



State of Texas  
Regional ITS Architectures and Deployment Plans

# Laredo Region

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## Regional ITS Deployment Plan

*Prepared by:*



Kimley-Horn  
and Associates, Inc.

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## LIST OF ACRONYMS

APC	Automatic Passenger Counter
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVI	Automated Vehicle Identification
AVL	Automatic Vehicle Location
BCS	Bridge Control System
C2C	Center-to-Center
CAA	Community Action Agency
CAD	Computer-Aided Dispatch
CCTV	Closed-Circuit Television
CVISN	Commercial Vehicle Information Systems and Network
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
DPS	Department of Public Safety
DSRC	Dedicated Short Range Communications
ECC	Emergency Communications Center
EOC	Emergency Operations Center
ETC	Electronic Toll Collection
FHWA	Federal Highway Administration
GIS	Geographic Information System
GPS	Global Positioning System
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HCRS	Highway Condition Reporting System
HRI	Highway-Rail Intersections
IFTA	International Fuel Tax Agreement



## LIST OF ACRONYMS

IRP	International Registration Plan
ISP	Information Service Provider
ITS	Intelligent Transportation System
LAN	Local Area Network
LCS	Lane Control Signal
LCU	Local Control Unit
MDT	Mobile Data Terminal
NAFTA	North American Free Trade Agreement
NTCIP	National Transportation Communications for ITS Protocol
OBD	On-Board Diagnostic
OM&M	Operations, Management, and Maintenance
RFID	Radio Frequency Identification
RWIS	Road Weather Information System
TEA-21	Transportation Equity Act for the 21st Century
TMC	Traffic Management Center
TOC	Traffic Operations Center Transit Operations Center
TxDOT	Texas Department of Transportation
TxDPS	Texas Department of Public Safety
USDOT	United States 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 Laredo Region was the third in the series of regional ITS architectures and deployment plans to be prepared as part of this initiative.

The Laredo 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, FHWA, Texas Department of Public Safety (TxDPS), cities, counties, transit agencies, police, fire, U.S. Border Patrol and U.S. Customs.

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

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

Recommended ITS projects in the 5-year, 10-year, and 20-year deployment timeframes were summarized in tables for each deployment horizon. This summary included the project name 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 Laredo 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 the ITS Deployment Plan would need to be periodically reviewed and potentially updated in order to reflect current deployment status as well as re-evaluate priorities. A two-year timeframe was selected by the stakeholders for this update to correspond with the Region's Transportation Improvement Plan update.

## 1. INTRODUCTION

### 1.1 Project Overview

FHWA's 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 ITS Deployment Plan for the Laredo Region was developed using the Regional ITS Architecture developed in 2002. Through the architecture development process, stakeholders reached consensus on the transportation needs in the Region that could be addressed with ITS, worked with the architecture team to customize and prioritize market packages that formed the basis for the ITS Deployment Plan, and identified the required interfaces to provide the desired level of integration of systems and agencies within the Laredo Region.

The Laredo Regional ITS Architecture provided the framework and prioritized the key functions and services desired by stakeholders in the Region. The ITS Deployment Plan builds on the architecture by outlining specific ITS project recommendations and strategies for the Region, and by 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 Laredo Regional ITS Deployment Plan is organized into four key sections:

#### Section 1 – Introduction

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

#### Section 2 – Prioritization of Market Packages

Section 2 contains the prioritized market packages for the Laredo 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 Laredo Region to provide an incremental, phased build-out of the Region’s ITS. These projects are categorized into five-year, ten-year and twenty-year deployment timeframes. Each project recommendation includes a brief description, responsible agency, associated market package, pre-requisite projects or systems (not in the table), an estimate of probable cost, funding identified, and estimated project duration. These recommendations took into consideration existing as well as planned ITS deployments in the Laredo Region.

### **Section 4 – Procedure for Submitting ITS Projects**

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

## **1.3 The Laredo Region**

### *1.3.1 Geography and Regional Characteristics*

The Laredo Region is located just south of the Texas Hill Country on the north bank of the middle Rio Grande River. The ITS stakeholders defined the regional boundaries to correspond with the Rio Grande River and the counties that surround or include the city of Laredo.

There are four counties within this Region:

- Webb;
- Dimmit;
- La Salle; and
- Duval.

The major cities within and immediately adjacent to the Region include Laredo and Nuevo Laredo in Mexico. TxDOT partners with local governments for roadway construction, maintenance, and traffic operations support, and serves as the responsible agency for on-system roadways throughout the Region in cities with populations of less than 50,000. The City of Laredo, with a population just under 200,000 is currently the only city in the Laredo Region with a population that exceeds TxDOT’s threshold.

Laredo is unique because it is the only city that maintains two border crossings, one with the Mexican State of Tamaulipas at Nuevo Laredo and one with Nuevo Leon at Columbia. Laredo is conveniently located on the Pan American Highway (which stretches from Canada into Central and South America), and currently is the U.S. principal port of entry into Mexico. The city has been ranked as the second fastest growing city in the country, due to the passage of the North American Free Trade Agreement (NAFTA), which has brought major trade and industry to the Region. Laredo contains several major border crossings between Mexico and the United States. Commercial vehicle operations, tourism, and international trade are significant economic factors in the Region.



### 1.3.2 *Transportation Infrastructure*

The Laredo Region connects major cities of the United States to Mexico through Laredo and Nuevo Laredo. The roadway network is well developed. The primary facilities include I-35, US 83, US 59, State Highway 359, Loop 20, FM 1472, and Mexico's State Routes 2 and 85 (Pan American Highway).

Interstate 35 serves the heartland of the United States, connecting south Texas to northern Minnesota, and provides a direct freeway connection between Mexico and Canada. It begins at the international border with Mexico at Laredo and terminates at Duluth, Minnesota. I-35 crosses the State of Texas serving cities such as Laredo, San Antonio, Austin, Waco, and Dallas.

I-35 is more than just a commercial vehicle route; it also is a major automobile route through Laredo, and connects to several pedestrian bridges and to International Bridge No. 1 (Puente de las Americas Bridge).

US 59 is a principal highway that travels through the entire eastern area of the state of Texas in a generally north-south direction between the cities of Texarkana and Laredo. US 59 carries a significant amount of truck traffic, as it is part of a major NAFTA trade corridor. In fact, this highway is the corridor alignment being considered in the state of Texas for the proposed I-69 extension between Indianapolis, Indiana, and the City of Laredo. US 59 connects Laredo to cities such as Victoria, Corpus Christi (through US 44), and Houston.

There are two key roadways on the Mexico side that are important for the Laredo Region:

- Mexico SR 2, which follows the Rio Grande down into Matamoros; and
- Mexico SR 85, which extends I-35 into Mexico City. Also called Pan American Highway, it connects to Monterrey and South America.

The City of Laredo operates a fixed-route transit system called El Metro that serves the metropolitan area. Outside of the city, transit services are somewhat limited, but there are demand-responsive (or paratransit) services available through a company named El Aguila. For instance, El Lift is a special transportation service offered by the City of Laredo providing curb to curb, on demand transportation service to disabled citizens unable to use conventional public transportation.

### 1.3.3 *Existing ITS in the Laredo Region*

There are several ITS programs and initiatives underway in the Region that are in various stages of implementation. TxDOT has embarked on a multi-year program to implement traffic management and traveler information systems in the Region, including dynamic message signs (DMS), highway advisory radio (HAR), video surveillance, and a central control software system. The Advanced Traffic Management System (ATMS) software is being developed by the TxDOT Traffic Operations Division in Austin, and will integrate the various subsystems to be deployed in Laredo. The software will be housed at the planned TxDOT's Traffic Management Center (TMC) in Laredo.

The City of Laredo currently has an interim traffic operations center (TOC) to monitor and manage traffic flow. Incidents are detected and verified and incident information is provided to the appropriate agencies, like the Department of Public Safety (DPS), local fire



and local police dispatch, and also to third party providers. Some ITS technologies currently used by this center are DMS, closed-circuit television (CCTV) cameras, and traffic detectors. This center is staffed 14 hours per day with night support via pager.

The City of Laredo has already deployed a closed loop traffic signal system and is operating it from Traffic Operations Center control center. There are plans to incorporate control system elements in the Emergency Operations Center at the City.

The City has a franchise arrangement with Time/Warner that provides fiber optic cable connection and bandwidth to many of the City's transportation and non-transportation facilities. In addition, the current transportation improvement plan contains several projects to augment the on-going infrastructure deployment at the Milo 1 Interchange.

The TxDOT Laredo District has installed several large overhead DMS on I-35 and is in the process of constructing additional signs as part of the Milo 1 Interchange project.

The City of Laredo Traffic Department has CCTV monitoring in place at two locations and plans to add two additional locations in the short term. This system provides an interface to the City's INET. In addition, CCTV and communication links are planned for the Laredo Arena, which is scheduled to be open in Fall 2002. Additional cameras are planned as part of several construction projects along I-35, Loop 20 and as part of the coordinated bridge control project. Interconnection with these cameras is currently planned with fiber optic cable for the TxDOT roadway projects and is yet to be determined for the coordinated bridge control project.

HAR stations are strategically located near the airport and crossings. HAR is one of the ITS technologies that are planned to be used in order to perform coordinated bridge control functions. Bridge control activities will be coordinated from the planned Traffic Operations Center.

An electronic fare collection system that allows transit users to use an electronic payment device on-board transit vehicles is already in place. There are proposed plans to upgrade this system.

Commercial vehicle operations are especially important in this Region due to the presence of several border crossings between Mexico and the United States. There are two existing Commercial Vehicle Information Systems and Network (CVISN) sites in the Region and plans to install this system at a total of 25 sites. There also are weigh-in-motion systems in place and hazardous materials (HAZMAT) management initiatives. Internet enabled International Registration Plan (IRP) registration, motor carrier registration and International Fuel Tax Agreement registration are all planned for implementation.

Emergency services and public safety agencies in the Region also are using technology to improve incident management and emergency response. City of Laredo Police and Fire use computer-aided dispatch (CAD), and there are mobile data terminals in the police and fire vehicles with additional units planned for implementation.



#### 1.3.4 Laredo Stakeholders

A diverse group of stakeholders provided ongoing input and guidance to the development of the ITS Architecture and Deployment Plan for the Laredo Region. By having input from several perspectives, including federal, state, county, local, emergency services, public safety and transit, the resulting deployment plan and vision is an accurate reflection of the needs and unique issues in the Laredo Region.

The following is a list of stakeholder agencies in the Laredo Region that have participated in the project workshops or provided input to the study team:

- City of Laredo Bridge System;
- City of Laredo Fire Department;
- City of Laredo INET;
- City of Laredo Police Department;
- City of Laredo Traffic Safety;
- El Aguila;
- El Metro;
- Federal Motor Carrier Safety Administration, Southern Service Center;
- Federal Motor Carrier Safety Administration, Texas Division;
- FHWA Southern Resource Center;
- FHWA Texas Division;
- Laredo Independent School District;
- Texas Department of Public Safety;
- Time Warner Company;
- TxDOT Laredo District;
- TxDOT Traffic Operations Division (Austin);
- TxDOT Public Transportation Division (Austin);
- United States Border Patrol; and
- Webb County.

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



**Table 1 – Laredo Stakeholder Agencies and Contacts**

<b>Stakeholder Agency</b>	<b>Contact</b>	<b>Address</b>	<b>Phone Number</b>	<b>E-Mail</b>
City of Laredo INET	Mario Ruiz	1101 Garden Street Laredo, Texas 78040	(956) 795-2385	mruiz@ci.laredo.tx.us
City of Laredo Bridge System	Rafael Garcia	11601 FM 1472 Laredo, Texas 78045	(956) 791-2200	rgarcia0@ci.laredo.tx.us
City of Laredo Bridge System	Berta Rivera	11601 FM 1472 Laredo, Texas 78045	(956) 791-2200	brivera0@ci.laredo.tx.us
City of Laredo Bridge System	Rubin Villarreal	11601 FM 1472 Laredo, Texas 78045	(956) 791-2200	rvillarrea@ci.laredo.tx.us
City of Laredo Fire Department	Juan Meza, Jr.	1 Guadalupe Laredo, Texas 78041	(956) 795-2150	N/A
City of Laredo Fire Department	Daniel Pottin	1 Guadalupe Laredo, Texas 78041	(956) 795-2150	N/A
City of Laredo Police Department	Jim Dempsey	4712 Maher Avenue Laredo, Texas 78041	(956) 795-3125	jdchuckwagon@aol.com
City of Laredo Police Department	Albert Janchez	4712 Maher Avenue Laredo, Texas 78041	(956) 795-2827	ajanchez@ci.laredo.tx.us
City of Laredo Police Department	Gilbert Navarro	4712 Maher Avenue Laredo, Texas 78041	(956) 795-2866	gnavarro@ci.laredo.tx.us
City of Laredo Police Department	Pete Palacios	4712 Maher Avenue Laredo, Texas 78041	(956) 795-2823	ppalacios@ci.laredo.tx.us
City of Laredo Traffic Safety	Manuel Benavides	2800 Saunders Laredo, Texas 78041	(956) 795-2550	mbenavides@ci.laredo.tx.us
City of Laredo Traffic Safety	Oscar Canales	2800 Saunders Laredo, Texas 78041	(956) 795-2550	jcanales@ci.laredo.tx.us
City of Laredo Traffic Safety	Robert Pena	2800 Saunders Laredo, Texas 78041	(956) 795-2550	rpena@ci.laredo.tx.us
City of Laredo Traffic Safety	Roberto Murillo	2800 Saunders Laredo, Texas 78041	(956) 795-2550	rmurillo@ci.laredo.tx.us
El Metro	Joe Guerra	1301 Farragut Laredo, Texas 78046	(956) 795-2288	jguerra@ci.laredo.tx.us
El Metro	Juan Gala	401 Scott Laredo, Texas 78046	(956) 795-2250	jpgala@ci.laredo.tx.us
El Metro	R.J. Garza	401 Scott Laredo, Texas 78046	(956) 795-2250	rgarza0@ci.laredo.tx.us
Federal Motor Carrier Safety Administration, Southern Service Center	Joel Hiatt	61 Forsyth St., Suite 17T75 Atlanta, GA 30303	(404) 562-3610	joel.hiatt@fhwa.dot.gov
Federal Motor Carrier Safety Administration, Texas Division	Rodney Baumgartner	826 Federal Bldg. #865 300 East 8 <sup>th</sup> Street Austin, Texas 78701	(512) 536-5980	rodney.baumgartner@fmcsa.dot.gov



**Table 1 – Laredo Stakeholder Agencies and Contacts (continued)**

<b>Stakeholder Agency</b>	<b>Contact</b>	<b>Address</b>	<b>Phone Number</b>	<b>E-Mail</b>
FHWA Southern Resources Center	Daniel Grate, Jr.	61 Forsyth St., Suite 17T26 Atlanta, GA 30303-3104	(404) 562-3912	daniel.grate@fhwa.dot.gov
FHWA Texas Division	Mark Olson	300 E. 8th Street, Room 826 Austin, Texas 78701	(512) 536-5972	mark.olson@fhwa.dot.gov
Laredo Independent School District	Jose Perez	3006 Hendricks Laredo, Texas 78040	(956) 795-3675	N/A
Laredo Independent School District	Rick Gonzalez	3006 Hendricks Laredo, Texas 78040	(956) 795-3625	RKG@laredo.k12.tx.us
Texas Department of Public Safety	Jesse Sharp	1901 Bob Bullock Loop Laredo, Texas 78043	(956) 728-2292	jesse.sharp@txdps.state.tx.us
Texas Department of Public Safety	Mario Salinas	1901 Bob Bullock Loop Laredo, Texas 78043	(956) 728-2210	mario.salinas@txdps.state.tx.us
Time Warner Company	Juan Botello	1313 West Carlton Road Laredo, Texas 78041	(956) 721-0612	juan.botello@twcable.com
TxDOT Laredo District	Albert Adalpe	1817 Bob Bullock Loop Laredo, Texas 78043	(956) 712-7441	aadalpe@dot.state.tx.us
TxDOT Laredo District	Danny Magee	1817 Bob Bullock Loop Laredo, Texas 78043	(956) 712-7443	dmagee@dot.state.tx.us
TxDOT Laredo District	Randy Aguilar	1817 Bob Bullock Loop Laredo, Texas 78043	(956) 712-7744	jaguil2@dot.state.tx.us
TxDOT Laredo District	Roberto Rodriguez	1817 Bob Bullock Loop Laredo, Texas 78043	(956) 712-7485	rrodri9@dot.state.tx.us
TxDOT Laredo District	Omar Cantu	1817 Bob Bullock Loop Laredo, Texas 78043	(956) 712-7438	ocantu@dot.state.tx.us
TxDOT Public Transportation	Loren Herr	125 East 11th Street Austin, Texas 78701-2483	(512) 416-2812	lherr@dot.state.tx.us
TxDOT Traffic Operations	Alesia Gamboa	TRF-TM 125 East 11th Street Austin, Texas 78701-2483	(512) 416-2780	agamboa@dot.state.tx.us
TxDOT Traffic Operations	Charles Brindell	TRF-TM 125 East 11th Street Austin, Texas 78701-2483	(512) 416-3268	cbrinde@dot.state.tx.us
TxDOT Traffic Operations	Janie Light	TRF-TM 125 East 11th Street Austin, Texas 78701-2483	(512) 416-3258	jlight@dot.state.tx.us
U.S. Border Patrol	Gus Cantu	207 West Del Mar Boulevard Laredo, Texas 78041	(956) 764-3269	gus.cantu@usdoj.gov
U.S. Border Patrol	Michael Knowles	207 West Del Mar Boulevard Laredo, Texas 78041	(956) 764-3214	michael.knowles@usdoj.gov



**Table 1 – Laredo Stakeholder Agencies and Contacts (continued)**

<b>Stakeholder Agency</b>	<b>Contact</b>	<b>Address</b>	<b>Phone Number</b>	<b>E-Mail</b>
U.S. Customs	Joe Ramos	101 Shitok Dr, Suite 300 Laredo, Texas 78045	(956) 753-1759	N/A
Webb County	Antonio Alderete	1110 Washington St Suite 303 Laredo, Texas 78040	(956) 523-4055	aalderete@webbcounty.com
Webb County Engineering	Eliseo Valdez, Jr.	110 Victoria, Suite 207 Laredo, Texas 78040	(956) 718-8504	evaldez@webbcounty.com
Webb County Planning	Rafael Vidaurri	110 Victoria, Suite 208 Laredo, Texas 78040	(956) 721-2560	rvidaurri@webbcounty.com

## 2. PRIORITIZATION OF MARKET PACKAGES

### 2.1 Prioritization Process

Of the 75 available market packages in the National ITS Architecture, the stakeholders selected 39 and customized them for deployment in the Laredo 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 Laredo Region**

High Priority	Medium Priority	Low Priority
<ul style="list-style-type: none"> <li>▪ Network Surveillance</li> <li>▪ Surface Street Control</li> <li>▪ Traffic Information Dissemination</li> <li>▪ Regional Traffic Control</li> <li>▪ Incident Management System</li> <li>▪ Standard Railroad Grade Crossing</li> <li>▪ Railroad Operations Coordination</li> <li>▪ Work Zone Management</li> <li>▪ Transit Vehicle Tracking</li> <li>▪ Transit Fixed-Route Operations</li> <li>▪ Transit Passenger and Fare Management</li> <li>▪ Transit Security</li> <li>▪ Broadcast Traveler Information</li> <li>▪ Electronic Clearance</li> <li>▪ Commercial Vehicle Administrative Processes</li> <li>▪ International Border Electronic Clearance</li> <li>▪ Weigh-in-Motion</li> <li>▪ Roadside CVO Safety</li> <li>▪ Emergency Response</li> <li>▪ Emergency Routing</li> <li>▪ ITS Data Mart</li> </ul>	<ul style="list-style-type: none"> <li>▪ Freeway Control</li> <li>▪ Electronic Toll Collection</li> <li>▪ Work Zone Safety Monitoring</li> <li>▪ Maintenance and Construction Activity Coordination</li> <li>▪ Demand Response Transit Operations</li> <li>▪ Transit Traveler Information</li> <li>▪ HAZMAT Management</li> </ul>	<ul style="list-style-type: none"> <li>▪ Probe Surveillance</li> <li>▪ Parking Facility Management</li> <li>▪ Regional Parking Management</li> <li>▪ Maintenance and Construction Vehicle Tracking</li> <li>▪ Maintenance and Construction Vehicle Maintenance</li> <li>▪ Roadway Maintenance and Construction</li> <li>▪ Internet Service Provider (ISP)-based Route Guidance</li> <li>▪ Fleet Administration</li> <li>▪ Freight Administration</li> <li>▪ On-board CVO Safety</li> <li>▪ CVO Fleet Maintenance</li> </ul>

The market package prioritization was a key factor in developing recommendations for ITS deployment and integration in the Laredo Region. These priorities identified the key needs and services that are desired in the Laredo 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 Laredo 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-year, ten-year 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 was another factor for prioritizing the market packages. Other considerations included whether or not the market package was better suited for private deployment and operations rather than public. As an example, ISP-based Route Guidance might be viewed as a valuable traveler information service for motorists in the Region, but stakeholders felt this market package was best suited for deployment by a private service provider, and as such, deemed it a low priority for agencies in the Region.

Each market package in the following subsections includes:

- A brief definition of the market package (which have been modified from the National ITS Architecture definitions);
- Any infrastructure from that market package that is already existing in the Laredo 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 Laredo 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.

Many of these high priority market packages have components that are in various stages of deployment and operation in the Laredo Region; that is, there are already systems and technologies deployed to deliver some of these high priority services and functions. For example, the City of Laredo has a traffic signal system in place that is monitored by a TMC, which is a key component of the Surface Street Control market package. Although a signal system and TMC 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 Laredo Region.



**Table 3 – High Priority Market Packages for the Laredo Region**

<b>Network Surveillance (ATMS01)</b>	<b>High Priority</b>
<p>This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and wire-line 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 faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data also can be analyzed and made available to users and the Information Service Provider Subsystem.</p>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT Laredo CCTV Cameras</li> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ City of Laredo CCTV Cameras</li> <li>▪ City of Laredo Interim TMC</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ City of Laredo</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> <li>▪ City of Laredo Closed Loop Signal System Expansion</li> <li>▪ TxDOT TMC/City of Laredo Connection</li> <li>▪ TxDOT MILO I</li> <li>▪ TxDOT MILO II</li> <li>▪ TxDOT MILO II C.O.</li> <li>▪ TxDOT I-35 Widening North of MP B-14</li> <li>▪ TxDOT Loop 20 Widening</li> <li>▪ TxDOT US 83/SH 359 Interchange</li> <li>▪ TxDOT Integration I</li> <li>▪ TxDOT Integration II C.O.</li> <li>▪ TxDOT Oversize/Overweight Systems</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Laredo Region CCTV Deployment</li> <li>▪ City of Laredo Video Image Vehicle Detector Systems (VIVDS) Phase 1</li> <li>▪ Emergency Vehicle Preemption (Police, Fire, and EMS)</li> <li>▪ Traffic Operations Plans</li> <li>▪ Interagency Coordination</li> <li>▪ City of Laredo TMC/Local Media Connection</li> <li>▪ City of Laredo TMC/TxDOT Laredo District Webpage Connection</li> <li>▪ Laredo Regional Communications Master Plan</li> <li>▪ City of Laredo Emergency Operations Center (EOC)</li> <li>▪ TxDOT/City of Laredo/County Computer-Aided Dispatch</li> <li>▪ TxDOT Flood Detection Stations</li> <li>▪ City of Laredo Flood Detection Stations</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Surface Street Control (ATMS03)</b>	<b>High Priority</b>
<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><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ TxDOT Laredo Closed Loop Signal System</li> <li>▪ City of Laredo Interim TMC</li> <li>▪ City of Laredo Traffic Signal System</li> <li>▪ City of Laredo Signal Preemption for Fire and Police</li> <li>▪ City of Laredo Radio-controlled school zone flashing signs</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ City of Laredo</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> <li>▪ City of Laredo Closed Loop Signal System Expansion</li> <li>▪ City of Laredo TMC Upgrade</li> <li>▪ TxDOT TMC/City of Laredo Connection</li> <li>▪ TxDOT MILO I</li> <li>▪ TxDOT MILO II</li> <li>▪ TxDOT MILO II C.O.</li> <li>▪ TxDOT I-35 Widening North of MP B-14</li> <li>▪ TxDOT Loop 20 Widening</li> <li>▪ TxDOT US 83/SH 359 Interchange</li> <li>▪ TxDOT US 59/Loop 20 Interchange</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo Video Image VIVDS Phase 1</li> <li>▪ Emergency Vehicle Preemption (Police, Fire and EMS)</li> <li>▪ Traffic Operations Plans</li> <li>▪ Interagency Coordination</li> <li>▪ Railroad Grade Crossing Enhancements</li> <li>▪ Laredo Regional Communications Master Plan</li> <li>▪ Emergency Response Plan</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Traffic Information Dissemination (ATMS06)</b>	<b>High Priority</b>
<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>	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ TxDOT DMS</li> <li>▪ TxDOT Portable DMS</li> <li>▪ HAR (Airport) El Metro Transit Management</li> </ul>	<b>Agency</b> <ul style="list-style-type: none"> <li>▪ TxDOT</li> </ul>
<b>Planned Projects</b> <ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> <li>▪ TxDOT TMC/City of Laredo Connection</li> <li>▪ TxDOT MILO I</li> <li>▪ TxDOT MILO II</li> <li>▪ TxDOT I-35 Widening North of MP B-14</li> <li>▪ TxDOT US 83/SH 359 Interchange</li> </ul>	
<b>Additional Needs</b> <ul style="list-style-type: none"> <li>▪ TxDOT TMC/ISPs Connections</li> <li>▪ Traffic Operations Plans</li> <li>▪ Interagency Coordination</li> <li>▪ City of Laredo TMC/Local Media Connection</li> <li>▪ City of Laredo TMC/TxDOT Laredo District Webpage Connection</li> <li>▪ Laredo Regional Communications Master Plan</li> <li>▪ Emergency Response Plan</li> <li>▪ Regional 511 Advanced Traveler Information System Server</li> <li>▪ City of Laredo TMC/Paratransit Services Connection</li> <li>▪ El Metro Web-based Transit Information</li> <li>▪ ISP-Based Route Guidance</li> <li>▪ Webb County Transit Traveler Information System/Travel Data and Route Guidance</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Regional Traffic Control (ATMS07)</b>	<b>High Priority</b>
<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. At the request of stakeholders in the Laredo Region, this market package was expanded to include coordination and information sharing with TxDOT Districts and neighboring states.</p>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ City of Laredo Interim TMC</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ City of Laredo</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> <li>▪ City of Laredo TMC Upgrade</li> <li>▪ TxDOT TMC/City of Laredo Connection</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Bridge Coordination System</li> <li>▪ Traffic Operations Plans</li> <li>▪ Interagency Coordination</li> <li>▪ TxDOT Center-to-Center Communication</li> <li>▪ Laredo Regional Communications Master Plan</li> <li>▪ Emergency Response Plan</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Incident Management System (ATMS08)</b>	<b>High Priority</b>
<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 also can 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><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ DPS CAD system</li> <li>▪ City of Laredo Interim TMC</li> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ Bridge CCTVs</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ DPS</li> <li>▪ City of Laredo</li> <li>▪ TxDOT</li> <li>▪ Border Patrol</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> <li>▪ TxDOT TMC/City of Laredo Connection</li> <li>▪ TxDOT Oversize/Overweight Systems</li> <li>▪ City of Laredo Fire Mobile Data System</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Laredo Region CCTV Deployment</li> <li>▪ Emergency Vehicle Preemption (Police, Fire, EMS)</li> <li>▪ Traffic Operations Plans</li> <li>▪ Interagency Coordination</li> <li>▪ Emergency Communications Center (ECC) (911)/EOC Connection</li> <li>▪ Laredo Regional Communications Master Plan</li> <li>▪ Inter-agency Common Frequency</li> <li>▪ City of Laredo EOC</li> <li>▪ TxDOT/City of Laredo/County Computer-Aided Dispatch</li> <li>▪ TxDPS/EOC Communication Connection</li> <li>▪ Laredo Police Automated Accident Investigation System</li> <li>▪ Emergency Response Plan</li> <li>▪ HAZMAT Management</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Standard Railroad Grade Crossing (ATMS13)</b>	<b>High Priority</b>
<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>	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ Wayside HRI equipment</li> <li>▪ Wayside HRI equipment</li> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ City of Laredo Interim TMC</li> </ul>	<b>Agency</b> <ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ City of Laredo</li> </ul>
<b>Planned Projects</b> None identified at this time	
<b>Additional Needs</b> <ul style="list-style-type: none"> <li>▪ Railroad Grade Crossing Enhancements</li> <li>▪ Railroad Operations Coordination</li> </ul>	

<b>Railroad Operations Coordination (ATMS15)</b>	<b>High Priority</b>
<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>	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ City of Laredo Interim TMC</li> </ul>	<b>Agency</b> <ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ City of Laredo</li> </ul>
<b>Planned Projects</b> None identified at this time	
<b>Additional Needs</b> <ul style="list-style-type: none"> <li>▪ Railroad Grade Crossing Enhancements</li> <li>▪ Railroad Operations Coordination</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Workzone Management (MC08)</b>	<b>High Priority</b>
This market package directs activity in work zones, controlling traffic through portable DMS and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ TxDOT Portable DMS</li> <li>▪ TxDOT Permanent DMS</li> <li>▪ TxDOT Laredo CCTV</li> </ul>	<b>Agency</b> <ul style="list-style-type: none"> <li>▪ TxDOT</li> </ul>
<b>Planned Projects</b> None identified at this time	
<b>Additional Needs</b> <ul style="list-style-type: none"> <li>▪ City of Laredo TMC/Local Media Connection</li> <li>▪ City of Laredo TMC/TxDOT Laredo District Webpage Connection</li> <li>▪ TxDOT/City of Laredo Workzone Management</li> </ul>	

<b>Transit Vehicle Tracking (APTS01)</b>	<b>High Priority</b>
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.	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ El Metro</li> </ul>	<b>Agency</b> <ul style="list-style-type: none"> <li>▪ El Metro</li> </ul>
<b>Planned Projects</b> <ul style="list-style-type: none"> <li>▪ El Metro Transit Automated Vehicle Location (AVL)</li> <li>▪ El Metro Smart Stop</li> </ul>	
<b>Additional Needs</b> <ul style="list-style-type: none"> <li>▪ Webb County Transit CAD System and Transit Operations Center (TOC)</li> <li>▪ Webb County Transit AVL and Mobile Data Terminals (MDTs)</li> <li>▪ El Metro Web-based Transit Information</li> <li>▪ El Metro/El Aguila Dispatch/Operations Center</li> <li>▪ Webb County Transit Traveler Information System/Travel Data and Route Guidance</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Transit Fixed-Route Operations (APTS02)</b>	<b>High Priority</b>
<p>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.</p>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ El Metro Operations</li> <li>▪ El Aguila Operations</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ El Metro</li> <li>▪ El Aguila</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ El Metro Transit AVL</li> <li>▪ El Metro Smart Stop</li> <li>▪ El Metro Transit Traveler Information System</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Webb County Transit CAD and TOC</li> <li>▪ Webb County Transit AVL and MDTs</li> <li>▪ El Metro CAD</li> <li>▪ City of Laredo TMC/Paratransit Services Connection</li> <li>▪ El Metro Web-based Transit Information</li> <li>▪ El Metro Transit Kiosks</li> <li>▪ El Metro/El Aguila Dispatch/Operations Center</li> </ul>	

<b>Transit Passenger and Fare Management (APTS04)</b>	<b>High Priority</b>
<p>This market package manages passenger loading and fare payments on-board vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Sensors mounted on the vehicle permit the driver and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicles allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem.</p>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ Electronic Payment Devices on-board transit vehicles</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ El Metro</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ El Metro Electronic Fare Collection System</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Webb County Electronic Fare Collection</li> <li>▪ Webb County Automatic Passenger Counter (APC)</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Transit Security (APTS05)</b>	<b>High Priority</b>
<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) also are monitored.</p> <p>Information is communicated to the Transit Management Subsystem using wireless or wireline infrastructure. Security related information also is 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>	
<b>Existing Infrastructure</b>	<b>Agency</b>
None identified at this time	
<b>Planned Projects</b>	
<ul style="list-style-type: none"> <li>▪ El Metro Security Cameras</li> </ul>	
<b>Additional Needs</b>	
<ul style="list-style-type: none"> <li>▪ Webb County On-board Video Security System</li> </ul>	

<b>Broadcast Traveler Information (ATIS01)</b>	<b>High Priority</b>
<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 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>	
<b>Existing Infrastructure</b>	<b>Agency</b>
<ul style="list-style-type: none"> <li>▪ TxDOT Laredo District Webpage</li> <li>▪ Broadcast Warning Systems – Emergency radio broadcast warning systems operated by private radio and television outlets</li> </ul>	<ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ Private Sector Radio and Television Stations</li> </ul>
<b>Planned Projects</b>	
None identified at this time	
<b>Additional Needs</b>	
<ul style="list-style-type: none"> <li>▪ TxDOT TMC/ISPs Connection</li> <li>▪ Traffic Operations Plans</li> <li>▪ City of Laredo TMC/Local Media Connection</li> <li>▪ City of Laredo TMC/TxDOT Laredo District Webpage Connection</li> <li>▪ ECC (911)/EOC Connection</li> <li>▪ Laredo Regional Communication Master Plan</li> <li>▪ City of Laredo EOC</li> <li>▪ Regional 511 Advanced Traveler Information System Server</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Electronic Clearance (CVO03)</b>	<b>High Priority</b>
<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>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ CVISN (two sites)</li> <li>▪ Electronic Screening Stations</li> <li>▪ Bridge CCTV</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ TxDOT</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ CVISN Cameras</li> <li>▪ CVISN Fiber Connection</li> <li>▪ Internet Enabled Motor Carrier Registration</li> <li>▪ Border Checkpoints</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ On Board Commercial Vehicle Safety</li> </ul>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>CV Administrative Processes (CVO04)</b>	<b>High Priority</b>
<p>This market package provides for electronic application, processing, fee collection, issuance, and distribution of Commercial Vehicle Operations (CVO) credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in the electronic clearance program provided by a separate market package, which allows commercial vehicles to be screened at mainline speeds at roadside check facilities. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration subsystem and snapshots of this database are made available to the roadside check facilities at the roadside to support the electronic clearance process.</p>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ Credentials Administration and Safety Information Exchange</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo AVI System at Bridge I</li> <li>▪ CVISN Cameras</li> <li>▪ Electronic Clearance Sites</li> <li>▪ Internet Enabled IRP Registration</li> <li>▪ Internet Enabled Motor Carrier Registration</li> <li>▪ Internet Enabled International Fuel Tax Agreement (IFTA) Registration</li> <li>▪ Border Checkpoints</li> <li>▪ CVISN at International Border Crossings Expansion</li> </ul>	
<p><b>Additional Needs</b></p> <p>None identified at this time</p>	

<b>International Border Electronic Clearance (CVO05)</b>	<b>High Priority</b>
<p>This market package provides for automated clearance at international border crossings. This package augments the electronic clearance package by allowing interface with customs related functions.</p>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ AVI System at Bridges II (lanes 4, 5, and 6), III, and IV</li> <li>▪ Laredo Trade Tag (Bridge IV)</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo Bridge System</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo AVI System at Bridge I</li> <li>▪ Electronic Clearance Sites</li> <li>▪ Border Checkpoints</li> <li>▪ CVISN at International Border Crossings Expansion</li> </ul>	
<p><b>Additional Needs</b></p> <p>None identified at this time</p>	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Weigh-In-Motion (CVO06)</b>	<b>High Priority</b>
This market package provides for high speed weigh-in-motion with or without AVI capabilities. This market package provides the roadside equipment that could be used as a stand-alone system or to augment the Electronic Clearance (CVO03) market package.	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ Roadside WIM (installed on every lane of the World Trade Bridge and Solidarity Bridge)</li> <li>▪ Oversize/Overweigh Systems</li> </ul>	<b>Agency</b> <ul style="list-style-type: none"> <li>▪ City of Laredo Bridge System</li> </ul>
<b>Planned Projects</b> <ul style="list-style-type: none"> <li>▪ TxDOT Oversize/Overweight Systems</li> </ul>	
<b>Additional Needs</b> None identified at this time	

<b>Roadside CVO Safety (CVO07)</b>	<b>High Priority</b>
This market package provides for automated roadside safety monitoring and reporting. It automates commercial vehicle safety inspections at the roadside check facilities. The capabilities for performing the safety inspection are shared between this market package and the On-Board CVO Safety (CVO08) Market Package, which enables a variety of implementation options. The basic option, directly supported by this market package, facilitates safety inspection of vehicles that have been pulled in, perhaps as a result of the automated screening process provided by the Electronic Clearance (CVO03) Market Package. In this scenario, only basic identification data and status information is read from the electronic tag on the commercial vehicle. The identification data from the tag enables access to additional safety data maintained in the infrastructure which is used to support the safety inspection, and also may inform the pull-in decision if system timing requirements can be met. More advanced implementations, supported by the On-Board CVO Safety (CVO08) market package, utilize additional on-board vehicle safety monitoring and reporting capabilities in the commercial vehicle to augment the roadside safety check.	
<b>Existing Infrastructure</b> None identified at this time	<b>Agency</b>
<b>Planned Projects</b> <ul style="list-style-type: none"> <li>▪ City of Laredo AVI System at Bridge I</li> <li>▪ CVISN Cameras</li> <li>▪ CVISN Fiber Connection</li> <li>▪ Electronic Clearance Sites</li> <li>▪ Internet Enabled Motor Carrier Registration</li> <li>▪ Border Checkpoints</li> <li>▪ TxDOT Oversize/Overweight Systems</li> <li>▪ CVISN at International Border Crossings Expansion</li> </ul>	
<b>Additional Needs</b> None identified at this time	



**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Emergency Response (EM1)</b>	<b>High Priority</b>
<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>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ Two-way radio communication between DPS Dispatch and Highway Patrol Vehicles</li> <li>▪ City of Laredo Police CAD System</li> <li>▪ City of Laredo Police Mobile Data Units – provide communications with CAD System</li> <li>▪ City of Laredo Fire Dispatch – CAD System, communications between dispatch and patrol vehicles</li> <li>▪ Emergency Vehicle Dispatch</li> <li>▪ Computer aided dispatch for TxDPS</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ TxDPS</li> <li>▪ City of Laredo Police</li> <li>▪ City of Laredo Police</li> <li>▪ City of Laredo Fire</li> <li>▪ City of Laredo Fire</li> <li>▪ Private Ambulance</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo Fire Mobile Data System</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Traffic Operations Plans</li> <li>▪ ECC (911)/EOC Connection</li> <li>▪ Inter-agency Common Frequency</li> <li>▪ City of Laredo EOC</li> <li>▪ TxDOT/City of Laredo/County Computer-Aided Dispatch</li> <li>▪ TxDPS/EOC Communication Connection</li> <li>▪ Emergency Response Plan</li> <li>▪ HAZMAT Management</li> </ul>	

**Table 3 – High Priority Market Packages for the Laredo Region (continued)**

<b>Emergency Routing (EM2)</b>	<b>High Priority</b>
<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>	
<b>Existing Infrastructure</b>	<b>Agency</b>
<ul style="list-style-type: none"> <li>▪ Signal preemption for fire/ambulance vehicles</li> </ul>	<ul style="list-style-type: none"> <li>▪ City of Laredo</li> </ul>
<b>Planned Projects</b>	
<ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> <li>▪ City of Laredo Fire Mobile Data System</li> </ul>	
<b>Additional Needs</b>	
<ul style="list-style-type: none"> <li>▪ Emergency Vehicle Preemption (Police, Fire and EMS)</li> <li>▪ Traffic Operations Plans</li> <li>▪ TxDOT/City of Laredo/County Computer-Aided Dispatch</li> <li>▪ ECC (911)/EOC Connection</li> <li>▪ Inter-agency Common Frequency</li> <li>▪ City of Laredo EOC</li> <li>▪ TxDPS/EOC Communication Connection</li> </ul>	

<b>ITS Data Mart (AD01)</b>	<b>High Priority</b>
<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. 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>	
<b>Existing Infrastructure</b>	<b>Agency</b>
<ul style="list-style-type: none"> <li>▪ Electronic data storage (7 days)</li> <li>▪ Static data of volumes/counts</li> </ul>	<ul style="list-style-type: none"> <li>▪ City of Laredo</li> <li>▪ TxDOT Headquarters (Austin) – provided to Laredo District</li> </ul>
<b>Planned Projects</b>	
<ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> </ul>	
<b>Additional Needs</b>	
<ul style="list-style-type: none"> <li>▪ Interagency Coordination</li> <li>▪ TxDOT Center-to-Center Communications</li> <li>▪ ITS Data Mart</li> </ul>	

### 2.3 Medium Priority Market Packages

**Table 4** outlines market packages that were deemed medium priority by stakeholders in the Laredo 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 (through 2005). 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 operations 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 Laredo 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.

Several of these medium priority market packages have components that are dependent on deployment and implementation of higher priority market packages, such as Transit Vehicle Tracking (APTS1) to support Demand Response Transit Services.

**Table 4 – Medium Priority Market Packages for the Laredo Region**

<b>Freeway Control (ATMS04)</b>	<b>Medium Priority</b>
This market package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. This package is consistent with typical urban traffic freeway control systems. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option. This market package also includes the capability to utilize surveillance information for detection of incidents.	
<b>Existing Infrastructure</b>	<b>Agency</b>
<ul style="list-style-type: none"> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ TxDOT Laredo CCTV</li> </ul>	<ul style="list-style-type: none"> <li>▪ TxDOT</li> </ul>
<b>Planned Projects</b>	
<ul style="list-style-type: none"> <li>▪ TxDOT ATMS</li> <li>▪ TxDOT TMC/City of Laredo Connection</li> <li>▪ TxDOT MILO I</li> <li>▪ TxDOT MILO II</li> <li>▪ TxDOT MILO II C.O.</li> <li>▪ TxDOT I-35 Widening North of MP B-14</li> <li>▪ TxDOT Loop Widening</li> <li>▪ TxDOT US 83/SH 359 Interchange</li> <li>▪ TxDOT US 59/Loop 20 Interchange</li> </ul>	
<b>Additional Needs</b>	
<ul style="list-style-type: none"> <li>▪ Bridge Coordination System</li> <li>▪ Traffic Operations Plans</li> <li>▪ Interagency Coordination</li> <li>▪ Laredo Regional Communications Master Plan</li> <li>▪ Emergency Response Plan</li> </ul>	



**Table 4 – Medium Priority Market Packages for the Laredo Region (continued)**

<b>Electronic Toll Collection (ATMS10)</b>	<b>Medium Priority</b>
<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>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo Trade Tag System</li> <li>▪ City of Laredo Bridge System</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo Border Crossing</li> <li>▪ CVISN TxDOT</li> </ul>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Laredo Electronic Toll Collection (ETC)</li> </ul>	
<p><b>Additional Needs</b></p> <p>None identified at this time</p>	

<b>Work Zone Safety Monitoring (MC09)</b>	<b>Medium Priority</b>
<p>This market package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. This market package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment or other potential safety hazards.</p> <p>The market package supports both stationary and mobile work zones. The intrusion detection and alarm systems may be collocated or distributed, allowing systems that detect safety issues far upstream from a work zone (e.g., detection of over-dimension vehicles before they enter the work zone).</p>	
<p><b>Existing Infrastructure</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT Laredo Interim TMC</li> <li>▪ CCTV cameras</li> <li>▪ Construction Road Reports</li> </ul>	<p><b>Agency</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT</li> <li>▪ City of Laredo</li> </ul>
<p><b>Planned Projects</b></p> <p>None identified at this time</p>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ TxDOT/City of Laredo Workzone management</li> <li>▪ Workzone Safety Monitoring (Engineering)</li> <li>▪ Workzone Safety Monitoring (Equipment)</li> </ul>	



**Table 4 – Medium Priority Market Packages for the Laredo Region (continued)**

<b>Maintenance and Construction Activity Coordination (MC10)</b>	<b>Medium Priority</b>
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.	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ TxDOT construction/closure information available on web, phone, and to local media</li> </ul>	<b>Agency</b> <ul style="list-style-type: none"> <li>▪ TxDOT</li> </ul>
<b>Planned Projects</b> None identified at this time	
<b>Additional Needs</b> <ul style="list-style-type: none"> <li>▪ City of Laredo TMC/Local Media Connection</li> <li>▪ City of Laredo TMC/TxDOT Laredo District Webpage Connection</li> <li>▪ Inter-agency Common Frequency</li> <li>▪ TxDOT/City of Laredo Workzone Management</li> </ul>	

<b>Demand Response Transit Operations (APTS03)</b>	<b>Medium Priority</b>
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 ISP Subsystem.	
<b>Existing Infrastructure</b> None identified at this time	<b>Agency</b>
<b>Planned Projects</b> <ul style="list-style-type: none"> <li>▪ El Metro Transit AVL</li> <li>▪ El Metro Transit Traveler Information System</li> </ul>	
<b>Additional Needs</b> <ul style="list-style-type: none"> <li>▪ Webb County Transit CAD and TOC</li> <li>▪ Webb County Transit AVL and MDTs</li> <li>▪ El Metro CAD</li> <li>▪ City of Laredo TMC/Paratransit Services Connection</li> <li>▪ El Metro Web-based Transit Information</li> <li>▪ El Metro Transit Kiosks</li> <li>▪ El Metro/El Aguila Dispatch/Operations Center</li> <li>▪ Webb County Transit Traveler Information System/Travel Data and Route Guidance</li> </ul>	

**Table 4 – Medium Priority Market Packages for the Laredo Region (continued)**

<b>Transit Traveler Information (APTS08)</b>	<b>High Priority</b>
<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 announcement, 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 also are represented by this market package.</p>	
<b>Existing Infrastructure</b> None identified at this time	<b>Agency</b>
<p><b>Planned Projects</b></p> <ul style="list-style-type: none"> <li>▪ El Metro Transit AVL</li> <li>▪ El Metro Smart Stop</li> <li>▪ El Metro Transit Traveler Information System</li> </ul>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Webb County Transit CAD and TOC</li> <li>▪ Webb County Transit AVL and MDTs</li> <li>▪ El Metro CAD</li> <li>▪ El Metro Web-based Transit Information</li> <li>▪ El Metro Transit Kiosks</li> <li>▪ El Metro/El Aguila Dispatch/Operations Center</li> <li>▪ Webb County Transit Traveler Information System/Travel Data and Route Guidance</li> </ul>	

<b>HAZMAT Management (CVO10)</b>	<b>Medium Priority</b>
<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>	
<b>Existing Infrastructure</b> <ul style="list-style-type: none"> <li>▪ HAZMAT notification via phone (permitting)</li> </ul>	<b>Agency</b>
<p><b>Planned Projects</b> None identified at this time</p>	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ ECC (911)/EOC Connection</li> <li>▪ Inter-agency Common Frequency</li> <li>▪ City of Laredo EOC</li> <li>▪ TxDPS/EOC Communication Connection</li> <li>▪ HAZMAT Management</li> </ul>	



**Table 4 – Medium Priority Market Packages for the Laredo Region (continued)**

<b>Maintenance and Construction Vehicle Maintenance (MC02)</b>	<b>Medium Priority</b>
<p>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.</p>	
<b>Existing Infrastructure</b> None identified at this time	<b>Agency</b>
<b>Planned Projects</b> None identified at this time	
<p><b>Additional Needs</b></p> <ul style="list-style-type: none"> <li>▪ Maintenance and Construction Vehicle Maintenance</li> </ul>	



## 2.4 Low Priority Market Packages

Eleven market packages were identified and customized for the Laredo 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, such as ISP-Based Route Guidance. Other market packages might be more feasible for future implementation, such as Parking Facility Management. Another market package, Probe Surveillance, is probably better suited for deployment in a more urbanized area, due to the saturation levels needed for accurate probe data; however, with growth in the Laredo area expected to continue, the feasibility of probe surveillance should be reviewed in the future.

**Table 5 – Low Priority Market Packages for the Laredo 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 Laredo 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 Laredo 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. Two potential probe vehicle candidates could be buses or commercial vehicles.</p>



**Table 5 – Low Priority Market Packages for the Laredo Region (continued)**

Market Package Name	Description	Comments
Parking Facility Management (ATMS16)	This market package provides enhanced monitoring and management of parking facilities. It assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees. This market package collects current parking status, shares this data with Information Service Providers and Traffic Management, and collects parking fees using the same in-vehicle equipment utilized for electronic toll collection or contact or proximity traveler cards used for electronic payment.	Deployment of this market package will be limited to facility-specific parking operators (i.e., parking lots/garages in central business districts, major event venues, airports). Information gathered would support parking guidance and information systems' components of Advanced Travel Information System (ATIS).
Regional Parking Management (ATMS17)	This market package supports coordination between parking facilities to enable regional parking management strategies.	Deployment of this market package depends on implementation of Parking Facility Management projects (ATMS16)
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 Laredo 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 Laredo 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.



**Table 5 – Low Priority Market Packages for the Laredo Region (continued)**

Market Package Name	Description	Comments
Roadway Maintenance and Construction (MC07)	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 also is received from various weather sources to aid in scheduling maintenance and construction activities.	The Laredo Region might want to consider this market package as a future deployment to assist with maintenance functions.
ISP-Based Route Guidance (ATIS05)	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.



**Table 5 – Low Priority Market Packages for the Laredo Region (continued)**

Market Package Name	Description	Comments
Fleet Administration (CVO01)	This market package provides the capabilities to manage a fleet of commercial vehicles. The Fleet and Freight Management subsystem would provide the route for a commercial vehicle by either utilizing an in-house routing software package or an Information Service Provider. A route would be electronically sent to the commercial vehicle with any appropriate dispatch instructions. The location of the commercial vehicle can be monitored by the Fleet and Freight Management subsystem and routing changes can be made depending on current road network conditions. The Fleet and Freight Management subsystem can process and respond to requests for assistance and general information from the commercial vehicle. The market package also provides the Fleet and Freight Management subsystem with the capability of monitoring on-board vehicle data.	Implementation of CVISN will help in defining this service.
Freight Administration (CVO02)	This market package tracks the movement of cargo and monitors the cargo condition. Interconnections are provided to intermodal freight shippers and intermodal freight depots for tracking of cargo from source to destination.	Implementation of this market package will be influenced by Homeland Security's forthcoming cargo regulations.
On-board CVO Safety (CVO08)	This market package provides for on-board commercial vehicle safety monitoring and reporting. It is an enhancement of the Roadside CVO Safety (CVO07) Market Package and includes roadside support for reading on-board safety data via tags. Safety warnings are provided to the driver as a priority with secondary requirements to notify the Commercial Vehicle Check roadside elements. This market package allows for the Fleet and Freight Management subsystem to have access to the on-board safety data.	This market package will primarily be installed through the private sector.



**Table 5 – Low Priority Market Packages for the Laredo Region (continued)**

<b>Market Package Name</b>	<b>Description</b>	<b>Comments</b>
CVO Fleet Maintenance (CVO09)	This market package supports maintenance of CVO fleet vehicles with on-board monitoring equipment and AVL capabilities with in the Fleet and Freight Management Subsystem. Records of vehicle mileage, repairs, and safety violations are maintained to assure safe vehicles on the highway.	This market package will primarily be installed through the private sector.

### 3. PRIORITIZATION OF PROJECTS

To achieve the vision of the Regional ITS Architecture, the Laredo 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.

To receive input from stakeholders, a workshop was held in the Laredo Region on September 19, 2002 to present the draft Regional ITS Deployment Plan and discuss potential projects. Each project recommended for the Regional ITS Deployment Plan was discussed, and consensus was reached by the stakeholders on the project description and the timeframe for implementation.

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

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 Laredo 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
<b>Travel and Traffic Management</b>					
TxDOT Advanced Traffic Management System (ATMS)	Implement TxDOT ATMS in TxDOT Laredo TMC	TxDOT	N/A	Yes	1 Year
TxDOT Center-to-Center Communication	Enhance coordination with other TxDOT Districts through implementation of center-to-center communications between each TxDOT TMC	TxDOT Traffic Operations Division (Austin)	N/A	No	1 year
TxDOT Traffic Management Center (TMC)/Information Service Providers (ISPs) Connection	Install connection to public and private ISPs for CCTV shared monitoring. This will allow media to show camera feeds on local television.	TxDOT/ISPs	NA (ISPs responsible for costs)	No	1 year
TxDOT TMC/City of Laredo Connection	Implement communications link between TxDOT TMC and the City of Laredo TMC for shared use of traffic management infrastructure (e.g. joint control of cameras and DMS). TxDOT will go into Laredo TMC box. This project is underway and will be complete in a year.	TxDOT/City of Laredo	Under Construction	Yes	Under Construction
TxDOT MILO I	Includes the installation of 4 DMS, 5 LCU, 3 CCTV, 2 VIVDS, 0.62 miles of fiber optic trunk lines, and 10 LCS	TxDOT	Under Construction	Yes	Under Construction
TxDOT MILO II	Includes the installation of 5 DMS, 8 LCU, 6 CCTV, 2 VIVDS, 5.0 miles of fiber optic trunk lines, and 15 LCS	TxDOT	Under Construction	Yes	Under Construction
TxDOT MILO II C.O.	Includes the installation of 0.5 miles of fiber optic trunk lines	TxDOT	Under Construction	Yes	Under Construction
TxDOT I-35 Widening North of MP B-14	Includes the installation of 2 DMS, 4 LCU, 2 CCTV, 5.0 miles of fiber optic trunk lines, and 6 LCS ¼ mile north of Uniroyal	TxDOT	To Be Determined	Yes	18 months
TxDOT Loop 20 Widening	Includes the installation of 3 CCTV, 2 VIVDS, and 5.0 miles of fiber optic trunk lines	TxDOT	Under Construction	Yes	Under Construction



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Travel and Traffic Management (continued)</b>					
TxDOT US 83/SH 359 Interchange	Includes the installation of 2 DMS, 5 LCU, 3 HAR Signs, 7 CCTV, 2 VIVDS, 2.0 miles of fiber optic trunk lines, 4 LCS, and 1 microwave communication system	TxDOT	To Be Determined	Yes	18 months
TxDOT US 59/Loop 20 Interchange	Includes the installation of 2 CCTV and relocation of HUB. Also will connect to airport.	TxDOT	Under Construction	Yes	Under Construction
TxDOT Integration I	Includes the installation of 3 CCTV, and 2.0 miles of fiber optic trunk lines	TxDOT	Under Construction	Yes	Under Construction
TxDOT Integration II C.O.	Includes the installation of 2 CCTV, and 2.5 miles of fiber optic trunk lines	TxDOT	To Be Determined	Yes	18 months
TxDOT Laredo District/City of Laredo TMC Webpage	Develop joint website between City of Laredo and TxDOT for the TMCs to provide information about traffic conditions, road/bridge closures, construction zones, etc.	TxDOT/City of Laredo	Implementation: \$20,000 Updates: \$10,000 per year	No	Continuously Updated
City of Laredo TMC Upgrade	Update signal system software and controllers	City of Laredo	\$400,000	Partial	1 year
City of Laredo Closed Loop Signal System Expansion	Expand closed loop signal system on additional signalized intersections in City of Laredo. This project will add 140 intersections to the existing 103 currently on-line.	City of Laredo	\$4,000/signalized intersection	Yes	2 years
City of Laredo Video Image Vehicle Detector Systems (VIVDS) Phase 1	Implement VIVDS on signalized intersections in Laredo	City of Laredo	\$18,000/site	No	6 months
City of Laredo TMC/Local Media Connection	Implement communication links between City of Laredo TMC and local media to share traffic and road/bridge closure information	City of Laredo TMC/Local Media	\$30,000	No	3 months



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Travel and Traffic Management (continued)</b>					
City of Laredo AVI System at Bridge I	This system will be used for automated clearance at this international border crossing	City of Laredo Bridge System	\$100,000-\$150,000	Yes	3 months
Traffic Operations Plans	Integrate the EMC and develop 30 traffic operations plans for special events and emergency conditions	TxDOT/City of Laredo	\$30,000/plan	No	8 months
Laredo Region CCTV Deployment	<p>Install CCTV cameras at miscellaneous locations within Laredo. The project was described as originating from three sources:</p> <ul style="list-style-type: none"> <li>▪ 270 cameras as part of the Border Patrol five-year plan to use microwave along the river, and also Cotulla and Hebbronville;</li> <li>▪ 18 for TxDOT in next five years; and</li> <li>▪ The City of Laredo has plans to install 3-4 cameras annually.</li> </ul>	TxDOT/US Border Patrol/City of Laredo	\$25,000-\$30,000/site	No	6 months
Bridge Coordination System	Implement system to optimize the flow of traffic from the United States to Mexico at Bridges I and II. The system will combine several ITS technologies such as detectors, decision support system software, dynamic message signs, trailblazers, and communications equipment.	TxDOT/City of Laredo	\$800,000-\$1,200,000	No	1 year
Interagency Coordination	Implement communication links to coordinate Bridge Management System with TMCs and EOC	TxDOT/City of Laredo	\$100,000/agency	No	6 months
Railroad Grade Crossings Enhancements	Enhance wayside equipment at several highway-rail intersections (HRI)	TxDOT/City of Laredo	\$150,000-\$500,000	No	1 year



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Travel and Traffic Management (continued)</b>					
Inter-Agency Common Frequency	Implement common radio frequency by multiple agencies for incident and emergency management	TxDOT/Laredo Fire/Laredo Police/TxDPS/EOC	\$6,500,000 (Estimate from Trott Engineering)	No (Two grants have been applied for but there is no identified funding)	2 years
ECC (911) to EOC Connection	Install communications connection between ECC and EOC to facilitate and improve incident and emergency management response and coordination	City of Laredo	To Be Determined	No	6 months
Regional 511 Advanced Traveler Information System Server	Implement an ATIS server in the Laredo TMC 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
Laredo Regional Communications Master Plan	Develop Regional Communications Master Plan, including needs analysis and recommendations	TxDOT/City of Laredo	\$100,000	No	6 months
<b>Commercial Vehicle Operations</b>					
CVISN Cameras	Install CVISN cameras at 25 sites throughout the Laredo TxDOT District	TxDOT	\$25,000 – \$30,000/site	No	5 years
CVISN Fiber Connection	Deployment of fiber connection to all CVISN sites	TxDOT	To Be Determined	No	To Be Determined
Electronic Clearance Sites	Install additional Electronic Screening Stations (NIS – Customs)	Customs/US Border Patrol	To Be Determined	Yes	1 year
Internet Enabled IRP Registration	Implement system to allow commercial vehicles to perform on-line IRP registration	TxDOT/USDOT	To Be Determined	Yes	To Be Determined
Internet Enabled Motor Carrier Registration	Implement system to allow commercial vehicles to perform on-line motor carrier registration	TxDOT/USDOT/TxDPS	To Be Determined	Yes	To Be Determined



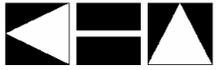
**Table 6 – Short-Term Projects (5-Year) (continued)**

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Commercial Vehicle Operations (continued)</b>					
Internet Enabled International Fuel Tax Agreement Registration	Implement system to allow commercial vehicles to perform on-line International Fuel Tax Agreement registration	USDOT	To Be Determined	Yes	To Be Determined
Border Checkpoints	Build new buildings with centers and communications infrastructure to support border checkpoints	US Border Patrol	To Be Determined	Yes	1-3 years
TxDOT Oversize/Overweight Systems	Install oversize/overweight systems at low clearance locations	TxDOT	\$20,000/site	Yes	3 months
<b>Emergency Management</b>					
City of Laredo Emergency Operation Center (EOC)	This planned EOC will be activated for major incidents/emergencies in the City of Laredo. It will be staffed only during emergencies by representatives of all allied responding agencies.	City of Laredo	\$225/sf	No	18 months
TxDOT/City of Laredo/County Computer-Aided Dispatch (CAD)	Integrate City of Laredo, Counties, and Emergency Services CAD for more effective incident response	TxDOT/City of Laredo/Counties	\$400,000	No	6 months
Emergency Vehicle Pre-emption (Police, Fire and EMS)	Expand traffic control system and pre-emption to include additional intersections and arterials for police, fire, and EMS. Software will identify what type of vehicles have crossed intersection and signal status (on preempt or not).	TxDOT/City of Laredo	\$850,000	No	1 Year
City of Laredo Fire Mobile Data System	Install mobile data terminals in fire vehicles to provide communications with CAD system	City of Laredo Fire	Project is in Progress	Yes	Project is in Progress
TxDPS/EOC Communication Connection	Establish communication links among these agencies for coordinated emergency response (centralized dispatch). Need to add operator workstation and short cable at TxDPS. TxDPS acts as EOC for statewide emergencies.	TxDPS/EOC	\$20,000	No	3 months



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Emergency Management (continued)</b>					
Laredo Police Automated Accident Investigation System	Procure 5 Total Station Units (includes workstation, tripod, monopole antenna, Auto Integration, and AutoCAD software)	Laredo Police	\$75,000	No	3 months
Emergency Response Plan	Develop emergency response plan scenarios	Region	30 Plans at \$5,000 each	No	8 months
<b>Maintenance and Construction Operations</b>					
TxDOT Flood Detection Stations	Implement flood detection systems on flood-prone segments of Interstates and State Routes in the Laredo Region (approximately two to three sites). TxDOT plans to deploy flood detection systems in Del Rio (2 sites). Communication will be the main part of the project (may use satellite or cellular).	TxDOT	\$25,000/site	No	2-6 months
City of Laredo Flood Detection Stations	Implement flood detection stations at arterial street locations prone to flooding (approximately 6 sites within the next 5 years)	City of Laredo	\$20,000/station	No	2-6 months
TxDOT/City of Laredo Workzone Management	This will be a procedures type project that will be implemented as part of another project with TTI. It includes: <ul style="list-style-type: none"> <li>▪ Coordination with TMCs to help support monitoring workzone;</li> <li>▪ Enhanced information sharing with public and private entities;</li> <li>▪ Implementation of speed warning signs for workzones; and</li> <li>▪ Contractor requirements to implement consistent workzone management and safety procedures.</li> </ul>	TxDOT/City of Laredo	\$40,000	No	6-12 months



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Public Transportation Management</b>					
El Metro Transit Automated Vehicle Location (AVL)	Install AVL on fixed routes buses and paratransit vehicles	El Metro	\$10,000/vehicle	Yes (Hardware only)	6 months
El Metro Electronic Fare Collection	Upgrade and add additional features to the existing electronic fare collection system on approximately 45 buses. Current system is 9 or 10 years old.	El Metro	\$5,000/bus	Partial	4 months
El Metro Security Cameras	Install security cameras on fixed route buses and paratransit vehicles	El Metro	\$300,000	Yes	7 years (based on current implementation schedule)
El Metro Smart Stop	Equip bus stops with signs to provide enhanced passenger route and schedule information, including detailed bus system map to assist customers with their trip planning	El Metro	\$30,000	Yes	1 month
Webb County Transit Computer Aided Dispatch (CAD) and Transit Operations Center (TOC)	Hardware and software applications to optimize route and schedule planning used in a TOC for routine and emergency operations	Webb County CAA	\$100,000	No	6 months
Webb County Transit AVL and Mobile Data Terminals (MDTs)	Transit vehicle mounted devices provide voice and/or digital communications and location information between the vehicle and the operations center. Installed on 20 buses.	Webb County CAA	\$10,000/vehicle	No	6 months
<b>Information Management</b>					
ITS Data Mart	Implement system to archive ITS data from multiple agencies	Laredo MPO	\$200,000	No	3 years

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

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



## Laredo Region Short-Term Projects (5-Year)

### Travel and Traffic Management

#### **TxDOT Advanced Traffic Management System (ATMS)**

*Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Emergency Routing (EM2)
- ITS Data Mart (AD01)

*Prerequisite Projects:* None

*Description:* The TxDOT ATMS is a software and hardware based platform developed by the TxDOT Traffic Operations Division in Austin. The TxDOT TOC project is underway. 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:

- Collection of traffic information (e.g., speed, incidents, lane closures) through a variety of collection methods such as loops, video detection, user entry, etc.;
- Data Archiving;
- Graphical Map with traffic information;
- Status information, command and control for DMS, LCS, 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 (i.e., RWIS). 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 communications, and data collection devices.



## **TxDOT Center-to-Center Communication**

### *Associated Market Packages:*

- Regional Traffic Control (ATMS07)
- ITS Data Mart (AD01)

*Prerequisite Projects:* TxDOT ATMS (one or more other TxDOT District ATMS implementations must be completed and operational), Laredo Regional Communications Master Plan, City of Laredo TMC Upgrade, and Completion of TxDOT Laredo TMC.

*Description:* The center to center communications (C2C) project is a logical extension of the TxDOT ATMS and field equipment deployments. The project will enhance coordination with TxDOT Districts and other agencies through connection to the statewide C2C core infrastructure (already in place). A communication backbone must be developed with sufficient capacity between the TxDOT Laredo TMC and existing C2C infrastructure. Determination of whether the backbone should be TxDOT owned, leased, or combination thereof, should be coordinated significantly with the Laredo Regional Communications Master Plan development. The software required to support C2C communications is integral with the TxDOT developed ATMS. Therefore, significant software development efforts are not anticipated. However, resources are required to oversee installation of the communications backbone and integration of existing software between the Laredo TMC and statewide C2C facilities. As part of connecting to the statewide C2C infrastructure, the Laredo District will provide data to the statewide webserver and statewide data archiving database. In return, access to information from other districts and agencies will be available to enhance operations throughout the Region.

## **TxDOT Traffic Management Center (TMC)/Information Service Providers (ISPs) Connection**

### *Associated Market Packages:*

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- ISP Based Route Guidance (ATIS05)

*Prerequisite Projects:* Completion of TxDOT Laredo TMC

*Description:* Install connection interface to public and private Information Service Providers for CCTV shared monitoring. This connection will allow media to show camera feeds on local television. In addition, a communication link will be in place between TxDOT TMC and local media to share traffic and road/bridge closure information. The cost of the system would be covered by the ISP.



## **TxDOT TMC/City of Laredo Connection**

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)

*Prerequisite Projects:* TxDOT ATMS, Laredo Regional Communications Master Plan, City of Laredo TMC Upgrade, and completion of the TxDOT Laredo TMC.

*Description:* Implement communications link between City of Laredo and TxDOT TMC to allow shared viewing of video, traffic information, and other mutually beneficial data. One server is needed at each center, which will be connected via existing fiber optic cable. This project is already underway and expected to be complete in one year. Shared monitoring and control capabilities provided through the connection could also allow for joint operations of City equipment (i.e., traffic signals) by TxDOT TMC staff, such as for after-hours or on weekends, if the TxDOT TMC serves as a 24/7 facility. Data/video sharing and other joint operation policies need to be developed and agreed upon between TxDOT and the City of Laredo. The estimated deployment cost for this project is \$100,000 per center.

## **TxDOT MILO I**

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)

*Prerequisite Projects:* None

*Description:* The MILO I Interchange Project provides for the construction of an interchange system with bridges, direct connectors and frontage roads including Interstate Highway 35, at Bob Bullock Loop and FM 3464 (Milo Road). This project is under construction and includes the installation of the following ITS and communications equipment:

- 4 DMS;
- 5 LCU;
- 3 CCTV;
- 2 VIVDS;
- 10 LCS; and
- 0.62 miles of fiber optic trunk lines.



## **TxDOT MILO II**

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)

### *Prerequisite Projects: MILO I*

*Description:* The MILO II Interchange Project is also under construction and includes the installation of the following ITS and communications equipment:

- 5 DMS;
- 8 LCU;
- 6 CCTV;
- 2 VIVDS;
- 15 LCS; and
- 5.0 miles of fiber optic trunk lines.

## **TxDOT MILO II C.O.**

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)

### *Prerequisite Projects: MILO I, MILO II.*

*Description:* This project is also under construction and includes the installation of 0.5 miles of fiber optic trunk line.



### **TxDOT I-35 Widening North of MP B-14**

*Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)

*Prerequisite Projects:* None

*Description:* This project includes the installation of the following ITS and communications equipment:

- 2 DMS;
- 4 LCU;
- 2 CCTV;
- 6 LCS; and
- 5.0 miles of fiber optic trunk lines.

### **TxDOT Loop 20 Widening**

*Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)

*Prerequisite Projects:* None

*Description:* The Loop 20 widening project is under construction, and will upgrade a portion of Loop 20 from a two-lane two-way roadway with shoulders to a five lane urban section to include a four-lane, two-way (two lanes in either direction) roadway, a raised center median, shoulders, and a bicycle lane. Specifically, the work includes grading of the surface and placement of drainage structures, retaining walls, flexible base material, asphalt pavement, curb and gutters, traffic signals and signing, striping and pavement markings. Project limits are from 1.6 miles north of US 59 to the intersection of Loop 20 and McPherson Road. This project also includes the installation the following ITS and communications equipment:

- 3 CCTV;
- 2 VIVDS; and
- 5.0 miles of fiber optic trunk lines.



### **TxDOT US 83/SH 359 Interchange**

*Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)

*Prerequisite Projects:* None

*Description:* This project includes the installation of the following ITS and communications equipment:

- 2 DMS;
- 5 LCU;
- 3 HAR signs;
- 7 CCTV;
- 2 VIVDS;
- 4 LCS;
- 2.0 miles of fiber optic trunk lines; and
- 1 microwave communication system.

### **TxDOT US 59/Loop 20 Interchange**

*Associated Market Packages:*

- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)

*Prerequisite Projects:* None

*Description:* This project is already underway and includes the relocation of the communications HUB and connections to Laredo International Airport.

### **TxDOT Integration I**

*Associated Market Packages:*

- Network Surveillance (ATMS01)

*Prerequisite Projects:* None

*Description:* This project is under construction and includes the installation of 3 CCTV and the 2.0 miles of fiber optic trunk lines.



### **TxDOT Integration II C.O.**

*Associated Market Packages:*

- Network Surveillance (ATMS01)

*Prerequisite Projects:* None

*Description:* This project includes the installation of 2 CCTV and the 2.5 miles of fiber optic trunk lines.

### **TxDOT Laredo District/City of Laredo TMC Webpage**

*Associated Market Packages:*

- Network Surveillance (ATMS01)
- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- Work Zone Management (MC08)
- Maintenance and Construction Activity Coordination (MC10)

*Prerequisite Projects:* TxDOT ATMS

*Description:* Develop joint website between the City of Laredo and TxDOT for the TMCs to provide information about traffic conditions, bridge/road closures, construction zones, etc. The purpose of this connection is to keep the public informed so they can optimize the use of the transportation network. The initial investment on this project would be around \$20,000 but will require annual updates of \$10,000.

### **City of Laredo TMC Upgrade**

*Associated Market Packages:*

- Surface Street Control (ATMS03)
- Regional Traffic Control (ATMS07)

*Prerequisite Projects:* None

*Description:* The City will update its signal system software and controllers. The estimated deployment cost for this project is \$400,000.



## City of Laredo Closed Loop Signal System Expansion

### *Associated Market Packages:*

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

*Prerequisite Projects:* Laredo Regional Communications Master Plan, City of Laredo TMC Upgrade.

*Description:* Expand the closed loop signal system by integrating additional signals and implementing VIVDS at select signalized intersections throughout the City of Laredo. 103 signals are currently on-line, and this project will add 140 more intersections to the system. Some long-term cost savings may be realized if the Laredo Regional Communications Master Plan was complete prior to establishing locations and routing of communications infrastructure between traffic signals and the Laredo TMC. The estimated cost per signalized intersection is about \$4,000. Implementation of VIVDS is discussed in more detail under the Laredo VIVDS project description.

## City of Laredo Video Image Vehicle Detector Systems (VIVDS) Phase 1

### *Associated Market Packages:*

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

*Prerequisite Projects:* (No specific pre-requisite projects, but VIVDS are installed in conjunction with traffic signals)

*Description:* Implement VIVDS at signalized intersections in Laredo. VIVDS will provide Laredo flexibility to determine traffic detector placement at signalized intersections by installing cameras and processors that can determine change in gray scale over a predetermined detection zone within the field of vision. Typically a camera is mounted at approximately 25-30 feet above the roadway and is positioned to look at oncoming vehicles. A processor is then connected to the traffic signal controller and as detection zones are activated, the controller recognizes the inputs as traditional induction loops. Many agencies operating closed loop signal systems install VIVDS and do not transport that data or video to a central location; however, as a more advanced signal system is deployed throughout the Laredo Region, the need to provide a central system with data will be required. Also, as sufficient communications bandwidth becomes available at VIVDS field locations, both raw (without detection zones) and processed (with detection zones) video could be sent to the Laredo TMC to provide information to support better operational decisions, enhanced traveler information, improved signal maintenance. Another capability of VIVDS includes various alarm features. In addition to drawing vehicle detection zones in the camera field of vision, addition zones can be created and tied to alarms. For example, if a VIVDS was located near a high vandalism area, an alarm zone could be created to assist public safety officials protect public property.

The estimated cost including card, communications, and camera will be approximately \$18,000 per site.



## City of Laredo TMC/Local Media Connection

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- Maintenance and Construction Activity Coordination (MC10)

*Prerequisite Projects:* TxDOT ATMS, Laredo Regional Communications Master Plan, City of Laredo TMC Upgrade

*Description:* Implement communications link between City of Laredo TMC and local media to allow shared traffic and road/bridge closure information. The purpose of this connection is to keep the media informed on a timely manner of critical traffic and closure related information so they can use their resources to disseminate this information to the public. The estimated deployment cost for this project is \$30,000.

## City of Laredo AVI System at Bridge I

### *Associated Market Packages:*

- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CVO05)
- Roadside CVO Safety (CVO07)
- On-board CVO Safety (CVO08)

*Prerequisite Projects:* Bridge Coordination System.

*Description:* Implement automated vehicle identification (AVI) System to allow for automated clearance at this international border crossing. The system is typically comprised of a data processing system, the reader field site system, and the AVI tags. As vehicles equipped with AVI tags pass by the reader field site, antennas recognize the tags and report the tag reads to the data processing system. The check facility at Bridge I will communicate 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 will allow a good driver/vehicle/carrier to cross the international border at highway speed. Interfaces with government agencies such as customs and immigration will be used to check compliance with import/export and immigration regulations to allow release of cargo, vehicle, and driver across the international border. The cost for this system ranges from \$100K to \$150K per bridge.

## Traffic Operations Plans

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Broadcast Traveler Information (ATIS01)
- Emergency Response (EM1)
- Emergency Routing (EM2)

### *Prerequisite Projects:* None

*Description:* Integrate the EOC and develop 30 traffic operations plans for special events and emergency conditions in the Region. Traveler and traffic information dissemination, traffic control, emergency response procedures, emergency routing, and multi-agency coordination are all important aspects that should be taken into consideration during the preparation of these plans. The estimated cost per plan is approximately \$30,000.

## Laredo Region CCTV Deployment

### *Associated Market Packages:*

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

### *Prerequisite Projects:* None

*Description:* This project consists of the deployment of CCTV cameras at miscellaneous locations within the City of Laredo for purposes of traffic monitoring and incident management. The project was described as originating from three sources:

- 270 cameras as part of the Border Patrol five-year plan to use wireless microwave along the river, and also Cotulla and Hebbronville;
- 18 cameras are also planned for deployment by TxDOT in the next five years; and
- The City of Laredo has plans to install three to four cameras annually.

The estimated cost per CCTV site ranges from \$25,000 to \$30,000 and includes the device, the physical infrastructure, and the required communications equipment.

## Bridge Coordination System

### *Associated Market Packages:*

- Freeway Control (ATMS04)
- Regional Traffic Control (ATMS07)

### *Prerequisite Projects:* Laredo Region CCTV Deployment

*Description:* A Bridge Coordination System (BCS) will be implemented to optimize the flow of traffic from the United States to Mexico at Bridges I (Gateway to the Americas) and II (Lincoln/Juarez Bridge). The purpose is to balance the flow of traffic to the bridges using a combination of ITS technologies such as detectors, decision support system (software), dynamic message signs, trailblazers, and the related communications equipment. Data provided by the detectors at the bridges will be used by a decision support system software to estimate the queue time at each bridge. This information will be sent to DMS located strategically, so drivers can decide which bridge to use to cross the border. This information will be updated every minute in order to maintain a balanced flow of vehicles to the bridges. In addition, Trailblazers will be placed on main access roads to the bridges to guide drivers to their destination.

Preliminary estimates account for the following equipment: 16 detectors, four DMS, 25 trailblazers, and 29 wireless sites. The decision support system will be included as part of the planned TxDOT control center. The estimated cost for this system may vary considerably depending upon the technologies selected for deployment and the desired functionality, and may vary between \$800,000 and \$1,200,000.

## Interagency Coordination

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- ITS Data Mart (AD01)

### *Prerequisite Projects:* None

*Description:* Implement communications link to coordinate Bridge Management System with City of Laredo and TxDOT TMCs and EOC 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 equipment (i.e., traffic signals) as needed. Data/video sharing and other joint operation policies need to be developed and agreed upon among agencies, preferably before final design of the systems begins, since some policies may have a direct impact on design strategies. The estimated deployment cost for this project is \$100,000 per agency. Connections will be part of another project.

## Railroad Grade Crossing Enhancements

### *Associated Market Packages:*

- Surface Street Control (ATMS03)
- Standard Railroad Grade Crossing (ATMS13)
- Railroad Operations Coordination (ATMS15)

### *Prerequisite Projects:* None

*Description:* Install several railroad crossing enhancements to provide better safety and traveler information at several arterial-rail intersections throughout the Laredo Region. The proposed improvements include a variety of traffic signal coordination modifications, detector stations (speed and presence), gate enhancements/trapped vehicle alarm systems, and dynamic estimated time of arrival/departure signs. It is anticipated that TxDOT and local law enforcement would receive a notice when the trapped vehicle alarm has been activated. More sophisticated systems may include DMS, trailblazer signs, and CCTV. The DMS would display an advisory message informing motorists of the event ahead and suggesting the use of an alternate route. This route would be indicated through the use of trailblazers located strategically along the suggested route. In addition, CCTV cameras would provide visual confirmation of the events taking place at the arterial-rail intersection. Performance monitoring of the equipment and interfaces should be incorporated into the system; detected abnormalities will be reported to both highway and railroad officials through wayside interfaces and interfaces to the TMC.

The estimated cost for this project is between \$150K and \$550K, depending on technology decisions and how sophisticated the deployment is at each site.

## Inter-Agency Common Frequency

### *Associated Market Packages:*

- Incident Management System (ATMS08)
- Maintenance and Construction Activity Coordination (MC10)
- HAZMAT Management (CVO10)
- Emergency Response (EM1)
- Emergency Routing (EM2)

### *Prerequisite Projects:* TxDOT ATMS, Laredo Regional Communications Master Plan

*Description:* Implement common radio frequency for use by multiple agencies for incident and emergency management. A high capacity, shared radio frequency among emergency first responders is critical to fast, efficient response. There are currently some shared frequencies in use in the Laredo Region, including TxDPS with TxDOT maintenance, and TxDPS with counties (note: DPS uses county frequency, but not vice versa). See 511 description.

TxDPS has been legislatively mandated to implement a statewide communications frequency to support interagency communications, especially during major emergencies. There could be other initiatives and requirements under Homeland Security mandates yet to be defined.

TxDPS, sheriff, police departments, emergency management personnel, transit/transportation agencies, and fire departments should analyze the feasibility of and benefits of radio system interoperability. If a common, interoperable radio frequency is deemed beneficial to the Region, this project will design and implement a Interagency Radio Communications Project that supports a common frequency and provides sufficient capacity and coverage to handle cross-jurisdictional and cross-boundary voice and data traffic. The communications system design would include development of an operations, management, and maintenance (OM&M) plan, a standard operating procedures manual and a memorandum of understanding signed by all involved agencies. Common issues in the design of interagency radio projects include finding the correct technology to support the needs of individual partners. For example, some agencies may require 100% building penetration, while others agencies may need to cover a broad geographical region. Each requirement lends itself to a slightly different radio technology.

As per a preliminary estimate from Trott Engineering, the cost for this project is approximately \$6,500,000. The project would be shared by several Districts.

### **Emergency Communications Center (ECC) (911)/EOC Connection**

*Associated Market Packages:*

- Incident Management System (ATMS08)
- Broadcast Traveler Information (ATIS01)
- HAZMAT Management (CVO10)
- Emergency Response (EM1)
- Emergency Routing (EM2)

*Prerequisite Projects:* None

*Description:* Install communications connection between ECC and EOC in order to facilitate and improve incident and emergency management response and coordination. Since the use of the information between the ECC and the EOC will likely occur during a large scale emergency, a significant emphasis on secondary and tertiary connection redundancy should be considered during connection design. It would also be beneficial to design this connection concurrently with or following the completion of the Laredo Regional Communications Master Plan.

### **Regional 511 Advanced Traveler Information System Server**

*Associated Market Packages:*

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)

*Prerequisite projects:* TxDOT ATMS, TxDOT Center-to-Center Communications, TxDOT Highway Condition Reporting System (HCRS) Enhancements, Media Liaison and Coordination

*Description:* Install a server dedicated to traveler information in the TxDOT Laredo TMC. This server would be installed as part of a 511 rollout in Texas and would provide a gateway for public and private entities to access current conditions, closures, restrictions, weather, and other valuable travel information. Relevant data from the ATMS and HCRS would be sent to the ATIS server where it would



be consolidated and ‘packaged’ for distribution via phone (511) and also web as well as to private partners who desire access to information in the Laredo 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.

### **Laredo Regional Communications Master Plan**

#### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Regional Parking Management (ATMS17)
- Broadcast Traveler Information (ATIS01)

#### *Prerequisite Projects:* None

*Description:* Develop Telecommunications Master Plan for the Laredo Region. The Plan would include needs identification, technology alternatives analysis, and ultimately will 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, 911 centers, both within the Region and inter-state) and field-to-center links (from the TMCs out to the ATMS field devices, RWIS, 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.

The outcome of these efforts will be a phased plan for transportation and ITS communications throughout the Region over a 20-year period. Strong coordination with public safety is encouraged since there may be significant benefits in combining capital improvement funds to install telecommunications infrastructure to support interagency coordination needs. The estimated cost to develop this plan is \$50,000.

## **Commercial Vehicle Operations**

### **CVISN Cameras**

#### *Associated Market Packages:*

- Electronic Clearance (CV03)
- CV Administrative Processes (CVO04)
- Roadside CVO Safety (CVO07)
- On-board CVO Safety (CVO08)

#### *Prerequisite Projects:* CVISN Fiber Connection

*Description:* This project consists of the deployment of Commercial Vehicle Information Systems and Networks (CVISN) cameras at 25 sites throughout the Laredo Region. This project will provide for the delivery of real-time safety information to roadside inspectors to more precisely target unsafe carriers; the creation of systems to facilitate electronic processing of registration, tax credentials and permits; and the electronic clearance of commercial vehicles past weigh stations along highways. This is a project being supervised through the TxDOT Traffic Operations Division in Austin.

### **CVISN Fiber Connection**

#### *Associated Market Packages:*

- Electronic Clearance (CV03)
- Roadside CVO Safety (CVO07)

#### *Prerequisite Projects:* Laredo Regional Telecommunications Master Plan.

*Description:* This project consists of the deployment fiber connection to all CIVSN sites throughout the Laredo Region. This is a project being supervised through the TxDOT Traffic Operations Division in Austin.

### **Electronic Clearance Sites**

#### *Associated Market Packages:*

- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CVO05)
- Roadside CVO Safety (CVO07)
- On-board CVO Safety (CVO08)

#### *Prerequisite Projects:* None

*Description:* This project consists of the installation of additional electronic screening stations for electronic clearance of commercial vehicles at international border crossings in Laredo. The purpose of these deployments is the integration of electronic information systems and technologies in order to facilitate the safe and efficient movement of goods between the United States and Mexico. These systems usually consist of dedicated short-range communications (DSRC) equipment, an RF local area network (LAN), and signaling devices. The system will be designed to provide an interface between

vehicles traversing the border, and US information systems such as Customs and the US Border Patrol. Operating in a manner consistent with weigh station bypass systems currently in operation throughout the US, information stored on a transponder placed inside the vehicle is retrieved for use in processing vehicles through the border. This project is being coordinated with the Department of Public Safety and supervised through the TxDOT Traffic Operations Division in Austin.

### **Internet Enabled IRP Registration**

*Associated Market Packages:*

- CV Administrative Processes (CVO04)

*Prerequisite Projects:* None

*Description:* TxDOT has plans and funds identified to implement an Internet registration system to allow owners of fleets and vehicles registered under the International Registration Plan (IRP) to register vehicles using the Internet. IRP Registration is an option method of registering commercial vehicles operating on an interstate basis (two or more states). It allows owners of fleets and vehicles to divide registration fees among the states they plan on operating through. They will pay based on the percentage of mileage through the declared states. This will prevent them from having to buy a trip permit when they enter into a non-base state. They may base in any state in which they have an established place of business and where operational records can be made available.

### **Internet Enabled Motor Carrier Registration**

*Associated Market Packages:*

- Electronic Clearance (CV03)
- CV Administrative Processes (CVO04)
- Roadside CVO Safety (CVO07)
- On-board CVO Safety (CVO08)

*Prerequisite Projects:* None

*Description:* TxDOT has plans and funds identified to implement an Internet registration system to allow owners of fleets and vehicles to perform on-line motor carrier registration. Motor carriers who transport LP-gas or other commodities and conduct operations in interstate or foreign commerce are required to register with the Federal Motor Carrier Safety Administration, maintain prescribed documentation of financial responsibility, and mark vehicle power units with their USDOT ID numbers and other prescribed information.

This process is currently performed by mail, fax, and/or in person. After the implementation of the internet-based process, the carrier will enter application data through the on-line application, an automated system will review the application for completion and compliance with department requirements, fees will be calculated immediately, and a payment will be submitted electronically (charged against a credit card). The system will issue credentials within minutes of original application.



## **Internet Enabled International Fuel Tax Agreement (IFTA) Registration**

### *Associated Market Packages:*

- CV Administrative Processes (CVO04)

### *Prerequisite Projects:* None

*Description:* TxDOT has plans and funds identified to implement an Internet registration system to allow owners of fleets and vehicles to perform on-line International Fuel Tax Agreement (IFTA) registration. The IFTA is designed to significantly reduce compliance burdens for reporting state fuel tax. Some of the advantages of IFTA include:

- A single fuel tax license issued by the base state authorizing travel in all IFTA jurisdictions;
- A quarterly tax return containing detailed operations in each of the member jurisdictions, filed only with the base state; and
- Fuel tax audits generally performed only by the base state.

The IFTA member jurisdictions include all 48 contiguous states of the United States and the 11 provinces of Canada. The following jurisdictions are presently not members of IFTA: Alaska, the District of Columbia, the Northwest Territories and Yukon Territory of Canada, and Mexico.

## **Border Checkpoints**

### *Associated Market Packages:*

- Electronic Clearance (CV03)
- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CV05)
- Roadside CVO Safety (CVO07)

### *Prerequisite Projects:* None

*Description:* This U.S. Border Patrol project includes the construction of new buildings with control centers and communications infrastructure to support border checkpoints. The main purpose of such checkpoints is to facilitate the flow of legal immigration and goods into the United States while preventing the illegal trafficking of people and contraband. Funding will be provided through non-transportation sources.

## **TxDOT Oversize/Overweight Systems**

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Incident Management System (ATMS08)
- Roadside CVO Safety (CVO07)

### *Prerequisite Projects:* None

*Description:* This project consists of the installation of oversize/overweight systems at low clearance locations in order to avoid damage to infrastructure or commercial vehicles, and loss of life. The dimensions of the vehicle must allow it to fit on the road, and underneath bridges, tunnels, and overpasses throughout the Laredo Region. The estimated deployment cost per site is \$20,000.

## **Emergency Management**

### **City of Laredo Emergency Operations Center (EOC)**

#### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Incident Management System (ATMS08)
- Broadcast Traveler Information (ATIS01)
- HAZMAT Management (CVO10)
- Emergency Response (EM1)
- Emergency Routing (EM2)

#### *Prerequisite Projects:* Laredo Regional Telecommunications Plan

*Description:* This planned EOC will be responsible for the management of all emergency preparedness program areas within Laredo. The primary role of the center is to develop and implement comprehensive disaster planning, mitigation and response activities within Laredo. 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 City of Laredo, and will be staffed by representatives of all allied responding agencies. The cost for this project will depend mainly on the dimensions of the center (\$225/sf).

## **TxDOT/City of Laredo/County Computer-Aided Dispatch (CAD)**

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Incident Management System (ATMS08)
- Emergency Response (EM1)
- Emergency Routing (EM2)

### *Prerequisite Projects:* None

*Description:* Integrate City of Laredo, Counties, and Emergency Services CAD for more effective incident response. CAD fully automates call taking and dispatching functions. Multiple law enforcement, fire, and Emergency Services agencies for municipal, county, or other jurisdictions will be able to use the same system to initiate and manage incidents and dispatch resources. During a major event requiring a multi-agency response, all agencies will work from the same incident data and immediately will know what resources have been committed. The estimated cost for this project is \$400,000.

## **Emergency Vehicle Preemption (Police, Fire and EMS)**

### *Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Incident Management System (ATMS08)
- Emergency Routing (EM2)

*Prerequisite Projects:* City of Laredo Closed Loop Signal System Expansion, City of Laredo TMC Upgrade, and TxDOT Laredo TMC.

*Description:* Equip approximately 100 intersections (4 preempt units per intersection) and 450 vehicles (including City of Laredo Police, Fire and EMS vehicles) 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 apparatus en-route to an incident. The total deployment cost for this project is around \$850,000, including software (\$150,000) if required by the responsible agencies. An alternate method for providing preemption is being discussed and if accepted, will reduce the deployment cost by nearly \$300,000.



### **City of Laredo Fire Mobile Data System**

*Associated Market Packages:*

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

*Prerequisite Projects:* None

*Description:* This project is currently funded and is already in process. Funding will be used to purchase Mobile Data Terminals (MDTs), computer hardware, and computer software needed to implement the new technology in Fire Vehicles. This system will enable fire officers to access information regarding the nearest route and geographical location of an incident. Fire officers will be able to view essential operational information such as water supplies, the storage of hazardous materials, type of occupancy, etc. Communication with the CAD system will be provided which will offer the opportunity to benefit from other information and datasets held and maintained by other Fire departments, the Counties and other agencies such as City of Laredo Police, Ambulance Services, and the utilities.

### **TxDPS/EOC Communication Connection**

*Associated Market Packages:*

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

*Prerequisite Projects:* None

*Description:* Establish communications connection between TxDPS and EOC to facilitate and improve incident and emergency management response and coordination. An operator workstation and short communications cable are need at TxDPS. Since the use of the information between the TxDPS and the EOC will likely occur during a large scale emergency, a significant emphasis on secondary and tertiary connection redundancy should be considered during connection design. It would also be beneficial to design this connection concurrently with or following the completion of the Laredo Regional Communications Master Plan.

### **Laredo Police Automated Accident Investigation System**

*Associated Market Packages:*

- Incident Management System (ATMS08)

*Prerequisite Projects:* None

*Description:* Procure 5 Total Station units (includes workstation, tripod, monopole antenna, Auto Integration, and AutoCAD software) and provide training and certification.

Total Stations are a combination of electronic distance meter and a theodolite. Measurements of accident sites are taken from a central point using an infrared beam and prism. The investigator places the Total Station at a location from which the entire site is visible. One person then holds a rod with the prism at the various points and positions to where measurements are needed. The Station can measure distance and angles to the prism relative to itself, using the average time it takes the beam to reflect from the prism. Measurements are then stored on a computer. The incident layout can then be recreated at the office by downloading the data to a drafting program.

The benefit of the Total Station based accident investigation is that it streamlines the accident investigation process, thereby allowing faster clearance time for the incident scene, and restoring the roadway to normal operating conditions.

### **Emergency Response Plan**

*Associated Market Packages:*

- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Emergency Response (EM1)

*Prerequisite Projects:* None

*Description:* Develop Emergency Response Plan scenarios (a total of 30 plans) to respond to emergencies and disasters in the Laredo Region. The purpose of this project is to design policies to guide disaster management planners and emergency responders, and to provide a consistently high level of preparedness at the different agencies in the Region. The estimated cost is \$150,000.

### **Maintenance and Construction Operations**

#### **TxDOT Flood Detection Stations**

*Associated Market Packages:*

- Network Surveillance (ATMS01)

*Prerequisite Projects:* TxDOT ATMS, Laredo Regional Communications Master Plan.

*Description:* Implement flood detection systems on flood-prone segments of Interstates and state routes in the Laredo Region (probably 2 to 3 sites). 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 Laredo District TMC. Communications between the flood detection stations and the TMC can be achieved through a variety of wireline and wireless telemetry methods. TxDOT has plans to deploy this

type of system at two sites in Del Rio; communications will be the main part of the project (may use satellite or cellular communications). There is a future module of the ATMS software planned to support environmental sensors (i.e., RWIS), and development of this module could be extended to include the needs of flood detection stations.

Costs for this project will vary based on the number of locations and detection stations installed, as well as communications. For planning purposes, 2-3 flood detection stations at \$25,000 each (including communications) was used.

### **City of Laredo Flood Detection Stations**

*Associated Market Packages:*

- Network Surveillance (ATMS01)

*Prerequisite Projects:* Laredo Regional Communications Master Plan

*Description:* Implement flood detection stations at arterial street locations prone to flooding. There are plans to install approximately six of these systems within the next five years. The systems will be remotely monitored from the City of Laredo's TOC. This will enable faster response times by maintenance crews to close roadway segments as necessary. Automated gates to close the roadway are a supplementary device that could be implemented. The classic 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. Communications between the flood detection stations and the TOC can be achieved through a variety of wireless and wireline telemetry methods. Since there is a future module of the ATMS software planned to support environmental sensors (i.e., RWIS); the development may be extended to include the needs of flood detection stations.

Costs will vary depending on the number of flood detection stations purchased. For planning purposes, six stations at \$20,000 each was used. This cost does not include automated gates, which could be up to \$100,000 per location.

### **TxDOT/City of Laredo Workzone Management**

*Associated Market Packages:*

- Workzone Management (MC08)
- Work Zone Safety Monitoring (MC09)
- Maintenance and Construction Activity Coordination (MC10)

*Prerequisite Projects:* Traffic Operations Plans.

*Description:* This will be a procedures-type project that will be implemented as part of another project with TTI. The following aspects should be covered as part this project:

- Coordination with TMCs to help support monitoring workzone;
- Enhanced information sharing with public and private entities;



- Implementation of speed warning signs for workzones; and
- Contractor requirements to implement consistent workzone management and safety procedures.

The estimated cost for this project is \$40,000.

### **Public Transportation Management**

#### **El Metro Transit Automated Vehicle Location (AVL)**

*Associated Market Packages:*

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

*Prerequisite Projects:* None

*Description:* Install AVL on El Metro Transit fixed routes buses and para-transit vehicles. The AVL system will convey information regarding real-time vehicle location to the El Metro Transit Dispatch Center, which will allow for enhanced system monitoring, scheduling, routing (or re-routing), as well as provide for precise bus location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of transit vehicles, and relay that information back to a transit operations center, 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. Transit managers for real-time operations and management as well as for transit traveler information can use information from the AVL/CAD system. In areas where AVL technology has been installed on buses, agencies report a 5-25% increase in on-time performance, which translates directly to improved efficiency and operations.

Costs will vary depending on the number of vehicles equipped with the on-board AVL unit. For planning purposes, it is estimated that the cost per vehicle is approximately \$10,000. Funding has been identified for hardware but not for software.

#### **El Metro Electronic Fare Collection System**

*Associated Market Packages:*

- Transit Passenger and Fare Management (APTS04)

*Prerequisite Projects:* El Metro Transit AVL

*Description:* Upgrade and add additional features to the existing El Metro Electronic Fare Collection system. The current system is 9-10 years old. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and

security for the transit patrons. The system will build on hardware and software previously provided under the transit AVL projects. Specifically, fare boxes will be upgraded to accept smart cards (i.e., cards with passive RFID technology or a magnetic information strip, such as a credit card) with rider and account information. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

El Metro estimates the cost per bus to be approximately \$5,000, and the fleet size is 45 buses.

### **El Metro Security Cameras**

#### *Associated Market Packages:*

- Transit Security (APTS05)

#### *Prerequisite Projects:* None

*Description:* El Metro is installing security cameras on its fixed route buses and paratransit vehicles. Cameras will be for on-board recording only, and are not envisioned to be monitored remotely from the El Metro Dispatch. Video will be stored for a pre-determined amount of time via video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses (video recordings help to resolve fraudulent cases), there have been noticeable maintenance benefits such as a reduction of litter and debris. This project is expected to be implemented progressively over several years and completed in a total of seven years. Its estimated cost for planning purposes is of \$300,000.

### **El Metro Smart Stop**

#### *Associated Market Packages:*

- Transit Vehicle Tracking (APTS01)
- Transit Fixed Route Operations (APTS02)
- Transit Traveler Information (APTS08)

#### *Prerequisite Projects:* El Metro Transit AVL

*Description:* Equip El Metro bus stops with signs to provide enhanced passenger route and schedule information, including a detailed bus system map to assist customers with their trip planning. Imminent arrival signs will also be used to inform customers directly at bus stops of the estimated time of arrival of their bus.

Costs will vary depending on the number of bus stops equipped with the proposed smart technologies. For planning purposes, it is estimated that the cost per stop is approximately \$30,000; however, deployment on personal data terminals with wireless connections are possible at one-third the cost.

## **Webb County Transit Computer Aided Dispatch (CAD) System and Transit Operations Center (TOC)**

### *Associated Market Packages:*

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

### *Prerequisite Projects:* None

*Description:* Implement a centralized transit management and operations center for Webb County CAA. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information (including customer call center) and other functions. Upgrading to computer-aided dispatch (CAD) will streamline communications between dispatchers and drivers. Used in conjunction with automatic vehicle location (AVL) and mobile data terminals, dispatchers can assess vehicle locations, status, route adherence, as well as communicate with one or several vehicles that are in the field. A CAD system also improves the system reporting functions, by automatically logging all communications between the dispatch center and the driver, including time, vehicle/driver, nature of the communication, and response. The estimated cost to deploy this system is \$100,000.

## **Webb County Transit AVL and Mobile Data Terminals (MDT)**

### *Associated Market Packages:*

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

### *Prerequisite Projects:* Webb County, CAD System and Transit TOC.

*Description:* Install AVL and MDT units on Webb County CAA buses (this type of systems has been already installed on 20 Webb County CAA buses). 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. These functions are particularly desirable for the Panhandle Community Services transit operations, due to the large, rural geographic area that is covered by Panhandle, as well as the demand-response nature of the transportation services provided. In areas where AVL technology has been installed on buses, agencies report a 5-25% 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.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions). For planning purposes, the estimated cost is \$10,000 per vehicle.

### **Information Management**

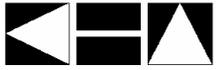
#### **ITS Data Mart**

*Associated Market Packages:*

- ITS Data Mart (AD01)

*Prerequisite Projects:* TxDOT ATMS

*Description:* Implement a system to archive ITS data from multiple agencies. A central archived data server will be developed at the TxDOT Laredo District TMC that will collect, process, store and provide access to historical ITS data from throughout the district. Communications links will be necessary between TxDOT and the other data sources, such as the City of Laredo TMC, City of Laredo Bridge System, the EOC, etc. 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. The estimated cost to implement this Data Mart system is approximately \$200,000.



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Traffic and Travel Management</b>					
Freeway Communications Network Plan	Develop freeway communications network plan to support center-to-field communications of freeway control infrastructure	TxDOT/City of Laredo	\$75,000	No	1 year
City of Laredo Electronic Toll Collection	Install toll booths at selected locations throughout the Region.	City of Laredo Bridge System	To Be Determined	Yes	1 year
<b>Commercial Vehicle Operations</b>					
CVISN at International Border Crossings Expansion	Continued deployment of CVISN	TxDOT	To Be Determined	Yes	To Be Determined
HAZMAT Management	Implement a system to handle HAZMAT related incidents from a centralized location (City of Laredo Fire/EMS/HAZMAT Dispatch)	City of Laredo/Fire/EMS/Hazmat	To Be Determined	No	2 years
<b>Maintenance and Construction Operations</b>					
Work Zone Safety Monitoring (Engineering)	Require major construction contracts to have work zone safety monitoring procedures and equipment	TxDOT/Other maintenance agencies	N/A	No	2 years
Work Zone Safety Monitoring (Equipment)	Install detection equipment and warning systems for workzones	TxDOT/Other maintenance agencies	\$500,000	No	6 months



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Public Transportation Management</b>					
El Metro Computer-Aided Dispatch (CAD)	Implement CAD for paratransit services to monitor and manage paratransit operations	El Metro	\$400,000	No	6 months
City of Laredo TMC/Paratransit Services Connection	Implement communications link between the City of Laredo TMC and paratransit services to share status and road conditions information	El Metro/El Aguila	\$30,000	No	3 months
El Metro Transit Traveler Information System	Implement system to provide transit schedules, operating hours, routes, and fare information by telephone	El Metro	\$100,000	Yes	1 Year
El Metro Web-based Transit Information	Build website to provide up-to-date transit traveler information (status, schedule, etc.)	El Metro	\$50,000	No	6 months
El Metro Transit Kiosks	Install transit kiosks at major transfer centers or hubs (i.e. civic centers and buildings, event venues) to provide static and dynamic transit information	El Metro	\$25,000/kiosk	No	6 months
Webb County Electronic Fare Collection	A continuation and upgrade to an existing AVL/MDT system enabling the use of smart card and electronic swipe card technology. Installed on 20 buses.	Webb County CAA	\$30,000	No	3 months
El Metro/El Aguila Dispatch Operations Center	Centralized location that will use dynamic transit information for operations (schedule adherence) as well as for traveler information. Communications links are needed between this location and the Traveler Information and Traffic Management System.	El Metro/El Aguila	Plan at \$200,000 + \$225/sf	No	18 months
Webb County On Board Video Security System	Stand alone security cameras installed on board buses. System does not transmit video images to an operations center. Installed on 20 buses.	Webb County CAA	\$300,000	No	6 months

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

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



## Laredo Region Mid-Term Projects (10-Year)

### Travel and Traffic Management

#### **Freeway Communications Network Plan**

*Associated Market Packages:*

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Regional Parking Management (ATMS17)
- Broadcast Traveler Information (ATIS01)

*Prerequisite Projects:* Laredo Regional Communications Master Plan

*Description:* Develop freeway communications network plan for the Laredo Region. The main purpose of this project is to evaluate the existing communications infrastructure throughout the Region and propose alternatives to interconnect and integrate infrastructure from different agencies into one region-wide communications network. Strong coordination among transportation agencies is encouraged since there may be significant benefits in combining capital improvement funds to install telecommunications infrastructure to support interagency coordination needs.

This network will support center-to-field communication links (e.g. from the TMCs out to the field devices, RWIS, traffic signals, etc.). The project includes an analysis of technology and transmission media options, comparing technologies, bandwidths, life cycle costs, and other requirements against the Region's needs and goals. The outcome of these efforts will be a phased plan for the deployment of center-to-field communications links throughout the Region. The estimated cost to develop this plan is \$75,000.

#### **City of Laredo Electronic Toll Collection (ETC)**

*Associated Market Packages:*

- Electronic Toll Collection (ATMS10)

*Prerequisite Projects:* None

*Description:* Install toll booths with electronic toll collection capabilities at selected locations throughout the Region (possibly starting at the Colombia Bridge). ETC systems allow residents, daily commuters, and visitors to pass through the toll lanes without stopping for payment of tolls. To participate in this program a customer must purchase a transponder and establish a pre-paid account. Transponders are small wireless devices that are easy to install on the windshield inside any vehicle. Each time motorist travel in the designated ETC lane(s), an overhead antenna reads the transponder and debits the toll amount from the pre-paid account.



## **Commercial Vehicle Operations**

### **CVISN at International Border Crossings Expansion**

*Associated Market Packages:*

- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CVO05)
- Roadside CVO Safety (CVO07)
- On-board CVO Safety (CVO08)

*Prerequisite Projects:* CVISN Cameras

*Description:* Continued deployment of CVISN.

### **HAZMAT Management**

*Associated Market Packages:*

- Incident Management System (ATMS08)
- Fleet Administration (CVO01)
- Freight Administration (CVO02)
- HAZMAT Management (CVO10)
- Emergency Response (EM1)

*Prerequisite Projects:* None

*Description:* Implement a system to handle HAZMAT related incidents from a centralized location within the Region (City of Laredo Fire/EMS/HAZMAT Dispatch). HAZMAT management integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents. The emergency management agencies are notified by the commercial vehicle or other source if an incident occurs and coordinate the response. The response is tailored based on information that is provided as part of the original incident notification.

Emergency response guidelines should be developed jointly by the corresponding authorities for use by firefighters, police, and other emergency services personnel who may be the first to arrive at the scene of a transportation incident involving a hazardous material. These guidelines will be used primarily as a guide to aid first responders in (1) quickly identifying the specific or generic classification of the material(s) involved in the incident, and (2) protecting themselves and the general public during the initial response phase of the incident.



## **Maintenance and Construction Operations**

### **Work Zone Safety Monitoring (Engineering)**

*Associated Market Packages:*

- Work Zone Safety Monitoring (MC09)

*Prerequisite Projects:* TxDOT/City of Laredo Work Zone Management

*Description:* Implement procedures to require major construction contracts to have work zone safety monitoring procedures and equipment.

### **Work Zone Safety Monitoring (Equipment)**

*Associated Market Packages:*

- Work Zone Safety Monitoring (MC09)

*Prerequisite Projects:* TxDOT/City of Laredo Work Zone Management

*Description:* Install detection equipment and warning systems for work zones.

## **Maintenance and Construction Vehicle Maintenance**

*Associated Market Packages:*

- Maintenance and Construction Vehicle Maintenance (MC02)

*Prerequisite Projects:* None

*Description:* Install on-board diagnostic (OBD) Systems on maintenance and construction vehicles to monitor vehicle performance, level of activity, etc. Most cars today have on board computers, which control engine performance and other important vehicle systems. These management systems considerably enhance the way in which cars can be maintained, tested and repaired.

OBD are computer-based systems that detect operational malfunctions or failures of the engine, emissions related components, and other variables as desired by the maintaining agency. For instance, using sensors and software to compare expected and actual signals from the engine, OBD can trace misfires or other faults that will lead to excessive vehicle emissions. Oxygen sensors upstream and downstream of the catalyst can be used to check the air/fuel ratios and detect any emission control failure. If such a failure is found the system automatically illuminates a Malfunction Indicator in the dashboard display to alert the driver of the problem and the need for repair.

To identify and repair any fault will require access to the engine control computer, the OBD command software and to fault codes, which record and store the status of the engine and emission control systems. To achieve this, maintenance personnel (or any would-be repairer) must have a standardized scan tool that can connect with the vehicle's OBD system, be able to read and erase the relevant fault codes, and have all other relevant repair information.

## **Public Transportation Management**

### **El Metro Computer Aided Dispatch (CAD)**

#### *Associated Market Packages:*

- Transit Fixed-Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Traveler Information (APTS08)

#### *Prerequisite Projects:* El Metro Transit AVL

*Description:* Implement CAD for EL Metro paratransit services to monitor and manage paratransit operations. The CAD system will provide data processing support to assist the dispatchers in managing communications with vehicles and generate management reports. The main goal of this project is to use automation to plan daily optimal routes where origins, destinations, common locations, and client requested times and equipment needs are grouped so that the most efficient routes with the maximum number of shared rides (several clients sharing a vehicle) are created.

This system will allow dispatchers to assign clients to appropriate vehicles considering many different parameters (acceptable client pick-up and drop-off times, individualized client loading times, equipment and seating availability of a vehicle, and any other special client needs or equipment) and producing optimum daily routes. Dispatchers will have control over such variables as number, types and configuration of vehicles and vehicle shifts on a daily basis, street speed by size of street and time of day, types of disability codes, general client current and historical information, identification of common destination locations, etc. The system should be able to process rapidly both subscription (repetitive) and casual (non-repetitive) ride requests emphasizing optimization of resources.

This CAD system will provide reporting functions, by automatically logging all communications between the dispatch center and the driver, including time, vehicle/driver ID, nature of the communication, and response. The estimated cost to implement this system is approximately \$400,000.

### **City of Laredo TMC/Paratransit Services Connection**

#### *Associated Market Packages:*

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

#### *Prerequisite Projects:* None

*Description:* Implement communications link between TMC and El Metro/EL Aguila paratransit services. This center-to-center application area supports coordination with traffic management centers to obtain near real-time traffic conditions on paratransit routes in order to generate optimum schedules and alternate routes when necessary. In addition, information on service/fleet performance and paratransit incident information and schedules will be provided to the TMC.

The extent to which information and coordination are shared between the centers will be determined through working arrangements among the agencies/jurisdictions involved. The estimated cost to implement this communication link is approximately \$30,000.

## **El Metro Transit Traveler Information System**

### *Associated Market Packages:*

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Traveler Information (APTS08)

*Prerequisite Projects:* None

*Description:* Implement system to provide transit schedules, operating hours, routes, and fare information by telephone.

## **El Metro Web-based Transit Information**

### *Associated Market Packages:*

- Traffic Information Dissemination (ATMS06)
- Transit Vehicle Tracking (APTS01)
- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Traveler Information (APTS08)

*Prerequisite Projects:* El Metro Transit AVL

*Description:* Build website to provide up-to-date transit information. This project will implement web-based transit traveler information that can be accessed by patrons pre-trip to identify routes, schedules, status (delays, bus arrival times, etc. from AVL data) and other pertinent information. This project also should provide for an interactive trip planner to allow patrons to map out their trips, including bus arrival/departure times, transfers, and help them to identify optimum routes and schedules. This trip planning system will enhance current efforts to provide trip planning assistance to patrons by phone. Coordination with TxDOT and the City of Laredo would allow for current traffic conditions, incidents, closures, special events, and other impacts to the roadway network to be displayed with the transit route and status information.

## **El Metro Transit Kiosks**

### *Associated Market Packages:*

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Traveler Information (APTS08)

*Prerequisite Projects:* El Metro Transit AVL

*Description:* Install transit kiosks at major transfer centers or hubs (i.e., civic centers and buildings, event venues, etc.) to provide static and dynamic transit information. These public transit kiosks will

provide an easy to use touch screen interface for displaying transit routes and schedules, personalized itineraries and transit route maps.

The transit agency will be able to keep the transit kiosk database updated with current routes and schedule information. Each of the transit routes will be displayed on a GIS-based street map. The user will use the touch screen, push-button interface to zoom in or out on the map to generate a desired map view of the transit route for their personalized printout. The user can specify their origin and destination from the touch screen menu structure. The kiosk will then display a list of multi-modal transit options that will transport the user from their origin to their desired destination including a transfer to another route if necessary. The kiosk then displays the series of bus stops for that route along with the arrival time at each stop.

### **Webb County Electronic Fare Collection**

*Associated Market Packages:*

- Transit Passenger and Fare Management (APTS04)

*Prerequisite Projects:* None

*Description:* This project is a continuation and upgrade to an existing AVL/MDT system enabling the use of smart cards and electronic swipe card technology on transit buses. The system has been already installed on 20 buses in Webb County. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patron. The system will build on hardware and software previously provided under the transit AVL projects. Specifically, fare boxes will be upgraded to accept smart cards (i.e., cards with passive RFID technology or a magnetic information strip, such as a credit card) with rider and account information. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

### **El Metro/El Aguila Dispatch Operations Center**

*Associated Market Packages:*

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

*Prerequisite Projects:* None

*Description:* Implement a centralized transit management and operations center. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information (including customer call center) and other functions. Upgrading to computer-aided dispatch (CAD) will streamline communications between dispatchers and drivers. Used in conjunction with automatic vehicle location (AVL) and mobile data terminals, dispatchers can assess vehicle locations, status, and route adherence, as well as communicate with one or several vehicles that are in the field. A CAD system also improves the system reporting functions by automatically logging all communications



between the dispatch center and the driver, including time, vehicle/driver, nature of the communication, and response.

The total cost of the project includes a plan at \$200,000 plus the cost of the physical installations which is of \$225 per square foot.

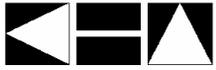
### **Webb County On-board Video Security System**

*Associated Market Packages:*

- Transit Security (APTS05)

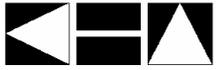
*Prerequisite Projects:* None

*Description:* Webb County desires to install additional security cameras on its fixed route buses. Cameras will be for on-board recording only, and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time via video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The total cost of the project will depend on the total size of the bus fleet.



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Traffic and Travel Management</b>					
TxDOT Probe Surveillance	Implement systems to allow probe surveillance of vehicles (transit and/or commercial vehicles) using possible existing transponders in vehicles	TxDOT/Private Sector	\$1,000,000	No	2 years
City of Laredo Parking and Event Management System	Implement parking and event management system at parking lots/garages in central business districts, major event venues, and airports	City of Laredo	\$100,000 to \$500,000 (Dependent on size)	No	2 years
Regional Parking Management	Implement a system to support coordination between parking facilities in the Region	City of Laredo/TxDOT	To Be Determined	No	1 year
Railroad Operations Coordination	Implement communications link between rail operations and TxDOT and Laredo centers in order to exchange HRI and railroad advisories and schedules	Union Pacific/TxDOT/City of Laredo	\$20,000	No	6 months
ISP-based Route Guidance	Provide direct support to ISP-based route guidance systems through sharing of traveler information	Public Agencies/Private Sector	N/A (ISPs responsible for costs)	No	1 year
<b>Commercial Vehicle Operations</b>					
Fleet Administration	Implement system to manage fleets of commercial vehicles. Functionalities include route guidance, AVL software, and the capability of monitoring on-board vehicle data	Private Sector	N/A	No	1 year
Freight Administration	Implement system to track movement of cargo and monitor cargo condition from source to destination	Private Sector	N/A	No	1 year
On-Board Commercial Vehicle Safety	Provide for on-board commercial vehicle safety monitoring and reporting. Includes roadside support for reading on-board safety data via tags.	Private Sector	N/A	No	1 year



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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
<b>Commercial Vehicle Operations (continued)</b>					
Fleet Maintenance	Implement system to support maintenance of commercial vehicle fleets with on-board monitoring equipment. Records of vehicle mileage, repairs, and safety violations are maintained.	Private Sector	N/A	No	1 year
<b>Maintenance and Construction Operations</b>					
Maintenance and Construction Vehicle AVL	Installation of automatic vehicle location system on maintenance and construction vehicles	TxDOT/Other Maintenance Agencies	\$100,000	No	1 year
Maintenance and Construction Vehicles Maintenance	Install on-board diagnostic systems on maintenance and construction vehicles to monitor vehicle condition, level of activity, etc.	TxDOT/Other Maintenance Agencies	To Be Determined	No	1 year
Roadway Maintenance and Construction Services	Implement system to support scheduled and unscheduled maintenance and construction on the roadway system or right-of-way. Maintenance services include landscape maintenance, hazard removal, routine maintenance activities, and repair and maintenance of both ITS and non-ITS equipment.	TxDOT/Other Maintenance Agencies	To Be Determined	No	1 year
<b>Public Transportation Management</b>					
Webb County Automatic Passenger Counters	Passive system to accurately count ridership. Installed on 20 buses.	Webb County CAA	\$40,000	No	6 months
Webb County Transit Traveler Information System/Travel Data and Route Guidance	Dial-a-Ride and Internet based web site systems providing automated information to passengers seeking route guidance.	Webb County CAA	\$500,000	No	1 year

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

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



## Laredo Region Long-Term Projects (20-Year)

### **Travel and Traffic Management**

#### **TxDOT Probe Surveillance**

*Associated Market Packages:*

- Probe Surveillance (ATMS02)

*Prerequisite Projects:* TxDOT ATMS

*Description:* Obtain travel condition information from vehicles equipped with GPS devices. Since many new vehicles are being equipped with GPS based in-vehicle route guidance systems, a public/private partnership will be developed, possibly in conjunction with the ISP-based Route Guidance project, to provide location, travel direction, and speed data to TxDOT to integrate into the ATMS. The high presence of commercial vehicles in the Region makes them good candidates to be used as probes. Software, and potentially hardware enhancements will be required to integrate the probe information into the existing platform and user interface. The estimated cost for this project is approximately \$1,000,000.

#### **City of Laredo Parking and Event Management System**

*Associated Market Packages:*

- Parking Facility Management (ATMS16)

*Prerequisite Projects:* None

*Description:* Install a parking and event management system that directs motorists to available spaces. Potential installation locations include the downtown Civic Center, LIFE Fair Grounds, Laredo International Airport, Laredo Entertainment Center, etc. Parking management systems have proven to reduce delays/congestion and improve air quality around areas where motorists may “circle” a venue in search of an available parking location. Parking and event management systems are composed of two subsystems. The first subsystem monitors the availability of parking spaces at a facility based on gate counts of vehicles entering and exiting the facility. More sophisticated subsystems count how many spaces are available based on individual parking stall presence detectors. The second major subsystem provides motorists with dynamic parking information on the major streets approaching the venue(s). The information is routinely disseminated using a combination of static and dynamic signing. The cost for this project will depend on the number of locations where the system is installed.

## Regional Parking Management

*Associated Market Packages:*

- Parking Facility Management (ATMS16)
- Regional Parking Management (ATMS17)

*Prerequisite Projects:* City of Laredo Parking and Event Management

*Description:* Implement a system to support coordination between parking facilities in the Region and to enable regional parking management strategies.

## Railroad Operations Coordination

*Associated Market Packages:*

- Standard Railroad Grade Crossing (ATMS13)
- Railroad Operations Coordination (ATMS15)

*Prerequisite Projects:* None

*Description:* Implement communications link between rail operations and TxDOT and Laredo centers to exchange Highway Rail Intersection (HRI) and railroad advisories and schedules. This provides an additional level of strategic coordination between rail operations and traffic management centers. Rail operations will provide train schedules, maintenance schedules, and any other forecast events that will result in HRI closures. This information will be 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.

## ISP-based Route Guidance

*Associated Market Packages:*

- Traffic Information Dissemination (ATMS06)
- ISP Based Route Guidance (ATIS05)

*Prerequisite Projects:* None

*Description:* Provide direct support to private ISP-based route guidance systems through sharing of traveler information. These systems offer users pre-trip route planning and turn-by-turn route guidance services. Routes may be based on static information or reflect real time network conditions. The route determination functions are performed in the ISP system. This approach simplifies the user equipment requirements and can provide the infrastructure better information on which to predict future traffic. The system 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.

## **Commercial Vehicle Operations**

### **Fleet Administration**

*Associated Market Packages:*

- Fleet Administration (CVO01)
- On-board CVO Safety (CVO08)

*Prerequisite Projects:* None

*Description:* Implement system to manage fleets of commercial vehicles. Functionalities of the system include route guidance, AVL software, and the capability of monitoring on-board vehicle data. A typical system would be purchased by the managers of a trucking company. It would have a satellite navigation system, a small computer and a digital radio in each truck. At pre-established time intervals the computer transmits where the truck has been. The digital radio service forwards the data to the central office of the trucking company. A computer system in the central office manages the fleet in real time under control of a team of dispatchers. In this way, the central office knows where its trucks are. One special functionality is that the computer can automatically eliminate routes over roads that cannot take the weight of the truck, or that have overhead obstructions.

### **Freight Administration**

*Associated Market Packages:*

- Fleet Administration (CVO01)
- Freight Administration (CVO02)

*Prerequisite Projects:* None

*Description:* Implement system to track movement of cargo and monitor cargo condition from source to destination. Truck companies will be able to track individual loads by using, for instance, bar-coded containers and pallets to track loads combined into a larger container. To minimize handling-expense, damage and waste of vehicle capacity, optimal-sized pallets may be constructed at distribution points to go to particular destinations. A good load-tracking system will help deliver more than 95% of its loads via truck, on planned schedules. Controlled routes will allow trucks to avoid heavy traffic caused by rush-hour, accidents or road-work. If a truck gets off its route, or is delayed, the truck can be diverted to a better route, or urgent loads that are likely to be late can be diverted to air-freight. The best proprietary systems, such as the one operated by FedEx, achieve better than 99.999% on-time delivery.

## **On-Board Commercial Vehicle Safety**

### *Associated Market Packages:*

- Electronic Clearance (CVO03)
- On-board CVO Safety (CVO08)

### *Prerequisite Projects:* Electronic Clearance Sites

*Description:* Provide for on-board commercial vehicle safety monitoring and reporting. The system will be used to collect and process on board vehicle and driver safety information to monitor the safety status and supply this information to the roadside facilities both at mainline speeds and while stopped for inspections. Tags installed on commercial vehicles may be used for reading on-board safety data at roadside facilities. The capability to alert the commercial vehicle driver whenever there is a critical safety problem or potential emergency shall also be provided.

## **Fleet Maintenance**

### *Associated Market Packages:*

- CVO Fleet Maintenance (CVO09)

### *Prerequisite Projects:* None

*Description:* Implement system to support maintenance of commercial vehicle fleets with on-board monitoring equipment. This system combines the use of on-board equipment and software to provide fleet owners with capabilities to regulate maintenance, repairs, tires, fuel consumption, mileage, logs, licensing and tags, preventative maintenance scheduling, parts inventory with bar code support and employee, vendor, vehicle information, etc. This system will facilitate data input and storage, and will also include report generation capabilities to allow fleet owners to generate any type of report needed using an easy to use interface.

## **Maintenance and Construction Vehicle Operations**

### **Maintenance and Construction Vehicle AVL**

### *Associated Market Packages:*

- Maintenance and Construction Vehicle Tracking (MC01)

### *Prerequisite Projects:* None

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

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

### **Maintenance and Construction Vehicle Maintenance**

*Associated Market Packages:*

- Maintenance and Construction Vehicle Maintenance (MC02)

*Prerequisite Projects:* None

*Description:* Implement system to support maintenance of maintenance and construction vehicle fleets with on-board monitoring equipment. This system combines the use of on-board equipment and software to provide maintenance agencies with capabilities to regulate maintenance, repairs, tires, fuel consumption, mileage, logs, licensing and tags, preventative maintenance scheduling, parts inventory with bar code support and employee, vehicle information, etc. This system will facilitate data input and storage, and will also include report generation capabilities to allow the maintenance agency to generate any type of report needed using an easy to use interface.

### **Roadway Maintenance and Construction Services**

*Associated Market Packages:*

- Roadway Maintenance and Construction (MC07)

*Prerequisite Projects:* None

*Description:* Implement system to support scheduled and unscheduled maintenance and construction on the roadway system or right-of-way. Maintenance services include landscape maintenance, debris removal, routine maintenance activities, and repair and maintenance of both ITS and non-ITS equipment

### **Public Transportation Management**

#### **Webb County Automatic Passenger Counters (APC)**

*Associated Market Packages:*

- Transit Passenger and Fare Management (APTS04)

*Prerequisite Projects:* None

*Description:* Install APC systems on transit vehicles to accurately count ridership. In general, APC system components can be divided into three categories: hardware, software, and transit agency staff. To collect ridership data such as load levels and their locations on a given route, a number of APC hardware components are required:

- counting sensors (such as treadle mats or I-R beams);
- an odometer sensor;
- an internal clock in the microprocessor to determine the time that the passenger activity occurred;

- a microprocessor to tabulate, accumulate, and store passenger activity data onboard the bus;
- manual or automatic data storage/retrieval devices;
- a power supply to convert primary bus voltage to the APC system;
- engine sensors to register engine dwell and idle times;
- wheelchair-lift sensors to register wheelchair lift activity (optional); and
- door sensors to register door openings and closings.

The current state-of-the-art methods of APCs currently in use can be divided into several technologies:

- infra-red (I-R) beams (both passive and active);
- treadle mats;
- I-R optic sensors; and
- low ultrasonic frequency sensors.

The technology that utilizes I-R beams computes the total number of boardings and alightings by tabulating the number of times the beam(s) is "interrupted" by a passenger entering or exiting the bus. Generally, the I-R beams are placed at the waist height of passengers. Algorithms are specifically built into the APC's proprietary software to take into account the under- and over-counting of passengers created by multiple passengers crossing the beam simultaneously and passengers exiting through the front door on a two-or-more-door bus. The other APC counting technologies are similar in operation but differ only in how the passenger's presence is detected and counted.

### **Webb County Transit Traveler Information System/Travel Data and Route Guidance**

*Associated Market Packages:*

- Traffic Information Dissemination (ATMS06)
- Transit Vehicle Tracking (APTS01)
- Demand-Response Transit Operations (APTS03)
- Transit Traveler Information (APTS08)

*Prerequisite Projects:* Computer-Aided Dispatch and Transit Operations Center, Webb County Transit AVL and MDTs

*Description:* Provide enhanced transit related traveler information to Webb County CAA transit customers. The on-demand nature of the service 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 TOC 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 transit 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 City of Laredo 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**

With the substantial amount of effort invested by stakeholders in the Laredo 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.

New market packages are added to the National ITS Architecture every few years, and with the increasing emphasis on homeland security issues, it is envisioned that there will be additional market packages focused on addressing homeland security and emergency management. New federal initiatives, such as Amber Alert and 511, could also generate a new or updated category of market packages within the National ITS Architecture. Laredo stakeholders agreed that it would be beneficial to review any modifications to the National ITS Architecture as well as any USDOT/FHWA guidance on an as-needed basis, and identify any additions or modifications that should be considered for the Laredo Regional ITS Architecture.

At the Comment Resolution Meeting held in Laredo in January 2003, 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 re-evaluate priorities. A two-year timeframe was selected by the stakeholders for this update to correspond with the Laredo MPO's Transportation Improvement Plan (TIP) updates. 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 multijurisdictional committee in the Region. This group would also provide input to the Laredo MPO TIP planning process.

Stakeholders in the Region placed a stronger emphasis on reviewing the Regional ITS Deployment Plan in order to determine which of the short-term projects have the highest priority for the Region, as well as to update the status of short-term projects. The group felt that periodic meetings to discuss these changes would be beneficial. Input would be gathered at these meetings by TxDOT and incorporated into the next update of the documents. This review would be particularly beneficial if funding opportunities arise. As part of the review, projects can be removed that are already underway or deployed, and priorities can be assessed again as more ITS infrastructure is put in place.

It is recommended that the stakeholders involved in the development of the Laredo Regional ITS Architecture and Deployment Plan seek the buy-in from management from within their agency. A formal presentation from the stakeholder group to the Metro Government Committee was suggested by the stakeholders as a possible means to accomplish this goal. Ultimately, it will be the management of the various stakeholder agencies that will determine if funds and resources can be allocated to implementing ITS in the Laredo Region, and therefore their support is critical to the success of the project.

Both the Laredo Regional ITS Architecture and 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.