporating TSMO strategies in roadway and standalone ITS projects, including the HSIP, Safety Bond Program, Road to Zero funding, Energy Sector funding, National Highway Freight Program projects, and Towing and Recovery Incentive Program (TRIP). Other potential funding sources for TxDOT projects might include public-private partnerships to fund ITS.

The following observations and recommendations arose from CMM/CMF analysis, one-on-one conversations with stakeholders, and input from the District's steering committee. The Odessa District can accommodate TSMO into the planning process for projects and day-to-day functions by:

a. **Sharing HSIP Project Information:** TxDOT Odessa District can share which projects they apply for HSIP funding with the MPO, which projects are selected, and which are unfunded each year. This can help the MPO to know which projects and safety issues require funding that is not met by other sources and improve the planning and programming for these. Open communication regarding these projects can help TxDOT Odessa District, Permian Basin MPO, and other stakeholders to target, "low-hanging fruit" issues that can be addressed with standalone projects.

b. **Sharing Operations Information and Data with Key Stakeholders:** Permian Basin MPO and other stakeholders expressed an interest in the sharing of information during operations meetings and/or sharing information about operational needs with the MPO. Though the MPO has a scoring system including operations and management when ranking projects, it would benefit them to have a deeper working knowledge of TxDOT Odessa District's traffic operations issues, processes, data collection and performance measures. For example, the District could share in a meeting or white paper some signal timing asset uptime issues, which intersections or corridors they should monitor for congestion and/or crashes, and whether there are metrics such as travel time, incident response time, or others that they would desire to monitor. This can help the MPO to select projects that better meet TSMO needs and potentially include more funding for equipment and maintenance of TxDOT's assets.

c. **TSMO in Project Selection:** TxDOT, Permian Basin MPO, and other stakeholders should prioritize projects with TSMO elements in project selection. This means that projects with funding to enhance operations and management. TxDOT and the MPO should utilize existing performance measures and targets for asset uptime, incident clearance time, travel time reliability (for freight and passenger vehicles), and traffic management system coverage completion to identify where projects may be able to improve these met

d. **Share Performance Management Data:** The district should share performance management data with stakeholders such as Permian Basin MPO, Permian Basin Regional Planning Commission, City of Midland, City of Odessa and others to open up collaboration in project planning. Provide stakeholders with knowledge of the operational data and decisions made regarding this data that TxDOT analyzes on a regular basis. This can allow TxDOT to have a common language with stakeholders. For example, sharing

the asset uptime for selected ITS equipment could help stakeholders to understand the performance of the ITS system and the need to provide replacement equipment and/or parts, staffing, or training to address the maintenance of the ITS system.

iv. Continuous Improvement

While strategies to improve business processes can benefit the District, the paradigm of TSMO planning is to continuously address gaps and needs to elevate the District's TSMO capabilities. Continuous improvement depends on documentation. To ensure that the Odessa District is making progress towards its TSMO goals and program objectives, there should be an accounting of successes and action items to assess gaps that need to be filled. The following items are considered as necessary components of implementing continuous improvement in the Odessa District's TSMO program.

a. **After-action Coordination:** For actions TxDOT and other agencies take in managing work zones, weather events and traffic incidents, there should be after-action coordination to regularly assess lessons learned. From this coordination, some best practices may be incorporated permanently into agency standard operating procedures, training, and documentation.

b. **Contractor Feedback:** Whenever TxDOT or other agencies work with contractors to implement TSMO processes or actions, including managing work zones, traffic management, or other TSMO areas, establish a feedback mechanism to ensure two-way communication regarding contractor feedback. This could be the case for managing traffic during construction projects. Regular feedback meetings or forms to document successes are beneficial in ensuring continual opportunities for improvement.

c. **Develop Procedures to Update TSMO Actions:** When TSMO strategies such as work zone management are implemented for a specific project and corridor, the corresponding documentation and performance measurement targets can improve the TxDOT Odessa District's ability to revise and improve performance. Using outcome-based measures to review and update policies and procedures. For example, if contractors or the public report issues such as near misses in a work zone where temporary queue detection systems are implemented, the District may implement a series of checks against TxDOT's Smart Work Zone Guidelines including the placement of the temporary ITS equipment such as sensors, CCTV and temporary DMS, which messages are displayed on the DMS, location of work zone in proximity to decision points. If any implementation procedures must be modified, the District would have a methodical approach to improvement.

d. **Update Congestion Management Process for the Region:** TxDOT and other stakeholders (e.g., municipalities, counties, Permian Road Safety Coalition and others) should assist Permian Basin MPO in updating the region's congestion management process. Using the 2014 congestion management program as a baseline, the region can update, monitor, and achieve the goals in the CMP. This can be used to identify the corridors or areas where TSMO strategies, low-cost enhancements or processes such as monitoring and information disseminations may be introduced to manage traffic. Coupled with TSMO

action items identified in this report, the updated CMP may lead to outcomes in project selection to address "low-hanging fruit" or projects that may be implemented on a fast timeframe that have a high benefit/cost ratio.

4.2.2 Systems and Technology

This section outlines the capability maturity dimension Systems and Technology, which includes the use of the systems engineering analysis process, systems architecture, ITS standards, and systems interoperability standards. It may also include the hardware and software components to enable certain TSMO processes, data collection, and decision making in management and operations of the transportation system. Through the development of the TSMO Program Plan, many stakeholders expressed interest in accessing and implementing the "latest and greatest" in ITS technology as a means of improving the capabilities of the District to manage traffic, traffic incidents, and traffic signal systems. Systems and technology may also enable new data sharing among agencies, or better management of existing data. Often, more data and dashboards may not be the appropriate solution when coordination and sharing of existing systems is sufficient. This section introduces systems and technology surrounding the District's TSMO program.

i. Systems Engineering Analysis Process

The FHWA describes systems engineering as an, "interdisciplinary approach and means to enable the realization of successful systems." All ITS projects use technology and should include the exchanging of information between organizations. The ITS systems engineering process improves stakeholder participation, provide for more adaptable, resilient systems, verify functionality and fewer defects, provide for more consistency from one project to the next, and improve documentation. In addition to these benefits, the systems engineering process is needed for any ITS project that uses Highway Trust Fund funding. Applying a systems engineering analysis approach to all ITS projects is essential in the District's efficient and cost-effective implementation of new technology. A sample V diagram is presented on the next page as Figure 8.

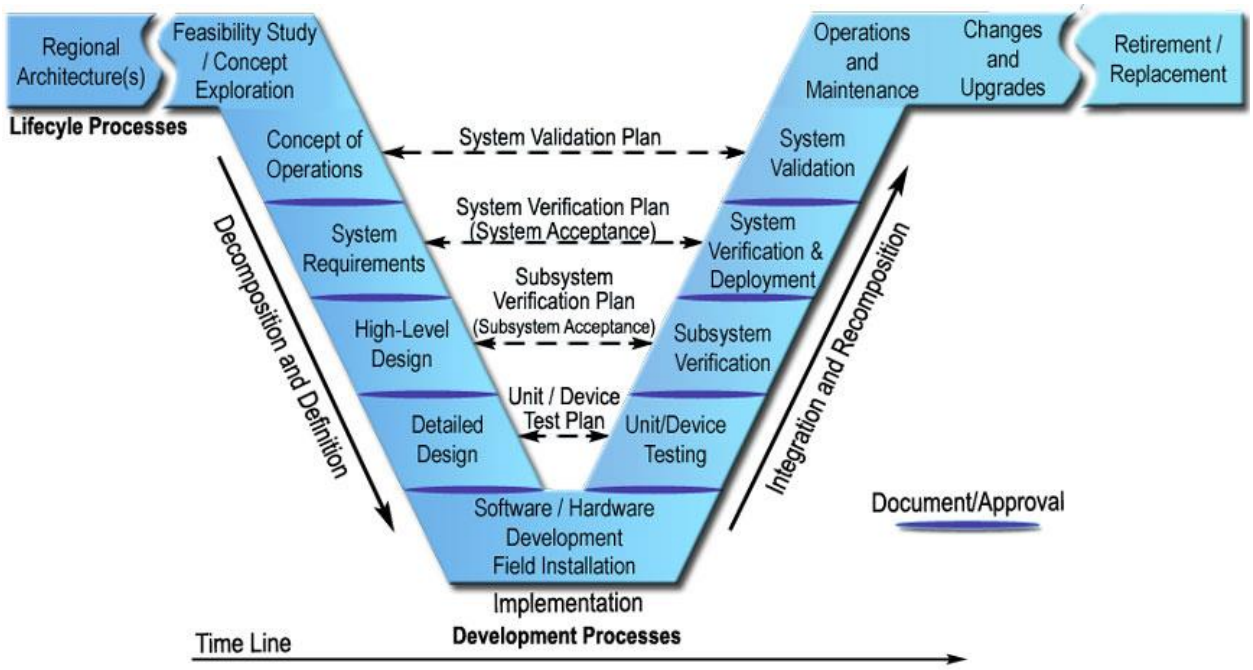


Figure 8: Systems Engineering V Diagram

The systems engineering approach is encouraged for the District to use in all ITS applications. More information regarding the systems engineering approach is recommended to be included if the District completes an ITS Master Implementation Plan and regional ITS architecture update. ITS implementations that may use the systems engineering approach may include:

- Wrong Way Driver detection systems
- Traffic signal controllers
- Radar speed feedback signs
- CCTV
- Detection systems
- DMS
- Road weather information systems
- Over height detection systems
- Weigh-in-motion
- Alert systems

ii. Processes to Vet Innovative Technologies

The Odessa District currently does not have a systematic process to vet innovative technologies, but may have avenues available to do so. TxDOT's TRF currently has a process to evaluate, test, and procure new equipment. Stakeholders in the Odessa District and others have suggested expediting this process with other avenues of technology vetting, including pilot programs for safety equipment by District staff. This strategy is being explored at a statewide level and is not yet recommended for this program plan.

There are other potential avenues for vetting new technologies. TxDOT's Freight, Connectivity, and Trade Division recommends implementing weigh-in-motion technology, a dashboard for monitoring weigh-in-motion data, a truck congestion tool, performance measures, and visual mapping. They also recommend sharing information between TxDOT and the Texas Railroad Commission to assess and plan for freight traffic impacts. Such information as load, depth of wells, water disposal, water source, sand disposal, and sand source could

all help TxDOT and other stakeholders to better map and know where freight network improvements or mitigation are needed. These processes may be leveraged by existing or future ITS equipment such as cameras, warning devices, and DMS boards. These technologies could have opportunities to be funded by public private partnerships. Many private transportation stakeholders in the freight and energy sectors impacted by traffic in the District may have a shared interest in gaining access to technology that would be managed and implemented by TxDOT. In this case, partnerships could form that enable the Odessa District and partner agencies to pilot new technology and data sharing platforms to enhance the safe mobility of freight and energy sector traffic in the District.

Though the public private partnership example may work for the District's needs, the process might require vetting through TRF and any such partnerships are encouraged to be piloted through existing agency processes.

iii. Regional ITS Architecture

Permian Basin Regional ITS Architecture was updated in 2004. The components and service packages are different from the current FHWA ARC-IT version.

The Odessa 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 Permian Basin Regional ITS Architecture (2004). 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.

There may be common types of agreements for data sharing, establishing common procedures, supporting regional operations, cost effective maintenance arrangements, and personnel training either formally or informally established in the District. 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. These kinds of agreements should be included when the District updates its regional ITS architecture or incorporates TxDOT's upcoming statewide ITS architecture update.

iv. Existing and Planned Tools

TxDOT transportation and development in the Odessa District throughout the development of the TSMO Program discussed the need to incorporate TSMO strategies and ITS early on in project development and through the design process. One method to do so includes implementing the TSMO Evaluation Tool to document where and when discussion of TSMO and ITS equipment occurs throughout the TxDOT project planning process. This tool includes benchmarks for project managers to check what kind of TSMO strategies are included from the District's program plan at the planning, schematic and PS&E, construction and post-construction stages of a project. This process also asks project managers to document which ITS equipment

are discussed during project meetings, which stakeholders contribute to implementing TSMO and ITS concepts in projects, and what ITS equipment are implemented in the project's design and construction. This process also ensures there is enough right-of-way for ITS equipment.

The Odessa District expressed the need for increased implementation of certain ITS equipment, such as road weather implementation systems. Previously, the implementation of RWIS did not include a method to collect/communicate weather information directly to area offices. In the next implementation of this and other equipment, the District can ensure proper infrastructure and data sharing capability to get the most usability possible out of their investments. The District is planning new ITS equipment including DMS, CCTV, and over height detection systems. The next priority are wrong-way driver detection systems and other improvements could include emergency vehicle pre-emption, transit signal priority, and a gap analysis of the ITS system, including the fiber optic system. These items are discussed in the "TSMO Tactical Plan" section of this document as part of a potential ITS Master Implementation Plan.

Asset management is limited to assessing the location and uptime of some equipment. The District is interested in implementing an ITS asset management dashboard, similar to other TxDOT districts, to centralize information regarding ITS equipment status. Such an implementation is being coordinated by TRF and is expected by FY 2022.

4.2.3 Performance Management

TxDOT and other agencies use performance measures to enable TSMO processes and strategies. Measures serve as a means of tracking whether the TSMO strategies implemented by the Odessa District are progressing according to the District's TSMO Mission, Vision, and goals. The District currently tracks certain performance measures such as asset uptime, but the full extent of measuring performance for management and operations of the transportation system are not fully developed. For each of the TSMO strategies in the TSMO Implementation plan section of this document, the District can reap the most benefit by setting and tracking data for performance measurement.

i. Agency Performance-Based Initiatives

TxDOT currently deploys a statewide performance measurement dashboard (http://www.dot.state.tx.us/dashboard/) with sections for optimizing system performance, project completion, fatalities and fatality rates, preserving assets, focusing on the customer, value of employees, and fostering stewardship. The state tracks such congestion statistics as the urban and rural congestion and reliability indices, vehicle miles traveled (VMT), annual delay per person. Safety performance measures include annual fatalities and fatality rates, annual serious injuries and rate of serious injuries. By tracking such measures for the Odessa District, whether on a facility, project, or district-level, the District can contribute both to the state's performance tracking initiatives as well as the District's own TSMO success.

TxDOT requires each district to report certain performance measures such as incident clearance time, travel time reliability, asset uptime, and TMS system coverage. The information technology division (ITD) is piloting ATSPM throughout the state and may soon expand these to all 25 districts of TxDOT.

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

For day-to-day operations and maintenance, Odessa District utilizes the basic metric of customer complaints (e.g., when complaints are low, the job is being done well) to assess the performance of the transportation system. TSMO offers the opportunity to formalize the District's measurement of congestion, safety, asset management, and maintenance. There is currently some ITS information available, but no real measures of performance for traffic signals. The District could use TSMO to develop metrics to prioritize ITS and signal timing improvements and a signal maintenance matrix. This signal maintenance matrix may be optimized and incorporated into the District's project planning and lifecycle planning. The District may also use such existing resources as the ISAT-E spreadsheet for crash projections and predicted safety benefits for a project, as well as incorporating before-and-after crash studies utilizing existing CRIS data.

Stakeholders in the Odessa District cited existing performance measures and future measures that would be helpful in assessing the District's TSMO processes. Before-and-after studies of safety can show useful impacts. For example, the Midland Area Engineer cited a recent study of the impact of implementing smart work zone equipment. Before implementation, there were 90 crashes related to the work zone, and this was cut to 10 crashes after implementation in a similar time period. Formalizing impacts such as this one could improve implementation of smart work zones (SWZ), justify their use, and lead to more funding. Other metrics include tracking monthly and quarterly inspections of work zone equipment and visual metrics of work zones in a central database. Some measures to track ITS equipment, such as when/where work is done, when equipment needs updated, the age of equipment, and asset uptime. Traffic incident management related metrics such as roadway clearance time (RCT), incident clearance time (ICT), incident frequency related to a project/corridor, duration, are already collected for some TxDOT projects, but this information may not be automatically updated or in a useful format. The District can streamline these sources of information to know where to expect or need to mitigate incidents and how well traffic control measures are performing. Wrong-way driver performance metrics should be implemented related to how well wrong-way driver detection systems are functioning. These include how often the systems are triggered and whether the system results in the safe mitigation of a wrong-way driver.

Several district-wide performance measures were requested by stakeholders throughout the TSMO program plan development including:

- Travel times
- Travel times around work zones
- Crash data around safety improvements
- Freight trip counts
- Queues
- Cost of congestion
- ADT
- Travel time reliability
- Corridor performance measures
- Freight fluidity

iii. Regional Performance-Based Initiatives

The Permian Basin MPO CMP is a framework to improve the transportation system performance and reliability by reducing congestion. This includes developing congestion management objectives, establishing performance measures, collecting data to analyze system performance, identify measures to address congestion, implement activities in accordance to an implementation schedule and evaluate the effectiveness of the strategies once implemented. Many performance measures in the CMP are exactly the kind of measures recommended to measure traffic management, including level of service, volume/capacity ratios, travel time and speed, transit travel metrics, crash frequency and severity, and traffic counts.

The Permian Basin Freight and Energy Sector Transportation Plan calls for the assessment of the freight transportation system through performance measures on the Permian Basin Highway Freight Network (PBHFN). Factors to assess conditions of the network include the following:

Mobility & Reliability	Safety	Asset Utilization & Preservation	Rural Roads Connectivity
Truck Counts	Truck involved crashes	Pavement conditions	Frontage roads
Truck travel time reliability	Rest areas and truck parking	Bridge load restrictions and conditions	Number of lanes
Buffer time index	Access management	Bridge vertical clearance	

In coordinating TSMO efforts with these existing measures assessing the freight network, the District may not need to replicate efforts to collect data related to these measures on the PBHFN. The Permian Basin Freight and Energy Sector Transportation Plan should be referenced for the findings related to these performance measures in the study years.

The Permian Basin MPO regularly tracks performance measures and reports them to the policy board and or FHWA. An additional initiative in addition to the existing standard performance measures required by MAP-21 may include before-and-after studies of projects to determine whether real-world conditions justify the mobility and/or safety benefits ascribed to each project. For example, there could be congestion measures studied in Title VI areas, and whether the projects deliver the expected benefits in congestion reduction to people living in those areas expected to benefit from the project development. Additionally, as an initiative to improve the ranking of congestion related projects in selection, the MPO suggested lowering the threshold for congestion projects in the District from a travel time index (TTI) of 1.5 to 1.2 to allow for more projects to be considered for congestion relief funding.

The Permian Road Safety Coalition is planning to collect more performance data in the future. This includes impacts of training on freight driver behavior. They currently track the types of crashes in the District, but are working on a measure of relating which crashes are related to the freight and energy sector. In-vehicle monitoring currently tracks speeds of freight vehicles—data which could be shared with TxDOT and other agencies.

iv. Measures Definitions

The TSMO Statewide Strategic Plan requires each TxDOT district to collect and supply TRF with performance measures to evaluate the effectiveness of TSMO strategies and assess whether further improvements are needed. The measures listed in the TxDOT Chief Engineer's 2017 memo requires each district to supply the TMS asset operation uptime, incident clearance times, travel time reliability, and TMS system coverage. The Odessa District can work on the implementation of systems and streamlined processes to collect and share these data consistently with TRF through TSMO implementation. Definitions of the performance measures are as follows:

- 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

v. TMS Status Report Required Performance Measures

TxDOT's TMS status reports require the following performance measures:

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

The Odessa District can provide these and other relevant performance metrics related to TSMO priorities in the TMS performance reports.

vi. Utilization Strategy

The utilization of performance measures varies based on the applications that are the priorities of the District in managing and operating the transportation system. In the Odessa District, priorities include better management of traffic, work zones, and traffic incidents; thus, the utilization of those performance measures described in this section and those supporting specific TSMO program action items tend to support continuous improvement, applications and decision making for these three focus areas.

The Odessa District's strategy of reporting required performance measures can be enabled by further technology implementations directed by TRF including the upcoming asset management system improvements.

vii. Data Acquisition Plan

As with performance measures, data acquisition relies upon the priorities of the District and may change for each TSMO action item in the implementation plan. For work zone strategies, existing methods of data acquisition include field observations and sensor/detection system information. As the District implements more smart work zone technology, it can coordinate data collection efforts and define both manually collected and automated performance measures. These include delays, queues, work zone incidents, and clearance times. Collecting data for traffic management may improve with ATSPM, delays, queues, video observations, travel time index, reliability index, and others. As the District implements TSMO action items, it can define the best means of acquiring the data needed to measure and assess the system performance using these measures.

4.2.4 Organization and Workforce

The Odessa District comprises many different functional groups including safety, public information office, construction, transportation planning & development, area offices, operations (including maintenance and traffic functions).

i. Revise Organization Structure to Accommodate TSMO

TxDOT's organizational structure currently allows for the flexibility in District organization to meet their unique needs. The Odessa District's organization currently accommodates TSMO through existing roles in construction, planning and development, and operations (including maintenance and traffic). As the Odessa District's TSMO capabilities mature, it may be necessary to revise the organizational structure to accommodate TSMO roles. In the first implementation of the TSMO Program Plan, the District can document gaps in roles or organizational structure that should be filled with additional roles, staffing, or organizational structure changes.

ii. Key TSMO Roles

This section summarizes the key organizational roles related to TSMO. The Odessa District's structure is designed to accommodate current and planned TSMO strategies and processes. Formalizing the inclusion of the following roles and responsibilities in the District is a key to the success of the TSMO program, especially in the beginning of the implementation process. The District's TSMO maturity may need improvement before getting to a level where staff may be recruited, hired, and trained for roles that are expressly related to TSMO. The existing capacity of the Odessa District includes functional capabilities in many key roles, as included in this section. Each "main responsibilities" section of each role is not meant to be all-encompassing or rigid – as the District's TSMO capabilities mature, the roles may cross-over to a more natural fit, and this program plan should be updated as a living document when roles and responsibilities change or crossover to other positions.

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 9.

Role	Culture	Organization /Workforce	Collaboration	Business Processes	Systems and Technology	Performance Measures
TSMO Champion	■		■			
TSMO Coordinator		■	■			
Project Planning / Programming				■		■
Project Design / Delivery					■	■
Construction					■	
Maintenance				■	■	■

Figure 9: TSMO Staff Roles and CMM Responsibilities

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

TSMO capabilities in the Odessa District are in the beginning phases, or a lower level of capability maturity. In this case, the District does not yet require a full staffing plan for a TSMO workforce. As capabilities for TSMO mature, and Odessa District staff implement more TSMO strategies, there may be a need to grow the District's TSMO workforce. In this case, additional support staff with expertise in engineering, data systems, operations or maintenance can be added to the District's staff. The National Operations Center of Excellence (NOCoE) has published the *Transportation Systems Management and Operations (TSMO) Workforce Guidebook* that outlines the roles and responsibilities as well as recruitment, developing, and retention of a TSMO workforce.

iv. Training Plan

TSMO training is essential to the continuous improvement in capability maturity gained through the Odessa District's TSMO program. Through conversations with stakeholders, there are many opportunities for improvement in training that can result through the implementation of TSMO strategies. For example, District

stakeholders and the CMM survey results expressed the need for more training for traffic incident management as critical in improving the District's abilities to prevent and/or streamline the management of traffic incidents. Training may also be essential in the District's ability to use automated traffic signal performance measures – though TRF has provided this capability to the District, there has not yet been enough training to get the most out of this technology.

Other training topics and expertise that could benefit the District regionally include:

- Travel demand modeling
- Traffic incident management
- Traffic signal maintenance
- Traffic signal coordination and timing
- Smart work zones
- Traffic control plans
- Routine maintenance training
- Automated traffic systems performance measures
- Cross training for freight operators – work zone, traffic safety

TxDOT TRF is currently developing a series of TSMO training modules that each TxDOT district may use to educate and train their stakeholders on the importance and implementation of TSMO processes and strategies. The modules range on topics from TSMO overview, planning, implementation, operations & maintenance, and strategies. Through these programs and other training opportunities, such as TxDOT's traffic incident management training program and NOCoE training database (https://transportationops.org/training), there are many existing resources the District may choose to utilize for training their workforce and other stakeholders for TSMO.

4.2.5 Culture

Through the development of the TSMO program plan for the Odessa District, stakeholders expressed great interest in participating in the development and implementation of the program. TxDOT staff will lead the development and implementation of TSMO on behalf of TxDOT. Partner agencies have crucial roles to play in TSMO, as the transportation system relies on the performance of multiple agencies simultaneously operating at the highest level of capability with their respective responsibilities. This TSMO program plan, particularly in implementation, fosters a culture that prioritizes collaboration and desire to operate the transportation system at the highest level.

i. Engagement Opportunities

TxDOT staff are bought into TSMO at the highest level and desire the "latest and greatest" in technology and TSMO strategies. TSMO champions in TxDOT and other agencies should have a key role to play in fostering and maintaining a receptive culture. Some TxDOT staff do not currently understand or know of TSMO benefits –

there is a need for champions to show examples of TSMO in practice and the real benefits TSMO strategies convey. Other stakeholders including National Weather Service, City of Midland, City of Odessa, and Area Engineers are receptive to TSMO and desire working knowledge of what kind of improvements TSMO can offer, including by participating in TSMO implementation.

Permian Basin MPO expressed great interest in learning more about operations, at least being advised by TxDOT and educated on what operations mean for traffic, safety, and performance of projects. This can improve the MPO's planning for future improvements with the goal of helping TxDOT implement their own expertise and get funding for operational improvements—even "low-hanging fruit" that may currently be overlooked such as traffic safety devices, signage, striping, and signal retiming. The MPO and TxDOT are involved in a quarterly advisory meeting that could include TSMO updates as an agenda item.

Some methods to institutionalize TSMO culture include regular stakeholder meetings, case studies, a TSMO newsletter, and submitting an Odessa District TSMO application for the annual NOCoE TSMO awards.

4.2.6 Collaboration

Collaboration includes relationships with stakeholders including internal partnerships, public agencies, local governments, the federal government, and the private sector. A key to TSMO is coordinating the strategies developed in the program plan with affected or involved agencies in the District. This section addresses partnerships/relationships that already exist and may help implement TSMO strategies as well as developing new relationships among stakeholders.

i. Internal Partnerships

Internal partnerships for the Odessa District may include input from all functional groups throughout the project development process, during implementation of TSMO strategies, for training, and feedback or measuring the performance of TSMO. Internal relationships such as designers and planners discussing operations and maintenance issues with an upcoming project during the planning phase can save the District tremendous strife in managing issues well before construction of a project. To ensure the project delivery process works with utmost efficiency, the Odessa District may consider:

- Including all functional groups in project development milestones such as 30/60/90/100% project meetings. Include construction, maintenance, traffic, transportation and development, public information office and safety.
- Engage multidisciplinary teams to review value studies
- Engage project managers from adjacent or previous projects for lessons learned
- Collaborate among traffic engineers, design engineers and planners to identify where TSMO strategies or ITS projects may be incorporated as a means of safety or congestion improvements before adding capacity.

By fostering such internal partnerships, the Odessa District can gain a better level of interoperability across the agency and higher level of capability in managing traffic, work zones, and traffic incidents.

ii. External Partnerships

Partnerships with Odessa District stakeholders are critical to the ultimate success of the District's TSMO program. Whether it includes information sharing agreements, memoranda of understanding, meetings, or other collaborative activities, there are many opportunities for stakeholders to be involved with TSMO. The regional ad hoc partnerships existing for such processes as managing traffic, traffic incidents, work zones, and weather events should be formalized through agreements or interagency partnerships.

TxDOT and partners such as City of Midland and Odessa can meet for periodic updates regarding TSMO. This can be accomplished by including TSMO as an agenda item on existing update meeting agenda. TxDOT recognizes the need to coordinate earlier with stakeholders regarding construction projects to ensure that operational adjustments due to closures, partial closures and work zones can be planned for, and make sure to include contractors as a collaboration partner. Rural partners also could be more included in TSMO outreach, including counties and cities, rural police departments and industries. Utility companies should be contacted and coordinated with especially for construction projects (digging and getting electricity can be roadblocks to project schedules when handled too late).

When traffic incidents occur, additional coordination is needed to address jurisdictions. The DPS boundaries do not always line up with TxDOT's boundaries, causing some confusion about which stakeholder agency needs to respond to incidents. TxDOT could collaborate with law enforcement agencies to plan for incident response and training, including cross-training with TxDOT staff involved in local law enforcement traffic incident response training when possible. A formalized incident management plan or agreement with assigned roles can help all stakeholders to better understand roles and responsibilities when managing incidents.

The Odessa District may consider the following opportunities to collaborate with stakeholders in TSMO implementation:

- Permian Basin MPO: Regional transportation plans, mobility initiatives, public participation plan, congestion management process, data sharing and cross training
- Cities of Odessa and Midland: Regional transportation plans, multimodal plans, data sharing, public transit, project planning and development process, traffic incident management
- Other Cities and Municipalities: Regional transportation plans, data sharing, project development process, rural traffic incident management
- Counties: Regional transportation plans, multimodal initiatives, data sharing, project planning and development, traffic incident management
- Local Governments, Law Enforcement, Emergency Operations Centers, Towing: Project planning and development, traffic incident management, data sharing
- National Weather Service: Road weather information systems, after-action reports

iii. Adjacent Districts

The Odessa District borders several TxDOT Districts: El Paso, Lubbock, Abilene, San Angelo, and Laredo. The Odessa District can coordinate with these districts by sharing the TSMO Program Plan, sharing data, CCTV feeds, and other information. In some cases, it might make sense to include adjacent districts in planning for the management of traffic incidents or traffic management. There may also be opportunities to share equipment such as temporary traffic control equipment and road weather management devices.

iv. Public-Private Partnerships

Odessa District stakeholders expressed the need to work with industry partners in managing illegal driveways onto FM roads. These are not managed by any signage, striping, signals, or roadway infrastructure and pose a danger by creating false intersections where they were not designed to be. Increased coordination and education can help partners using such driveways to understand their negative impacts and Permian Road Safety Coalition (PRSC) and these companies can work with TxDOT and other transportation agencies to determine better, safer driveway locations. There may be opportunities for TxDOT to partner with PRSC and private companies to address these and other issues in road safety throughout the Odessa District.

Private-public partnerships may also be implemented for traffic data sharing, safety data sharing and other operational data sharing.

5.0 TSMO Implementation Plan

This section lays out a plan for advancing TSMO priorities in the TxDOT Odessa District over the next five years. Its contents are based on the existing strengths and needs that the Odessa District and regional stakeholders identified over the course of the TSMO Plan's development. The Implementation Plan is shown in Table 6.

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 can be undertaken by the District.
- Lead Agency/Support: Identifies the agency taking ownership of the action and overseeing 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 Odessa 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 can be implemented as District resources permit.

Table 6: 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 Technology (ST)	Performance Measurement (PM)	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Access	Collaboration	Integration	Innovation			
Work Zone Management Strategies																	
WZ01	Work Zone Training: Train staff to effectively design and implement Traffic Control Plans/Work Zone Safety Plans, including hands-on and smart work zone components.				X			X				X			High Priority / Short Term	TxDOT Odessa District	Medium Effort / $$
WZ02	Smart Work Zone Implementation: Utilize TxDOT's existing SWZ guidelines (modify for the Odessa District as needed) and tool to implement technology on all projects with significant work zones and/or closures.	X	X						X			X		X	High Priority / Short Term	TxDOT Odessa District	Low Effort / $
WZ03	Alternate Routes for Work Zones: - Include alternate routes as a component of WZM for all construction projects, especially for large-scale projects. - Collaborate with stakeholders to determine needs and impacts.	X					X		X						High Priority / Short Term	TxDOT Odessa District	High Effort / $$
WZ04	Utility Company Coordination: Develop mechanism to include utility companies in traffic control plan/work zone trainings and coordination meetings.	X					X			X		X			High Priority / Short Term	TxDOT Odessa District	Low Effort/ $
WZ05	Tie WZM Performance Measures to Regional Objectives: Define how project and program-level WZM measures map to regional operations objectives.			X					X					X	Medium Priority / Short Term	TxDOT Odessa District	Low Effort / $
WZ06	Develop Procedures to Update WZM Processes: Develop procedures to utilize outcome-based measures for work zone process reviews and update work zone policies and procedures.			X						X					Medium Priority / Short Term	TxDOT Odessa District	Low Effort / $
WZ07	Work Zone Driver Awareness Campaign: - Develop an educational/ information campaign to educate drivers (especially freight operators) on work zone safety. - Stress the importance of not driving recklessly due to delays caused by work zones (and closures/delays due to incidents), for freight operators.					X	X	X				X			Medium Priority / Short Term	TxDOT Odessa 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 Technology (ST)	Performance Measurement (PM)	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Access	Collaboration	Integration	Innovation			
WZ08	Improve the Assessment of Traffic Control Plans: Develop a process to streamline and improve inspection of traffic control plans implemented by contractors.	X						X				X			Medium Priority / Short Term	TxDOT Odessa District	Medium Effort / $
WZ09	Work Zone Information Dissemination: - Establish processes and clear messaging protocols for sharing work zone information to the public. - Utilize channels such as local news media, ITS, social media and 3rd party applications to share closure and alternate route information.	X									X	X			Medium Priority / Short Term	TxDOT Odessa District	Medium Effort / $
WZ10	Work Zone Safety Enforcement: - Formalize enforcement of WZ including speed limits, variable speeds, temporary barriers and cushions. - Coordinate with Law enforcement to ensure safety for construction workers.	X					X	X							Medium Priority / Medium Term	TxDOT Odessa District	Medium Effort / $
Traffic Management Strategies																	
TM01	Low Cost Enhancements to Improve Safety: - Develop action plan to address high priority, low-cost improvements such as signing, striping, signage, and signal re-timing. - Develop timeline for addressing improvements. Include GIS exhibits and documentation of each project as standalone or part of a larger corridor improvement plan.	X	X					X						X	High Priority / Short Term	TxDOT Odessa District	Medium Effort/ $
TM02	ITS in Project Development: Incorporate ITS into project conceptualization/planning phases before PS&E has begun.	X	X							X			X		High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TM03	Freight Traffic Data Collection: - Collect freight data including monitoring of truck counts, travel time, delays, and share with partners through an open data portal. - Leverage existing sources (e.g., Streetlight Data, other partners)		X	X					X				X		High Priority / Short Term	TxDOT Odessa 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 Technology (ST)	Performance Measurement (PM)	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Access	Collaboration	Integration	Innovation			
TM04	Traffic Management Roles and Responsibilities: - Develop a comprehensive list of traffic management roles and responsibilities across TxDOT to facilitate timely coordination (Ex: For day-to-day operations, core processes, planning and construction activities, etc.) - Provide list of cross-linked TM roles to all traffic management staff across TxDOT for reference and use in daily and strategic TSMO activities.				X						X	X			High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TM05	Identify Corridors for Traffic Management Performance: - Identify target corridors for performance measurement, including possible nearby arterials where the impacts of traffic management strategies are expected. Example corridors are IH-20, IH-10, Loop 338 and Loop 250, etc.			X					X	X					High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TM06	Share Traffic Impact Studies for Sites with Heavy Freight: - Share oil/gas, sand, etc. traffic impact study reports with stakeholders. - Include assessment of volume of truck traffic and impacts to roadway network and any related mitigation in traffic impact study reports.						X					X			High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TM07	ITS Asset Management: - Utilize asset management dashboard to track assets such as ITS equipment, DMS, signals, other devices. - Automate tickets and true visibility of all devices in traffic network.		X	X					X	X					High Priority / Medium Term	TxDOT Odessa District	Medium Effort / $$
TM08	CCTV and DMS Coverage (Freeways): - Perform gap analysis to increase CCTV and DMS coverage on highways and main arterials. - Develop an ITS Master Plan which can be separated into standalone projects or included as part of roadway and/or bridge projects.		X						X		X		X		High Priority / Medium Term	TxDOT Odessa District	Medium Effort / $$$
TM09	Update Congestion Management Process for the Region: - Using 2014 Congestion Management Process as a baseline, update for current and future traffic conditions in the region. - Establish, monitor, and achieve goals and vision of CMP.	X					X		X			X			High Priority / Medium Term	TxDOT Odessa 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 Technology (ST)	Performance Measurement (PM)	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Access	Collaboration	Integration	Innovation			
TM10	Freight Operator Information Dissemination: Share messages tailored to freight operators through public information channels. Messages could include information about delays, alternative routes, traffic incidents and weather.	X					X		X			X			Medium Priority / Medium Term	TxDOT Odessa District	Low Effort / $
Traffic Incident Management Strategies																	
TIM01	Equipment Staging Standards (Upon Arrival): Develop policies for staging arriving vehicles and equipment so that vehicles do not block lanes and equipment can access the scene and be removed when not needed any longer.	X					X	X							High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TIM02	Emergency Lighting Procedures: Develop procedures for emergency lighting use for low-light or evening crashes to improve visibility of incidents, without causing motorist confusion with excessive lighting.	X					X	X							High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TIM03	Hazardous Materials Procedures: - Develop well-defined hazmat response policies and procedures including guidelines for materials being transported as well as vehicle fluids. - Provide responder training to accurately identify the hazardous material and direct further response.	X					X	X				X			High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TIM04	Two-Way Voice Communications: - Develop plan for voice communications among responders to enable on-site, direct communication between TIM Team members. - Define protocols for usage of voice and text messages over radio, phone/cell phone, and internet messaging services.		X				X	X				X			High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TIM05	After Action Reviews: - Develop procedures, within the TIM Plan, for the TIM Team to perform structured reviews and/or debriefs after significant TIM events. - Develop an After-Action Report which analyzes what happened, why it happened and how it can be improved.	X			X		X	X	X	X	X	X	X	X	High Priority / Short Term	TxDOT Odessa 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 Technology (ST)	Performance Measurement (PM)	Organization and Workforce (OW)	Culture (CU)	Collaboration (CO)	Safety	Reliability	Efficiency	Access	Collaboration	Integration	Innovation			
TIM06	TIM Information Dissemination: - Develop standard operating procedures for sharing information about incidents to the public, including alternate routes, closures, and/or delays. - Leverage existing communication avenues including DMS, social media, news media, and DriveTexas website.	X					X	X			X	X			High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TIM07	Fatal Crash Investigation Standards: - Develop policies and procedures for fatal crash response and investigation. Review protocol for declaration of death so that incidents may be cleared from the roadway as quickly as possible. - Utilize technology, such as 3-D digital photography, which enables investigators to review the crash after the roadway has been reopened to traffic.	X	X					X				X	X	X	High Priority / Short Term	TxDOT Odessa District	Low Effort / $
TIM08	Incident Management Plan: - Create TIM Team, to include public and private partners (or internal and external stakeholders however it should be defined). - Develop TIM Plan which defines geographic-based roles and responsibilities and includes agreements and memoranda of understanding, as necessary. - Develop incident clearance procedures and alternate route plans to detect, respond and remove incidents and restore traffic back to normal operations safely and quickly.	X			X		X	X	X	X	X	X	X	X	High Priority / Short Term	TxDOT Odessa District	High Effort / $$
TIM09	Regional Criteria for EOC Activation: - Develop standard operating procedures for activating the regional EOC, including roles and responsibilities with partners such as law enforcement, EMS, municipalities, and TxDOT.	X					X	X				X			Medium Priority / Medium Term	TxDOT Odessa District	Low Effort / $
TIM10	Towing and Recovery - Formalize Coordination: - Implement Towing and Recovery Association of America (TRAA) National Driver Certification Program standards to establish a higher standard of professionalism for the industry in the region. - Train tow truck operators to appropriate level (Level 1 - Light Duty, 2 - Medium/Heavy Duty, 3 - Heavy Recovery Specialist).	X			X		X	X	X						Medium Priority / Medium Term	TxDOT Odessa District	Low Effort / $

6.0 TSMO Tactical Plan Assessment

TSMO Tactical Plans allow the TxDOT Odessa District to establish greater detail in how to act upon some of the high priority recommended action items included in the TSMO Program Plan, or actions that do not fit cleanly within one TSMO focus area, but remain critical to achieving a higher level of maturity. 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).

6.1 Tactical Plan Criteria

Based on the transportation challenges in the region, and priorities identified by regional stakeholders, several Tactical Plans are recommended for the TxDOT Odessa District. These recommended Tactical Plans are shown below in Table 7. Plans are displayed according to the following criteria:

1. Alignment with the TxDOT Odessa 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 from this TSMO Program Plan within the Tactical Plan's scope

6.2 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 can 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

Table 7: 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 ITS Master Plan** Develop ITS master plan to identify ITS gaps and needs for the Odessa District. Develop framework to prioritize, budget and implement ITS in the Odessa District.	X	X	X	X	X	X	X	TxDOT Odessa District	Low Effort / $	I	WZ02, WZ09, TM01, TM02, TM07, TM08, TM10, TIM06
02	**Traffic Incident Management Plan** Develop traffic incident plan for urban and rural areas. Develop framework and toolkit to mimic operations of a TMC. Setup stakeholder protocols for rural and urban incidents. Develop plans for major and HAZMAT response strategies.	X	X	X	X	X	X		TxDOT Odessa District, Permian Basin MPO, City of Midland and Odessa, Midland County and others.	High Effort / $$	III	TM04, TIM03, TIM05, TIM06, TIM08, TIM09
03	**Tools and Skills Training** Develop training modules and resources to tackle limited TxDOT staff and turnover. Training modules for new staff, TSMO, existing and emerging ITS technology, data and performance analysis. Identify tools and platforms for centralized communication and collaboration.			X		X		X	TxDOT Odessa District	High Effort / $$$	III	WZ01, WZ02, WZ08
04	**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 Odessa District, Permian Basin MPO, City of Midland and Odessa	Medium Effort / $$	III	WZ05, TM03, TM05, TM09
05	**Regional ITS Architecture Update** Update TxDOT Odessa District (Permian Basin) ITS architecture to current FHWA ARC-IT version.		X	X	X	X	X	X	TxDOT Odessa District, FHWA, Permian Basin MPO, City of Midland and Odessa	Low Effort / $	I	WZ09, TM01, TM02, TM03, TM04, TM07, TM08, TM10, TIM04, TIM06
06	**Work Zone Management and Alternate Route Framework** Update alternate routes during construction and severe weather for both urban and rural freeways. Develop WZM and alternate route framework for IH 20 construction project.	X	X	X	X	X			TxDOT Odessa District, City of Midland and Odessa	Medium Effort / $$	II	WZ02, WZ03, WZ05, WZ09, WZ10

7.0 TSMO Update Cycle

TxDOT is facing more mobility and safety challenges than ever before. With ever growing population and economic activity in the Permian Basin, the Odessa 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 Odessa District staff and their counterparts in partner agencies such as the Permian Basin MPO, City of Midland, City of Odessa, law enforcement agencies, counties, Permian Road Safety Coalition, 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 *10* shows TxDOT's recommended rural district update process for TSMO.

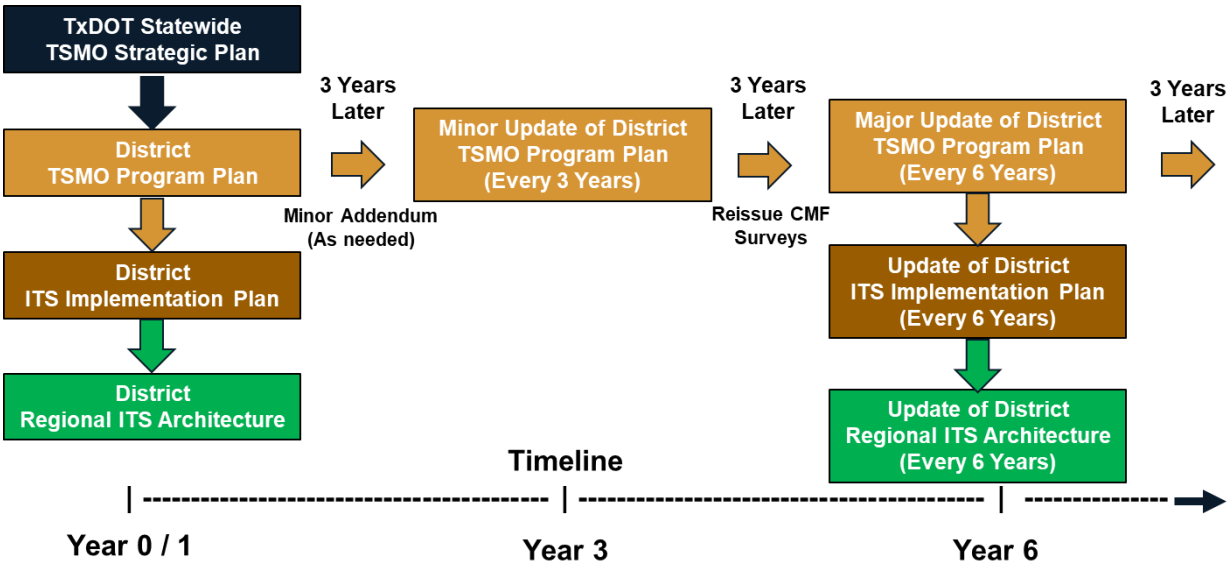


Figure 10: TxDOT's Rural District Update Process for TSMO

The Odessa 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 Odessa District can emerge as an agency with TSMO mainstreamed as a fundamental agency focus.

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TxDOT Odessa District TSMO Program

Appendices

Appendix A – One-Page TSMO Implementation Plan Action Item Summaries

TxDOT ODESSA TSMO IMPLEMENTATION PLAN

WORK ZONE MANAGEMENT STRATEGIES

Action #WZ01

Work Zone Training

Train staff to effectively design and implement Traffic Control Plans/Work Zone Safety Plans, including hands-on and smart work zone components.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZ02

Smart Work Zone Implementation

Utilize TxDOT's existing SWZ guidelines (modify for the Odessa District as needed) and tool to implement technology on all projects with significant work zones and/or closures.

DIMENSIONS

Business Processes

Systems & Technology

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Collaboration

Innovation

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

WORK ZONE MANAGEMENT STRATEGIES

Action #WZ03

Alternate Routes for Work Zones

- Include alternate routes as a component of WZM for all construction projects, especially for large-scale projects.
- Collaborate with stakeholders to determine needs and impacts.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZ04

Utility Company Coordination

Develop mechanism to include utility companies in traffic control plan/work zone trainings and coordination meetings.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

WORK ZONE MANAGEMENT STRATEGIES

Action #WZ05

Tie WZM Performance Measures to Regional Objectives

Define how project and program-level WZM measures map to regional operations objectives.

DIMENSIONS

Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Innovation

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZ06

Develop Procedures to Update WZM Processes

Develop procedures to utilize outcome-based measures for work zone process reviews and update work zone policies and procedures.

DIMENSIONS

Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

WORK ZONE MANAGEMENT STRATEGIES

Action #WZ07

Work Zone Driver Awareness Campaign

- Develop an educational/ information campaign to educate drivers (especially freight operators) on work zone safety.
- Stress the importance of not driving recklessly due to delays caused by work zones (and closures/ delays due to incidents), for freight operators.

DIMENSIONS

Culture

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZ08

Improve the Assessment of Traffic Control Plans

Develop a process to streamline and improve inspection of traffic control plans implemented by contractors.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TxDOT ODESSA TSMO IMPLEMENTATION PLAN

WORK ZONE MANAGEMENT STRATEGIES

Action #WZ09

Work Zone Information Dissemination

- Establish processes and clear messaging protocols for sharing work zone information to the public.
- Utilize channels such as local news media, ITS, social media and 3rd party applications to share closure and alternate route information.

DIMENSIONS

Business Processes

ALIGNMENT WITH SUPPORTED TSMO GOALS

Access

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #WZ10

Work Zone Safety Enforcement

- Formalize enforcement of WZ including speed limits, variable speeds, temporary barriers and cushions.
- Coordinate with Law enforcement to ensure safety for construction workers.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

PRIORITY

LOW — HIGH

TIMELINE: MEDIUM TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TxDOT ODESSA TSMO IMPLEMENTATION PLAN

TRAFFIC MANAGEMENT STRATEGIES

Action #TM01

Low Cost Enhancements to Improve Safety

- Develop action plan to address high priority, low-cost improvements such as signing, striping, signage, and signal re-timing.
- Develop timeline for addressing improvements. Include GIS exhibits and documentation of each project as standalone or part of a larger corridor improvement plan.

DIMENSIONS

Business Processes

Systems & Technology

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Innovation

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action # TM02

ITS in Project Development

Incorporate ITS into project conceptualization/ planning phases before PS&E has begun.

DIMENSIONS

Business Processes

Systems & Technology

ALIGNMENT WITH SUPPORTED TSMO GOALS

Efficiency

Integration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC MANAGEMENT STRATEGIES

Action #TM03

Freight Traffic Data Collection

- Collect freight data including monitoring of truck counts, travel time, delays, and share with partners through an open data portal.
- Leverage existing sources (e.g., Streetlight Data, other partners.

DIMENSIONS

Systems & Technology

Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Integration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action # TM04

Traffic Management Roles and Responsibilities

- Develop a comprehensive list of traffic management roles and responsibilities across TxDOT to facilitate timely coordination (Ex: For day-to-day operations, core processes, planning and construction activities, etc.)
- Provide list of cross-linked TM roles to all traffic management staff across TxDOT for reference and use in daily and strategic TSMO activities.

DIMENSIONS

Organization & Workforce

ALIGNMENT WITH SUPPORTED TSMO GOALS

Access

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC MANAGEMENT STRATEGIES

Action #TM05

Identify Corridors for Traffic Management Performance

- Identify target corridors for performance measurement, including possible nearby arterials where the impacts of traffic management strategies are expected. Example corridors are IH-20, IH-10, Loop 338 and Loop 250, etc.

DIMENSIONS

Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Efficiency

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action # TM06

Share Traffic Impact Studies for Sites with Heavy Freight

- Share oil/gas, sand, etc. traffic impact study reports with stakeholders.
- Include assessment of volume of truck traffic and impacts to roadway network and any related mitigation in traffic impact study reports.

DIMENSIONS

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC MANAGEMENT STRATEGIES

Action #TM07

ITS Asset Management

- Utilize asset management dashboard to track assets such as ITS equipment, DMS, signals, other devices.
- Automate tickets and true visibility of all devices in traffic network.

DIMENSIONS

Systems & Technology

Perfomance Measurement

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Efficiency

PRIORITY

LOW — HIGH

TIMELINE: MEDIUM TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action # TM08

CCTV and DMS Coverage (Freeways)

- Perform gap analysis to increase CCTV and DMS coverage on highways and main arterials.
- Develop an ITS Master Plan which can be separated into standalone projects or included as part of roadway and/or bridge projects.

DIMENSIONS

Systems & Technology

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Access

Integration

PRIORITY

LOW — HIGH

TIMELINE: MEDIUM TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC MANAGEMENT STRATEGIES

Action #TM09

Update Congestion Management Process for the Region

- Using 2014 Congestion Management Process as a baseline, update for current and future traffic conditions in the region.
- Establish, monitor, and achieve goals and vision of CMP.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: MEDIUM TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action # TM10

Freight Operator Information Dissemination

Share messages tailored to freight operators through public information channels. Messages could include information about delays, alternative routes, traffic incidents and weather.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Reliability

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: MEDIUM TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC INCIDENT MANAGEMENT STRATEGIES

Action #TIM01

Equipment Staging Standards (Upon Arrival)

Develop policies for staging arriving vehicles and equipment so that vehicles do not block lanes and equipment can access the scene and be removed when not needed any longer.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TIM02

Emergency Lighting Procedures

Develop procedures for emergency lighting use for low-light or evening crashes to improve visibility of incidents, without causing motorist confusion with excessive lighting.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC INCIDENT MANAGEMENT STRATEGIES

Action #TIM03

Hazardous Materials Procedures

- Develop well-defined hazmat response policies and procedures including guidelines for materials being transported as well as vehicle fluids.
- Provide responder training to accurately identify the hazardous material and direct further response.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TIM04

Two-Way Voice Communications

- Develop plan for voice communications among responders to enable on-site, direct communication between TIM Team members.
- Define protocols for usage of voice and text messages over radio, phone/cell phone, and internet messaging services.

DIMENSIONS

Systems & Technology

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TxDOT ODESSA TSMO IMPLEMENTATION PLAN

TRAFFIC INCIDENT MANAGEMENT STRATEGIES

Action #TIM05

After Action Reviews

- Develop procedures, within the TIM Plan, for the TIM Team to perform structured reviews and/or debriefs after significant TIM events.
- Develop an After-Action Report which analyzes what happened, why it happened and how it can be improved.

DIMENSIONS

Business Processes

Organization & Workforce

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Reliability

Efficiency

Access

Collaboration

Integration

Innovation

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TIM06

TIM Information Dissemination

- Develop standard operating procedures for sharing information about incidents to the public, including alternate routes, closures, and/or delays.
- Leverage existing communication avenues including DMS, social media, news media, and DriveTexas website.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Access

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TxDOT ODESSA TSMO IMPLEMENTATION PLAN

TRAFFIC INCIDENT MANAGEMENT STRATEGIES

Action #TIM07

Fatal Crash Investigation Standards

- Develop policies and procedures for fatal crash response and investigation. Review protocol for declaration of death so that incidents may be cleared from the roadway as quickly as possible.
- Utilize technology, such as 3-D digital photography, which enables investigators to review the crash after the roadway has been reopened to traffic..

DIMENSIONS

Business Processes

Systems & Technology

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

Integration

Innovation

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TIM08

Incident Management Plan

- Create TIM Team, to include public and private partners (or internal and external stakeholders however it should be defined).
- Develop TIM Plan which defines geographic-based roles and responsibilities and includes agreements and memoranda of understanding, as necessary.
- Develop incident clearance procedures and alternate route plans to detect, respond and remove incidents and restore traffic back to normal operations safely and quickly.

DIMENSIONS

Business Processes

Organization & Workforce

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Reliability

Efficiency

Access

Collaboration

Integration

Innovation

PRIORITY

LOW — HIGH

TIMELINE: SHORT TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

TRAFFIC INCIDENT MANAGEMENT STRATEGIES

Action #TIM09

Regional Criteria for EOC Activation

- Develop standard operating procedures for activating the regional EOC, including roles and responsibilities with partners such as law enforcement, EMS, municipalities, and TxDOT.

DIMENSIONS

Business Processes

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Collaboration

PRIORITY

LOW — HIGH

TIMELINE: MEDIUM TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Action #TIM10

Towing and Recovery - Formalize Coordination

- Implement Towing and Recovery Association of America (TRAA) National Driver Certification Program standards to establish a higher standard of professionalism for the industry in the region.
- Train tow truck operators to appropriate level (Level 1 - Light Duty, 2 - Medium/Heavy Duty, 3 - Heavy Recovery Specialist).

DIMENSIONS

Business Processes

Organization & Workforce

Collaboration

ALIGNMENT WITH SUPPORTED TSMO GOALS

Safety

Reliability

PRIORITY

LOW — HIGH

TIMELINE: MEDIUM TERM

LEAD AGENCY/SUPPORT: TxDOT ODESSA DISTRICT

STAFF EFFORT

LOW — HIGH

COST $ $ $

Prepared by:

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ENGINEERS | SURVEYORS | CONTRACTORS

Version 1.1

Texas Department of Transportation