State of Texas
Regional ITS Architectures and Deployment Plans

Permian Basin Region

Regional ITS Deployment Plan

Prepared by:

Kimley-Horn
and Associates, Inc.

March 24, 2005
068510017

Copyright © 2005 by Texas Department of Transportation. All rights reserved.

TABLE OF CONTENTS

REGIONAL ITS DEPLOYMENT PLAN

SUMMARY ..... **v**

1. INTRODUCTION **1-1**

1.1 Project Overview **1-1**
1.2 Document Overview **1-1**
1.3 The Permian Basin Region **1-2**
1.3.1 Geography and Regional Characteristics *1-2*
1.3.2 Transportation Infrastructure *1-2*
1.3.3 Existing ITS in the Permian Basin Region *1-3*
1.3.4 Permian Basin Stakeholders *1-3*

2. PRIORITIZATION OF MARKET PACKAGES **2-1**

2.1 Prioritization Process **2-1**
2.2 High Priority Market Packages **2-3**
2.3 Medium Priority Market Packages **2-16**
2.4 Low Priority Market Packages **2-22**

3. PRIORITIZATION OF PROJECTS **3-1**

3.1 Short-Term Projects (5-Year) **3-1**
3.2 Mid-Term Projects (10-Year) **3-1**
3.3 Long-Term Projects (20-Year) **3-2**

4. MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN **4-1**

LIST OF TABLES

Table 1 – Permian Basin Stakeholder Agencies and Contacts 1-4
Table 2 – Summary of Prioritized Market Packages for the Permian Basin Region 2-2
Table 3 – High Priority Market Packages for the Permian Basin Region 2-3
Table 4 – Medium Priority Market Packages for the Permian Basin Region 2-16
Table 5 – Low Priority Market Packages for the Permian Basin Region 2-22
Table 6 – Short-Term Projects (5-Year) 3-3
Table 7 – Mid-Term Projects (10-Year) 3-24
Table 8 – Long-Term Projects (20-Year) 3-41

LIST OF ACRONYMS

ATIS	Advanced Traveler Information System
ATMS	Advanced Traffic Management System
AVI	Automated Vehicle Identification
AVL	Automated Vehicle Location
CAD	Computer Aided Dispatch
CCTV	Closed-Circuit Television
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Signs
DPS	Department of Public Safety
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
GIS	Geographic Information System
GPS	Global Positioning System
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HCRS	Highway Conditions Reporting System
HRI	Highway-Rail Intersections
ISP	Information Service Provider
ITS	Intelligent Transportation System
MDT	Mobile Data Terminal
MORTS	Midland-Odessa Regional Transportation Study
MOTRAN	Midland-Odessa Transportation Alliance
PSAP	Public Safety Answering Point
PTZ	Pan/Tilt/Zoom
RFID	Radio Frequency Identification
RTD	Rural Transit District

LIST OF ACRONYMS

RWIS	Road Weather Information System
TEA-21	Transportation Equity Act for the 21st Century
TMC	Transportation Management Center
TOC	Traffic Operations Center Transit Operations Center
TxDOT	Texas Department of Transportation
VIVDS	Video Image Vehicle Detector System

SUMMARY

In January 2001, the Federal Highway Administration (FHWA) issued a final rule to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21) requiring that Intelligent Transportation System (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards.

To meet these requirements the Texas Department of Transportation (TxDOT) initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. Although not required by the FHWA final rule, TxDOT took the opportunity to also develop an ITS deployment plan for each Region. The Permian Basin Regional ITS Architecture and Regional ITS Deployment Plan was prepared as part of this initiative.

The Permian Basin Regional ITS Deployment Plan outlines a vision for ITS deployment, and identifies and prioritizes projects that are needed to implement the ITS architecture on a short-, medium-, and long-term basis. In doing so, this plan also helps the Region to prioritize funding decisions. As infrastructure is incrementally built-out over a 20-year horizon, integration among key foundation systems in the Region can occur as the system grows and expands.

Stakeholders from throughout the Region participated in the development of the Regional ITS Deployment Plan. Participants included representatives from TxDOT, cities, public safety, transit agencies, and planning organizations.

Building on the dialogue, consensus, and vision outlined in the Regional ITS Architecture, stakeholders in the Permian Basin Region prioritized market packages and potential ITS projects for deployment in the Region. Projects were identified to correspond to the needs and priorities identified by the regional stakeholders, and were categorized into 5-year, 10-year, and 20-year timeframes.

The majority of ITS projects recommended for the Permian Basin Region were identified in the following key areas:

- Travel and Traffic Management;
- Emergency Management;
- Maintenance and Construction Management; and
- Public Transportation Management.

Recommended ITS projects in the 5-year, 10-year, and 20-year deployment timeframes were summarized in tables for each deployment horizon. This summary included the project name, a brief description, primary responsible agency, a planning level estimate of probable cost, an indication of whether or not funding had been identified for that project, as well as an estimated duration for implementation. For each recommended ITS project, more detailed project descriptions were developed which mapped each project back to applicable market packages and also identified any prerequisite project requirements.

With the substantial amount of effort invested by stakeholders in the Permian Basin Region to develop both the Regional ITS Architecture and the Deployment Plan, developing a plan for maintaining these important tools was a key component of the process.

1. INTRODUCTION

1.1 Project Overview

The FHWA final rule to implement Section 5206(e) of the TEA-21 requires that ITS projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. The rule requests that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a "Regional ITS Architecture."

In order to meet these requirements, TxDOT initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. Although not required by the FHWA final rule, TxDOT sought to have an ITS deployment plan developed for each Region. The ITS Deployment Plan outlines a vision for ITS deployment in the Region and identifies and prioritizes projects that are needed to implement the ITS architecture on a short- medium- and long-term basis. In doing so, this plan also helps the Region to prioritize funding decisions by having a comprehensive, phased approach to the regional ITS programs, so that the infrastructure can be incrementally built-out over a 20-year horizon, and integration among key foundation systems in the Region can occur as the system grows and expands.

The Permian Basin Regional ITS Deployment Plan was developed using the Regional ITS Architecture developed in 2004. Through the architecture development process, stakeholders reached consensus on the transportation needs in the Region that could be addressed with ITS, worked with the architecture team to customize and prioritize market packages that formed the basis for the ITS Deployment Plan, and identified the required interfaces to provide the desired level of integration of systems and agencies within the Permian Basin Region.

The Permian Basin Regional ITS Architecture provided the framework and prioritized the key functions and services desired by stakeholders in the Region. The ITS Deployment Plan builds on the architecture by outlining specific ITS project recommendations and strategies for the Region, and identifying deployment timeframes so that the recommended projects and strategies can be implemented over time. Agency responsibilities for implementing and operating the systems also are a key component of the ITS Deployment Plan.

1.2 Document Overview

The Permian Basin Regional ITS Deployment Plan is organized into four key sections:

Section 1 – Introduction

This section provides a brief overview of the Permian Basin Regional ITS Deployment Plan, as well as an overview of some of the key features and stakeholders in the Permian Basin Region.

Section 2 – Prioritization of Market Packages

Section 2 contains the prioritized market packages for the Permian Basin Region. Included in this section is an overview of the prioritization process and detailed descriptions of the high, medium and low priority market packages.

Section 3 – Prioritization of Projects

Project recommendations have been developed for the Permian Basin Region to provide an incremental, phased build-out of the Region's ITS. These projects are categorized into 5-year, 10-year, and 20-year deployment timeframes.

Section 4 – Maintaining the Regional ITS Architecture and Deployment Plan

A procedure for maintaining the ITS Deployment Plan and submitting new projects to add to the plan is recommended in this section.

1.3 The Permian Basin Region

1.3.1 Geography and Regional Characteristics

The Permian Basin Region is bordered by the TxDOT Lubbock District to the north, the TxDOT Laredo District to the south, the TxDOT San Angelo and Abilene Districts to the east, and the TxDOT El Paso District to the west. For the Permian Basin Regional ITS Architecture and Deployment Plan, the study area included all 12 counties that comprise the TxDOT Odessa District.

The counties included in the Permian Basin Region are:

- Andrews;
- Crane;
- Ector;
- Loving;
- Martin;
- Midland;
- Pecos;
- Reeves;
- Terrell;
- Upton;
- Ward; and
- Winkler.

TxDOT partners with local governments for roadway construction, maintenance, and traffic operations support, and serves as the responsible agency for on-system roadways in cities with populations less than 50,000. The Cities of Midland and Odessa are the only cities in the project Region with populations that exceed the 50,000 threshold.

1.3.2 Transportation Infrastructure

The Permian Basin Region has an extensive transportation infrastructure. The primary roadway facilities include I-10, I-20, US 67, US 285, and US 385.

I-10 and I-20 are east-west divided interstate highways. Their effective operation is critical to the movement of goods and people through the State of Texas and the United States. Blockages along I-10 and I-20 can have serious implications for drive-time for commercial vehicles and motorists alike due to the lack of obvious alternate routes. Knowing the road

and travel conditions within this transportation corridor and having the ability to disseminate this information to motorists are important elements for this project. For example, if I-20 has been closed due to a major incident or weather, and motorists are informed of the closure in advance, they can alter their travel plans by taking an alternate route or waiting to begin their travels.

1.3.3 Existing ITS in the Permian Basin Region

Within the Permian Basin Region there are currently several ITS applications in place. TxDOT has portable dynamic message signs (DMS) that are utilized primarily for displaying construction and delay information.

Video image vehicle detection systems (VIVDS) have been implemented by the City of Midland and TxDOT.

Traffic signal preemption for emergency vehicles is in place within the City of Midland and City of Odessa, and several emergency management agencies are utilizing computer aided dispatch systems.

1.3.4 Permian Basin Stakeholders

Stakeholder coordination and involvement is one of the key elements to the development of a regional ITS architecture and deployment plan. Because ITS often transcends traditional transportation infrastructure, it is important to involve non-traditional stakeholders in the architecture development and visioning process. Input from these stakeholders, both public and private, is a critical part of defining the interfaces, integration needs, and overall vision for ITS in the Permian Basin Region.

The following is a list of stakeholders in the Permian Basin Region who have participated in the project workshops or provided input to the study team as to the needs and issues that should be considered as part of the Permian Basin Regional ITS Architecture and Deployment Plan:

- City of Balmorhea;
- City of Fort Stockton;
- City of Midland;
- City of Odessa;
- City of Pecos;
- EZ Rider;
- Midland-Odessa Regional Transportation Study (MORTS);
- Midland-Odessa Transportation Alliance (MOTRAN);
- Permian Basin Regional Planning Commission;
- Texas Department of Public Safety;
- TxDOT El Paso District – Pecos Area Office;
- TxDOT Odessa District;
- TxDOT Traffic Operations Division (Austin); and
- West Texas Opportunities, Inc. – Permian Basin Rural Transit District.

Stakeholder agencies that are participating in the development of the Permian Basin Regional ITS Deployment Plan are listed in **Table 1** along with contact information for agency representatives that have participated.

Table 1 – Permian Basin Stakeholder Agencies and Contacts

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
City of Balmorhea	Lois Conteras	P.O. Box 323 Balmorhea, Texas 79718	(432) 325-2307	Elmeez67918@yahoo.com
City of Balmorhea	Ruben Fuentez	PO Box 7 Balmorhea, Texas	(432) 375-0207	N/A
City of Balmorhea	Mary Garcia	P.O. Box 323 Balmorhea, Texas 79718	(432) 375-2307	citybalm@overland.net
City of Ft. Stockton	Brad Newton	PO Box 100 Ft. Stockton, Texas 79735	(432) 336-8525	bnewton@ci.fort-stockton.tx.us
City of Midland	Mark Barnes	PO Box 1152 Midland, Texas 79702	(432) 685-7292	mbarnes@mail.ci.midland.tx.us
City of Midland	Gary Saunders	P.O. Box 1152 Midland, Texas 79702	(432) 685-7280	gsaunders@mail.ci.midland.tx.us
City of Midland Police Department	Rick Lewis	601 N Loraine Midland, Texas 79701	(432) 685-7172	rlewis@mail.ci.midland.tx.us
City of Odessa	Hal Feldman	P.O. Box 4398 Odessa, Texas 79762	(432) 335-3239	hfeldman@ci.odessa.tx.us
City of Odessa	Matt Squyres	411 West 8th Street Odessa, Texas 79761	(432) 335-3244	msquyres@ci.odessa.tx.us
City of Odessa Fire Department	Steve Pollock	411 West 8th Street Odessa, Texas 79761	(432) 335-3318	spollock@ci.odessa.tx.us
City of Odessa Fire Department	Charlie Smith	P.O. Box 4398 Odessa, Texas 79760	(432) 335-4654	csmith@ci.odessa.tx.us
City of Odessa Police Department	JD Echols	205 N. Grant Odessa, Texas 79761	(432) 335-3336	jechols@ci.odessa.tx.us
City of Odessa Police Department	Bob Forbus	205 N. Grant Odessa, Texas 79761	(432) 335-5756	bforbus@ci.odessa.tx.us
City of Odessa Police Department	Mike Sims	205 N Grant Odessa, Texas 79761	(432) 335-3355	N/A
City of Pecos	Joseph Torres	P.O. Box 929 Pecos, Texas 79772	(432) 445-2421	pecossec@classicnet.net
City of Pecos Police Department	Clay McKinney	510 South Oak Pecos, Texas 79772	(432) 445-2424	N/A
EZ Rider	Nelson Kirby	8007 E Hwy 80 Odessa, Texas 79765	(432) 561-8058	nkirby@netwest.com
MORTS	Robert Cox	P.O. Box 60660 ATS Midland, Texas 79701	(432) 563-1061	planning@pbrpc.org

Table 1 – Permian Basin Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
MOTRAN	James Beauchamp	PO Box 60816 Midland, Texas 79711	(432) 563-6240	james@motran.org
Permian Basin Regional Planning Commission	Abel Gamez	2910 La Force Blvd Midland, Texas 79711	(432) 563-1061	bforbus@ci.odessa.tx.us
Texas Department of Public Safety	Glen Adamson	2405 South Loop 250 West Midland, Texas 79702	(432) 332-6100	N/A
Texas Department of Public Safety	Shannon Gray	1910 IH-20 West Odessa, TX 79763	(432) 332-6100	shannon.gray@txdps.state.tx.us
Texas Department of Public Safety	Terry Truett	1910 IH-20 West Odessa, Texas 79763	(432) 332-6100	terry.truett@txdps.state.tx.us
TxDOT El Paso District – Pecos Area Office	Kelli Williams	2100 W Third Pecos, Texas 79772	(432) 445-3800	kwillia@dot.state.tx.us
TxDOT Odessa District	Nolberto Aguirre	3901 E. Highway 80 Odessa, Texas 79761	(432) 498-4682	taguirre@dot.state.tx.us
TxDOT Odessa District	Dan Dalager	3901 East Highway 80 Odessa, Texas 79761	(432) 498-4770	ddalage@dot.state.tx.us
TxDOT Odessa District	Doug Eichorst	5100 West IH-20 Midland, Texas 79703	(432) 694-2195	deichor@dot.state.tx.us
TxDOT Odessa District	Lauren Garduno	3901 East Highway 80 Odessa, Texas 79761	(432) 498-4711	lgardun@dot.state.tx.us
TxDOT Odessa District	Alfredo Gonzales	3901 East Highway 80 Odessa, Texas 79761	(432) 498-4766	agonza8@dot.state.tx.us
TxDOT Odessa District	Glen Larum	3901 East Highway 80 Odessa, Texas 79761	(432) 498-4746	glarum@dot.state.tx.us
TxDOT Odessa District	Robert Martinez	3901 East Highway 80 Odessa, Texas 79761	(432) 498-4748	rmarti1@dot.state.tx.us
TxDOT Odessa District	Mike McAnally	3901 East Highway 80 Odessa, Texas 79761	(432) 498-4740	mmcanal@dot.state.tx.us
TxDOT Odessa District	Mohammed Moabed	P.O. Box 97 Ft. Stockton, TX 79703	(432) 366-3671	mmoabed@dot.state.tx.us
TxDOT Odessa District	Ajay Shakyaver	3901 E. Highway 80 Odessa, Texas 79761	(432) 498-4753	ashakya@dot.state.tx.us
TxDOT Odessa District	Heather Sinclair	5100 West IH-20 Midland, Texas 79703	(432) 694-2195	N/A
TxDOT Odessa District	Cody Woodard	3901 E. Highway 80 Odessa, Texas 79761	(432) 498-4681	cwooda1@dot.state.tx.us
TxDOT Traffic Operations Division	Alex Power	Attn: TRF- Cedar Park #51 125 East 11th Street Austin, Texas 78701-2483	(512) 506-5153	apower@dot.state.tx.us

Table 1 – Permian Basin Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
West Texas Opportunities, Inc. – Permian Basin Rural Transit District	Richard Jones	603 N 4th Street Lamesa, Texas 79331-1308	(806) 872-8354	wtotrans@pics.net
West Texas Opportunities, Inc. – Permian Basin Rural Transit District	Fred Mustain	603 N 4th Street Lamesa, Texas 79331-1308	(806) 872-8354	wtotrans@pics.net

2. PRIORITIZATION OF MARKET PACKAGES

2.1 Prioritization Process

Of the 75 available market packages available in Version 4.0 of the National ITS Architecture, 38 were selected and customized for deployment in the Permian Basin Region. Stakeholders were asked to prioritize the market packages into high, medium, and low priorities, based on regional needs, feasibility and likelihood of deployment, and overall contribution of the market package to the goals and vision for ITS functionality in the Region. A summary of these prioritized market packages is shown in **Table 2**.

The market package prioritization was a key factor in developing recommendations for ITS deployment and integration in the Permian Basin Region. These priorities identified the key needs and services that are desired in the Permian Basin Region, as well as the interfaces that need to be established to provide integrated functionality and establish communication between elements.

This section includes detailed descriptions of the prioritized market packages for the Permian Basin Region. The market packages are organized into high, medium, and low priorities. It is important to note that the high, medium, and low prioritization does not necessarily correspond to any specific time frame (such as five, ten, or twenty year deployment horizon). For example, a market package can be a high priority, but because of funding or prerequisite project requirements, it might not be feasible for deployment for several years. Maturity and availability of technology were other factors for prioritizing the market packages. Other considerations included whether or not the market package was better suited for private deployment and operations rather than public. As an example, ISP-based Route Guidance might be viewed as a valuable traveler information service for motorists in the Region, but stakeholders felt this market package was best suited for deployment by a private service provider, and as such, deemed it a low priority for agencies in the Region.

Each market package in the following subsections includes:

- A brief definition of the market package (which have been modified from the National ITS Architecture definitions);
- Any existing infrastructure from that market package that is already existing in the Permian Basin Region;
- Agencies currently operating or maintaining systems that apply to that market package;
- Planned projects that will address some or all of the services that are contained in the market package; and
- Any additional needs to bring the market package to the desired level of deployment or functionality.

Table 2 – Summary of Prioritized Market Packages for the Permian Basin Region

High Priority	Medium Priority	Low Priority
▪ Network Surveillance ▪ Surface Street Control ▪ Traffic Information Dissemination ▪ Regional Traffic Control ▪ Incident Management System ▪ Emergency Response ▪ Evacuation and Reentry Management ▪ Road Weather Data Collection ▪ Weather Information Processing and Distribution ▪ Maintenance and Construction Activity Coordination ▪ Transit Vehicle Tracking ▪ Transit Fixed-Route Operations ▪ Demand Response Transit Operations ▪ Transit Traveler Information ▪ HAZMAT Management ▪ Broadcast Traveler Information ▪ ITS Data Mart	▪ Freeway Control ▪ Standard Railroad Grade Crossing ▪ Advanced Railroad Grade Crossing ▪ Railroad Operations Coordination ▪ Emergency Vehicle Routing ▪ Roadway Maintenance and Construction ▪ Work Zone Management ▪ Transit Passenger and Fare Management ▪ Transit Security ▪ Weigh-in-Motion ▪ ITS Data Warehouse	▪ Probe Surveillance ▪ Maintenance and Construction Vehicle Tracking ▪ Maintenance and Construction Vehicle Maintenance ▪ Roadway Automated Treatment ▪ Winter Maintenance ▪ Work Zone Safety Monitoring ▪ Transit Maintenance ▪ Multi-modal Coordination ▪ Electronic Clearance ▪ ISP-Based Route Guidance

2.2 High Priority Market Packages

Market packages that were selected as high priorities for the Permian Basin Region are listed and described in **Table 3**. These market packages typically represent systems or functions that serve as foundations on which to build regional ITS programs. Listed in this section are market packages that address baseline control, monitoring and coordination technologies for surface streets and freeways, road/weather conditions data gathering, transit, incident management and emergency response.

Many of these high priority market packages have components that are in various stages of deployment and operation in the Permian Basin Region; that is, there are already systems and technologies deployed to deliver some of these high priority services and functions. For example, several City of Midland closed loop signal systems have already been deployed and these are key components of the Surface Street Control market package. Although these devices are in place, this market package is still listed as a high priority. There are additional capabilities and functionality contained in this market package that are planned for implementation in the near-term, thus building on the existing infrastructure and expanding the services of this particular market package in the Permian Basin Region.

Table 3 – High Priority Market Packages for the Permian Basin Region

Network Surveillance (ATMS01)	**High Priority**
This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and wireline communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally or remotely. The data generated by this market package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect equipment faults, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.	
Existing Infrastructure ▪ VIVDS	**Agency** ▪ TxDOT ▪ City of Midland
Planned Projects ▪ City of Midland Closed Loop Signal System Expansion Phase 1 ▪ City of Midland Signal System Upgrades Phase 1 ▪ TxDOT ATMS Implementation ▪ TxDOT Closed Loop Signal System Implementation Phase 1	
Additional Needs ▪ City of Midland Advance Railroad Warning System ▪ City of Midland CCTV Camera Deployment ▪ City of Midland Closed Loop Signal System Expansion Phase 2 ▪ City of Midland Flood Detection ▪ City of Midland Flood Detection Expansion ▪ City of Midland Signal System Upgrades Phase 2	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Network Surveillance (ATMS01) (continued)	High Priority
Additional Needs (continued)	
▪ City of Midland Signal System Upgrades Phase 3	
▪ City of Midland TOC	
▪ City of Odessa Advance Railroad Warning System	
▪ City of Odessa CCTV Camera Deployment	
▪ City of Odessa Closed Loop Signal System Expansion Phase 1	
▪ City of Odessa Closed Loop Signal System Expansion Phase 2	
▪ City of Odessa Signal System Upgrades Phase 1	
▪ City of Odessa Signal System Upgrades Phase 2	
▪ City of Odessa Signal System Upgrades Phase 3	
▪ City of Odessa TOC	
▪ Regional Telecommunications Master Plan	
▪ TxDOT Advance Railroad Warning System	
▪ TxDOT CCTV Camera Deployment Phase 1	
▪ TxDOT CCTV Camera Deployment Phase 2	
▪ TxDOT Closed Loop Signal System Implementation Phase 2	
▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 1	
▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 2	
▪ TxDOT High Wind/Low Visibility Detection	
▪ TxDOT Odessa TMC	
▪ TxDOT RWIS Stations Phase 1	
▪ TxDOT RWIS Stations Phase 2	
▪ TxDOT Work Zone Safety Monitoring	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Surface Street Control (ATMS03)	**High Priority**
This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. This market package is consistent with typical urban traffic signal control systems.	
Existing Infrastructure ▪ Closed Loop Signal Systems ▪ VIVDS ▪ Emergency Vehicle Traffic Signal Preemption	**Agency** ▪ TxDOT ▪ City of Midland ▪ City of Odessa
Planned Projects ▪ City of Midland Closed Loop Signal System Expansion Phase 1 ▪ City of Midland Signal System Upgrades Phase 1 ▪ TxDOT Closed Loop Signal System Implementation Phase 1	
Additional Needs ▪ City of Midland Advance Railroad Warning System ▪ City of Midland Closed Loop Signal System Expansion Phase 2 ▪ City of Midland Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion ▪ City of Midland Signal System Upgrades Phase 2 ▪ City of Midland Signal System Upgrades Phase 3 ▪ City of Midland TOC ▪ City of Odessa Advance Railroad Warning System ▪ City of Odessa Closed Loop Signal System Expansion Phase 1 ▪ City of Odessa Closed Loop Signal System Expansion Phase 2 ▪ City of Odessa Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion ▪ City of Odessa Signal System Upgrades Phase 2 ▪ City of Odessa Signal System Upgrades Phase 2 ▪ City of Odessa Signal System Upgrades Phase 3 ▪ City of Odessa TOC ▪ Detour Planning ▪ Municipal Emergency Vehicle Traffic Signal Preemption Implementation ▪ Municipal Emergency Vehicle Traffic Signal Preemption Vehicle Equipment ▪ Regional Telecommunications Master Plan ▪ TxDOT Advance Railroad Warning System ▪ TxDOT Closed Loop Signal System Implementation Phase 2 ▪ TxDOT Emergency Vehicle Traffic Signal Preemption Expansion ▪ TxDOT Odessa TMC	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Traffic Information Dissemination (ATMS06)	**High Priority**
This market package allows traffic information and road/bridge closures due to construction, maintenance, and weather, to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Information Service Providers.	
Existing Infrastructure ▪ Portable Dynamic Message Signs	**Agency** ▪ TxDOT
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT HCRS Enhancements	
Additional Needs ▪ 911 PSAP/TxDOT Odessa TMC Communications Connection ▪ City of Midland Advance Railroad Warning System ▪ City of Midland TOC ▪ City of Midland TOC/TxDOT Odessa TMC Communications Connection ▪ City of Odessa Advance Railroad Warning System ▪ City of Odessa TOC ▪ City of Odessa TOC/TxDOT Odessa TMC Communications Connection ▪ Ector County EOC/TxDOT Odessa TMC Communications Connection ▪ EZ Rider/Midland TOC Communications Connection ▪ EZ Rider/Odessa TOC Communications Connection ▪ EZ Rider/TxDOT Odessa TMC Communications Connection ▪ Media Liaison and Coordination ▪ Midland County EOC/TxDOT Odessa TMC Communications Connection ▪ Permian Basin Rural Transit/TxDOT Odessa TMC Communications Connection ▪ Regional 511 Advanced Traveler Information System Server ▪ Regional Telecommunications Master Plan ▪ TxDOT Additional DMS Implementation ▪ TxDOT Additional Portable DMS ▪ TxDOT Advance Railroad Warning System ▪ TxDOT DMS on I-10 ▪ TxDOT DMS on I-20 ▪ TxDOT Odessa TMC ▪ TxDOT Rest Area Kiosks ▪ TxDOT Web Page Customization and Enhancement	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Regional Traffic Control (ATMS07)	**High Priority**
This market package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. This package relies on roadside instrumentation supported by the Surface Street Control and Freeway Control Market Packages and adds hardware, software, and communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. The extent of information and control sharing is determined through working arrangements between jurisdictions.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT Center-to-Center Communications (Statewide)	
Additional Needs ▪ City of Midland TOC ▪ City of Midland TOC/TxDOT Odessa TMC Communications Connection ▪ City of Odessa TOC/TxDOT Odessa TMC Communications Connection ▪ TxDOT Odessa TMC ▪ City of Odessa TOC ▪ Regional Telecommunications Master Plan	

Incident Management System (ATMS08)	**High Priority**
This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g. CCTV) and through regional coordination with other traffic management, maintenance and construction management, and emergency management centers as well as weather service entities and event promoters. Information from these diverse sources is collected and correlated by this market package to detect and verify incidents and implement an appropriate response. The response may include traffic control strategy modifications or resource coordination between center subsystems. The coordination with emergency management might be through a computer-aided dispatch (CAD) system or through other communication with emergency field personnel. The coordination can also extend to tow trucks and other allied response agencies and field service personnel. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination, Broadcast Traveler Information, or Interactive Traveler Information market packages.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT Center-to-Center Communications (Statewide) ▪ TxDOT HCRS Enhancements	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Incident Management System (ATMS08) (continued)	High Priority
Additional Needs	
▪ 911 PSAP/TxDOT Odessa TMC Communications Connection ▪ City of Midland CCTV Camera Deployment ▪ City of Midland TOC ▪ City of Midland TOC/TxDOT Odessa TMC Communications Connection ▪ City of Odessa CCTV Camera Deployment ▪ City of Odessa TOC ▪ City of Odessa TOC/TxDOT Odessa TMC Communications Connection ▪ Detour Planning ▪ Ector County EOC/TxDOT Odessa TMC Communications Connection ▪ EZ Rider/City of Midland Emergency Dispatch Communications Connection ▪ EZ Rider/City of Odessa Emergency Dispatch Communications Connection ▪ EZ Rider/DPS Communication Connections ▪ EZ Rider/Midland TOC Communications Connection ▪ EZ Rider/Odessa TOC Communications Connection ▪ EZ Rider/TxDOT TMC Communications Connection ▪ Media Liaison and Coordination ▪ Midland County EOC/TxDOT Odessa TMC Communications Connection ▪ Permian Basin Rural Transit/TxDOT Odessa TMC Communications Connection ▪ Regional Telecommunication Master Plan ▪ TxDOT Additional DMS Implementation ▪ TxDOT Additional Portable DMS ▪ TxDOT CCTV Camera Deployment Phase 1 ▪ TxDOT CCTV Camera Deployment Phase 2 ▪ TxDOT DMS on I-10 ▪ TxDOT DMS on I-20 ▪ TxDOT Odessa TMC ▪ TxDOT Web Page Customization and Enhancement	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Emergency Response (EM01)	**High Priority**
This market package includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification and coordinated response between agencies.	
Existing Infrastructure ▪ Police Department Mobile Data Terminals ▪ GPS on Police Vehicles ▪ Computer Aided Dispatch ▪ Emergency Operations Center ▪ Emergency Warning System	**Agency** ▪ City of Odessa ▪ City of Midland ▪ Midland County ▪ Ector County
Planned Projects None identified at this time	
Additional Needs ▪ City of Midland Police AVL and MDT Upgrade ▪ City of Odessa Fire Department AVL and MDTs ▪ City of Odessa Police Department AVL and MDTs ▪ Municipal Emergency Management AVL and MDTs ▪ City of Midland Fire AVL and MDT Upgrade	

Evacuation and Reentry Management (EM09)	**High Priority**
This market package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The market package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Road Weather Data Collection (MC03)	**High Priority**
This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed road weather information system (RWIS) stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles. The collected environmental data is used by the Weather Information Processing and Distribution Market Package to process the information and help operators make decisions on operations.	
Existing Infrastructure ▪ Weather Stations	**Agency** ▪ National Weather Service
Planned Projects ▪ TxDOT ATMS Implementation	
Additional Needs ▪ City of Midland Flood Detection ▪ City of Midland Flood Detection Expansion ▪ TxDOT Anti-Icing Equipment Installation ▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 1 ▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 2 ▪ TxDOT High Wind/Low Visibility Detection ▪ TxDOT RWIS Stations Phase 1 ▪ TxDOT RWIS Stations Phase 2	

Weather Information Processing and Distribution (MC04)	**High Priority**
This market package processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, and dense fog so that system operators and decision support systems can make decisions on corrective actions to take. The continuing updates of road condition information and current temperatures can be used by system operators to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination market package, and aid operators in scheduling work activity.	
Existing Infrastructure None identified	**Agency**
Planned Projects ▪ TxDOT ATMS Implementation ▪ TxDOT HCRS Enhancements	
Additional Needs ▪ TxDOT Anti-Icing Equipment Implementation ▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 1 ▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 2	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Maintenance and Construction Activity Coordination (MC10)	**High Priority**
This market package supports the dissemination of maintenance and construction activity information to centers which can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.	
Existing Infrastructure ▪ TxDOT HCRS	**Agency** ▪ TxDOT
Planned Projects ▪ TxDOT HCRS Enhancements ▪ TxDOT Center-to-Center Communications (Statewide)	
Additional Needs ▪ City of Midland TOC/TxDOT Odessa TMC Communications Connection ▪ City of Odessa TOC/TxDOT Odessa TMC Communications Connection ▪ Media Liaison and Coordination ▪ TxDOT Web Page Customization and Enhancement	

Transit Vehicle Tracking (APTS1)	**High Priority**
This market package monitors current transit vehicle location using an automated vehicle location (AVL) System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ EZ Rider AVL and Security System ▪ Permian Basin Rural Transit AVL and MDTs	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Transit Fixed-Route Operations (APTS2)	**High Priority**
This market package performs vehicle routing and scheduling, as well as automatic driver assignment and system monitoring for fixed-route transit services. This service determines current schedule performance using AVL data and provides information displays for the Transit Management Subsystem. Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.	
Existing Infrastructure ▪ Central Dispatch Center ▪ Transit Website	**Agency** ▪ EZ Rider
Planned Projects None identified at this time	
Additional Needs ▪ EZ Rider AVL and Security System ▪ EZ Rider Bus Stop Annunciation ▪ EZ Rider Electronic Fare Collection ▪ EZ Rider Transit Information Kiosks at Transfer Stations ▪ EZ Rider/Midland TOC Communications Connection ▪ EZ Rider/Odessa TOC Communications Connection ▪ EZ Rider/TxDOT Odessa TMC Communications Connection	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Demand Response Transit Operations (APTS3)	**High Priority**
This market package performs vehicle routing and scheduling as well as automatic driver assignment and monitoring for demand responsive transit services. This package monitors the current status of the transit fleet and supports allocation of these fleet resources to service incoming requests for transit service while also considering traffic conditions. The Transit Management Subsystem provides the necessary data processing and information display to assist the transit operator in making optimal use of the transit fleet. This service includes the capability for a traveler request for personalized transit services to be made through the Information Service Provider (ISP) Subsystem.	
Existing Infrastructure ▪ Transit Website ▪ Central Dispatch Center	**Agency** ▪ EZ Rider ▪ Permian Basin Rural Transit
Planned Projects None identified at this time	
Additional Needs ▪ EZ Rider AVL and Security System ▪ EZ Rider Electronic Fare Collection ▪ EZ Rider Paratransit Web-based Scheduling and Travel Data ▪ EZ Rider Transit Information Kiosks at Transfer Stations ▪ EZ Rider/Midland TOC Communications Connection ▪ EZ Rider/Odessa TOC Communications Connection ▪ EZ Rider/TxDOT Odessa TMC Communications Connection ▪ Permian Basin Rural Transit AVL and MDTs ▪ Permian Basin Rural Transit Electronic Fare Collection ▪ Permian Basin Rural Transit Information Kiosks at Transfer Stations ▪ Permian Basin Rural Transit Vehicle Maintenance Tracking System ▪ Permian Basin Rural Transit Web-based Scheduling and Travel Data ▪ Permian Basin Rural Transit/EZ Rider Communications Connection ▪ Permian Basin Rural Transit/TxDOT Odessa TMC Communications Connection	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Transit Traveler Information (APTS8)	**High Priority**
This market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.	
Existing Infrastructure ▪ Transit Website	**Agency** ▪ EZ Rider ▪ Permian Basin RTD
Planned Projects None identified at this time	
Additional Needs ▪ EZ Rider Bus Stop Annunciation ▪ EZ Rider Paratransit Web-based Scheduling and Travel Data ▪ EZ Rider Transit Information Kiosks at Transfer Stations ▪ Permian Basin Rural Transit Information Kiosks at Transfer Stations ▪ Permian Basin Rural Transit Web-based Scheduling and Travel Data	

HAZMAT Management (CVO10)	**High Priority**
This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT materials and incidents. HAZMAT tracking is performed by the Fleet and Freight Management Subsystem. The Emergency Management Subsystem is notified by the Commercial Vehicle if an incident occurs and coordinates the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation.	
Existing Infrastructure ▪ Internet Based HAZMAT Tracking	**Agency** ▪ TxDOT
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 3 – High Priority Market Packages for the Permian Basin Region (continued)

Broadcast Traveler Information (ATIS1)	**High Priority**
This market package collects traffic conditions, advisories, general public transportation information, toll and parking information, incident information, air quality and weather information, and broadly disseminates this information through existing infrastructure and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). This market package differs from the Traffic Information Dissemination market package, which provides localized highway advisory radio (HAR) and DMS information capabilities. The information may be provided directly to travelers by an ISP or other traveler service providers so that they can better inform travelers of conditions. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles, or other sources.	
Existing Infrastructure ▪ Website ▪ TxDOT HCRS ▪ TxDOT Expressway Website	**Agency** ▪ City of Midland ▪ City of Odessa ▪ TxDOT
Planned Projects ▪ TxDOT HCRS Enhancements	
Additional Needs ▪ ISP-Based Route Guidance ▪ Media Liaison and Coordination ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Web Page Customization and Enhancement	

ITS Data Mart (AD1)	**High Priority**
This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides general query and report access to archive data users.	
Existing Infrastructure ▪ Accident Database ▪ GIS Mapping System ▪ Transit Ridership Database	**Agency** ▪ TxDOT ▪ City of Odessa ▪ City of Midland ▪ Permian Basin Regional Planning Commission ▪ EZ Rider ▪ Permian Basin Rural Transit District
Planned Projects None identified at this time	
Additional Needs None identified at this time	

2.3 Medium Priority Market Packages

Table 4 outlines market packages that were deemed medium priority by stakeholders in the Permian Basin Region. These market packages were identified as useful and desirable services and functions for the Region, although very few of these market packages have existing infrastructure in place or planned over the next few years. The feasibility of funding for these market packages was a factor in the prioritization. Availability and maturity of technology also was a consideration, particularly for the maintenance and construction management market packages. Many of these market packages were recently developed and added to the National ITS Architecture, and are not yet widely deployed.

Table 4 – Medium Priority Market Packages for the Permian Basin Region

Freeway Control (ATMS04)	**Medium Priority**
This market package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. This package is consistent with typical urban traffic freeway control systems. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option. This market package also includes the capability to utilize surveillance information for detection of incidents.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 4 – Medium Priority Market Packages for the Permian Basin Region (continued)

Standard Railroad Grade Crossing/ Advanced Railroad Grade Crossing/ Railroad Operations Coordination (ATMS13/ATMS14/ATMS15)	**Medium Priority**
This Standard Railroad Grade Crossing market package manages highway traffic at highway-rail intersections (HRIs) where rail operational speeds are less than 80 miles per hour. Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem. The Advanced Railroad Grade Crossing market package manages highway traffic at HRIs where operational requirements demand advanced features (e.g. where operational speeds are greater than 80 miles per hour). This market packages builds upon the services offered by Standard Railroad Grade Crossing with additional safety features to mitigate the risks associated with higher rail speeds. The Railroad Operations Coordination component provides an additional level of strategic coordination between rail operations and traffic management centers. Rail operations provide train schedules, maintenance schedules, and any other forecast events that will result in HRI closures. This information is used to develop forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information.	
Existing Infrastructure ▪ Railroad Signal Preemption	**Agency** ▪ TxDOT
Planned Projects None identified at this time	
Additional Needs ▪ City of Midland Advance Railroad Warning System ▪ City of Odessa Advance Railroad Warning System ▪ TxDOT Advance Railroad Warning System	

Table 4 – Medium Priority Market Packages for the Permian Basin Region (continued)

Emergency Vehicle Routing (EM02)	**Medium Priority**
This market package supports automated vehicle location and dynamic routing of emergency vehicles. The service also supports coordination with the Traffic Management Subsystem, collecting detailed road network conditions and requesting special priority or other specific emergency traffic control strategies on the selected route(s). The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.	
Existing Infrastructure ▪ Emergency Vehicle Traffic Signal Preemption ▪ Computer Aided Dispatch	**Agency** ▪ TxDOT ▪ City of Midland ▪ City of Odessa
Planned Projects None identified at this time	
Additional Needs ▪ 911 PSAP/TxDOT Odessa TMC Communications Connection ▪ City of Midland Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion ▪ City of Midland Fire AVL and MDT Upgrade ▪ City of Midland Police AVL and MDT Upgrade ▪ City of Odessa Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion ▪ City of Odessa Fire Department AVL and MDTs ▪ City of Odessa Police Department AVL and MDTs ▪ Ector County EOC/TxDOT Odessa TMC Communications Connection ▪ Midland County EOC/TxDOT Odessa TMC Communications Connection ▪ Municipal Emergency Management AVL and MDTs ▪ Municipal Emergency Vehicle Traffic Signal Preemption Implementation ▪ Municipal Emergency Vehicle Traffic Signal Preemptions Vehicle Equipment ▪ TxDOT Emergency Vehicle Traffic Signal Preemption Expansion	

Table 4 – Medium Priority Market Packages for the Permian Basin Region (continued)

Roadway Maintenance and Construction (MC07)	**Medium Priority**
This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal, routine maintenance activities, and repair and maintenance of both ITS and non-ITS equipment on the roadway. Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.	
Existing Infrastructure ▪ TxDOT HCRS	**Agency** ▪ TxDOT
Planned Projects ▪ TxDOT HCRS Enhancements	
Additional Needs ▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 1 ▪ TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 2 ▪ TxDOT RWIS Stations Phase 1 ▪ TxDOT RWIS Stations Phase 2 ▪ City of Midland Flood Detection ▪ City of Midland Flood Detection Expansion	

Work Zone Management (MC08)	**Medium Priority**
This market package directs activity in work zones, controlling traffic through portable DMS and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.	
Existing Infrastructure ▪ Portable DMS ▪ TxDOT HCRS	**Agency** ▪ TXDOT
Planned Projects ▪ TxDOT HCRS Enhancements	
Additional Needs ▪ City of Odessa TOC/TxDOT Odessa District TMC Communications Connection ▪ City of Midland TOC/TxDOT Odessa District TMC Communications Connection ▪ ISP-Based Route Guidance ▪ Media Liaison and Coordination ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Additional DMS Implementation ▪ TxDOT Additional Portable DMS ▪ TxDOT DMS on I-10 ▪ TxDOT DMS on I-20 ▪ TxDOT Web Page Customization and Enhancement	

Table 4 – Medium Priority Market Packages for the Permian Basin Region (continued)

Transit Passenger and Fare Management (APTS4)	**Medium Priority**
This market package manages passenger loading and fare payments on-board vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Sensors mounted on the vehicle permit the driver and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicle allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ EZ Rider Electronic Fare Collection ▪ Permian Basin Rural Transit Electronic Fare Collection	

Transit Security (APTS5)	**Medium Priority**
This market package provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g. stops, park and ride lots, stations) are also monitored. Information is communicated to the Transit Management Subsystem using wireless or wireline infrastructure. Security related information is also transmitted to the Emergency Management Subsystem when an emergency is identified that requires an external response. Incident information is communicated to the Information Service Provider.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ EZ Rider AVL and Security System ▪ EZ Rider/City of Midland Emergency Dispatch Communications Connection ▪ EZ Rider/City of Odessa Emergency Dispatch Communications Connection ▪ EZ Rider/DPS Communications Connection ▪ Permian Basin Rural Transit Video Surveillance	

Table 4 – Medium Priority Market Packages for the Permian Basin Region (continued)

Weigh-in-Motion (CVO06)	**Medium Priority**
This market package provides for high speed weigh-in-motion with or without Automated Vehicle Identification (AVI) capabilities. This market package provides the roadside equipment that could be used as a stand-alone system or to augment the Electronic Clearance (CVO03) market package.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ TxDOT Weigh-in-Motion for Pavement Management	

ITS Data Warehouse (AD2)	**Medium Priority**
This market package includes all of the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow the collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries. It performs the additional transformations and provides the additional data management features that are necessary so that all the data can be managed in a single repository. The potential for large volumes of carried data suggests additional on-line analysis and data mining features that are also included in this market package in addition to the basic query and reporting user access features offered by the ITS Data Mart.	
Existing Infrastructure None identified	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ Permian Basin Regional Planning Commission Data Warehouse	

2.4 Low Priority Market Packages

Ten of the market packages that were identified and customized for the Permian Basin Region were ranked as low priority by stakeholders. These market packages are listed in **Table 5**. The services contained in these lower priority market packages were deemed useful and desirable for the Region, but stakeholders did not feel that public agencies should put a strong focus on these market packages in the near-term. These market packages were included as part of the Regional ITS Architecture so as not to preclude them from future deployment in the Region.

Some of these market packages were identified as candidates for private sector deployment and operations, such as ISP-Based Route Guidance. Others, such as Maintenance and Construction Vehicle Tracking, are just more feasible for future implementation.

Table 5 – Low Priority Market Packages for the Permian Basin Region

Market Package Name	Description	Comments
Probe Surveillance (ATMS02)	This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: 1) wide-area wireless communications between the vehicle and Information Service Provider is used to communicate current vehicle location and status and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem. It requires either wide area or short-range communications equipment, roadside beacons and wireline communications for the short-range communications option, data reduction software, and utilizes wireline links between the Traffic Management Subsystem and Information Service Provider Subsystem to share the collected information. Both “Opt out” and “Opt in” strategies are available to ensure that the user has the ability to turn off the probe functions to ensure individual privacy.	This may be appropriate for future implementation in the Region, but at this time is not something that the Region is interested in.
Maintenance and Construction Vehicle Tracking (MC01)	This market package will track the location of maintenance vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.	Projects have been included for this market package in the long term. There are likely institutional issues that will need to be worked out before this market package can be implemented.

Table 5 – Low Priority Market Packages for the Permian Basin Region (continued)

Market Package Name	Description	Comments
Maintenance and Construction Vehicle Maintenance (MC02)	This market package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment. It includes on-board sensors capable of automatically performing diagnostics for maintenance and construction vehicles, and the systems that collect this diagnostic information and use it to schedule and manage vehicle maintenance.	A project has been included for this market package in the long term. It is likely that this market package will be implemented at some point in the future as the existing fleet is replaced with vehicles that have the capability to provide the diagnostic information.
Roadway Automated Treatment (MC05)	This market package automatically treats a roadway section based on environmental or atmospheric conditions. Treatments include fog dispersion, anti-icing chemicals, etc. The market package includes the environmental sensors that detect adverse conditions, the automated treatment system itself, and driver information systems (e.g., dynamic message signs) that warn drivers when the treatment system is activated.	A project has been included in the long term for anti-icing technologies. At this time this is not a high priority market package for this Region, but as the technology evolves the Region is interested in deployment.
Winter Maintenance (MC06)	This market package supports winter road maintenance including snow plow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities. This package monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.	A project has been included in the long term for anti-icing technologies. At this time this is not a high priority market package for this Region, but as the technology evolves the Region is interested in deployment.
Work Zone Safety Monitoring (MC09)	This market package includes systems and strategies to improve work crew safety and reduce collisions between the motoring public and maintenance vehicles and activities. Included in this market package is detection for vehicle intrusions to the work zone and warning systems to alert workers and drivers of potential safety hazards. This market package support both stationary and mobile work zones.	A project has been included in the long term for work zone safety monitoring. At this time this is not a high priority market package for this Region, but as the technology evolves the Region is interested in deployment.

Table 5 – Low Priority Market Packages for the Permian Basin Region (continued)

Market Package Name	Description	Comments
Transit Maintenance (APTS6)	This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance.	Projects have been included for this market package in the long term. It is likely that this market package will be implemented at some point in the future as the existing fleet is replaced with vehicles that have the capability to provide the diagnostic information.
Multi-modal Coordination (APTS7)	This market package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multimodal coordination between transit agencies can increase traveler convenience at transfer points and also improve operating efficiency. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network. More limited local coordination between the transit vehicle and the individual intersection for signal priority is also supported by this package.	The Permian Basin Region might want to consider this market package as a future deployment.
Electronic Clearance (CVO03)	This market package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration subsystem to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using transponders and dedicated short range communications to the roadside. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, transponder read/write devices and computer workstations.	The Permian Basin Region might want to consider this market package as a future deployment.

Table 5 – Low Priority Market Packages for the Permian Basin Region (continued)

Market Package Name	Description	Comments
ISP-Based Route Guidance (ATIS5)	This market package offers the user pre-trip route planning and turn-by-turn route guidance services, which are generated by an ISP. Routes may be based on static information or reflect real time network conditions. This approach simplifies the user equipment requirements and can provide the infrastructure better information on which to predict future traffic. The package includes two way data communications and optionally also equips the vehicle with the databases, location determination capability, and display technology to support turn by turn route guidance.	This market package is best suited for deployment and ongoing operations by a private sector ISP. Fee-based subscription services are typically required for delivery of this service. Because this market package is deemed a private sector initiative, it is not recommended that the public sector play a significant role, other than as a data provider to private ISPs.

3. PRIORITIZATION OF PROJECTS

In order to achieve the vision of the Regional ITS Architecture, a Region must deploy carefully developed projects that provide the functionality and interoperability identified in the architecture. A key step toward that vision is the development of an ITS Deployment Plan that identifies specific projects, timeframes, and responsible agencies.

Input from all stakeholders is required in order for the stakeholders to have ownership of the ITS Deployment Plan and also to be sure that the plan has realistically identified projects and timeframes for the Region. Cost is another important factor. Cost can vary a great deal for many ITS elements, depending on the level of deployment, maturity of the technology, type of communications, etc. For example, freeway network surveillance could be adequately achieved for one Region by the deployment of still frame closed-circuit television (CCTV) cameras only at freeway interchanges. In another Region, there may be a desire for full motion cameras deployed at one mile intervals to provide complete coverage of the freeway. The infrastructure and telecommunications costs for these two projects would vary a great deal, yet either one could be suitable for a particular Region.

In order to achieve input from stakeholders, a workshop was held in the Permian Basin Region on July 8, 2004 to present the draft Regional ITS Deployment Plan and discuss potential projects. Each project recommended for the Regional ITS Deployment Plan was discussed, and consensus was reached by the stakeholders on the project description and the timeframe for implementation.

In the following sections, projects are categorized into short-term projects (5-year deployment timeframe), mid-term projects (10-year deployment timeframe), and long-term projects (20-year deployment timeframe). For each timeframe, a summary table has been included that provides a brief project description, responsible agency, probable cost, an indication as to whether funding has been identified, and an estimated duration for the project to be designed and implemented. The agency identified as the responsible agency will be responsible for implementation, operations, and maintenance unless otherwise noted.

Following each table, a more detailed description of individual projects is included. This section also lists the market packages associated with each project and any pre-requisite projects that are required.

3.1 Short-Term Projects (5-Year)

Table 6 provides a description of projects for the Permian Basin Region in the 5-year timeframe. These projects represent the highest priority for the Region and should be strongly considered for implementation in the short-term. Immediately following **Table 6** are project descriptions for each of the short-term recommendations.

3.2 Mid-Term Projects (10-Year)

Table 7 provides a description of projects in the 10-year timeframe. Several of these projects are continuations of projects that will begin in the 5-year timeframe. These projects are important to the Region, but will need further review at the time of their deployment to ensure they are still a priority for the Region. Immediately following **Table 7** are project descriptions for each of the mid-term recommendations.

3.3 Long-Term Projects (20-Year)

Table 8 provides a description of projects in the 20-year timeframe. While these projects represent market packages and anticipated future needs identified for the Region, they will need to be closely reviewed prior to implementation. It is expected that a major update to the Region's ITS Deployment Plan will occur prior to year 10 which would allow stakeholders to reassess these long-term projects to be sure that they are still feasible for the Region. Immediately following **Table 8** are project descriptions for each of the long-term recommendations.

Table 6 – Short-Term Projects (5-Year)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT Odessa TMC	Establish a traffic management center (TMC) for the TxDOT Odessa District. Project includes the implementation of end equipment to allow video feed and control for video image vehicle detection systems (VIVDS) and closed-circuit television (CCTV) camera pan/tilt/zoom (PTZ).	TxDOT	To Be Determined	No	2 years
TxDOT ATMS Implementation	Implement the TxDOT Advanced Traffic Management System (ATMS) in the TxDOT Odessa TMC	TxDOT	N/A	N/A	2 years
TxDOT Center-to-Center Communications (Statewide)	Enhance coordination with other TxDOT Districts through implementation of center-to-center communications between TxDOT TMCs. The software to facilitate this connection is included in the ATMS Implementation. Some hardware may be required at the District level.	TxDOT	N/A	N/A	1 year
TxDOT DMS on I-20	Implement dynamic message signs (DMS) along I-20 for traffic information dissemination. Potential locations include a site on I-20 westbound leaving Odessa, approaching Pecos.	TxDOT	$100,000/sign	No	2 years
TxDOT DMS on I-10	Implement DMS along I-10 for traffic information dissemination	TxDOT	$100,000/sign	No	2 years
TxDOT CCTV Camera Deployment Phase 1	Implement eight to ten CCTV cameras along interstates and loop highways in the Region for traffic monitoring and incident detection	TxDOT	$20,000-$25,000/site	No	2 years
Detour Planning	Develop detour plans for major thoroughfares in the Permian Basin Region to prepare for a potential detour due to an incident or construction	TxDOT/City of Midland/City of Odessa	To Be Determined	No	1 year
TxDOT Rest Area Kiosks	Install kiosks at seven rest areas to provide roadway information to motorists	TxDOT	To Be Determined	No	1 Year
TxDOT Closed Loop Signal System Implementation Phase 1	Expand the TxDOT closed loop signal system at signalized intersections throughout the Region. Also includes the implementation of VIVDS.	TxDOT	Annual budget approximately $1M	Yes	5 years

Table 6 – Short-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management (continued)					
City of Midland TOC	Establish a Traffic Operations Center (TOC) for the City of Midland. Project includes the implementation of end equipment to allow video feed as well as control for VIVDS and CCTV camera PTZ.	City of Midland	To Be Determined	No	2 years
City of Midland Signal System Upgrades Phase 1	Upgrade traffic signal controllers in the City of Midland to NEMA TS-2 controllers to allow implementation of an Ethernet based signal system. May also include the implementation of VIVDS.	City of Midland	$15,000/ intersection	Pending Approval	5 years
City of Midland Closed Loop Signal System Expansion Phase 1	Continue to develop the City of Midland closed loop signal system at signalized intersections in the City of Midland. Also includes the implementation of VIVDS.	City of Midland	$100,000/year	Pending Approval	3 years
City of Odessa TOC	Establish a TOC for the City of Odessa. Project includes the implementation of end equipment to allow video feed as well as control for VIVDS and CCTV camera PTZ	City of Odessa	To Be Determined	No	2 years
City of Odessa Signal System Upgrades Phase 1	Upgrade traffic signal controllers in the City of Odessa to NEMA TS-2 controllers. May also include the implementation of VIVDS.	City of Odessa	$15,000/ intersection	No	5 years
City of Odessa Closed Loop Signal System Expansion Phase 1	Continue to develop the City of Odessa closed loop signal system at signalized intersections in the City of Odessa. Also includes the implementation of VIVDS.	City of Odessa	To Be Determined	No	2 years
Emergency Management					
TxDOT Emergency Vehicle Traffic Signal Preemption Expansion	Implement additional emergency vehicle signal preemption equipment at TxDOT signals in the Odessa District	TxDOT/Municipality	$5,000/ intersection	No	1 year
Municipal Emergency Vehicle Signal Preemption Vehicle Equipment	Install emergency vehicle signal preemption equipment in municipal emergency vehicles	Municipality	$1,000/vehicle	No	1 year

Table 6 – Short-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Emergency Management (continued)					
City of Midland Police AVL and MDT Upgrade	Implement Automated Vehicle Location (AVL) on 80-90 City of Midland Police vehicles for real-time location information. This project also includes mobile data terminal (MDT) upgrades.	City of Midland	$10,000/vehicle	No	1 year
City of Midland Fire AVL and MDT Upgrade	Implement AVL on City of Midland Fire vehicles for real-time location information. This project also includes MDT upgrades.	City of Midland	$10,000/vehicle	No	1 year
City of Midland Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion	Implement emergency vehicle signal preemption at additional intersections in the City of Midland and upgrade to a system that supports the use of discriminators	City of Midland	$5,000/ intersection $1,000/vehicle	No	1 year
City of Odessa Fire Department AVL and MDTs	Implement AVL and MDTs on City of Odessa Fire Department vehicles for real time vehicle location information and improved communication	City of Odessa	$10,000/vehicle	No	1 year
City of Odessa Police Department AVL and MDTs	Implement AVL and MDTs on City of Odessa Police Department vehicles for real time vehicle location information and improved communication	City of Odessa	$10,000/vehicle	No	1 year
City of Odessa Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion	Implement emergency vehicle signal preemption at additional intersections in the City of Odessa and upgrade to a system that supports the use of discriminators	City of Odessa	$5,000/ intersection $1,000/vehicle	No	1 year
Maintenance and Construction Management					
TxDOT RWIS Stations Phase 1	Install six to eight road weather information system (RWIS) stations to collect road weather information in the Odessa District	TxDOT	$25,000/station	No	1 year
TxDOT High Wind/Low Visibility Detection	Implement high wind/low visibility detection equipment on I-10, I-20, and SH 17 at select locations to detect dust storms so that road condition information can be disseminated to the traveling public	TxDOT	To Be Determined	No	2 years

Table 6 – Short-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Maintenance and Construction Management (continued)					
TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 1	Implement flood detection stations at flood prone locations on roadways in the Odessa District. This project also includes low water crossing warning beacons to alert motorists when a roadway is flooded	TxDOT	To Be Determined	No	2 years
TxDOT HCRS Enhancements	Implement enhancements to the Highway Conditions Reporting System (HCRS)	TxDOT	N/A	Yes (statewide initiative)	1 year
City of Midland Flood Detection	Implement flood detection stations at two flood prone locations on roadways in the City of Midland	City of Midland	To Be Determined	No	1 year
Public Transportation Management					
EZ Rider AVL and Security System	Install AVL, on-board video cameras, and distress buttons on 19 EZ Rider vehicles to provide location information and increased security and safety	EZ Rider	$5,000/veh	No	6 months
EZ Rider Electronic Fare Collection	Implement smart card electronic fare collection for EZ Rider	EZ Rider	To Be Determined	No	6 months
EZ Rider Paratransit Web-based Scheduling and Travel Data	Implement a scheduling system to provide web-based ride scheduling and real time travel data via the internet	EZ Rider	To Be Determined	No	1 year
Permian Basin Rural Transit AVL and MDTs	Install AVL and MDTs on Permian Basin vehicles to provide location information and enable communications	Permian Basin RTD	$10,000/veh	No	6 months
Permian Basin Rural Transit Web-based Scheduling and Travel Data	Implement a scheduling system to provide web-based ride scheduling and real time travel data via the internet	Permian Basin RTD	To Be Determined	No	1 year
Permian Basin Rural Transit/EZ Rider Communications Connection	Install a connection between Permian Basin Rural Transit and EZ Rider to coordinate passenger transfers	Permian Basin RTD/ EZ Rider	To Be Determined	No	1 year

Table 6 – Short-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
EZ Rider/City of Midland Emergency Dispatch Communications Connection	Implement a connection between EZ Rider and the City of Midland Emergency Dispatch for coordination and communication during an incident	EZ Rider/City of Midland	To Be Determined	No	1 year
EZ Rider/City of Odessa Emergency Dispatch Communications Connection	Implement a connection between EZ Rider and the City of Odessa Emergency Dispatch for coordination and communication during an incident	EZ Rider/City of Odessa	To Be Determined	No	1 year

*Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

**The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

Permian Basin Region
Short-Term Projects (5-Year)

Travel and Traffic Management

TxDOT Odessa TMC

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project includes the establishment of the TxDOT Odessa District TMC. The planned TMC would include the implementation of end equipment to allow transmission of the video feed from the VIVDS in the field back to the TMC. This project would also include the capabilities to control the VIVDS remotely from the TMC as well as those needed to control the pan/tilt/zoom of the planned CCTV cameras.

TxDOT ATMS Implementation

Associated Market Packages:

- Network Surveillance (ATMS01)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Road Weather Data Collection (MC03)
- Weather Information Processing and Distribution (MC04)

Prerequisite Projects: None

Description: This project involves the implementation of ATMS software to facilitate control of DMS, future CCTV cameras and other TxDOT field equipment.

The TxDOT ATMS was developed by the TxDOT Traffic Operations Division. The function of this software is to provide a platform for the integration of various subsystems. The high level functions of the TxDOT ATMS include:

- Collect traffic information (e.g., speed, incidents, lane closures) through a variety of collection methods such as loops, video image detection, etc.;
- Data archiving;
- Graphical map with traffic information;
- Status information, command and control for DMS, ramp metering and CCTV;

- Video switching; and
- User ID/password provided with each transaction for tracking use and establishing device control authority.

Future development efforts include software modules to provide status information and command/control of HAR and environmental sensors (such as RWIS or flood detection systems). An integrated maintenance database management module is also under development. Lastly, several modules are currently being upgraded to support recently approved National Transportation Communications for ITS Protocol standards for CCTV, Center-to-Center Communications, and data collection devices.

The ATMS implementation will include the software and hardware necessary to have an operational central system to routinely poll devices and support archiving of data.

TxDOT Center-to-Center Communications (Statewide)

Associated Market Packages:

- Regional Traffic Control and Coordination (ATMS07)
- Incident Management System (ATMS08)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: TxDOT ATMS Implementation

Description: The Center-to-Center Communications project will enhance coordination with TxDOT Districts (and potentially other agencies) through connection to the statewide center-to-center core infrastructure. A communication backbone must be developed with sufficient capacity between the TxDOT District Offices and existing center-to-center infrastructure. Determination of whether the backbone should be TxDOT owned, leased, or a combination thereof will be determined at a later date. The software required to support center-to-center communications is integrated with the TxDOT developed ATMS, so significant software development efforts are not anticipated. Resources will be required to oversee installation of the communications backbone between the TxDOT District Offices and statewide center-to-center facilities. As part of connecting to the statewide center-to-center infrastructure, the Permian Basin Region will provide data to the statewide web server and statewide data archiving database. In return, access to information from other TxDOT Districts (and potentially other agencies) will be available to enhance operations throughout the Region.

TxDOT DMS on I-20

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project consists of the deployment of permanent DMS along I-20 for purposes of traffic information dissemination and incident management in the Permian Basin Region. Potential locations include a site on westbound I-20 between Odessa and Pecos.

The estimated cost per sign is approximately $100,000.

TxDOT DMS on I-10

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project consists of the deployment of permanent DMS along I-10 for purposes of traffic information dissemination and incident management in the Permian Basin Region.

The estimated cost per sign is approximately $100,000.

TxDOT CCTV Camera Deployment Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Incident Management (ATMS08)

Prerequisite Projects: None

Description: This project includes the deployment of eight to ten CCTV cameras along key segments of interstates and loop highways in the Permian Basin Region. This also includes associated communications, modems, and other support infrastructure. The CCTV cameras can be used for incident detection and verification, to monitor congestion, and to aid in the dispatch of emergency vehicles. The information gathered by CCTV cameras (video feed) can be shared with area emergency management agencies.

The estimated cost of this project is $20,000-$25,000 per site.

Detour Planning

Associated Market Packages:

- Surface Street Control (ATMS03)
- Incident Management (ATMS08)

Prerequisite Projects: None

Description: This project will identify detour routes for the interstate, state, and local arterials to be used during times of major incidents on the respective roadways. Once an incident has been detected and verified, the TxDOT Odessa TMC can post a message to a DMS or portable DMS along the subject roadway providing information not only on the incident (expected duration and delay) but also potential alternate routes. Additionally, if the detour routes are designated, the owning agency can provide alternate signal timing plans that will facilitate movement of detoured traffic along the detour route.

TxDOT Rest Areas Kiosks

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)

Prerequisite Projects: None

Description: Implement kiosks at seven rest areas to provide motorists with roadway information including incident and/or delay notification, construction information, and weather conditions.

TxDOT Closed Loop Signal System Implementation Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Expand the TxDOT closed loop signal system. This project also includes the implementation of VIVDS.

The annual budget for this project is approximately $ 1,000,000.

City of Midland TOC

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project includes the establishment of a City of Midland TOC. The project includes the implementation of end equipment to allow video feed and well as control of VIVDS and pan/tilt/zoom CCTV.

City of Midland Signal System Upgrades Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Upgrade existing traffic signal controllers in the City of Midland to NEMA TS-2 controllers to support implementation of an Ethernet based signal system. This project may also include the implementation of VIVDS at intersections where they have not previously been installed.

The estimated cost is $15,000 per intersection.

City of Midland Closed Loop Signal System Expansion Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Continue to develop the closed loop signal system in the City of Midland. This project also includes the implementation of VIVDS.

The estimated cost is $100,000 per year.

City of Odessa TOC

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project includes the establishment of a City of Odessa TOC. The project includes the implementation of end equipment to allow video feed and well as control of VIVDS and pan/tilt/zoom CCTV.

City of Odessa Signal System Upgrades Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Upgrade existing traffic signal controllers in the City of Odessa to NEMA TS-2 controllers. This project may also include the implementation of VIVDS at intersections where they have not previously been installed.

The estimated cost is $15,000 per intersection.

City of Odessa Closed Loop Signal System Expansion Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: None

Description: Continue to develop the closed loop signal system in the City of Odessa. This project also includes the implementation of VIVDS.

Emergency Management

TxDOT Emergency Vehicle Traffic Signal Preemption Expansion

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: This project implements additional preemption equipment at select traffic signals in the Odessa District. This project includes required controller modifications, sensors, and transmitters. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have been shown to improve safety of emergency personnel and vehicles en-route to an incident. Permian Basin stakeholders agreed that fire and ambulance would be the only vehicles authorized for preemption. TxDOT will have responsibility for implementing and maintaining preemption sensors on traffic signals, and fire and emergency services will be responsible for installing the on-board units.

The estimated cost is $5,000 per intersection.

Municipal Emergency Vehicle Traffic Signal Preemption Vehicle Equipment

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: The project includes the installation of preemption equipment in municipal emergency services vehicles. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have been shown to improve safety of emergency personnel and vehicles en-route to an incident.

The estimated cost is $1,000 per vehicle.

City of Midland Police AVL and MDT Upgrade

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL and upgrade MDT units to a Windows based laptop platform on 80-90 City of Midland Police vehicles. The AVL system will convey information regarding real-time vehicle location to dispatch which will allow for enhanced system monitoring and routing (or re-routing) of emergency vehicles. MDTs allow operators to send and receive digital messages. MDTs can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions).

The estimated cost is $10,000 per vehicle.

City of Midland Fire AVL and MDT Upgrade

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL units on City of Midland Fire vehicles and upgrade MDTs to a Windows based laptop platform. The AVL system will convey information regarding real-time vehicle location to dispatch which will allow enhanced system monitoring and routing (or re-routing) of emergency vehicles. Mobile data terminals allow operators to send and receive digital messages. Mobile data terminals can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions).

The estimated cost is $10,000 per vehicle.

City of Midland Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: This project implements additional preemption equipment at select traffic signals in the City of Midland and upgrades existing locations as necessary to support the use of discriminators. This project includes required controller modifications, sensors, and transmitters for new installation locations. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have been shown to improve safety of emergency personnel and vehicles en-route to an incident.

The estimated cost is $5,000 per intersection and $1,000 per vehicle.

City of Odessa Fire Department AVL and MDTs

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL and MDT units on City of Odessa Fire Department vehicles. The AVL system will convey information regarding real-time vehicle location to dispatch which will allow for enhanced system monitoring and routing (or re-routing) of emergency vehicles. Mobile data terminals allow operators to send and receive digital messages. Mobile data terminals can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions).

The estimated cost is $10,000 per vehicle.

City of Odessa Police Department AVL and MDTs

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL and MDT units on City of Odessa Police department vehicles. The AVL system will convey information regarding real-time vehicle location to dispatch which will allow for enhanced system monitoring and routing (or re-routing) of emergency vehicles. Mobile data terminals allow operators to send and receive digital messages. Mobile data terminals can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions).

The estimated cost is $10,000 per vehicle.

City of Odessa Emergency Vehicle Traffic Signal Preemption Upgrade and Expansion

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: This project implements additional preemption equipment at select traffic signals in the City of Odessa and upgrades existing locations as necessary to support the use of discriminators. This project includes required controller modifications, sensors, and transmitters for new installation locations. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have been shown to improve safety of emergency personnel and vehicles en-route to an incident.

The estimated cost is $5,000 per intersection and $1,000 per vehicle.

Maintenance and Construction Management

TxDOT RWIS Stations Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: None

Description: Install RWIS stations in the Permian Basin Region. The RWIS will be remotely monitored by the TxDOT Odessa District. Real time weather information improves response time, increases winter maintenance efficiency, and minimizes the traveling public's exposure to hazardous weather related roadway conditions. Archived RWIS information also provides valuable historic information for planning purposes. Data including temperature (atmospheric and pavement), precipitation, wind, humidity, visibility (white out/heavy fog) and even pavement surface conditions (i.e., snow, ice, and chemical percentage) are collected by sensors placed at the roadside (typically on a 30 foot tower) and embedded in the roadway. Remote processing units placed along the roadway communicate with various types of road and weather sensors. Data from the units are transmitted to the central ATMS server, via dial-up modem or other low bandwidth telecommunications methods, which will be located at the TxDOT Odessa District Traffic Office. A future module for the ATMS software will support environmental sensor data and provides collection, archiving, and distribution of the data.

The estimated cost for one site is $25,000. The District is interested in installing six to eight sites.

TxDOT High Wind/Low Visibility Detection

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)

Prerequisite Projects: None

Description: Install high wind/low visibility detection equipment on I-10, I-20, and SH 17. The Permian Basin Region is particularly vulnerable to high wind/low visibility conditions from late winter through late spring. During this portion of the year many agricultural fields are unvegetated and erosion is caused by strong winds. The dust obstructs visibility on area roadways and creates dangerous driving conditions. The equipment installed as part of this project would detect these dust storms and notify the TMC so that road condition information could be disseminated to the traveling public via DMS in the area and through information given to the media.

TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 1

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Weather Information Processing and Distribution (MC04)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: None

Description: Implement flood detection systems at locations prone to flooding in the Odessa District. This will enable faster response times by maintenance crews to close flooded or near flooded roadway segments as necessary. The typical flood detection station is composed of a stream gauge, a rain gauge, a temperature sensor, a wind speed sensor, a wind direction sensor, as well as remote communications support. Other upgrades that may support operational decision making include sensors to measure relative humidity, soil moisture content, solar radiation, and air and water quality. The flood detection systems will be monitored from the TxDOT Odessa District Office. Communications between the flood detection stations and the District Office can be achieved through a variety of wireless and wireline telemetry methods. There is a future module of the ATMS software planned to support environmental sensors, and development of this module could be extended to include the needs of flood detection stations.

This project will also implement low water crossing flashing beacon warning signs in conjunction with the flood detection stations. The beacons would flash when flood conditions were detected and water was obstructing the roadway to warn motorists.

TxDOT HCRS Enhancements

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Weather Information Processing and Distribution (MC04)
- Roadway Maintenance and Construction (MC07)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)
- Broadcast Traveler Information (ATIS1)

Prerequisite Projects: None

Description: TxDOT's HCRS will be enhanced on a statewide basis. The HCRS will use data from the Odessa District Office, both automated (ATMS) and manually entered. It is envisioned that the ATMS software will enhance the data collection and consolidation processes for automated information. This is a statewide effort; the Odessa District will be affected by this project, and will contribute information to the HCRS, but will not be responsible for funding the enhancements or for the implementation schedule.

City of Midland Flood Detection

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: None

Description: Implement flood detection systems at two locations prone to flooding in the City of Midland. This will enable faster response times by maintenance crews to close flooded or near flooded roadway segments as necessary. The typical flood detection station is composed of a stream gauge, a rain gauge, a temperature sensor, a wind speed sensor, and a wind direction sensor as well as remote communications support. Other upgrades that may support operational decision making include sensors to measure relative humidity, soil moisture content, solar radiation, and air and water quality.

Public Transportation Management

EZ Rider AVL and Security System

Associated Market Packages:

- Transit Vehicle Tracking (APTS1)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Transit Security (APTS5)

Prerequisite Projects: None

Description: Install AVL, on-board video cameras, and distress buttons on 19 EZ Rider vehicles. The AVL system will convey information regarding real-time vehicle location to the Transit Operations Center, which will allow for enhanced system monitoring, scheduling, routing (or re-routing), as well as provide for precise bus location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of transit vehicles, and relay that information back to a transit operations center. Used with a geographic information system map, bus locations can be displayed for any vehicles in the fleet equipped with the on-board AVL unit. AVL, in conjunction with computer-aided dispatch (CAD), allows for improved bus tracking capability, as well as archiving and managing historical data. AVL systems also can be equipped with additional features, including tie-ins to alarm/security systems, vehicle component monitoring, and automated passenger counter and fare payment systems. Information from the AVL/CAD system can be used by transit managers for real-time operations and management as well as for transit traveler information. In areas where AVL technology has been installed on buses, agencies report a 5-25 percent increase in on-time performance, which translates directly to improved efficiency and operations.

Cameras will be for on-board recording only, and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time via video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. This project will also install distress buttons on the

buses. If the driver feels there is a threat on the bus, the bus has been involved in an accident, or any other situation occurs where the driver may need assistance, he or she can activate the alarm. The alarm notifies the dispatch center of the potential problem so that help can be dispatched.

The estimated cost is $5,000 per vehicle.

EZ Rider Electronic Fare Collection

Associated Market Packages

- Transit Fixed-Route Operations (APTS2)
- Demand Response Transit Operations (APTS3)
- Transit Passenger and Fare Management (APTS4)

Prerequisite Projects: None

Description: Implement electronic fare collection for EZ Rider. There are several benefits of these collection systems. They include: enhanced revenue collection ability, increased security by not having large amounts of cash or tokens on the vehicle, and increased convenience and security for the transit patron. These systems are often implemented in conjunction with AVL or mobile data terminals, or are implemented as an add-on to those systems. To enable automated fare collection, fare boxes would need to be upgraded to accept smart cards (i.e., cards with passive radio frequency identification [RFID] technology or a magnetic information strip) with rider and account information. Electronic fare payment and passenger information technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

EZ Rider Paratransit Web-based Scheduling and Travel Data

Associated Market Packages:

- Demand Response Transit Operations (APTS3)
- Transit Traveler Information (APTS8)

Prerequisite Projects: None

Description: This project will include implementing an internet based paratransit trip reservation system on the EZ Rider website. Users of the system will be able to enter their origination and destination addresses and the system will schedule a paratransit vehicle to accommodate the requested trip.

Permian Basin Rural Transit AVL and MDTs

Associated Market Packages:

- Transit Vehicle Tracking (APTS1)
- Demand-Response Transit Operations (APTS3)

Prerequisite Projects: None

Description: Install AVL and MDT units on Permian Basin Rural Transit vehicles. The AVL system will convey information regarding real-time vehicle location to the Transit Operations Center which will allow for enhanced system monitoring, scheduling, routing (or re-routing), as well as provide for precise bus location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of transit vehicles, and relay that information back to a transit operations center. Used with a geographic information system map, bus locations can be displayed for any vehicles in the fleet equipped with the on-board AVL unit. AVL, in conjunction with CAD, allows for improved bus tracking capability, as well as archiving and managing historical data. AVL systems also can be equipped with additional features, including tie-ins to alarm/security systems, vehicle component monitoring, and automated passenger counter and fare payment systems. Information from the AVL/CAD system can be used by transit managers for real-time operations and management as well as for transit traveler information. In areas where AVL technology has been installed on buses, agencies report a 5-25 percent increase in on-time performance, which translates directly to improved efficiency and operations.

MDTs allow bus operators to send and receive digital messages. MDTs can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. MDTs can also transmit information from the driver to the dispatch center, including status, disruptions, or silent alarms. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions).

The estimated cost is $10,000 per vehicle.

Permian Basin Rural Transit Web-based Scheduling and Travel Data

Associated Market Packages:

- Demand Response Transit Operations (APTS3)
- Transit Traveler Information (APTS8)

Prerequisite Projects: None

Description: This project will include implementing an internet based trip reservation system on the Permian Basin Rural Transit website. Users of the system will be able to enter their origination and destination addresses and the system will schedule a vehicle to accommodate the requested trip.

Permian Basin Rural Transit/EZ Rider Communications Connection

Associated Market Packages:

- Demand-Response Transit Operations (APTS3)
- Multi-Modal Coordination (APTS7)

Prerequisite Projects: None

Description: Implement a communications link between the Permian Basin Rural Transit and EZ Rider Dispatch Centers to provide the transit agencies with the ability to share schedules and real time information.

EZ Rider/City of Midland Emergency Dispatch Communications Connection

Associated Market Packages:

- Incident Management System (ATMS08)
- Transit Security (APTS5)

Prerequisite Projects: None

Description: Implement a communications link between EZ Rider Transit Dispatch and the City of Midland Emergency Dispatch for coordination and communication during an incident.

EZ Rider/City of Odessa Emergency Dispatch Communications Connection

Associated Market Packages:

- Incident Management System (ATMS08)
- Transit Security (APTS5)

Prerequisite Projects: None

Description: Implement a communications link between EZ Rider Transit Dispatch and the City of Odessa Emergency Dispatch for coordination and communication during an incident.

Table 7 – Mid-Term Projects (10-Year)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT Additional DMS Implementation	Implement additional DMS in the Region for traffic information dissemination	TxDOT	$100,000/sign	No	2 years
TxDOT CCTV Camera Deployment Phase 2	Implement eight to ten additional CCTV cameras at select locations along state routes in the Region for traffic monitoring and incident detection	TxDOT	$20,000-$25,000/site	No	2 years
TxDOT Web Page Customization and Enhancement	Customize and enhance the Odessa District webpage on the TxDOT Expressway website to provide traffic information that will include information on current roadway conditions	TxDOT	$100,000	No	1 year
TxDOT Closed Loop Signal System Implementation Phase 2	Expand TxDOT closed loop signal system at signalized intersections throughout the Region. Also includes the implementation of VIVDS.	TxDOT	To Be Determined	No	5 years
Regional Telecommunications Master Plan	Develop a regional telecommunications master plan for the Permian Basin Region to support ITS deployment	TxDOT/City of Midland/ City of Odessa/Permian Basin Regional Planning Commission	$100,000	No	6 months
City of Midland CCTV Camera Deployment	Implement CCTV cameras at select locations in the City of Midland for traffic monitoring and incident detection	City of Midland	$20,000-$25,000/site	No	1 year
City of Midland TOC/TxDOT Odessa TMC Communications Connection	Implement a connection between the City of Midland TOC and the TxDOT Odessa TMC to allow video sharing, traffic data sharing, and other joint functions.	City of Midland/TxDOT	To Be Determined	No	1 year
City of Midland Signal System Upgrades Phase 2	Upgrade traffic signal controllers in the City of Midland to NEMA TS-2 controllers to allow implementation of an Ethernet based signal system. May also include the implementation of VIVDS.	City of Midland	$15,000/ intersection	No	5 years
City of Midland Closed Loop Signal System Expansion Phase 2	Expand the City of Midland closed loop signal system at additional signalized intersections throughout the City. Also includes the implementation of VIVDS.	City of Midland	To Be Determined	No	2 years
City of Odessa CCTV Camera Deployment	Implement CCTV cameras at select locations in the City of Odessa for traffic monitoring and incident detection	City of Odessa	$20,000-$25,000/site	No	1 year

Table 7 – Mid-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management (continued)					
City of Odessa TOC/TxDOT Odessa TMC Communications Connection	Implement a connection between the City of Odessa TOC and the TxDOT Odessa TMC to allow video sharing, traffic data sharing, and other joint functions	City of Odessa/TxDOT	To Be Determined	No	1 year
City of Odessa Signal System Upgrades Phase 2	Upgrade traffic signal controllers in the City of Odessa to NEMA TS-2 controllers. May also include the implementation of VIVDS.	City of Odessa	$15,000/ intersection	No	5 years
City of Odessa Closed Loop Signal System Expansion Phase 2	Continue to expand the City of Odessa closed loop signal system at additional signalized intersections throughout the City. Also includes the implementation of VIVDS	City of Odessa	To Be Determined	No	2 years
Regional 511 Advanced Traveler Information System Server	Implement an advanced traveler information system (ATIS) server in the TxDOT Odessa TMC that will collect, consolidate, and distribute traveler information to a 511 phone system, web, and private Information Service Providers (ISPs)	TxDOT	To Be Determined	No	1 year
Media Liaison and Coordination	Develop agreements/enhanced coordination with local media to improve information sharing and dissemination. Provide CCTV camera feeds to media.	TxDOT/City of Midland/ City of Odessa	N/A	N/A	6 months
Emergency Management					
Midland County EOC/TxDOT Odessa TMC Communications Connection	Establish a connection between the Midland County Emergency Operations Center (EOC) and the TxDOT Odessa TMC for coordination and sharing of incident and traffic information	Midland County/TxDOT	To Be Determined	No	1 year
Ector County EOC/TxDOT Odessa TMC Communications Connection	Establish a connection between the Ector County EOC and the TxDOT Odessa TMC for coordination and sharing of incident and traffic information	Ector County/TxDOT	To Be Determined	No	1 year
911 PSAP/TxDOT Odessa TMC Communications Connection	Establish a connection between the local 911 Public Safety Answering Points (PSAPs) and the TxDOT Odessa TMC for coordination and sharing of incident and traffic information	PSAPs/TxDOT	To Be Determined	No	1 year

Table 7 – Mid-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Emergency Management (continued)					
Municipal Emergency Management AVL and MDTs	Implement AVL and MDTs on municipal emergency management vehicles for real time vehicle location information and improved communication	Municipalities	$10,000/vehicle	No	1 year
Maintenance and Construction Management					
TxDOT RWIS Stations Phase 2	Install additional RWIS stations to collect road weather information in the Odessa District	TxDOT	$25,000/station	No	1 year
TxDOT Additional Portable DMS	Procure two additional portable DMS for use by TxDOT maintenance crews	TxDOT	$30,000/sign	No	6 months
TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 2	Implement additional flood detection stations at flood prone locations on roadways in the Odessa District. This project also includes low water crossing warning beacons to alert motorists of flooded roadways	TxDOT	To Be Determined	No	2 years
TxDOT Weigh-in-Motion for Pavement Management	Establish weigh-in-motion sites on roadways in the Odessa District to collect vehicle data for use in pavement management. The high cost is due to the addition of a concrete pavement on the approach to the weigh-in-motion (WIM). The equipment itself costs approximately $15,000.	TxDOT	$100,000/site	No	2 years
City of Midland Flood Detection Expansion	Implement an additional flood detection station at a flood prone location in the City of Midland.	City of Midland	To Be Determined	No	1 year
Public Transportation Management					
EZ Rider Bus Stop Annunciation	Install stop annunciation equipment on EZ Rider Buses to provide information on an upcoming stop to all passengers	EZ Rider	To Be Determined	No	1 year
EZ Rider/TxDOT Odessa TMC Communications Connection	Implement a connection between the EZ Rider transit operations center and the TxDOT Odessa TMC for sharing of incident information	EZ Rider/TxDOT	To Be Determined	No	1 year
EZ Rider/Midland TOC Communications Connection	Implement a connection between the EZ Rider transit operations center and the City of Midland TOC for sharing of incident information	EZ Rider/City of Midland	To Be Determined	No	1 year

Table 7 – Mid-Term Projects (5-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
EZ Rider/Odessa TOC Communications Connection	Implement a connection between the EZ Rider transit operations center and the City of Odessa TOC for sharing of incident information	EZ Rider/City of Odessa	To Be Determined	No	1 year
EZ Rider/DPS Communications Connection	Implement a connection between EZ Rider and DPS for coordination and communication during an incident	EZ Rider/DPS	To Be Determined	No	1 year
EZ Rider Transit Information Kiosks at Transfer Stations	Provide real-time bus information at transfer stations including time to next bus arrival	EZ Rider	To Be Determined	No	9 months
Permian Basin Rural Transit Electronic Fare Collection	Implement smart card electronic fare collection for Permian Basin Rural Transit	Permian Basin RTD	To Be Determined	No	6 months
Permian Basin Rural Transit Video Surveillance	Install security cameras on Permian Basin Rural Transit vehicles possibly with real time surveillance feed back to the transit operations center	Permian Basin RTD	To Be Determined	No	6 months
Permian Basin Rural Transit/TxDOT Odessa TMC Communications Connection	Implement a connection between the Permian Basin Rural Transit operations center and the TxDOT Odessa TMC for sharing of incident information	Permian Basin RTD/TxDOT	To Be Determined	No	1 year
Archived Data					
Permian Basin Regional Planning Commission Data Warehouse	Establish a data warehouse to archive date from cities and transit agencies in the Metropolitan Planning Organization (MPO) service area	Permian Basin Regional Planning Commission	$100,000	No	3 years

*Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

**The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

Permian Basin Region
Mid-Term Projects (10-Year)

Travel and Traffic Management

TxDOT Additional DMS Implementation

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project consists of the deployment of additional permanent DMS for purposes of traffic information dissemination.

The estimated cost per sign is approximately $100,000.

TxDOT CCTV Camera Deployment Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Incident Management (ATMS08)

Prerequisite Projects: TxDOT CCTV Camera Deployment Phase 1

Description: This project includes the deployment of eight to ten additional CCTV cameras along key segments of roadway in the Permian Basin Region. The CCTV cameras can be used for incident detection and verification, to monitor congestion and to aid in the dispatch of emergency vehicles. The information gathered by the CCTV cameras (video feed) can be shared with area emergency management agencies.

The estimated cost per site is between $20,000 and $25,000.

TxDOT Web Page Customization and Enhancement

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)
- Broadcast Traveler Information (ATIS1)

Prerequisite Projects: TxDOT ATMS Implementation

Description: Customize and enhance the Permian Basin District webpage on the TxDOT Expressway website to provide information on traffic, current roadway conditions, construction and any weather advisories.

The estimated cost for completing these enhancements is $100,000.

TxDOT Closed Loop Signal System Implementation Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: TxDOT Closed Loop Signal System Implementation Phase 1

Description: Expand the closed loop signal system by integrating additional signals and implementing VIVDS at select TxDOT intersections throughout the Region.

Regional Telecommunications Master Plan

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: Develop a regional telecommunications master plan for the Permian Basin Region to support ITS deployment. The plan would include needs identification and technology alternatives analysis, and will ultimately develop recommendations for region-wide ITS and traffic related communications. A network to serve center to center needs (among TMCs, emergency management centers, transit operations centers, etc.) and field to center links (for example from the TMC to the field devices or traffic signals) will be defined. The plan will investigate technology and media transmission

options, comparing technologies, bandwidths, life cycle costs, and other requirements against the Region's needs and goals.

The outcome of these efforts will be a phased plan for transportation and ITS communications throughout the Region over a 20-year period. Strong coordination with public safety is encouraged since there may be significant benefits in combining capital improvement funds to install telecommunications infrastructure to support interagency coordination needs. The estimated cost to deliver this plan is $100,000.

City of Midland CCTV Camera Deployment

Associated Market Packages:

- Network Surveillance (ATMS01)
- Incident Management (ATMS08)

Prerequisite Projects: None

Description: This project includes the deployment of CCTV cameras along key segments of roadway in the City of Midland. The CCTV cameras can be used for incident detection and verification, to monitor congestion and to aid in the dispatch of emergency vehicles. The information gathered by the CCTV cameras (video feed) can be shared with the area emergency management agencies.

The estimated cost per site is between $20,000 and $25,000.

City of Midland TOC/TxDOT Odessa TMC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: None

Description: Install a connection between the City of Midland TOC and the TxDOT Odessa TMC to allow video sharing, traffic data sharing and other joint functions. The type of connection (fiber, wireless, leased line) will need to be determined prior to implementation based on desired band width and cost of technologies available.

City of Midland Signal System Upgrades Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Midland Signal System Upgrades Phase 1

Description: Continue to upgrade existing traffic signal controllers in the City of Midland to NEMA TS-2 controllers to support implementation of an Ethernet based signal system. This project may also include the implementation of VIVDS at intersections where they have not previously been installed.

The estimated cost is $15,000 per intersection.

City of Midland Closed Loop Signal System Expansion Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Midland Closed Loop Signal System Expansion Phase 1

Description: Expand the closed loop signal system by integrating additional signals into the closed loop system. Also includes the implementation of VIVDS.

City of Odessa CCTV Camera Deployment

Associated Market Packages:

- Network Surveillance (ATMS01)
- Incident Management (ATMS08)

Prerequisite Projects: None

Description: This project includes the deployment of CCTV cameras along key segments of roadway in the City of Odessa. The CCTV cameras can be used for incident detection and verification, to monitor congestion and to aid in the dispatch of emergency vehicles. The information gathered by the CCTV cameras (video feed) can be shared with the area emergency management agencies.

The estimated cost per site is between $20,000 and $25,000.

City of Odessa TOC/TxDOT Odessa TMC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: None

Description: Install a connection between the City of Odessa TOC and the TxDOT Odessa District Traffic Office to allow video sharing, traffic data sharing and other joint functions. The type of connection (fiber, wireless, leased line) will need to be determined prior to implementation based on desired band width and cost of technologies available.

City of Odessa Signal System Upgrades Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Odessa Signal System Upgrades Phase 1

Description: Continue to upgrade existing traffic signal controllers in the City of Odessa to NEMA TS-2. This project may also include the implementation of VIVDS at intersections where they have not previously been installed.

The estimated cost is $15,000 per intersection.

City of Odessa Closed Loop Signal System Expansion Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Odessa Closed Loop Signal System Expansion Phase 1

Description: Expand the closed loop signal system by integrating additional signals into the closed loop system. Also includes the implementation of VIVDS.

Regional 511 Advanced Traveler Information System Server

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS1)
- Work Zone Management (MC08)

Prerequisite Projects: TxDOT ATMS Implementation, TxDOT HCRS Enhancements

Description: Install a server dedicated to traveler information in the TxDOT Odessa TMC. This server would be installed as part of a 511 rollout in Texas and would provide a gateway for public and private entities to access current conditions, closures, restrictions, weather, and other valuable travel information. Relevant data from the ATMS and HCRS would be sent to the ATIS server where it would be consolidated and 'packaged' for distribution via phone (511) and web as well as to private partners who desire access to information in the Permian Basin Region. These private partners could include local media and information service providers, which would link to the ATIS server to download information, or obtain real-time feeds, depending on the link provided by the private partner. Appropriate security measures and firewalls should be designed into the server to allow or restrict access to registered, authorized users. By fusing various types of data from a variety of sources (traffic management, incident management, and others), this data can be converted to usable information for travelers as well as other agencies.

Media Liaison and Coordination

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)
- Broadcast Traveler Information (ATIS1)

Prerequisite Projects: None

Description: Develop stronger liaison and coordination with local media to disseminate traveler information. Develop a link for local media to tap into CCTV camera images for dissemination of traffic and weather advisories to the public via television and radio news broadcasts. Most television and radio stations typically already have microwave licenses and infrastructure in place to support wireless transmission of video. Therefore, TxDOT should provide a connection point at the TMC for media providers (e.g., video switch including video images and traffic conditions map), but not design and install the entire connection between the TMC and the media. An initial task in the project will be to meet with interested news providers to determine information needs to support media interface design activities. Each agency that will be sharing information directly with the media will likely need an agreement or policy in place to determine what type of information will be shared. A subgroup of the stakeholders will need to work on the process of sharing data with the media and what broadcasts will be allowed to attempt to provide similar data to the media from each individual stakeholder.

Emergency Management

Midland County EOC/TxDOT Odessa TMC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install telecommunications connection between the Midland County EOC and TxDOT Odessa TMC to allow for shared incident information and roadway conditions. Cost of this connection will be determined based on the communications method chosen.

Ector County EOC/TxDOT Odessa TMC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install telecommunications connection between the Ector County EOC and TxDOT Odessa TMC to allow for shared incident information and roadway conditions. Cost of this connection will be determined based on the communications method chosen.

911 PSAP/TxDOT Odessa TMC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install telecommunications connection between the 911 public safety answering points and TxDOT TMC Odessa District to allow for CCTV camera shared monitoring and control and data sharing. Cost of this connection will be determined based on the communications method chosen.

Municipal Emergency Management AVL and MDTs

Associated Market Packages:

- Emergency Response (EM01)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: Install AVL and MDT units on municipal fire department vehicles. The AVL system will convey information regarding real-time vehicle location to dispatch which will allow for enhanced system monitoring and routing (or re-routing) of emergency vehicles. MDTs allow operators to send and receive digital messages. MDTs can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the route. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions).

The estimated cost is $10,000 per vehicle.

Maintenance and Construction Management

TxDOT RWIS Stations Phase 2

Associated Market Package:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: TxDOT RWIS Stations Phase 1

Description: Install additional RWIS stations in the Permian Basin Region. The RWIS will be remotely monitored by the TxDOT Odessa District. Real time weather information improves response time, increases winter maintenance efficiency, and minimizes the traveling public's exposure to hazardous weather related roadway conditions. Archived RWIS information also provides valuable historic information for planning purposes. Data including temperature (atmospheric and pavement), precipitation, wind, humidity, visibility (white out/heavy fog) and even pavement surface conditions (i.e., snow, ice, chemical percentage) are collected by sensors placed at the roadside (typically on a 30 foot tower) and embedded in the roadway. Remote processing units placed along the roadway communicate with various types of road and weather sensors. Data from the units are transmitted to the central ATMS server, via dial-up modem or other low bandwidth telecommunications methods, which will be located at the TxDOT Odessa District Traffic Office. A future module for the ATMS software will support environmental sensor data and provides collection, archiving, and distribution of the data.

The estimated cost is $25,000 per station.

TxDOT Additional Portable DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project procures two additional portable DMS for use by TxDOT maintenance crews. The signs can be used during construction, an incident, or other event where it is important to disseminate road conditions to travelers.

The estimated cost per sign is approximately $30,000.

TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 2

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Weather Information Processing and Distribution (MC04)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: TxDOT Flood Detection Stations and Low Water Crossing Warning Beacon Implementation Phase 1

Description: Implement additional flood detection systems at locations prone to flooding in the Odessa District. This will enable faster response times by maintenance crews to close flooded or near flooded roadway segments as necessary. The typical flood detection station is composed of a stream gauge, a rain gauge, a temperature sensor, a wind speed sensor, and a wind direction sensor as well as remote communications support. Other upgrades that may support operational decision making include sensors to measure relative humidity, soil moisture content, solar radiation, and air and water quality. The flood detection systems will be monitored from the TxDOT Odessa District Office. Communications between the flood detection stations and the District Office can be achieved through a variety of wireless and wireline telemetry methods. There is a future module of the ATMS software planned to support environmental sensors, and development of this module could be extended to include the needs of flood detection stations.

This project will also implement low water crossing flashing beacon warning signs in conjunction with the flood detection stations. The beacons would flash when flood conditions were detected and water was obstructing the roadway to warn motorists.

TxDOT Weigh-in-Motion for Pavement Management

Associated Market Packages:

- Weigh-in-Motion (CVO06)

Prerequisite Projects: None

Description: This project includes the implementation of WIM stations on roadways in the Odessa Region to collect vehicle data for use in pavement management.

The estimated cost is $100,000 a site. The equipment cost is approximately $15,000; however, the majority of roadway in the District is asphalt so the bulk of the implementation cost comes from installing a concrete approach necessary for a steady load and accurate measure.

City of Midland Flood Detection Expansion

Associated Market Packages:

- Network Surveillance (ATMS01)
- Road Weather Data Collection (MC03)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: None

Description: Implement an additional flood detection system at a location prone to flooding in the City of Midland. This will enable faster response times by maintenance crews to close flooded or near flooded roadway segments as necessary. The typical flood detection station is composed of a stream gauge, a rain gauge, a temperature sensor, a wind speed sensor, and a wind direction sensor as well as remote communications support. Other upgrades that may support operational decision making include sensors to measure relative humidity, soil moisture content, solar radiation, and air and water quality.

Public Transportation Management

EZ Rider Bus Stop Annunciation

Associated Market Packages:

- Transit Fixed-Route Operations (APTS2)
- Transit Traveler Information (APTS8)

Prerequisite Projects: None

Description: Install equipment to annunciate the next bus stop automatically. These systems usually perform several functions. They automatically announce the next stop within the bus and, at the same time, a visual stop announcement appears on a lighted digital display sign located inside the bus. When the bus door opens, it triggers an external speaker that announces the bus route to passengers waiting at the stop.

Routes and their stops are programmed into the system and bus operators recalibrate the system at the origination stop for the route they will travel. The automated systems use a number of different technologies, including a global positioning system (GPS) receiver or an odometer sensor.

EZ Rider/TxDOT Odessa TMC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Multi-modal Coordination (APTS7)

Prerequisite Projects: None

Description: This project establishes a link between the EZ Rider transit operations center and the TxDOT Odessa TMC to share information about road conditions, closures, and incidents.

EZ Rider/Midland TOC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Multi-modal Coordination (APTS7)

Prerequisite Projects: None

Description: This project establishes a link between the EZ Rider transit operations center and Midland TOC to share information about road conditions, closures, and incidents.

EZ Rider/Odessa TOC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Multi-modal Coordination (APTS7)

Prerequisite Projects: None

Description: This project establishes a link between the EZ Rider transit operations center and Odessa TOC to share information about road conditions, closures, and incidents.

EZ Rider/DPS Communications Connection

Associated Market Packages:

- Incident Management System (ATMS08)
- Transit Security (APTS5)

Prerequisite Projects: None

Description: This project establishes a link between the EZ Rider transit operations center and the DPS to share incident information.

EZ Rider Transit Information Kiosks at Transfer Stations

Associated Market Packages:

- Transit Fixed-Route Operations (APTS2)
- Demand-Response Transit Operations (APTS3)
- Transit Traveler Information (APTS8)

Prerequisite Projects: EZ Rider AVL and MDTs

Description: Install static and real-time transit traveler information devices at transit transfer stations in the Region. The project will build on information available from the transit AVL project. Kiosks, monitors, or dynamic signs will relay information on current bus operating conditions (e.g., Next bus – 5 minutes, on schedule, delayed 10 minutes, etc.).

Permian Basin Rural Transit Electronic Fare Collection

Associated Market Packages

- Demand Response Transit Operations (APTS3)
- Transit Passenger and Fare Management (APTS4)

Prerequisite Projects: None

Description: Implement electronic fare collection for Permian Basin Rural Transit. There are several benefits of these collection systems. They include: enhanced revenue collection ability, increased security by not having large amounts of cash or tokens on the vehicle, and increased convenience and security for the transit patron. These systems are often implemented in conjunction with AVL or mobile data terminals, or are implemented as an add-on to those systems. To enable automated fare collection, fare boxes would need to be upgraded to accept smart cards (i.e., cards with passive RFID technology or a magnetic information strip) with rider and account information. Electronic fare payment and passenger information technology is rapidly advancing, and there will be several technological considerations will need to be examined, such as standards for smart cards and interoperability issues.

Permian Basin Rural Transit Video Surveillance

Associated Market Packages:

- Transit Security (APTS5)

Prerequisite Projects: None

Description: Cameras will be for on-board recording only, and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time via video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris.

Permian Basin Rural Transit/TxDOT Odessa TMC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Demand-Response Transit Operations (APTS3)

Prerequisite Projects: None

Description: This project establishes a link between the Permian Basin Rural Transit dispatch and TxDOT Odessa TMC to share information about road conditions, closures, and incidents.

Archived Data

Permian Basin Regional Planning Commission Data Warehouse

Associated Market Packages:

- ITS Data Warehouse (AD2)

Prerequisite Projects: None

Description: Implement a system to collect, store and process transportation data from selected locations. This project will design the frequency, quantity, and quality of data to be collected and stored. User interfaces will be required at each local agency to be able to access, search, and upload archived data as needed. The interface will likely be web-based.

The estimated cost of this project is $100,000.

Table 8 – Long-Term Projects (20-Year)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT Advance Railroad Warning System	Implement warning system to alert drivers of approaching trains and expected wait times	TxDOT/Railroad Operators	$500,000	No	1 year
City of Midland Signal System Upgrades Phase 3	Continue to upgrade traffic signal controllers in the City of Midland	City of Midland	To Be Determined	No	5 years
City of Midland Advance Railroad Warning System	Implement warning system to alert drivers of approaching trains and expected wait times	City of Midland/ Railroad Operators	$300,000	No	1 year
City of Odessa Signal System Upgrades Phase 3	Continue to upgrade traffic signal controllers in the City of Odessa	City of Odessa	To Be Determined	No	5 years
City of Odessa Advance Railroad Warning System	Implement warning system to alert drivers of approaching trains and expected wait times	City of Odessa/ Railroad Operators	$300,000	No	1 year
ISP-Based Route Guidance	Provide direct support to ISP-based route guidance systems through sharing of traveler information	Public Agencies/ Private Sector	Public: $100,000	No	1 year
Emergency Management					
Municipal Emergency Vehicle Traffic Signal Preemption Implementation	Implement emergency vehicle signal preemption in cities in the Permian Basin Region	Municipalities	$5,000/ intersection $1,000/vehicle	No	2 years
Maintenance and Construction Management					
TxDOT Work Zone Safety Monitoring	Implement portable work zone safety monitoring equipment in work zones	TxDOT	To Be Determined	No	1 year
TxDOT Maintenance Vehicle AVL	Implement AVL on TxDOT maintenance vehicles to provide real time vehicle location information	TxDOT	$10,000/vehicle	No	1 year
TxDOT Maintenance and Construction Vehicle Maintenance Tracking System	Implement a system to monitor the maintenance status of TxDOT maintenance and construction vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled	TxDOT	To Be Determined	No	1 year
TxDOT Anti-Icing Equipment Implementation	Install automatic anti-icing systems at select bridges and overpasses in the District	TxDOT	To Be Determined	No	1 year

Table 8 – Long-Term Projects (20-Year) (continued)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Maintenance and Construction Management (continued)					
City of Midland Maintenance Vehicle AVL	Implement AVL on City of Midland maintenance vehicles to provide real time vehicle location information	City of Midland	$10,000/vehicle	No	1 year
City of Odessa Maintenance Vehicle AVL	Implement AVL on City of Odessa maintenance vehicles to provide real time vehicle location information	City of Odessa	$10,000/vehicle	No	1 year
Public Transportation Management					
Permian Basin Rural Transit Information Kiosks at Transfer Stations	Provide real-time bus information at transfer stations including time to next bus arrival	Permian Basin RTD	To Be Determined	No	9 months
Permian Basin Rural Transit Vehicle Maintenance Tracking System	Implement a system to monitor the maintenance status of Permian Basin Rural Transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled	Permian Basin RTD	To Be Determined	No	1 year

*Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

**The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

Permian Basin Region
Long-Term Projects (20-Year)

Travel and Traffic Management

TxDOT Advance Railroad Warning System

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Standard Railroad Grade Crossing (ATMS13)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: This project will include highway/rail intersection warning systems that will alert motorists of arriving trains, amount of time the train will occupy the crossing, and the length of time a motorist can expect to be delayed. The deployment of instrumentation will be along roadways at railroad grade crossings. Information will be gathered either directly from the railroad operators or from sensors placed along the railroad right-of-way that monitor train length and speed. Data will be transferred from the field sensors to the TxDOT TMC where operators can make decisions regarding changes in signal operations to facilitate flow around the closed crossing or to clear traffic once the train has passed the crossing.

The estimated cost is $500,000.

City of Midland Signal System Upgrades Phase 3

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Midland Signal System Upgrades Phase 1, City of Midland Signal System Upgrades Phase 2

Description: Continue to upgrade existing traffic signal controllers in the City of Midland.

City of Midland Advance Railroad Warning System

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Standard Railroad Grade Crossing (ATMS13)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: This project will include highway/rail intersection warning systems that will alert motorists of arriving trains, amount of time the train will occupy the crossing, and the length of time a motorist can expect to be delayed. The deployment of instrumentation will be along roadways at railroad grade crossings. Information will be gathered either directly from the railroad operators or from sensors placed along the railroad right-of-way that monitor train length and speed. Data will be transferred from the field sensors to the Midland TOC where operators can make decisions regarding changes in signal operations to facilitate flow around the closed crossing or to clear traffic once the train has passed the crossing.

The estimated cost for this project is $300,000.

City of Odessa Signal System Upgrades Phase 3

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)

Prerequisite Projects: City of Odessa Signal System Upgrades Phase 1, City of Odessa Signal System Upgrades Phase 2

Description: Continue to upgrade existing traffic signal controllers in the City of Odessa.

City of Odessa Advance Railroad Warning System

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Standard Railroad Grade Crossing (ATMS13)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: This project will include highway/rail intersection warning systems that will alert motorists of arriving trains, amount of time the train will occupy the crossing, and the length of time a motorist

can expect to be delayed. The deployment of instrumentation will be along roadways at railroad grade crossings. Information will be gathered either directly from the railroad operators or from sensors placed along the railroad right-of-way that monitor train length and speed. Data will be transferred from the field sensors to the Odessa TOC where operators can make decisions regarding changes in signal operations to facilitate flow around the closed crossing or to clear traffic once the train has passed the crossing.

The estimated cost is $300,000.

ISP-Based Route Guidance

Associated Market Packages:

- Work Zone Management (MC08)
- Broadcast Traveler Information (ATIS1)
- ISP-Based Route Guidance (ATIS5)

Prerequisite Projects: TxDOT ATMS

Description: Provide ISPs with data relative to current travel conditions. The project extends current static capabilities of the OnStar, in-vehicle route guidance systems (or equivalent) currently being equipped in new vehicles (OnStar is equipped on some GM, Acura, Audi, Saab, and Subaru models). Currently, the OnStar system will help guide a motorist to a location based on static information. By providing real-time traveler information to ISPs, the guidance systems could modify the recommended route based on dynamic roadway conditions (e.g., variation on congestion levels, accidents, roadwork, etc.). The project will require a public/private sector partnership, because route guidance and navigation services are typically subscription services.

The estimated cost is $100,000.

Emergency Management

Municipal Emergency Vehicle Traffic Signal Preemption Implementation

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Vehicle Routing (EM02)

Prerequisite Projects: None

Description: This project implements signal preemption equipment at traffic signals in municipalities in the Region. This project includes required controller modifications, sensors, and transmitters. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have been shown to improve safety of emergency personnel and vehicles en-route to an incident.

The estimated cost is $5,000 per intersection and $1,000 per vehicle.

Maintenance and Construction Management

TxDOT Work Zone Safety Monitoring

Associated Market Packages:

- Network Surveillance (ATMS01)
- Work Zone Safety Monitoring (MC09)

Prerequisite Projects: None

Description: This project will include the use of advanced warning systems to detect unauthorized vehicles that have entered the perimeter of the work zone. The intent of such systems is to help decrease the number of accidents in work zones due to motorists getting too close to workers or their equipment. Intrusion detection devices can alert construction workers and the motorist that the motorist has entered the safe zone and the worker should take evasive action. It is anticipated that this project will be conducted on and possibly required by TxDOT on a per-project basis.

TxDOT Maintenance Vehicle AVL

Associated Market Package:

- Maintenance and Construction Vehicle Tracking (MC01)
- Maintenance and Construction Vehicle Maintenance (MC02)

Prerequisite Projects: None

Description: Install an AVL system on maintenance vehicles. The system consists of a tracking device and tracking software connected over wireless networks. Web-enabled software will be used to track and monitor the AVL tracking device on-board of maintenance and construction vehicles in real time. The system is automatic, so a dispatcher always has a real-time view of all active crews in the field. The software can be configured to display only those crews for which a particular dispatcher is responsible. The fleet can be managed by "exception" events such as emergency alarms, over speed reports, geographic-based boundary alarms, or text messages. Automatic reporting rates are customizable. Inherent in interactive two-way wireless data communications are capabilities such as two-way text messages and security features such as the control and monitoring of vehicle interlocks so dispatchers can enable/disable vehicles remotely.

The estimated cost is $10,000 per vehicle.

TxDOT Maintenance and Construction Vehicle Maintenance Tracking System

Associated Market Packages:

- Maintenance and Construction Vehicle Maintenance (MC02)

Prerequisite Projects: TxDOT Maintenance Vehicle AVL

Description: Implement a system to monitor the maintenance status of TxDOT maintenance and construction vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled.

TxDOT Anti-Icing Equipment Implementation

Associated Market Packages:

- Road Weather Data Collection (MC03)
- Weather Information Processing and Distribution (MC04)
- Roadway Automated Treatment (MC05)
- Winter Maintenance (MC06)

Prerequisite Projects: None

Description: This project includes the installation of ice detection equipment and anti-icing systems on the roadway at key locations, particularly bridges and overpass structures. Anti-icing is a snow and ice control practice that attempts to prevent the formation or development of snow and ice that becomes bonded to the roadway by utilizing timely applications of a freezing point depressant.

Anti-icing devices apply a liquid chemical de-icing agent directly onto the surface before the temperature and humidity levels permit an ice bond to occur. This technique requires the chemical de-icing agents be applied in a timely and accurate manner. Permanent auto anti-icing systems must be activated by some means, and the level of service is directly impacted by the method that is used to activate the system. To achieve full autonomous operation (non-human intervention), the anti-icing system must be controlled by input from a road weather information system that measures atmospheric and pavement surface conditions, accurately measures the freeze point of the moisture/chemical solution on the road surface and in turn activates the permanent automated anti-icing system when icing conditions are imminent.

Automated anti-icing systems can be installed as part of a bridge re-decking project where equipment is integrated into overall construction. Alternatively, anti-icing systems can be retrofit to existing bridges. Other features that have been included in anti-icing systems are:

- Integration of DMS in advance of locations to warn motorists of operating spray nozzles;
- CCTV to verify anti-icing operations and to monitor critical infrastructure; and
- Bridge structure monitoring (on bridges that may be forming hairline cracks).

City of Midland Maintenance Vehicle AVL

Associated Market Package:

- Maintenance and Construction Vehicle Tracking (MC01)

Prerequisite Projects: None

Description: Install AVL system on maintenance vehicles. The system consists of a tracking device and tracking software connected over wireless networks. Web-enabled software will be used to track and monitor the AVL tracking device on-board of maintenance and construction vehicles in real time. The system is automatic, so a dispatcher always has a real-time view of all active crews in the field. The software can be configured to display only those crews for which a particular dispatcher is responsible. The fleet can be managed by "exception" events such as emergency alarms, over speed reports, geographic-based boundary alarms, or text messages. Automatic reporting rates are customizable. Inherent in interactive two-way wireless data communications are capabilities such as two-way text

messages and security features such as the control and monitoring of vehicle interlocks so dispatchers can enable/disable vehicles remotely.

The estimated cost is $10,000 per vehicle.

City of Odessa Maintenance Vehicle AVL

Associated Market Package:

- Maintenance and Construction Vehicle Tracking (MC01)

Prerequisite Projects: None

Description: Install AVL system on maintenance vehicles. The system consists of a tracking device and tracking software connected over wireless networks. Web-enabled software will be used to track and monitor the AVL tracking device on-board of maintenance and construction vehicles in real time. The system is automatic, so a dispatcher always has a real-time view of all active crews in the field. The software can be configured to display only those crews for which a particular dispatcher is responsible. The fleet can be managed by "exception" events such as emergency alarms, over speed reports, geographic-based boundary alarms, or text messages. Automatic reporting rates are customizable. Inherent in interactive two-way wireless data communications are capabilities such as two-way text messages and security features such as the control and monitoring of vehicle interlocks so dispatchers can enable/disable vehicles remotely.

The estimated cost is $10,000 per vehicle.

Public Transportation Management

Permian Basin Rural Transit Information Kiosks at Transfer Stations

Associated Market Packages:

- Demand Response Transit Operations (APTS3)
- Transit Traveler Information (APTS8)

Prerequisite Projects: Permian Basin Rural Transit AVL and MDTs

Description: Install static and real-time transit and traveler information devices at transit transfer stations in the Region. The project will build on information available from the transit AVL project. Kiosks, monitors, or dynamic signs will relay information on current bus operating conditions (e.g., Next bus – 5 minutes, on schedule, delayed 10 minutes, etc.).

Permian Basin Rural Transit Vehicle Maintenance Tracking System

Associated Market Packages:

- Demand-Response Transit Operations (APTS3)
- Transit Maintenance (APTS6)

Prerequisite Projects: Permian Basin Rural Transit AVL and MDTs

Description: Implement a system to monitor the maintenance status of Permian Basin Transit vehicles and alert the driver and dispatch center when maintenance is required or preventative maintenance needs to be scheduled. Such a system will enable maintenance issues to be addressed as soon as possible, hopefully preventing a break down and unplanned down time for a transit vehicle.

4. MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN

The Permian Basin Regional ITS Deployment Plan is a living document. The recommended projects and their timeframes for implementation reflect the needs of the Region at the time the plan was developed. It is expected that the needs of the Region will change as ITS deployments are put into place, population and travel patterns change, and as new technology is developed. In order for the ITS Deployment Plan to remain a useful document for Regional stakeholders, the plan must be updated over time.

TxDOT will serve as the lead agency for maintaining both the Permian Basin Regional ITS Architecture and the ITS Deployment Plan; however, these plans will continue to be driven by stakeholder consensus rather than a single stakeholder.

At the ITS Deployment Plan Meeting in July 2004, stakeholders recommended that a meeting be held on an annual basis to review the existing Regional ITS Deployment Plan to update project status and include any new projects. These updates will be documented and included in the next formal revision of the plans. It was also recommended that the group meet on a two year basis to review the Regional ITS Architecture. Any new market packages that have been added to the National Architecture should be reviewed to see if they are applicable to the Permian Basin Region. Data flows in existing market packages should be reviewed to determine if any planned/future flows have been implemented. The Deployment Plan will also be updated at that time to reflect projects that have been deployed, new projects that are necessary, and to reprioritize projects currently shown in the plan. Projects that are added to the ITS Deployment Plan should also be reviewed closely to determine if they fit into the ITS Architecture for the Permian Basin Region. If a new project does not fit into the ITS Architecture, then the ITS Architecture will need to be revised to include the necessary links and data flows for the project. Any changes to the geographic scope of the Region should be agreed upon by the stakeholders. The complete revision of the plan on a two year basis will correspond with the Transportation Improvement Plan update process, which also occurs on a two year basis.

Both the Permian Basin Regional ITS Architecture and the ITS Deployment Plan were developed with a consensus approach from the stakeholders. In order for these documents to continue to reflect the needs of the Region, changes in the documents will need to be driven by consensus of all of the stakeholders.