



State of Texas
Regional ITS Architectures and Deployment Plans

Del Rio Region

Regional ITS Deployment Plan

Prepared by:



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LIST OF ACRONYMS

ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
AVI	Automated Vehicle Information
C2C	Center-to-Center
CAD	Computer-Aided Dispatch
CCTV	Closed-Circuit Television
CISD	Consolidated Independent School District
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
DPS	Department of Public Safety
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
GIS	Geographic Information System
ETC	Electronic Toll Collection
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HCRS	Highway Condition Reporting System
HRI	Highway-Rail Intersections
ISP	Information Service Provider
ITS	Intelligent Transportation System
MDT	Mobile Data Terminal
NTCIP	National Transportation Communications for ITS Protocol
TEA-21	Transportation Equity Act for the 21st Century



LIST OF ACRONYMS

TOC	Traffic Operations Center Transit Operations Center
TMC	Transportation Management 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 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 Del Rio Region was the tenth in the series of regional ITS architectures and deployment plans to be prepared as part of this initiative.

The Del Rio 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, the Texas Department of Public Safety (DPS), City of Del Rio, Val Verde County, and US Border Patrol.

Building on the dialogue, consensus, and vision outlined in the Regional ITS Architecture, stakeholders in the Del Rio 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 Del Rio Region were identified in the following key areas:

- Travel and Traffic Management;
- Emergency Management; and
- Maintenance and Construction 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 and 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 Del Rio 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. Stakeholders agreed that both the Regional ITS Architecture and Deployment Plan would need to be periodically reviewed and potentially updated in order to reflect current deployment status as well as to re-evaluate priorities. Stakeholders agreed that it would be appropriate to review the plan every two years and update the Architecture and Deployment Plan to reflect any changes. The TxDOT Laredo District was identified as the agency that should take the lead in maintaining and updating the Region's ITS Architecture and Deployment Plan, with support from a multi-jurisdictional committee in the Region.

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 Del Rio Regional ITS Deployment Plan was developed using the Regional ITS Architecture developed in 2003. 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 deployment plan, and identified the required interfaces to provide the desired level of integration of systems and agencies within the Del Rio Region.

The Del Rio Regional ITS Architecture provided the framework and prioritized the key functions and services desired by stakeholders in the Region. The Del Rio Regional 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 Del Rio Regional ITS Deployment Plan is organized into four key sections:

Section 1 – Introduction

This section provides a brief overview of the State of Texas Regional ITS Architectures and Deployment Plans Program, the ITS Deployment Plan for the Del Rio Region, as well as an overview of some of the key features and stakeholders in the Del Rio Region.

Section 2 – Prioritization of Market Packages

Section 2 contains the prioritized market packages for the Del Rio 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 Planned Projects

Project recommendations have been developed for the Del Rio Region to provide an incremental, phased build-out of the Region's ITS. These projects are categorized into five, ten and twenty year deployment timeframes. Each project recommendation includes a brief description, responsible agency, associated market packages, pre-requisite projects or systems, and an estimate of probable cost. These recommendations took into consideration existing as well as planned ITS deployments in the Del Rio Region.

Section 4 – Maintaining the Regional ITS Architecture and Deployment Plan

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

1.3 The Del Rio Region

1.3.1 Geography and Regional Characteristics

The Del Rio Region is part of the TxDOT Laredo District and is bordered to the north and east by the TxDOT San Angelo District, to the west by the TxDOT Odessa District and to the south by Mexico. For the Del Rio Regional ITS Architecture and Deployment Plan, the study area is comprised of Val Verde County.

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. None of the cities in the Del Rio Region exceed the 50,000 threshold.

1.3.2 Transportation Infrastructure

The primary facilities in the Del Rio Region include US 90, US 277, US 377, and SH 163.

US 90 travels east-west along the border with Mexico in the Del Rio Region. The effective operation of this highway is critical to the movement of goods and people through the Region. US 90 extends all the way across the state of Texas from Orange, Texas, through San Antonio and Del Rio, to El Paso. US 90 connects the southern portion of Texas to Louisiana and New Mexico. Within the Del Rio Region blockages can have serious implications on drive-time for commercial vehicles and motorists alike due to the lack of obvious alternate routes. Knowing road and travel conditions within this transportation corridor and having the ability to disseminate this information to motorists are important elements for this project.

1.3.3 Existing ITS in the Del Rio Region

Within the Del Rio Region there are currently several ITS programs that are underway or are planned for deployment. The TxDOT Del Rio Area Office has a portable dynamic message sign used to display incident and construction related messages.

The City of Del Rio operates electronic toll collection (ETC) at the International Bridge. ETC systems allow residents, daily commuters, and visitors to pass through the toll lanes without stopping for payment of tolls. Also at the International Bridge, the US Customs inspection and enforcement office maintains license plate readers that record the license plate number of each vehicle that crosses the border.



1.3.4 *Del Rio 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 Del Rio Region.

The following is a list of stakeholders in the Del Rio 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 Del Rio Regional ITS Architecture:

- City of Del Rio;
- Federal Highway Administration;
- San Felipe/Del Rio CISD;
- Texas Department of Public Safety;
- TxDOT Laredo District;
- TxDOT Traffic Operations Division (Austin);
- US Border Patrol;
- US Customs;
- Val Verde County; and
- Val Verde County Sheriff.

Key stakeholder agencies that are participating in the development of the Del Rio Regional ITS Deployment Plan are listed in **Table 1**.



Table 1 – Del Rio Stakeholder Agencies and Contacts

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
City of Del Rio	Harold Bean	401 E. Losoya Del Rio, Texas 78840	830-774-8150	firechief@delrio.com
City of Del Rio	Rafael Castillo, Jr.	109 W. Broadway Del Rio, Texas 78840	830-774-8558	rcastillo@wcsonline.net
City of Del Rio	Alejandro Garcia	114 W. Martin Del Rio, Texas 78841	830-774-8535	cityengineer@cityofdelrio.net
City of Del Rio	Billy Guerra	109 W. Broadway Del Rio, Texas 78840	830-774-8510	bguerra@wcsonline.net
City of Del Rio	Rudy Palafax	103 E. Gibbs Del Rio, Texas 78840	830-774-8632	N/A
City of Del Rio	Antonio Partida	103 E. Gibbs Del Rio, Texas 78840	830-774-8631	N/A
City of Del Rio	Elsa Reyes	109 W. Broadway Del Rio, Texas 78840	830-774-8695	ereyes@cityofdelrio.com
Del Rio EMS	Jack Howley	801 Bedell Del Rio, Texas 78840	830-703-1700	ems@delrio.com
Del Rio Emergency Management	John Sheedy	109 W. Broadway Del Rio, Texas 78840	830-774-8650	dchief@delrio.com
Del Rio Police Dept.	Antonio Becerra	110 E Broadway Del Rio, Texas 78840	830-774-8594	abecerr1@leo.gov
Del Rio Police Dept.	Manuel Herrera	110 E Broadway Del Rio, Texas 78840	830-774-8576	police@cityofdelrio.com
Federal Highway Administration	Daniel Grate, Jr.	61 Forsyth Street, SW, Suite 17T26 Atlanta, Georgia 30303	404-562-3912	daniel.grate@fhwa.dot.gov
San Felipe/Del Rio CISD	Roberto Fernandez	PO Box 420128 Del Rio, Texas 78842	830-778-4012	N/A
Texas Department of Public Safety	Frank Anguiano, III	2012 Veterans Blvd Del Rio, Texas 78840	830-775-3569	N/A
Texas Department of Public Safety	Raul Morales	2012 Veterans Blvd Del Rio, Texas 78840	830-775-3569	N/A
Texas Department of Public Safety	Elizabeth Zeliff	2012 Veterans Blvd Del Rio, Texas 78840	830-775-3569	elizabeth.zeliff@txdps.state.tx.us
TxDOT – Del Rio Area Office	Alfredo Becerra	319 East Gibbs Street Del Rio, Texas 78840	830-774-7235	abecerra@dot.state.tx.us
TxDOT – Del Rio Area Office	Juan Ramirez	319 East Gibbs Street Del Rio, Texas 78840	830-703-1428	jmramire@dot.state.tx.us
TxDOT – Laredo District	Omar Cantu	1817 Bob Bullock Loop Laredo, Texas 78043	956-712-7442	ocantu1@dot.state.tx.us
TxDOT – Laredo District	Roberto Rodriguez	1817 Bob Bullock Loop Laredo, Texas 78043	956-712-7485	rrodri9@dot.state.tx.us



Table 1 – Del Rio Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
TxDOT Austin Traffic Operations	Alesia Gamboa	Attn: TRF-TM 125 East 11th Street Austin, Texas 78701-2483	512-416-2780	agamboa@dot.state.tx.us
TxDOT Austin Traffic Operations	Janie Light	Attn: TRF-TM 125 East 11th Street Austin, Texas 78701-2483	512-416-3258	jlight@dot.state.tx.us
US Border Patrol	John Poole	1868 Hwy 85 E Carrizo Springs, Texas 78834	830-876-3557	john.c.poole@dhs.gov
US Customs	Ester Cowan	International Bridge 8CR 2, Box 23 Loop Road Del Rio, Texas 78840	830-703-2012	tcowan9872@aol.com
Val Verde County	Otila Gonzalez	400 Pecan St. Del Rio, Texas 78840	830-774-7552	ogonzalez@delrio.com
Val Verde County Sheriff	JoAnn Cervantes	PO Box 1201 Del Rio, Texas 78841	830-774-7513	joanncivilcrime@yahoo.com
Val Verde County Sheriff	Pat Kraus	PO Box 1201 Del Rio, Texas 78841	830-774-7315	chiefdeputy@delriolive.com



2. PRIORITIZATION OF MARKET PACKAGES

2.1 Prioritization Process

Of the 75 available market packages in the National ITS Architecture, 34 were selected and customized for deployment in the Del Rio 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**.

Table 2 – Summary of Prioritized Market Packages for the Del Rio Region

High Priority	Medium Priority	Low Priority
<ul style="list-style-type: none"> ▪ Network Surveillance ▪ Surface Street Control ▪ Traffic Information Dissemination ▪ Regional Traffic Control ▪ Incident Management System ▪ Electronic Toll Collection ▪ Emergency Response ▪ Emergency Routing ▪ 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 ▪ Electronic Clearance ▪ HAZMAT Management ▪ Broadcast Traveler Information ▪ ITS Data Mart 	<ul style="list-style-type: none"> ▪ Standard Railroad Grade Crossing ▪ Advanced Railroad Grade Crossing ▪ Railroad Operations Coordination ▪ Roadway Maintenance and Construction ▪ Work Zone Management ▪ Transit Security ▪ ITS Data Warehouse 	<ul style="list-style-type: none"> ▪ Probe Surveillance ▪ Maintenance and Construction Vehicle Tracking ▪ Maintenance and Construction Vehicle Maintenance ▪ Work Zone Safety Monitoring ▪ Transit Maintenance ▪ Multi-modal Coordination ▪ Interactive Traveler Information ▪ ISP Based Route Guidance

The market package prioritization was a key factor in developing recommendations for ITS deployment and integration in the Del Rio Region. These priorities identified the key needs and services that are desired in the Del Rio 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 Del Rio 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, Information Service Provider (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 Del Rio 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.

2.2 High Priority Market Packages

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

Many of these high priority market packages have components that are in various stages of deployment and operation in the Del Rio Region; that is, there are already systems and technologies deployed to deliver some of these high priority services and functions. For example, the TxDOT Del Rio Area Office already has several closed loop signal systems in place which is a key component 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 as part of 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 Del Rio Region.



Table 3 – High Priority Market Packages for the Del Rio Region

Network Surveillance (ATMS01)	High Priority
<p>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.</p>	
<p>Existing Infrastructure</p> <ul style="list-style-type: none"> ▪ TxDOT Closed Loop Signal System ▪ TxDOT Loop and Microwave Detection ▪ City of Del Rio Loop Detection 	<p>Agency</p> <ul style="list-style-type: none"> ▪ TxDOT ▪ City of Del Rio
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ TxDOT Closed Loop Signal System Expansion Phase 1 ▪ TxDOT Flood Monitoring Phase 1 ▪ TxDOT Advanced Traffic Management System 	
<p>Additional Needs</p> <ul style="list-style-type: none"> ▪ City of Del Rio Closed Loop Signal System Implementation ▪ City of Del Rio TOC ▪ Del Rio Regional Communications Master Plan ▪ TxDOT Closed Loop Signal System Expansion Phase 2 ▪ City of Del Rio Closed Loop Signal System Expansion Phase 1 ▪ City of Del Rio CCTV ▪ TxDOT Flood Monitoring Phase 2 ▪ TxDOT Closed Loop Signal System Expansion Phase 3 ▪ City of Del Rio Closed Loop Signal System Expansion Phase 2 	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Surface Street Control (ATMS03)	High Priority
<p>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.</p>	
<p>Existing Infrastructure</p> <ul style="list-style-type: none"> ▪ TxDOT Closed Loop Signal System ▪ TxDOT Loop and Microwave Detection ▪ TxDOT Railroad Signal Preemption ▪ City of Del Rio Loop Detection 	<p>Agency</p> <ul style="list-style-type: none"> ▪ TxDOT ▪ City of Del Rio
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ TxDOT Closed Loop Signal System Expansion Phase 1 ▪ Emergency Vehicle Traffic Signal Preemption 	
<p>Additional Needs</p> <ul style="list-style-type: none"> ▪ City of Del Rio Closed Loop Traffic Signal System Implementation ▪ City of Del Rio TOC ▪ Del Rio Regional Communications Master Plan ▪ Evacuation Planning ▪ TxDOT Closed Loop Signal System Expansion Phase 2 ▪ City of Del Rio Closed Loop Signal System Expansion Phase 1 ▪ City of Del Rio CCTV ▪ TxDOT Closed Loop Signal System Expansion Phase 3 ▪ City of Del Rio Closed Loop Signal System Expansion Phase 2 ▪ City of Del Rio TOC/TxDOT Area Office TMC Communications Connection 	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Traffic Information Dissemination (ATMS06)	High Priority
<p>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.</p> <p>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.</p>	
Existing Infrastructure <ul style="list-style-type: none"> ▪ TxDOT Portable DMS ▪ TxDOT HCRS 	Agency <ul style="list-style-type: none"> ▪ TxDOT
Planned Projects <ul style="list-style-type: none"> ▪ TxDOT Center to Center Communications ▪ TxDOT HCRS Enhancements ▪ TxDOT Advanced Traffic Management System ▪ TxDOT Highway Advisory Radio Phase 1 	
Additional Needs <ul style="list-style-type: none"> ▪ City of Del Rio TOC ▪ Dynamic Message Signs for Border Patrol Checkpoints Phase 1 ▪ Del Rio Regional Communications Master Plan ▪ TxDOT Portable DMS ▪ TxDOT HAR Phase 2 ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Del Rio Area Office Web Page ▪ DMS for Border Patrol Checkpoints Phase 2 ▪ City of Del Rio TOC/TxDOT Area Office TMC Communications Connection ▪ DPS/TxDOT Area Office TMC Connection ▪ EOC/TxDOT Area Office TMC Connection ▪ County Portable DMS ▪ ISP-Based Route Guidance ▪ Transit Operations Center/City of Del Rio TOC Communications Connection 	

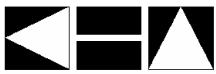


Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Regional Traffic Control (ATMS07)	High Priority
<p>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.</p>	
Existing Infrastructure	Agency
<p>None identified at this time</p>	
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ TxDOT Center to Center Communications ▪ TxDOT Advanced Traffic Management System <p>Additional Needs</p> <ul style="list-style-type: none"> ▪ Del Rio Regional Communications Master Plan ▪ Evacuation Planning ▪ City of Del Rio TOC/TxDOT Area Office TMC Communications Connection 	

Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Incident Management System (ATMS08)	High Priority
<p>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 are collected and correlated by this market package to detect and verify incidents and implement an appropriate response.</p> <p>The response may include traffic control strategy modifications or resource coordination between center subsystems. The coordination with emergency management might be through a 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.</p> <p>Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination, Broadcast Traveler Information or Interactive Traveler Information market packages.</p>	
<p>Existing Infrastructure</p> <ul style="list-style-type: none"> ▪ TxDOT Portable DMS 	<p>Agency</p> <ul style="list-style-type: none"> ▪ TxDOT
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ TxDOT Center to Center Communications ▪ City of Del Rio Emergency Services Central Dispatch ▪ TxDOT HCRS Enhancements ▪ TxDOT Advanced Traffic Management System ▪ TxDOT Highway Advisory Radio Phase 1 ▪ Del Rio Regional Emergency Operations Center 	
<p>Additional Needs</p> <ul style="list-style-type: none"> ▪ City of Del Rio TOC ▪ DMS for Border Patrol Checkpoints Phase 1 ▪ Del Rio Regional Communications Master Plan ▪ Evacuation Planning ▪ TxDOT Portable DMS ▪ TxDOT HAR Phase 2 ▪ DMS for Border Patrol Checkpoints Phase 2 ▪ City of Del Rio TOC/TxDOT Area Office TMC Communications Connection ▪ City of Del Rio CCTV ▪ DPS/TxDOT Area Office TMC Connection ▪ EOC/TxDOT Area Office TMC Connection ▪ Emergency Call-Out System 	

Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Electronic Toll Collection (ATMS10)	High Priority
<p>This market package provides toll operators with the ability to collect tolls electronically and detect and process violations. The fees that are collected may be adjusted to implement demand management strategies. Dedicated short-range communication between the roadway equipment and the vehicle is required as well as wireline interfaces between the toll collection equipment and transportation authorities and the financial infrastructure that supports fee collection. Vehicle tags of toll violators are read and electronically posted to vehicle owners. Standards, inter-agency coordination, and financial clearinghouse capabilities enable regional, and ultimately national interoperability for these services. The toll tags and roadside readers that these systems utilize also can be used to collect road use statistics for highway authorities. This data can be collected as a natural by-product of the toll collection process or collected by separate readers that are dedicated to probe data collection.</p>	
Existing Infrastructure	Agency
<ul style="list-style-type: none"> ▪ City of Del Rio International Bridge Electronic Toll Collection 	<ul style="list-style-type: none"> ▪ City of Del Rio
Planned Projects	
None identified at this time	
Additional Needs	
None identified at this time	

Emergency Response (EM01)	High Priority
<p>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.</p>	
Existing Infrastructure	Agency
<ul style="list-style-type: none"> ▪ Inter-City Radio Channel 	<ul style="list-style-type: none"> ▪ City of Del Rio
Planned Projects	
<ul style="list-style-type: none"> ▪ City of Del Rio Emergency Services Central Dispatch ▪ Del Rio Regional Emergency Operations Center ▪ Emergency Vehicle Traffic Signal Preemption 	
Additional Needs	
<ul style="list-style-type: none"> ▪ Evacuation Planning ▪ DPS/TxDOT Area Office TMC Connection ▪ EOC/DPS Connection ▪ EOC/US Border Patrol Connection ▪ EOC/Del Rio Centralized Dispatch Connection ▪ City of Del Rio Emergency Vehicle AVL and MDTs 	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Emergency Routing (EM02)	High Priority
<p>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.</p>	
<p>Existing Infrastructure</p> <ul style="list-style-type: none"> ▪ “Moving Window” Signal Priority for Emergency Vehicles 	<p>Agency</p> <ul style="list-style-type: none"> ▪ City of Del Rio
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ City of Del Rio Emergency Services Central Dispatch ▪ Del Rio Regional Emergency Operations Center ▪ Emergency Vehicle Traffic Signal Preemption 	
<p>Additional Needs</p> <ul style="list-style-type: none"> ▪ Evacuation Planning ▪ City of Del Rio Emergency Vehicle AVL and MDTs ▪ City of Del Rio TOC/TxDOT Area Office TMC Communications Connection ▪ DPS/TxDOT Area Office TMC Connection ▪ EOC/TxDOT Area Office TMC Connection 	

Road Weather Data Collection (MC03)	High Priority
<p>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.</p>	
<p>Existing Infrastructure</p> <p>None identified at this time</p>	<p>Agency</p>
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ TxDOT Flood Monitoring Phase 1 	
<p>Additional Needs</p> <ul style="list-style-type: none"> ▪ TxDOT Flood Monitoring Phase 2 	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Weather Information Processing and Distribution (MC04)	High Priority
<p>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 system operators and decision support systems can make decision 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.</p>	
Existing Infrastructure None identified at this time	Agency
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ TxDOT Center to Center Communications ▪ TxDOT HCRS Enhancements ▪ TxDOT Flood Monitoring Phase 1 	
<p>Additional Needs</p> <ul style="list-style-type: none"> ▪ TxDOT Advanced Traffic Management System ▪ TxDOT Del Rio Area Office Web Page ▪ Regional 511 Advanced Traveler Information System Server ▪ City of Del Rio TOC/TxDOT Area Office TMC Communications Connection ▪ TxDOT Flood Monitoring Phase 2 	

Maintenance and Construction Activity Coordination (MC10)	High Priority
<p>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.</p>	
Existing Infrastructure None identified at this time	Agency
<p>Planned Projects</p> <ul style="list-style-type: none"> ▪ TxDOT HCRS Enhancements ▪ TxDOT Center to Center Communications 	
<p>Additional Needs</p> <ul style="list-style-type: none"> ▪ TxDOT Highway Advisory Radio Phase 1 ▪ City of Del Rio TOC ▪ TxDOT Del Rio Area Office Web Page ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Highway Advisory Radio Phase 2 ▪ City of Del Rio TOC/TxDOT Area Office TMC Communications Connection 	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Transit Vehicle Tracking (APTS01)	High Priority
This market package monitors current transit vehicle location using an Automated Vehicle Location 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 at this time	Agency
Planned Projects <ul style="list-style-type: none"> ▪ City of Del Rio Transportation Transit Operations Center, AVL, and MDTs 	
Additional Needs None identified at this time	

Transit Fixed-Route Operations (APTS02)	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 at 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 <ul style="list-style-type: none"> ▪ City of Del Rio Transportation CAD 	Agency <ul style="list-style-type: none"> ▪ City of Del Rio Transportation
Planned Projects <ul style="list-style-type: none"> ▪ City of Del Rio Transportation Transit Operations Center, AVL, and MDTs 	
Additional Needs <ul style="list-style-type: none"> ▪ Evacuation Planning ▪ City of Del Rio Transportation Security System ▪ Transit Operations Center/City of Del Rio TOC Connection 	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Demand Response Transit Operations (APTS03)	High Priority
<p>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.</p>	
Existing Infrastructure	Agency
<ul style="list-style-type: none"> ▪ City of Del Rio Transportation CAD 	<ul style="list-style-type: none"> ▪ City of Del Rio Transportation
Planned Projects	
<ul style="list-style-type: none"> ▪ City of Del Rio Transportation Transit Operations Center, AVL, and MDTs 	
Additional Needs	
<ul style="list-style-type: none"> ▪ Evacuation Planning ▪ City of Del Rio Transportation Security System ▪ Transit Operations Center/City of Del Rio TOC Connection ▪ Del Rio Paratransit Web-Based Scheduling System and Trip Planner 	

Transit Traveler Information (APTS08)	High Priority
<p>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.</p>	
Existing Infrastructure	Agency
None identified at this time	
Planned Projects	
<ul style="list-style-type: none"> ▪ City of Del Rio Transportation Transit Operations Center, AVL, and MDTs 	
Additional Needs	
<ul style="list-style-type: none"> ▪ Del Rio Paratransit Web-Based Scheduling System and Trip Planner 	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Electronic Clearance (CVO03)	High Priority
<p>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.</p>	
Existing Infrastructure None identified at this time	Agency
Planned Projects None identified at this time	
Additional Needs None identified at this time	

HAZMAT Management (CVO10)	High Priority
<p>This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material 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 by the Fleet and Freight Management Subsystem. The latter information can be provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation.</p>	
Existing Infrastructure None identified at this time	Agency
Planned Projects <ul style="list-style-type: none"> ▪ City of Del Rio Emergency Services Central Dispatch 	
Additional Needs None identified at this time	



Table 3 – High Priority Market Packages for the Del Rio Region (continued)

Broadcast Traveler Information (ATIS01)	High Priority
<p>This market package collects traffic conditions, advisories, general public transportation, 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 HAR and DMS information capabilities.</p> <p>The information may be provided directly to travelers by an information service provider (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.</p>	
Existing Infrastructure None identified at this time	Agency
Planned Projects	
<ul style="list-style-type: none"> ▪ TxDOT HCRS Enhancements 	
Additional Needs	
<ul style="list-style-type: none"> ▪ Del Rio Regional Communications Master Plan ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Del Rio Area Office Web Page 	

ITS Data Mart (AD01)	High Priority
<p>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.</p> <p>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.</p>	
Existing Infrastructure	Agency
<ul style="list-style-type: none"> ▪ Accident Database ▪ Border Crossing Statistic Archive 	<ul style="list-style-type: none"> ▪ City of Del Rio ▪ US Customs, Border Business International
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 Del Rio 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 also was a factor in the prioritization. Availability and maturity of technology also was a consideration, particularly for the maintenance and construction management market packages. These market packages were recently developed and added to the National ITS Architecture, and are not yet widely deployed. It is recommended that stakeholders in the Del Rio Region review deployments of some of the maintenance and construction technologies in other areas over the next several years to assess how well they have performed, benefits, and cost-effectiveness.

Table 4 – Medium Priority Market Packages for the Del Rio Region

Standard Railroad Grade Crossing (ATMS13)	Medium Priority
<p>This 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.</p> <p>These traditional HRI warning systems also may 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 also may 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.</p>	
Existing Infrastructure <ul style="list-style-type: none"> ▪ Railroad Signal Preemption 	Agency <ul style="list-style-type: none"> ▪ TxDOT
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 4 – Medium Priority Market Packages for the Del Rio Region (continued)

Advanced Railroad Grade Crossing (ATMS14)	Medium Priority
<p>This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements demand advanced features (e.g., where speeds are greater than 80 miles per hour). This market package includes all capabilities from the Standard Railroad Grade Crossing Market package and augments these with additional safety features to mitigate the risks associated with higher rail speeds. The active warning systems supported by this market package include positive barrier systems that preclude entrance in to the intersection when the barriers are activated. Like the standard package, the HRI equipment is activated on notification by wayside interface equipment which detects, or communicates with the approaching train. In this market package the wayside equipment provides additional information about the arriving train so that the train's direction of travel, estimated time of arrival and estimated duration of closure may be derived. This enhanced information may be conveyed to the driver prior to, or in context with, warning system activation. This market package also includes additional detection capabilities that enable it to detect an entrapped or otherwise immobilized vehicle within the HRI and provide an immediate notification to highway and railroad officials.</p>	
Existing Infrastructure None identified at this time	Agency
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Railroad Operations Coordination (ATMS15)	Medium Priority
<p>This market package provides an additional level of strategic coordination between rail operations and traffic management centers. Rail operations provides train schedules, maintenance schedules, and any other forecast events that will result in highway-rail intersection (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.</p>	
Existing Infrastructure None identified at this time	Agency
Planned Projects None identified at this time	
Additional Needs None identified at this time	



Table 4 – Medium Priority Market Packages for the Del Rio Region (continued)

Roadway Maintenance and Construction (MC07)	Medium Priority
<p>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.</p>	
Existing Infrastructure None identified at this time	Agency
Planned Projects	
<ul style="list-style-type: none"> ▪ TxDOT HCRS Enhancements 	
Additional Needs None identified at this time	

Work Zone Management (MC08)	Medium Priority
<p>This market package directs activity in work zones, controlling traffic through portable DMS and informing other groups of activity (e.g., ISP, TM, and other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.</p>	
Existing Infrastructure <ul style="list-style-type: none"> ▪ TxDOT Portable DMS 	Agency <ul style="list-style-type: none"> ▪ TxDOT
Planned Projects	
<ul style="list-style-type: none"> ▪ TxDOT Center to Center Communications ▪ TxDOT Highway Advisory Radio Phase 1 	
Additional Needs	
<ul style="list-style-type: none"> ▪ City of Del Rio TOC ▪ TxDOT Portable DMS ▪ TxDOT HAR Phase 2 ▪ County Portable DMS ▪ Regional 511 Advanced Traveler Information System Server 	



Table 4 – Medium Priority Market Packages for the Del Rio Region (continued)

Transit Security (APTS05)	Medium Priority
<p>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.</p> <p>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.</p>	
Existing Infrastructure	Agency
None identified at this time	
Planned Projects	
None identified at this time	
Additional Needs	
<ul style="list-style-type: none"> ▪ City of Del Rio Transportation Security System 	

ITS Data Warehouse (AD2)	Medium Priority
<p>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.</p>	
Existing Infrastructure	Agency
None identified at this time	
Planned Projects	
None identified at this time	
Additional Needs	
<ul style="list-style-type: none"> ▪ Regional Accident/Crash Database 	



2.4 Low Priority Market Packages

Eight market packages were identified and customized for the Del Rio Region, but 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. Stakeholders also did not want to preclude these market packages from future deployment in the Region, so it was decided to keep these market packages as part of the Regional ITS Architecture.

Some of these market packages were identified as candidates for private sector deployment and operations, or will require a public-private partnership for implementation and ongoing operations. For example, ISP-Based Route Guidance could require a partnership between the TxDOT Motor Carrier Division and private commercial trucking fleets. Similarly, Probe Surveillance using commercial vehicles was identified as a potential source of road and traffic condition data, and this will require participation of truck drivers for in-vehicle transponders as well as a substantial public investment in roadside infrastructure for data collection. The use of transit fleets as probe vehicles also was discussed as a possibility. While both of these are not high priority needs, Del Rio stakeholders did not want to preclude them from future consideration.

Table 5 – Low Priority Market Packages for the Del Rio Region

Market Package Name	Description	Comments
Probe Surveillance (ATMS02)	<p>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 and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem.</p> <p>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 the user has the ability to turn off the probe functions to ensure individual privacy.</p>	<p>Probe surveillance was not deemed a high priority market package at the time of the initial architecture development in the Del Rio Region. For probe data to be consistent and accurately reflect current conditions there must be a quantifiable amount of vehicles equipped with probes on the roadways at any given time.</p> <p>The Del Rio Region might want to investigate the feasibility of using probe surveillance in the future to assist with determining near-real-time volume information on roads or freeways. Potential probe vehicle candidates could be buses or vehicles equipped with electronic toll tags.</p>



Table 5 – Low Priority Market Packages for the Del Rio Region (continued)

Market Package Name	Description	Comments
Maintenance and Construction Vehicle Tracking (MC01)	This market package will track the location of maintenance and construction 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.	This market package was not identified as needed for the Del Rio Region at this time; however it was expected that the information from Maintenance and Construction Vehicle Tracking may be useful to the Region some time in future if these activities were to become more automated. Included in this market package would be instrumentation of maintenance and construction vehicles with AVL.
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.	The Del Rio Region did not have a need for this market package based on the current state of technology. As technology evolves, the Region may consider implementation in the future.
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.	Based on the current state of technology, this market package was not identified as needed in the Del Rio Region at this time. As technology evolves, the Region may consider implementation of this market package in the future.
Transit Maintenance (APTS06)	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.	Transit maintenance was identified as an issue in the Region. The Del Rio Region might want to consider this market package as a future deployment.



Table 5 – Low Priority Market Packages for the Del Rio Region (continued)

Market Package Name	Description	Comments
Multi-Modal Coordination (APTS07)	<p>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.</p>	<p>The Del Rio Region might want to consider this market package as a future deployment to coordinate buses with other modes of transportation.</p>
Interactive Traveler Information (ATIS2)	<p>This market package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. The traveler can obtain current information regarding traffic conditions, transit services, ride share/ride match, parking management, and pricing information.</p> <p>Information can be accessed via phone, kiosk, Personal Digital Assistant, personal computer, and a variety of in-vehicle devices. Successful deployment of this market package relies on availability of real-time transportation data from roadway instrumentation, probe vehicles or other means.</p>	<p>The Del Rio Region might want to consider this market package as a future deployment. Several of the components of this market package, such as personal digital assistants and in-vehicle devices will be deployed by the private sector.</p>



Table 5 – Low Priority Market Packages for the Del Rio Region (continued)

Market Package Name	Description	Comments
ISP-Based Route Guidance (ATIS06)	This market package offers the user pre-trip route planning and turn-by-turn route guidance services, which are generated by an Information Service Provider. 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 in the deployment of those projects 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 CCTV cameras only at freeway interchanges. In another Region, there may be a desire for full motion cameras deployed at every mile 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 Del Rio Region on October 9, 2003 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.

Following each table, a more detailed description of individual projects is included. This section also includes the market packages associated with the 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 Del Rio 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 Closed Loop Signal System Expansion Phase 1	Expand closed loop signal system in the Del Rio Region, including signals, controllers and VIVDS	TxDOT	To Be Determined	Yes	5 years
TxDOT Highway Advisory Radio (HAR) Phase 1	Implement a HAR system in the Del Rio Region for dissemination of traffic and roadway conditions	TxDOT	\$30,000/ transmitter plus cost of beacon signs	Yes	3 years
City of Del Rio Closed Loop Signal System Implementation	Upgrade signal system in the City of Del Rio to a closed loop signal system	Implementation: TxDOT Operations and Maintenance: City of Del Rio	To Be Determined	No	2 years
City of Del Rio TOC	Establish a TOC in Del Rio for the control of City of Del Rio Traffic Signals, flood monitoring and eventual CCTV monitoring	Implementation: TxDOT Operations and Maintenance: City of Del Rio	\$200,000	No	2 years
Dynamic Message Signs for Border Patrol Checkpoints Phase 1	Implement DMS on approaches to Border Patrol Checkpoints in the Region to provide traveler information. This project will be phased and will instrument the checkpoints with greatest congestion levels first.	TxDOT	\$100,000/sign	No	2 years
Del Rio Regional Communications Master Plan	Develop Regional Communications Master Plan, including needs analysis and recommendations	TxDOT/City of Del Rio	\$150,000	No	6 months
Emergency Management					
Evacuation Planning	Develop evacuation routes and procedures to be used during evacuations for flooding or other hazardous conditions. Planning will need to include coordination with public transit.	TxDOT, DPS, Val Verde County Sheriff, US Border Patrol	\$75,000	No	1 year
City of Del Rio Emergency Services Central Dispatch	Establish a central dispatch location in the new fire station for dispatch of police and fire	City of Del Rio	\$800,000 (Combined cost for EOC, central dispatch and new fire station)	Yes	2 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)					
Del Rio Regional Emergency Operations Center (EOC)	Establish an EOC for the Del Rio Region in the City of Del Rio	City of Del Rio, Val Verde County	\$800,000 (Combined cost for EOC, central dispatch and new fire station)	Yes	2 years
Emergency Vehicle Traffic Signal Preemption	Perform feasibility study and install emergency vehicle signal preemption capability on traffic signals and emergency vehicles in the Region	TxDOT/City of Del Rio	\$250,000	Yes	2 years
Maintenance and Construction Management					
TxDOT Flood Monitoring Phase 1	Implement flood monitoring/warning systems in the City of Del Rio	TxDOT	To Be Determined	Yes	1 year
TxDOT HCRS Enhancements	Implement enhancements to the Highway Conditions Reporting System (HCRS)	TxDOT	N/A	Yes (statewide initiative)	1 year
TxDOT Portable DMS	Procure additional portable DMS for TxDOT maintenance crews	TxDOT	\$30,000/sign	No	6 months
Public Transportation Management					
City of Del Rio Transportation Transit Operations Center, AVL, and MDTs	Implement a Transit Operations Center to manage routine operations of the transit systems as well as emergency operations. This project also includes the installation of AVL and MDTs on fixed-route and paratransit vehicles in the Del Rio fleet to provide real-time bus location information and allow text communication with the driver about weather, construction, route changes or other items	City of Del Rio Transportation	\$200,000	Yes	1 year



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

Program Area/Project	Description	Responsible Agency	Probable Cost*	Funding Identified	Estimated Project Duration
Information Management					
Regional Accident/Crash Database	Implement system to archive accident data from multiple agencies in the Region, including DPS, local police, and county sheriff	City of Del Rio, Val Verde County Sheriff	\$100,000	No	2 years

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



Del Rio Region Short-Term Projects (5-Year)

Travel and Traffic Management

TxDOT Closed Loop Signal System Expansion Phase 1

Associated Market Packages:

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

Prerequisite Projects: None

Description: Expand the closed loop signal system by converting existing signalized intersections to the closed-loop signal system. New signals that are installed as part of other projects will become part of the closed loop signal system. This project also includes the installation of VIVDS. TxDOT Laredo currently has two new signals planned for the Region and to upgrade two signals to VIVDS.

TxDOT Highway Advisory Radio (HAR) Phase 1

Associated Market Packages:

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

Prerequisite Projects: None

Description: This project will implement HAR transmitters at sites throughout the Region. HAR will allow operators at the Del Rio Area Office or Laredo District Office to record travel advisory messages related to traffic, incidents, and weather for transmission at the roadside to vehicles traveling in the vicinity of the HAR transmitter(s). The estimated cost per transmitter is \$30,000. The cost of the project phase will depend on the number of transmitters installed as well as the cost and number of accompanying beacon signs that will be needed.

City of Del Rio Closed Loop Signal System Implementation

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a closed loop signal system in the City of Del Rio. This project will be implemented by TxDOT and then turned over to the City of Del Rio for operations and maintenance.



The project will be performed as part of an integration project aimed at connecting signal systems to improve incident management.

City of Del Rio TOC

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: None

Description: Installation of equipment needed to monitor and manage traffic flow in the city of Del Rio. Control of closed loop signal systems in the City of Del Rio as well as shared operations of TxDOT cameras within the city will occur from the TOC. The estimated cost for this TOC is approximately \$200,000.

Dynamic Message Signs for Border Patrol Checkpoints Phase 1

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project consists of the deployment of permanent DMS at locations along roadways in the Region approaching Border Patrol Checkpoints for purposes of traffic information dissemination and incident management. DMS also will be utilized in conjunction with emergency evacuation coordination (i.e., HAZMAT, weather, etc.). This project will be phased and will instrument the checkpoints with greatest congestion levels first. The estimated cost per sign is approximately \$100,000.

Del Rio Regional Communications Master Plan

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Broadcast Traveler Information (ATIS01)

Prerequisite Projects: None

Description: Develop a Regional Communications Master Plan for the Del Rio Region. 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 traffic management centers, emergency management centers, and 911 centers, both within the Region and inter-Regional) and field-to-center links (from the TMCs out to the ATMS field devices, traffic signals, etc.) will be defined. The report will investigate technology and transmission media options, comparing technologies, bandwidths, life cycle costs, and other requirements against the Region's needs and goals. Based on Regional radio communications issues, the communications master plan will also include an evaluation and recommendations for the radio communications network in the Region.

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 because there may be significant benefits in combining capital improvement funds to install telecommunications infrastructure to support interagency coordination needs. The estimated cost to develop this plan is \$150,000.

Emergency Management

Evacuation Planning

Associated Market Packages:

- Surface Street Control (ATMS03)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Emergency Response (EM1)
- Emergency Routing (EM2)
- Transit Fixed Route Operations (APTS02)
- Demand Response Transit Operations (ATPS03)

Prerequisite Projects: None

Description: Develop evacuation plans for the Del Rio Region to be used in case of a natural or man-made disaster or incident. These plans will include the use of DMS and signal timing plan modifications



in order to achieve timely and efficient evacuation of the Region. The estimated cost is approximately \$75,000.

City of Del Rio Emergency Services Central Dispatch

Associated Market Packages:

- Incident Management System (ATMS08)
- HAZMAT Management (CVO10)
- Emergency Response (EM1)
- Emergency Routing (EM2)

Prerequisite Projects: None

Description: Emergency Services Central Dispatch will consolidate all City of Del Rio and Val Verde County emergency services dispatch functions. The center will be located in the new fire station that is currently under construction and will facilitate coordination of emergency operations during an incident.

Del Rio Regional Emergency Operations Center (EOC)

Associated Market Packages:

- Incident Management System (ATMS08)
- Emergency Response (EM1)
- Emergency Routing (EM2)

Prerequisite Projects: None

Description: This EOC will be responsible for the management of all emergency preparedness program areas within Del Rio. The primary role of the center is to develop and implement comprehensive disaster planning, mitigation and response activities. Additionally, the EOC develops and maintains emergency plans for all types of natural and man-made hazards, and provides the analysis and recommendations necessary to make decisions that will effectively save lives and protect property in such emergencies. This EOC will be activated for major incidents/emergencies in the Del Rio Region, and will be staffed by representatives of all allied responding agencies. The EOC will be co-located with the central dispatch at the fire station.

Emergency Vehicle Traffic Signal Preemption

Associated Market Packages:

- Surface Street Control (ATMS03)
- Emergency Response (EM1)
- Emergency Routing (EM2)

Prerequisite Projects: None

Description: Perform a feasibility study and equip traffic signals and fire vehicles in the Region with traffic signal preemption equipment. 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 proven to improve safety of emergency personnel and vehicles en-route to an incident.

Maintenance and Construction Management

TxDOT Flood Monitoring Phase 1

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement flood monitoring equipment on flood-prone segments of roadway in the Del Rio Region. 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 and 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 Del Rio Area Office. Communications between the flood detection stations and the Area 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.

Phase 1 includes three flood detection stations, four pairs of low water crossing warning flasher signs, and four CCTV cameras along Veterans Boulevard to monitor road conditions.

TxDOT HCRS Enhancements

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- Incident Management System (ATMS08)
- Roadway Maintenance and Construction (MC07)
- Maintenance and Construction Activity Coordination (MC010)

Prerequisite Projects: None

Description: TxDOT's HCRS will be enhanced on a statewide basis. The HCRS will use data from the Del Rio Area 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; Del Rio 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.

TxDOT Portable DMS

Associated Market Packages:

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

Prerequisite Projects: None

Description: Portable DMS are a valuable tool to communicate existing and future closures, restrictions, detours, alternate routes, and other important information to motorists while they are en-route. These signs can be used at or near work zones to notify motorists of activity and appropriate measures to take (i.e., detour, slow down), but also can be mobilized at specific locations as conditions warrant, such as flooding or other closures. Portable DMS can be stand-alone signs or mounted to the back of a maintenance vehicle. Programming is typically done manually at the sign. The TxDOT Del Rio Area Office currently has access to portable DMS that can be used in the Region. This project will procure additional portable DMS. The estimated cost is \$30,000 a sign.

Public Transportation Management

City of Del Rio Transportation Transit Operations Center (TOC), Automated Vehicle Location (AVL), and Mobile Data Terminals (MDTs)

Associated Market Packages:

- Transit Vehicle Tracking (APTS01)
- Transit Fixed-Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Multimodal Coordination (APTS07)
- Transit Traveler Information (APTS08)

Prerequisite Projects: None

Description: Establish a Transit Operations Center (TOC) to manage routine operations of the transit systems as well as emergency operations. The project also includes installing AVL and MDT units on City of Del Rio Transportation vehicles. The AVL system will convey information regarding real-time vehicle location to the TOC, 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 the TOC, usually via global positioning system. Used with a geographic information system (GIS) 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, 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 automatic 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.

Mobile data terminals allow bus 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 scheduled route for both fixed-route and demand-response transit operations. MDTs also can 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.

The cost of implementing the components of this project is estimated to be \$200,000.

Information Management

Regional Accident/Crash Database

Associated Market Packages:

- ITS Data Warehouse (AD2)

Prerequisite Projects: None

Description: Implement a system to archive accident data from multiple agencies in the Region. A central archived data server will be developed by the City of Del Rio Police and Val Verde County Sheriff that will collect, process, store and provide access to historical accident data from throughout the Region, including accident/crash information from DPS, Del Rio Police, and the Val Verde County Sheriff. Communications links will be necessary between the data sources and the archive. This project will design the frequency, quantity, and quality of data to be collected and stored. User interfaces will be required at each “user” agency to be able to access, search, and upload archived data as needed. The interface will likely be web-based.



Table 7 – Mid-Term Projects (10-Year)

Program Area/Project	Description	Responsible Agency	Probable Cost*	Funding Identified	Estimated Project Duration
<i>Travel and Traffic Management</i>					
TxDOT Advanced Traffic Management System (ATMS)	Implement TxDOT ATMS in the TxDOT Del Rio TOC	TxDOT	N/A	Yes (statewide initiative)	6 months
TxDOT Center-to-Center Communications (Statewide)	Enhance coordination with other TxDOT Districts through implementation of center-to-center communications between the Del Rio Area Office and other TxDOT Districts	TxDOT	N/A	Yes (statewide initiative)	1 year
TxDOT Highway Advisory Radio (HAR) Phase 2	Continue implementation of a HAR system in the Del Rio Region for dissemination of traffic and roadway conditions	TxDOT	\$30,000/transmitter plus cost of beacon signs	No	3 years
TxDOT Closed Loop Signal System Expansion Phase 2	Continue expansion and upgrade of closed loop signal system at TxDOT intersections throughout Region	TxDOT	To Be Determined	No	10 years
TxDOT Del Rio Area Office Web Page	Implement a web page for the Del Rio Area Office to provide travel information, real-time traffic conditions, hurricane evacuation information/advisories, closures, etc. The site will include TxDOT and local agency information and can possibly be an extension of the TxDOT Laredo STRATIS site.	TxDOT	\$25,000 plus cost of periodic updates	No	2 years
Dynamic Message Signs for Border Patrol Checkpoints Phase 2	Implement DMS on approaches to Border Patrol Checkpoints in the Region to provide traveler information. This project will be phased and will instrument the checkpoints with greatest congestion levels first.	TxDOT	\$100,000/sign	No	2 years
Regional 511 Advanced Traveler Information System Server	Implement an Advanced Traveler Information System (ATIS) Server in the Laredo District Office that will collect, consolidate and distribute travel information to 511 phone based system, web, and private Information Service Providers (ISPs)	TxDOT	To Be Determined	No	1 year



Table 7 – Mid-Term Projects (10-Year) (continued)

Program Area/Project	Description	Responsible Agency	Probable Cost*	Funding Identified	Estimated Project Duration
Travel and Traffic Management (continued)					
City of Del Rio Closed Loop Signal System Expansion Phase 1	Expand and upgrade the closed loop signal system in the City of Del Rio, including expansion of VIVDS	Implementation: TxDOT Operations and Maintenance: City of Del Rio	To Be Determined	No	5 years
City of Del Rio CCTV	Implement CCTV cameras at key intersections and along key corridors in the City of Del Rio including border crossings	TxDOT/City of Del Rio	\$25,000/site	No	2 years
City of Del Rio TOC/TxDOT Area Office TMC Communications Connection	Implement a connection between the City of Del Rio TOC and TxDOT District Office to allow shared video viewing, traffic data sharing, and incident management coordination	TxDOT/City of Del Rio	To Be Determined	No	3 months
Emergency Management					
TxDOT Flood Monitoring Phase 2	Install additional flood detection systems at key locations in the Region prone to flooding	TxDOT	\$25,000/site	No	6 months
DPS/TxDOT Area Office TMC Connection	Establish connection to TxDOT Area Office TMC for CCTV shared monitoring	TxDOT/DPS	To Be Determined	No	3 months
EOC/TxDOT Area Office TMC Connection	Implement a communications connection from the TxDOT Del Rio TOC to the Del Rio Regional Emergency Operations Center	TxDOT/EOC	To Be Determined	No	3 months
EOC/DPS Connection	Implement a communications connection from the Del Rio Emergency Operations Center to the DPS	DPS/City of Del Rio/Val Verde County	To Be Determined	No	3 months
EOC/US Border Patrol Connection	Implement a communications connection from the Del Rio Emergency Operations Center to the US Border Patrol	US Border Patrol/City of Del Rio/Val Verde County	To Be Determined	No	3 months
EOC/Del Rio Centralized Dispatch Connection	Implement a communications connection from the Del Rio Emergency Operations Center to the Centralized Dispatch	City of Del Rio	To Be Determined	No	3 months
City of Del Rio Emergency Vehicle AVL and MDTs	Implement AVL and MDTs on fire and EMS vehicles for real-time location information and vehicle communications with CAD system	City of Del Rio	\$10,000/vehicle includes software	No	2 years



Table 7 – Mid-Term Projects (10-Year) (continued)

Program Area/Project	Description	Responsible Agency	Probable Cost*	Funding Identified	Estimated Project Duration
<i>Maintenance and Construction Management</i>					
County Portable DMS	Procure portable DMS for Val Verde county maintenance crews	Counties	\$30,000/sign	No	6 months
<i>Public Transportation</i>					
City of Del Rio Transportation Security System	Implement on-board security alarms on all Del Rio fixed route and paratransit vehicles	City of Del Rio Transportation	To Be Determined	No	1 year
Transit Operations Center/City of Del Rio TOC Communications Connection	Implement a connection between the City of Del Rio TOC and Transit Operations Center to allow traffic data sharing and incident management coordination	City of Del Rio	To Be Determined	No	3 months

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

Del Rio Region Mid-Term Projects (10-Year)

Travel and Traffic Management

TxDOT Advanced Traffic Management System (ATMS)

Associated Market Packages:

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

Prerequisite Projects: None

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

The TxDOT ATMS is a software and hardware based platform 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 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 (NTCIP) standards for CCTV, Center-to-Center (C2C) Communications, and data collection devices.

This ATMS implementation project 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:

- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control and Coordination (ATMS07)
- Incident Management System (ATMS08)
- Weather Information Processing and Distribution (MC04)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: TxDOT Advanced Traffic Management System (ATMS) Implementation

Description: The Center-to-Center Communications project will enhance coordination with TxDOT Districts (and potentially other agencies) through connection to the statewide C2C core infrastructure. A communication backbone must be developed with sufficient capacity between the TxDOT Del Rio Area Office and existing C2C 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 C2C 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 Del Rio Area Office and the TxDOT Laredo District Office, as well as to other statewide C2C facilities. As part of connecting to the statewide C2C infrastructure, the Del Rio 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 Highway Advisory Radio (HAR) Phase 2

Associated Market Packages:

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

Prerequisite Projects: None

Description: This project will continue to implement HAR transmitters at sites throughout the Region to expand the HAR coverage in the Region. HAR will allow operators at the Del Rio Area Office or Laredo District Office to record travel advisory messages related to traffic, incidents, and weather for transmission at the roadside to vehicles traveling in the vicinity of the HAR transmitter(s). The estimated cost per transmitter is \$30,000. The cost of the project phase will depend on the number of transmitters installed as well as the cost and number of accompanying beacon signs that will be needed.

TxDOT Closed Loop Signal System Expansion Phase 2

Associated Market Packages:

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

Prerequisite Projects: TxDOT Closed Loop Signal System Phase 1

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

TxDOT Del Rio Area Office Web Page

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS1)
- Weather Information Processing and Distribution (MC04)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: None

Description: The TxDOT Del Rio Area Office plans to implement a web page that will serve as a traveler information tool for motorists in the Region. This web page will be an enhanced version of what Del Rio-area information is currently available via the statewide TxDOT web page, and is envisioned to include current closures and restrictions, maintenance activities, hazards, real-time weather and pavement conditions, weather emergencies impacting travel, hurricane evacuation information, and motorist alerts and advisories. Additional content and links could include information about traveler services in towns and cities in the Region, or links to Chambers of Commerce. Information on major corridors in neighboring regions could be included. The web page will be managed and updated by the Public Information Officer in the TxDOT Laredo District Office.

Dynamic Message Signs for Border Patrol Checkpoints Phase 2

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project continues the deployment of permanent DMS at locations along roadways in the Region approaching Border Patrol Checkpoints for purposes of traffic information dissemination and incident management. DMS also will be utilized in conjunction with emergency evacuation coordination (i.e., HAZMAT, weather, etc.). This project will be phased and will instrument the checkpoints with greatest congestion levels first. The estimated cost per sign is approximately \$100,000.

Regional 511 Advanced Travel Information System Server

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- ISP-Based Route Guidance Support (ATIS06)
- Weather Information Processing and Distribution (MC04)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)

Prerequisite Projects: TxDOT Advanced Traffic Management System (ATMS), TxDOT Center-to-Center Communications, TxDOT Highway Condition Reporting System Enhancements

Description: Install a server dedicated to ATIS in the TxDOT Laredo District Office. 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 also web and to private partners who desire access to information in the Del Rio 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 could 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.

City of Del Rio Closed Loop Signal System Expansion Phase 1

Associated Market Packages:

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

Prerequisite Projects: None

Description: Expand the closed loop signal system in the City of Del Rio. This project will likely be implemented by TxDOT and then turned over to the City of Del Rio for operations and maintenance. The project will be performed as part of an integration project aimed at connecting signal systems to improve incident management.



City of Del Rio CCTV

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: This project includes the deployment of CCTV cameras at selected intersections in the City of Del Rio. The CCTV cameras can be used to monitor congestion associated with recurring events and signal control adjusted according to the vehicular demand. The information gathered by the CCTV cameras (video feed) can be shared with the TxDOT Area Office for shared or after-hours viewing/monitoring.

City of Del Rio TOC/TxDOT Area Office TMC Communications Connection

Associated Market Packages:

- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS 06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Weather Information Processing and Distribution (MC04)
- Maintenance and Construction Activity Coordination (MC10)
- Emergency Routing (EM2)

Prerequisite Projects: TxDOT ATMS

Description: Implement a connection between the City of Del Rio TOC and the TxDOT Area Office TMC to allow shared viewing of video, traffic information, and other mutually beneficial data. Shared monitoring and control capabilities provided through the connection could also allow for joint operations of City equipment (i.e., traffic signals) by TxDOT staff, such as for after-hours or on weekends, if the TxDOT Area Office TMC or STRATIS in Laredo serves as a 24/7 facility in an emergency event. Data/video sharing and other joint operation policies need to be developed and agreed upon between TxDOT and the City of Del Rio, preferably before final design of the systems begins, because some policies may have a direct impact on design strategies.

Emergency Management

TxDOT Flood Monitoring Phase 2

Associated Market Packages:

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

Prerequisite Projects: None

Description: Continue to implement flood monitoring equipment on flood-prone segments of roadway in the Del Rio Region. 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 and 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 Del Rio Area Office. Communications between the flood detection stations and the Area 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.

Phase 2 will instrument additional sites in the Region with monitoring equipment. This phase could also include the establishment of a website where video images can be displayed.

DPS/TxDOT Area Office TMC Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS 06)
- Incident Management System (ATMS08)
- Emergency Response (EM1)
- Emergency Routing (EM2)

Prerequisite Projects: None

Description: Install telecommunications connection and end equipment from the DPS dispatch center to TxDOT Del Rio TOC to share CCTV and incident data/images and provide information on current road conditions that could assist with incident/emergency management. The cost for this project will depend on the communications used to implement the connection (i.e., fiber connection or leased lines).

EOC/TxDOT Area Office TMC Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS 06)
- Incident Management System (ATMS08)
- Emergency Routing (EM2)

Prerequisite Projects: None

Description: Install telecommunications connection and end equipment from the Emergency Operations Center (co-located with City of Del Rio Central Dispatch) to TxDOT Del Rio TOC to share CCTV and current road condition data that could assist with incident/emergency management. The cost for this project will depend on the technology used to implement the connection (i.e., fiber or leased lines).

EOC/DPS Connection

Associated Market Packages:

- Emergency Response (EM1)

Prerequisite Projects:

Description: Install telecommunications connection from the Emergency Operations Center (co-located with City of Del Rio Central Dispatch) to the DPS to share incident/emergency information and facilitate coordination. The cost for this project will depend on the technology used to implement the connection (i.e., fiber or leased lines).

EOC/US Border Patrol Connection

Associated Market Packages:

- Emergency Response (EM1)

Prerequisite Projects:

Description: Install telecommunications connection from the Emergency Operations Center (co-located with City of Del Rio Central Dispatch) to the US Border Patrol to share incident/emergency information and facilitate coordination. The cost for this project will depend on the technology used to implement the connection (i.e., fiber or leased lines).

EOC/Del Rio Centralized Dispatch Connection

Associated Market Packages:

- Emergency Response (EM1)

Prerequisite Projects:

Description: Install telecommunications connection from the Emergency Operations Center to the US Del Rio Centralized Dispatch to share incident/emergency information and facilitate coordination. Because these two centers are located in the same building costs should be minimal.

City of Del Rio Emergency Vehicle AVL and MDTs

Associated Market Packages:

- Emergency Response (EM1)
- Emergency Vehicle Routing (EM2)

Prerequisite Projects: None

Description: Install AVL and MDT units on City of Del Rio fire, police and EMS vehicles. The AVL system will convey information regarding real-time vehicle location to the dispatch centers, which will allow for enhanced dispatch, routing (or re-routing), as well as provide for precise vehicle location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of vehicles, and relay that information back to a dispatch center, usually via global positioning system. The MDTs will enable emergency services to access information regarding the nearest route and geographical location of an incident.

Costs will vary depending on the number of vehicles equipped with the units. For planning purposes, it is estimated that the cost per vehicle is approximately \$10,000.

Maintenance and Construction Management

County Portable DMS

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: This project would procure portable DMS for Val Verde county maintenance crews. Portable DMS are a valuable tool to communicate existing and future closures, restrictions, detours, alternate routes, and other important information to motorists while they are en-route. These signs can be used at or near work zones to notify motorists of activity and appropriate measures to take (i.e., detour, slow down), but also can be mobilized at specific locations as conditions warrant, such as flooding or other closures. Portable DMS can be stand-alone signs or mounted to the back of a maintenance vehicle. Programming is typically done manually at the sign. The estimated cost is \$30,000 per sign.



Public Transportation Management

City of Del Rio Transportation Security System

Associated Market Packages:

- Transit Fixed Route Operations (APTS02)
- Demand Response Transit Operations (APTS03)
- Transit Security (APTS05)

Prerequisite Projects: None

Description: This project will install alarm buttons on City of Del Rio Transportation vehicles. 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.

Transit Operations Center/City of Del Rio TOC Communications Connection

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Transit Fixed-Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)

Prerequisite Projects: City of Del Rio Transportation Transit Operations Center, AVL and MDTs

Description: Implement communications link between the City of Del Rio TOC and the City of Del Rio Transportation Transit Operations Center. This center-to-center application supports coordination with traffic management centers to obtain near real-time traffic conditions on transit routes in order to generate optimum schedules and alternate routes when necessary. In addition, information on service/fleet performance and incident information and schedules will be provided to the TOC.

The extent to which information and coordination are shared between the centers will be determined through working arrangements among the agencies/jurisdictions involved. The cost for this project will depend on the communications used to implement the connection (i.e., fiber connection or leased lines).



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 Closed Loop Signal System Expansion Phase 3	Continue expansion and upgrade of closed loop signal system for TxDOT operated signals (including VIVIDS)	TxDOT	To Be Determined	No	5 years
City of Del Rio Closed Loop Traffic Signal System Expansion Phase 2	Continue to expand and upgrade the closed loop signal system in the City of Del Rio, including the expansion of VIVDS	Implementation: TxDOT Operations and Maintenance: City of Del Rio	To Be Determined	No	5 years
ISP-Based Route Guidance	Provided 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					
Emergency Call-Out System	Implement emergency call-out phone system for Val Verde County	Val Verde County Sheriff	To Be Determined	No	4 years
Public Transportation Management					
Del Rio Paratransit Web-Based Scheduling System and Trip Planner	Implement web-based dial-a-ride and travel information systems to provide automated access to schedule, status and reservation capabilities for transit patrons	City of Del Rio	\$100,000	No	2 years

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

Del Rio Region Long-Term Projects (20-Year)

Travel and Traffic Management

TxDOT Closed Loop Signal System Expansion Phase 3

Associated Market Packages:

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

Prerequisite Projects: TxDOT Closed Loop Signal System Expansion Phase 1, TxDOT Closed Loop Signal System Expansion Phase 2

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

City of Del Rio Closed Loop Signal System Expansion Phase 2

Associated Market Packages:

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

Prerequisite Projects: City of Del Rio Closed Loop Signal System Implementation, City of Del Rio Closed Loop Signal System Expansion Phase 1

Description: Continue to expand the closed loop signal system in the City of Del Rio. This project will likely be implemented by TxDOT and then turned over to the City of Del Rio for operations and maintenance. The project will be performed as part of an integration project aimed at connecting signal systems to improve incident management.

ISP-Based Route Guidance

Associated Market Packages:

- ISP-Based Route Guidance (ATIS06)

Prerequisite Projects: TxDOT Advanced Traffic Management System (ATMS) Implementation

Description: Provide Information Service Providers (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.

Emergency Management

Emergency Call-Out System

Associated Market Packages:

- Incident Management System (ATMS08)

Prerequisite Projects: None

Description: Establish an emergency call-out system to notify the public of emergency events in the Region. The system would call every household in an area and play a recorded message with details of action required on the part of the resident. This could be information regarding a prison escapee, hurricane evacuation, hazardous materials spill, or other incident where a large segment of the community needs to be made aware of an emergency condition.

Public Transportation Management

Del Rio Paratransit Web-Based Scheduling System and Trip Planner

Associated Market Packages:

- Demand-Response Transit Operations (APTS03)
- Multimodal Coordination (APTS07)
- Transit Traveler Information (APTS08)

Prerequisite Projects: Del Rio Transportation Transit Operations Center, AVL, and MDTs

Description: Provide enhanced transit related traveler information to City of Del Rio Transportation paratransit network customers. The on-demand nature of the transit services requires that up-to-the minute information about pick-ups, drop-offs, vehicle location, and any disruptions in service be available not only to the dispatch staff, but also to transit passengers pre-trip. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel information systems. Web-based maps could show locations of the vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination with TxDOT and the local cities would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information.

4. MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN

The Del Rio Regional ITS Deployment Plan is a living document. The recommended projects and timeframes for their 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, as 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 reviewed and updated over time.

TxDOT will serve as the lead agency for maintaining both the Del Rio Regional ITS Architecture and the ITS Deployment Plan. These plans will continue to be driven by stakeholder consensus rather than a single stakeholder. In order for changes to occur in the plan, it is recommended that all stakeholders be invited to a consensus building meeting to discuss any proposed changes to the Regional ITS Architecture or ITS Deployment Plan.

It is recommended that stakeholders meet every two years to review and update the existing Regional ITS Architecture and ITS Deployment Plan. At these meetings, stakeholders should identify which projects in the ITS Deployment Plan have been deployed. Project status (existing, planned, or future) may have to be updated for many of the projects as they move from the future to planned to existing status. New projects that are recommended by a stakeholder for inclusion in the ITS Deployment Plan should also be discussed to ensure that the Region as a whole feels that the project agrees with regional needs and priorities. This same type of consensus building should also be used should the geographic scope of the Region need to change or should additional stakeholders need to be added to the Regional ITS Architecture and ITS Deployment Plan.

Projects that are added to the ITS Deployment Plan should also be reviewed closely to determine if they fit into the current ITS Architecture for the Del Rio 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. The two-year update of the Del Rio Regional ITS Architecture and Deployment Plan should correspond to the two-year update of the Transportation Improvement Program.

Both the Del Rio 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.