



State of Texas  
ITS Architectures and Deployment Plans

# Laredo Region

---

## Executive Summary

*Prepared by:*



ConSysTec Corp

**June 20, 2003**

068510003

Copyright © 2003 by Texas Department of Transportation. All rights reserved.



## TABLE OF CONTENTS

### EXECUTIVE SUMMARY

<b>PROJECT APPROACH .....</b>	<b>1</b>
<b>OVERVIEW OF THE LAREDO REGION .....</b>	<b>2</b>
<b>LAREDO REGION STAKEHOLDERS .....</b>	<b>4</b>
<b>LAREDO REGIONAL ITS ARCHITECTURE.....</b>	<b>5</b>
<b>Inventory and Needs in the Region.....</b>	<b>5</b>
<b>Market Packages .....</b>	<b>8</b>
<b>Interconnects, Interfaces, and Standards.....</b>	<b>8</b>
<b>Operational Concept and Scenarios .....</b>	<b>13</b>
<b>Agreements .....</b>	<b>14</b>
<b>ITS Architecture Documentation.....</b>	<b>14</b>
<b>LAREDO REGIONAL ITS DEPLOYMENT PLAN.....</b>	<b>15</b>
<b>Prioritized Market Packages.....</b>	<b>15</b>
<b>ITS Project Recommendations for the Laredo Region.....</b>	<b>17</b>
<b>MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN.....</b>	<b>22</b>
<b>MEMORANDUM OF UNDERSTANDING .....</b>	<b>23</b>



## **TABLE OF CONTENTS**

### **EXECUTIVE SUMMARY**

## **LIST OF FIGURES**

Figure 1 – Laredo Regional ITS Architecture and Deployment Plan Development Process .....	1
Figure 2 – Laredo Region Map .....	3
Figure 3 – Laredo Regional System Interconnect Diagram.....	9
Figure 4 – Customized Market Package for Laredo Surface Street Control.....	10
Figure 5 – TxDOT Laredo DMS Interfaces.....	12
Figure 6 – TxDOT Laredo TMC to City/County Public Safety Dispatch Architecture Flows .....	13

## **LIST OF TABLES**

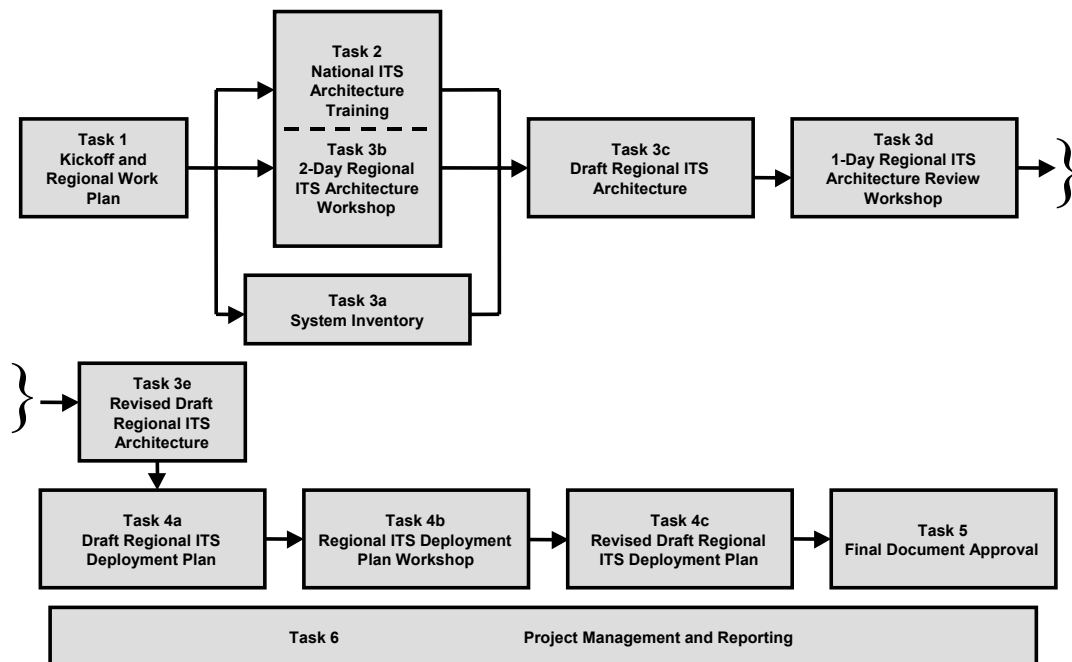
Table 1 – Laredo Region: Summary of ITS Needs.....	6
Table 2 – Summary of Prioritized Market Packages for the Laredo Region .....	16
Table 3 – Recommended ITS Projects for the Laredo Region .....	18

## PROJECT APPROACH

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) in January of 2001. This final rule requires that Intelligent Transportation System (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. FHWA has further established a deadline of April 2005 for regions to have an ITS architecture in place.

To meet these requirements and ensure future federal funding eligibility for ITS, the Texas Department of Transportation (TxDOT) initiated the development of Regional ITS Architectures and Deployment Plans throughout the State of Texas. There are several metropolitan Regions in the state that already have ITS architectures in place or under development. The focus of the TxDOT Regional ITS Architecture and Deployment Plan program is to develop architectures in those areas outside of the Austin, Houston, Dallas, Fort Worth, and San Antonio Regions. TxDOT expanded upon the ITS architecture requirements outlined in the FHWA Final Rule, and included an ITS Deployment Plan as part of the Regional efforts. The Regional ITS Architecture provides a framework for ITS systems, services, integration, and interoperability, and the Regional ITS Deployment Plan identifies specific projects and timeframes for ITS implementation to support the vision developed by stakeholders in the architecture.

TxDOT's process for developing the Regional ITS Architectures and Deployment Plans followed a consensus-based approach to meeting the requirements in the FHWA Final Rule and supporting guidelines. This process was further tailored to meet the specific multi-agency needs of these Regional plans, and was structured around stakeholder input and involvement. The addition of an ITS Deployment Plan provides for a tangible road map for regional ITS deployment and integration. **Figure 1** shows the development process for each of the Regional ITS Architectures and Deployment Plans.



**Figure 1 – Laredo Regional ITS Architecture and Deployment Plan Development Process**



## OVERVIEW OF THE LAREDO REGION

The Laredo Region is located just south of the Texas Hill Country on the north bank of the middle Rio Grande River. The Regional boundaries were defined to include Webb, Duval, LaSalle, and Dimmit Counties as well as the City of Laredo. **Figure 2** illustrates the Regional boundaries.

Primary interstate and state routes that traverse the Region include I-35, US 59, US 83, State Highway 359, Loop 20, and FM 1472. The Laredo roadway network also connects to Mexico's State Routes 2 and 85. These corridors are key links for inter- and intra-state as well as international movement of people and goods. I-35 is one of the most heavily traveled truck routes in southern Texas. The effective operation of this highway is critical to the movement of goods and people.

Agencies in the Laredo Region have already deployed several ITS technologies and are in the process of additional deployments. Current ITS elements in the Region include:

- Traffic management centers at the TxDOT Laredo District and the City of Laredo;
- Dynamic message signs (DMS) for motorist information along I-35 and additional signs under construction as part of the Milo 1 interchange project;
- Closed-circuit television (CCTV) cameras at selected interchanges;
- Highway advisory radio (HAR) near the airport and international border crossings; and
- Video image vehicle detection systems (VIVDS).

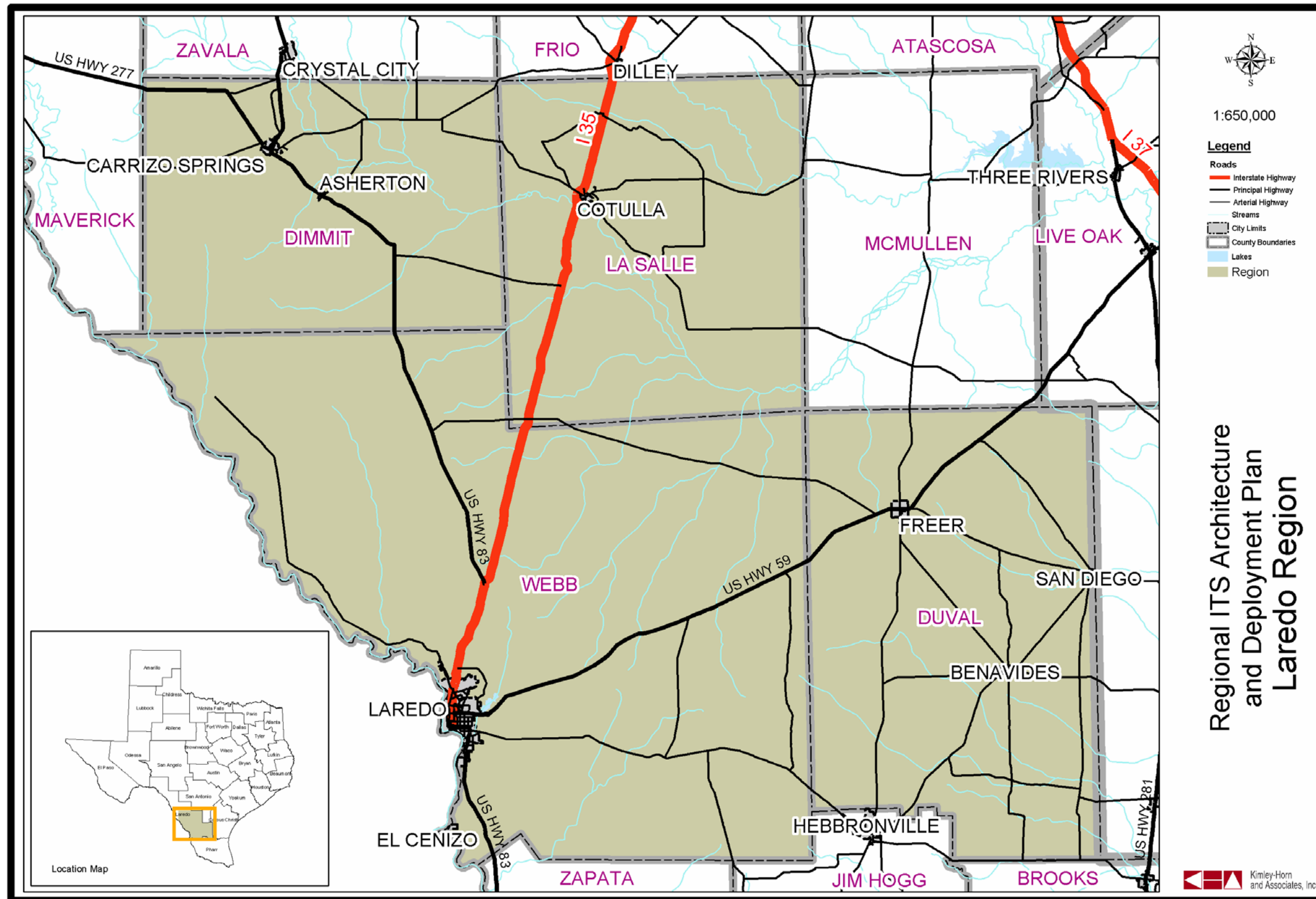


Figure 2 – Laredo Region Map



## LAREDO REGION STAKEHOLDERS

Involving a range of perspectives in the development of a regional ITS architecture and deployment plan, and obtaining consensus on the vision and recommendations are key components to the process. Stakeholders from throughout the Laredo Region participated in the development of the Regional ITS Architecture and Deployment Plan, including representatives from TxDOT, the Federal Highway Administration, cities, counties, the Texas Department of Public Safety (TxDPS), transit agencies, police and fire. These stakeholders provided input and review at key steps in the development process, including a project kick-off meeting, architecture development and review workshops, a deployment plan workshop, and review of the final project documentation.

Laredo Region stakeholders included:

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



## LAREDO REGIONAL ITS ARCHITECTURE

The process for developing the Regional ITS Architecture for Laredo included several key steps:

- Preparing an inventory of planned and existing systems in the Region;
- Identifying needs in the Region that could be addressed by ITS deployment or integration;
- Customizing and prioritizing market packages to address the specific needs and services identified by stakeholders;
- Developing interconnects and interfaces for system elements to map out data flows and agency links;
- Preparing an operational concept to illustrate how the systems, components and agencies will be integrated and function as a result of the architecture framework;
- Identifying high-level functional requirements;
- Identifying standards that could be applicable to the Laredo Region; and
- Outlining potential agreements that would be needed to facilitate information or resource sharing as a result of ITS implementation.

### Inventory and Needs in the Region

Laredo's Regional ITS Architecture began with a project kick-off meeting in March of 2002. At that meeting, stakeholders provided information about existing ITS elements deployed in the Region, as well as those planned for the Region. A diverse range of needs were identified by Regional stakeholders. The highest priority needs focused on improving traveler information (particularly for closures of major routes), incident management, and enhancing coordination and communication among local and state agencies within the Region as well as with neighboring TxDOT Districts. The inventory of planned and existing ITS infrastructure provided the basis for the architecture development. Needs that could be addressed by ITS technologies guided the selection of market packages, data flows, and integration requirements.

The needs identified by Laredo Region stakeholders were categorized into functional areas, and are shown in **Table 1**.



**Table 1 – Laredo Region: Summary of ITS Needs**

**Laredo Region  
Summary of ITS Needs  
Laredo Regional ITS Architecture and Deployment Plan Kick-Off Meeting  
March 21, 2002**

**Institutional Issues/Needs**

- Need coordination with border sites to share information (closures, restrictions, etc.)
- Need coordination with railroad
- Need coordination with Commercial Vehicle Information Systems Network (CVISN)
- Need security for staff at TxDOT, City of Laredo, Customs, Border Patrol, El Metro, et al.

**Traffic Management Needs**

- Need detours for weather and emergencies
- Need road closure plans (TxDOT has a plan for I-35 only)
- Need multiple road closure/detour plans
- Need to know locations of trains when stopped
- Need flood warning systems, especially for underpasses and low water crossings

**Traveler Information Needs**

- Need to communicate better with travelers and to general public
- Need to identify next steps for 511
- Need to use DMS for en-route information
- Need to provide ramp closure information to travelers
- Need coordination of international bridges along the border (fiber)
- Need English and Spanish on Highway Advisory Radio (HAR)
- Need English and International symbols on DMS
- Need coordination with Mexico for major events

**Data Needs (Collecting, Sharing)**

- Need volume information
- Need permanent count stations
- Need road information to be shared interstate and interdistrict
- Need to coordinate information on freeways and arterials
- Need off system traffic management and flow information

**Public Transportation Management Needs**

- Need transit operators/agencies to have access to information about closures, maintenance, weather, etc.
- Need Automatic Vehicle Location (AVL) on vehicles
- Need automated fare boxes
- Need to make information available to transit passengers at stops as well as from home or office
- Need security system for drivers and passengers

**Table 1 – Laredo Region: Summary of ITS Needs (continued)**

**Electronic Payment Needs**

- Need electronic payment for EI Metro
- Need electronic payment at border crossing
- Need CVISN common transponder

**Commercial Vehicle Operations Needs**

- Need early notification and communication with commercial vehicle operations (CVO) about closures, restrictions, etc. (just-in-time delivery has made this more critical)
- Need regional study for HAZMAT shipping and routing
- Need electronic screening - CVISN is under development

**Emergency Management Needs**

- Need a center to collocate Emergency Operations Center (EOC) and transportation personnel
- Need Emergency Management Coordination
- Need a system like LifeLink to share video between emergency (ambulance) and trauma centers
- Need security for Traffic Management Center (TMC)/EOC and places that handle emergencies

**Advanced Vehicle Safety Systems Needs**

- None Identified

**Information Management Needs (Data Archiving)**

- Need policy for shared use of video and data with media
- Need policy for shared telecommunications facility maintenance and operations

**Maintenance and Construction Operations Needs**

- Need speed warnings for work zones
- Need to coordinate maintenance with traffic operations during closures

**Other Needs**

- Need to look for opportunities to tie the Laredo Regional ITS Architecture and Deployment Plan into Homeland Defense/Security
- Need to enhance border safety and security
- Need a central, physical location for communications infrastructure sharing
- Need to update telecommunications study in light of major enhancements to the communications infrastructure over the past 2 years.
- Need to facilitate congestion management on freeways and arterials
- Need coordinated signal timing between city and state



## Market Packages

A 2-Day ITS Architecture Workshop was held in Laredo in May 2002. At this workshop, stakeholders were provided with architecture training, including background information about the National ITS Architecture, the purpose and benefits of a regional ITS architecture, as well as the process that would be used to develop the Laredo Regional ITS Architecture.

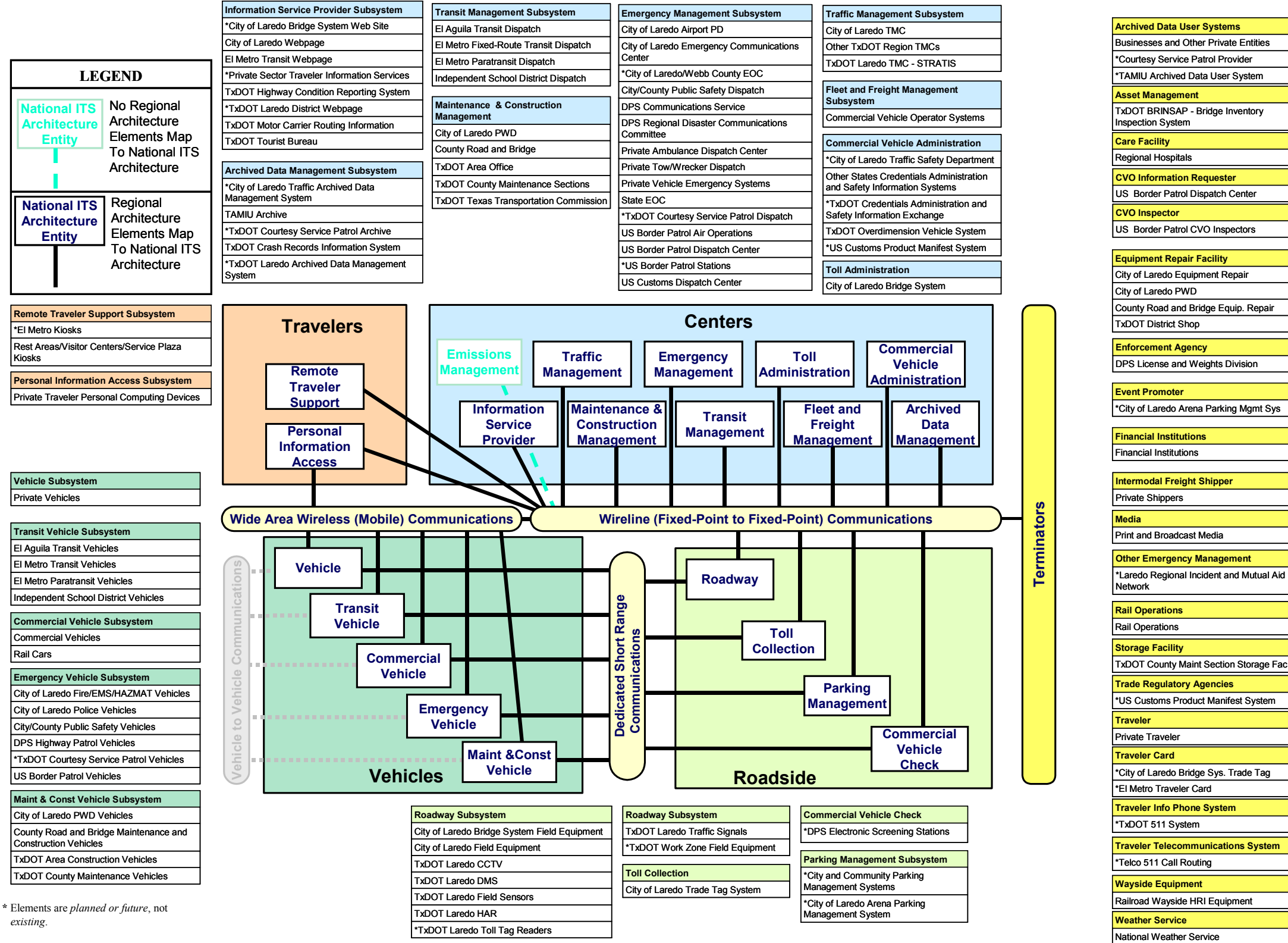
The next step in developing the Laredo Regional ITS Architecture was to identify the services that would be needed to address the stakeholder needs. In the National ITS Architecture, services are referred to as market packages. Market packages may include several stakeholders and elements that work together to provide a service in the Region. Examples of market packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 75 market packages identified in the National ITS Architecture.

At the 2-Day ITS Architecture Workshop, stakeholders selected the market packages that corresponded to the desired services and functions identified for the Region, and then customized these market packages. They included services and functions such as Network Surveillance, Surface Street Control, Freeway Control, and Road Weather Data Collection, as well as market packages to address coordination needs, including an Incident Management System and Regional Traffic Control and Coordination. Because market packages are groups of services and functions, they can be deployed incrementally and over time.

Of the 75 market packages in the National ITS Architecture, stakeholders identified 39 as being applicable to the Laredo Region. These market packages were then customized for the Laredo Region.

## Interconnects, Interfaces, and Standards

Stakeholders also began the process of mapping existing and planned ITS elements in Laredo to the subsystems in the National ITS Architecture. These elements included agencies, systems, and essentially all of the ITS components in the Region. Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, Roadside, Vehicles and Travelers. This mapping resulted in an interconnect diagram for the Laredo Region, which is shown in **Figure 3**. This architecture diagram, also referred to as the “sausage diagram” shows the relationship of existing, planned and future systems in Laredo.

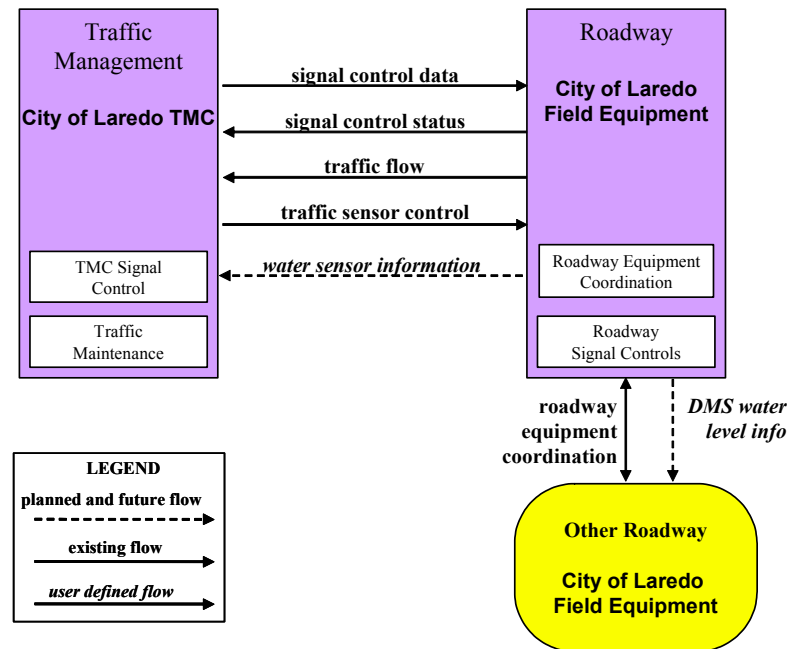


\* Elements are planned or future, not existing.

Figure 3 – Laredo Regional System Interconnect Diagram

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Laredo Region. Each market package was shown graphically, with the market package name, Laredo specific element, and with the unique agency and system identifiers within the subsystems and terminators.

**Figure 4** is an example of an ATMS market package for Surface Street Control that has been customized for the Laredo Region. This market package shows two subsystems, Traffic Management and Roadway, and the associated entities (City of Laredo TMC and City of Laredo Field Equipment) and equipment packages. The equipment packages are the rectangles inside of the subsystems, and represent the functions that deliver a particular service to support the market package. Data flows between the subsystems and the terminators (Other Roadway) indicate what information is being shared. Most of the data flow lines are solid in this market package, which means that these are existing functions and information flows, except for the water related flows which are future user defined flows. All of the Laredo Region market package diagrams are included in the Laredo Regional ITS Architecture report.



**Figure 4 – Customized Market Package for Laredo Surface Street Control**

More detailed interfaces were developed which identified the connectivity between the systems and elements. Each element identified in the ITS architecture for the Laredo Region was mapped to the other elements with which it must interface. These interfaces were further defined by architecture data flows between individual elements that specify the information to be exchanged. The data flows include requests for information, alerts and messages, status requests, confirmations, and other information requirements.

While it is important to identify the various systems and stakeholders as part of a regional ITS architecture, a primary purpose of the architecture is to identify the connectivity between transportation systems in the Laredo Region. There are 103 different elements identified as part of the Laredo Regional ITS Architecture. These elements include local and state traffic operations centers, transit vehicles, dispatch systems, emergency management agencies, media outlets, and



others – essentially, all of the existing and planned physical components that contribute to the Regional intelligent transportation system. Interfaces have been identified for each element in the Laredo Regional ITS Architecture, and each element has been mapped to those other elements with which it must interface.

An example of one of the system interfaces is included as **Figure 5** on the following page. This graphic shows the TxDOT Laredo DMS, and the interfaces with other elements throughout the Region. These interfaces are shown as existing, planned, or future. Interfaces defined as “planned” have funding identified, while “future” interfaces are desired by stakeholders but funding has not yet been identified.

Architecture flows between the subsystems and terminators define the specific information (data) that is exchanged between subsystems and terminators. Each architecture flow has one or more data flows that specify what information is exchanged and the direction of the exchange.

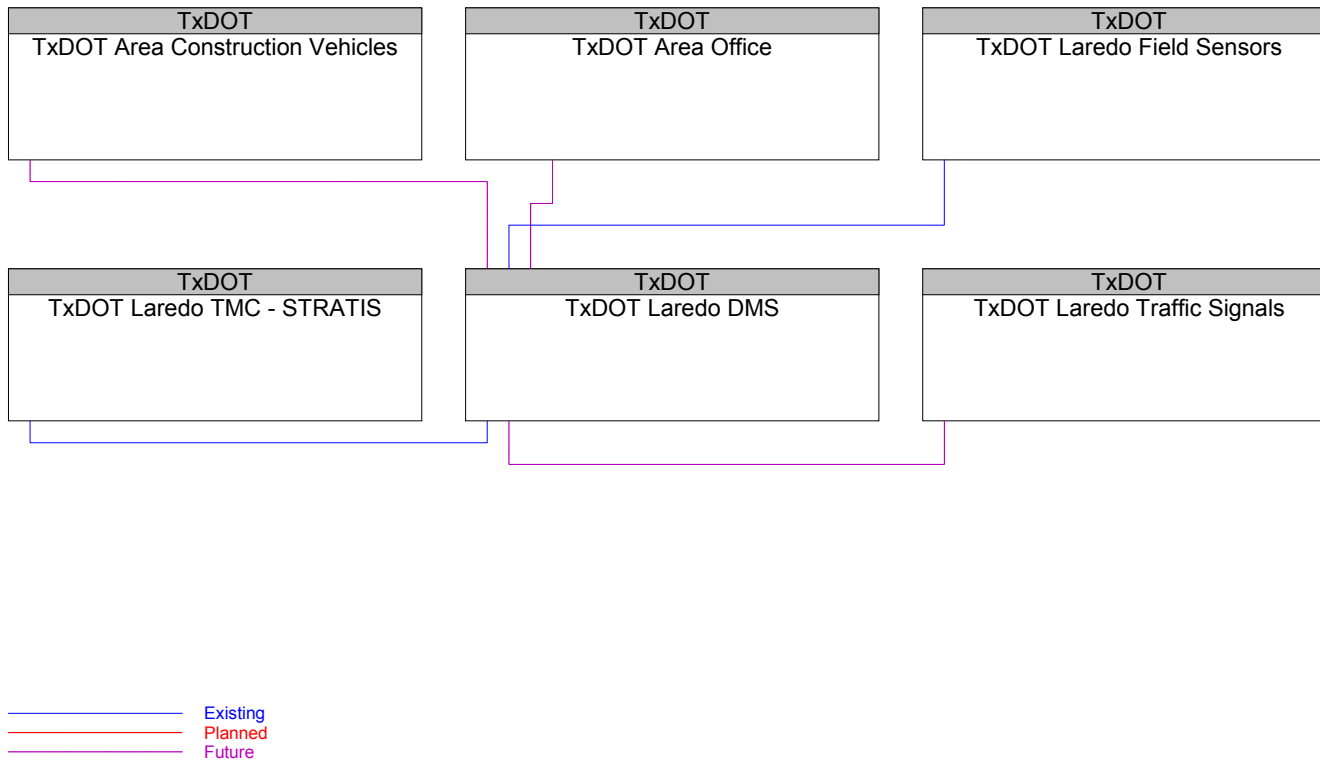
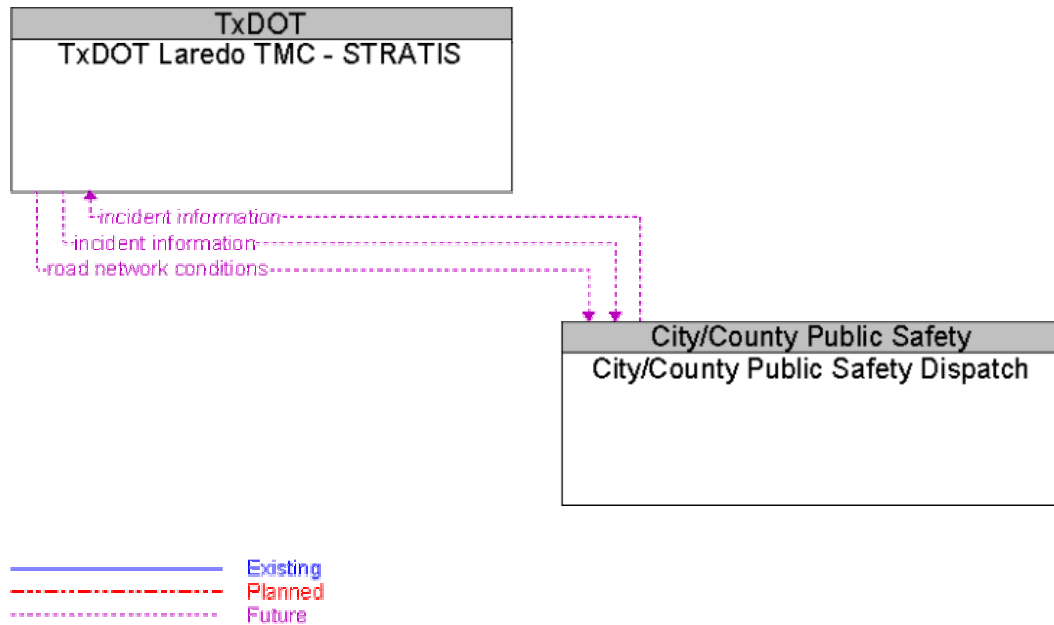


Figure 5 – TxDOT Laredo DMS Interfaces

An example of the architecture flows between two elements is shown in **Figure 6**. In this interface, the flows between the TxDOT Laredo Traffic Management Center (TMC) and the City/County Public Safety Dispatch show information that must go from the TxDOT Laredo TMC to the City/County Public Safety Dispatch, as well as information that the TMC needs from the Dispatch. Similar to the interfaces, architecture flows also are defined as existing, planned or future. All of the architecture flows between elements have been included on the project website.



**Figure 6 – TxDOT Laredo TMC to City/County Public Safety Dispatch Architecture Flows**

With the required interfaces and interconnections identified, standards that could potentially be applied to the Laredo Region were identified. Standards are an important tool that will allow efficient implementation of the elements in the Laredo Regional ITS Architecture over time. They facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and as new approaches evolve.

### Operational Concept and Scenarios

An operational concept for the Laredo Region was developed as part of the architecture process to illustrate how systems, components, and agencies will be integrated and function as a result of the framework provided by the Regional ITS Architecture. For the Laredo Region, three concepts were illustrated. The first was a tornado that caused heavy damage in Webb County. The operational concept shows that through ITS deployment, agency information sharing, and regional connectivity, agencies are able to work together and benefit from the technologies and systems in place to proactively manage the Region’s transportation system and coordinate emergency operations in the aftermath of the tornado. The second concept illustrates a sequence of events during a multi-vehicle accident along I-35 just as the afternoon rush hour is about to begin, and how TxDOT, emergency services, public safety, and other key agencies can put pre-determined strategies into effect as well as utilize technology and communications



infrastructure to respond effectively and minimize traffic impacts. The third scenario describes how the integrated elements of the Laredo Region's ITS program will function together in the event of a major incident caused by an overturned truck that has spilled flammable materials on I-35 approaching the border crossing.

## Agreements

Interfaces and data flows among public and private entities in the Laredo Region will require agreements among agencies that establish parameters for sharing agency information to support traffic and incident management, provide traveler information, and perform other functions identified in the Regional ITS Architecture. Recommended projects will result in systems and interfaces that will require inter-agency agreements, both public and private, to facilitate the exchange of information.

Currently, there are few formal agreements in place in the Laredo Region. Stakeholders indicated that while there is a high degree of cooperation among agencies, there hasn't been a need for formal agreements to facilitate multi-jurisdictional resource sharing, cooperation or mutual aid. With the implementation of ITS technologies, integration of systems from one or more agencies, and the anticipated level of information exchange identified in the architecture, it is likely that more formal agreements will be needed.

The following is a list of potential agreements for the Laredo Region based on the interfaces identified in the Regional ITS Architecture and recommended ITS projects in the Deployment Plan:

- Data sharing and usage agreements among public and private media and information service providers;
- Shared video monitoring agreements between TxDOT and emergency services agencies;
- Mutual aid agreements among public sector agencies, primarily fire, police, emergency services and TxDOT; and
- Joint operations and shared control agreements between TxDOT and the City of Laredo.

It is important to note that as ITS services and systems are implemented in the Region, part of the planning and review process for those projects should include a review of potential agreements that would be needed for implementation or operations.

## ITS Architecture Documentation

The Regional ITS Architecture for the Laredo Region is documented in a final report. Stakeholders were brought together to review the Regional ITS Architecture and provide feedback. The final report was not prepared until after completion of the Laredo Regional ITS Deployment Plan, to allow for modifications based on information and input received for the ITS Deployment Plan recommendations.

A website with all of the Regional ITS Architecture was also maintained. The website allowed stakeholders to review the architecture and provide comments directly to the project team through the website. At the time this report was published, the Laredo Regional ITS Architecture website was being hosted at [www.consystem.com](http://www.consystem.com). The site can be accessed by selecting the link to Texas, and then the link to Laredo. TxDOT plans to permanently host the site in the future at [www.dot.state.tx.us/trf/its](http://www.dot.state.tx.us/trf/its).

## LAREDO REGIONAL ITS DEPLOYMENT PLAN

Although development of an ITS Deployment Plan was not required by the FHWA Final Rule for the architecture, the Final Rule does request a sequence of projects required for implementation. Capitalizing on the momentum and interagency dialogue established during the development of the Laredo Regional ITS Architecture, TxDOT chose to expand on the project sequence requirement to develop a formal ITS Deployment Plan for the 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 prioritizing market packages, outlining specific ITS project recommendations and strategies for the Region, and identifying deployment timeframes so that the recommended projects and strategies can be implemented over time. Agency responsibilities for implementing and operating the systems also are a key component of the ITS Deployment Plan.

### Prioritized Market Packages

Market packages for the Laredo Region previously identified as part of the architecture were categorized into high, medium and low priorities by stakeholders. 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.

It is important to note that the high, medium and low priorities were not directly related to anticipated deployment timeframes (such as five, ten or twenty year deployment horizon). For example, a market package can be a high priority, but because of funding or prerequisite project requirements, it might not be feasible for deployment for several years. Maturity and availability of technology was another factor for prioritizing the market packages. Because market packages often represent groups of technologies or services to deliver a particular functionality, certain components of the market package could be identified as a high priority or existing capability, while other components would have a lower priority. Other considerations included whether or not the market package was better suited for deployment and operations by the private sector rather than public agencies in the Region.

**Table 2** shows the prioritization of the selected market packages for the Laredo Region. The majority of these market packages fall into the high priority category. This category also includes market packages (or portions of market packages) that are already deployed in the Laredo Region, such as network surveillance, surface street control, and traffic information dissemination.

**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>

Each of the prioritized market packages was assessed from the perspective of deployment status (which components, if any, were already existing in the Region), as well as any planned or additional new needs to bring the market package to the desired level of functionality in the Laredo Region. Each market package analysis included:

- A brief definition of the market package (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.

### **ITS Project Recommendations for the Laredo Region**

Using the needs, market package priorities, and any planned projects identified by the stakeholders during the architecture process, a list of recommended ITS projects for the Laredo Region was developed. These projects were refined and additions and deletions were made by the Regional stakeholders at the ITS Deployment Plan Workshop in September of 2002.

Recommended ITS projects for the Laredo Region were categorized into short, medium, and long term timeframes for programming in the 5, 10, and 20 year horizons. This was done based on current status if the project had previously been identified and planned by the Region, market package priority, and dependency on other project completions. The majority of the short term (or 5-year) recommendations serve as “foundation” projects to implement basic functionality, infrastructure and interfaces, with the intent of continuing to build out those foundation projects over the 10 and 20 year timeframes. Most projects for the Laredo Region are infrastructure based; however, there are some recommendations, such as enhanced coordination with local media, emergency response plans, and others that focus more on planning or institutional practices rather than deploying specific technologies.

Each recommended project for the Laredo Region was included in a short, medium or long-term table. These tables provided the name of the project, primary operating/implementing agency, a planning level estimate of probable cost, an indication of whether or not funding had been identified for that specific project, and an estimated project duration. Following each table, detailed descriptions of each project were developed, which also included associated market packages and any pre-requisite project requirements.

**Table 3** summarizes the ITS projects recommended for the Laredo Region. This summary is divided into the major program areas, and subdivided by timeframe. As can be seen from this summary, the majority of the project recommendations focus on the Travel and Traffic Management category, which would implement freeway and arterial management, traveler information, and inter-agency coordination elements.

**Table 3 – Recommended ITS Projects for the Laredo Region**

Project Time Frame	Project Name	Funding Identified (Funding Agency if Applicable)
<b>Travel and Traffic Management</b>		
Short Term Projects 5-year Horizon	TxDOT Advanced Traffic Management System (ATMS)	Yes (TxDOT)
	TxDOT Center-to-Center Communication	No
	TxDOT Traffic Management Center (TMC)/Information Service Providers (ISPs) Connection	No
	TxDOT TMC/City of Laredo Connection	Yes (TxDOT/City of Laredo)
	TxDOT MILO I	Yes (TxDOT)
	TxDOT MILO II	Yes (TxDOT)
	TxDOT MILO II C.O.	Yes (TxDOT)
	TxDOT I-35 Widening North of MP B-14	Yes (TxDOT)
	TxDOT Loop 20 Widening	Yes (TxDOT)
	TxDOT US 83/SH 359 Interchange	Yes (TxDOT)
	TxDOT US 59/Loop 20 Interchange	Yes (TxDOT)
	TxDOT Integration I	Yes (TxDOT)
	TxDOT Integration II C.O.	Yes (TxDOT)
	TxDOT Laredo District/City of Laredo TMC Webpage	No
	City of Laredo TMC Upgrade	Partial (City of Laredo)
	City of Laredo Closed Loop Signal System Expansion	Yes (City of Laredo)
	City of Laredo Video Image Vehicle Detector Systems (VIVDS) Phase 1	No
	City of Laredo TMC/Local Media Connection	No
	City of Laredo AVI System at Bridge I	Yes (City of Laredo)
	Traffic Operations Plans	No

**Table 3 – Recommended ITS Projects for the Laredo Region (continued)**

Project Time Frame	Project Name	Funding Identified (Funding Agency if Applicable)
<b><i>Travel and Traffic Management (continued)</i></b>		
Short Term Projects 5-year Horizon (continued)	Laredo Region CCTV Deployment	No
	Bridge Coordination System	No
	Interagency Coordination	No
	Railroad Grade Crossings Enhancements	No
	Inter-Agency Common Frequency	No
	ECC (911) to EOC Connection	No
	Regional 511 Advanced Traveler Information System Server	No
	Laredo Regional Communications Master Plan	No
Mid Term Projects 10-year Horizon	Freeway Communications Network Plan	No
	City of Laredo Electronic Toll Collection	Yes (City of Laredo)
Long Term Projects 20-year Horizon	TxDOT Probe Surveillance	No
	City of Laredo Parking and Event Management System	No
	Regional Parking Management	No
	Railroad Operations Coordination	No
	ISP-based Route Guidance	No
<b><i>Commercial Vehicle Operations</i></b>		
Short Term Projects 5-year Horizon	CVISN Cameras	No
	CVISN Fiber Connection	No
	Electronic Clearance Sites	Yes (Customs/US Border Patrol)
	Internet Enabled IRP Registration	Yes (TxDOT/US DOT)
	Internet Enabled Motor Carrier Registration	Yes (TxDOT/US DOT/ TxDPS)
	Internet Enabled International Fuel Tax Agreement Registration	Yes (US DOT)
	Border Checkpoints	Yes (US Border Patrol)
	TxDOT Oversize/Overweight Systems	Yes (TxDOT)
Mid Term Projects 10-year Horizon	CVISN at International Border Crossings Expansion	Yes (TxDOT)
	HAZMAT Management	No

**Table 3 – Recommended ITS Projects for the Laredo Region (continued)**

<b>Project Time Frame</b>	<b>Project Name</b>	<b>Funding Identified (Funding Agency if Applicable)</b>
<b><i>Commercial Vehicle Operations (continued)</i></b>		
Long Term Projects 20-year Horizon	Fleet Administration	No
	Freight Administration	No
	On-Board Commercial Vehicle Safety	No
	Fleet Maintenance	No
<b><i>Emergency Management</i></b>		
Short Term Projects 5-year Horizon	City of Laredo Emergency Operation Center (EOC)	No
	TxDOT/City of Laredo/County Computer Aided Dispatch (CAD)	No
	Emergency Vehicle Preemption (Police, Fire and EMS)	No
	City of Laredo Fire Mobile Data System	Yes (City of Laredo Fire)
	TxDPS/EOC Communication Connection	No
	Laredo Police Automated Accident Investigation System	No
	Emergency Response Plan	No
Mid Term Projects 10-year Horizon	None Identified	No
Long Term Projects 20-year Horizon	None Identified	No
<b><i>Maintenance and Construction Operations</i></b>		
Short Term Projects 5-year Horizon	TxDOT Flood Detection Stations	No
	City of Laredo Flood Detection Stations	No
	TxDOT/City of Laredo Workzone Management	No
Mid Term Projects 10-year Horizon	Work Zone Safety Monitoring (Engineering)	No
	Work Zone Safety Monitoring (Equipment)	No
Long Term Projects 20-year Horizon	Maintenance and Construction Vehicle AVL	No
	Maintenance and Construction Vehicles Maintenance	No
	Roadway Maintenance and Construction Services	No

**Table 3 – Recommended ITS Projects for the Laredo Region (continued)**

Project Time Frame	Project Name	Funding Identified (Funding Agency if Applicable)
<b>Public Transportation Management</b>		
Short Term Projects 5-year Horizon	El Metro Transit Automated Vehicle Location (AVL)	Yes (El Metro)
	El Metro Electronic Fare Collection	Partial (El Metro)
	El Metro Security Cameras	Yes (El Metro)
	El Metro Smart Stop	Yes (El Metro)
	Webb County Transit Computer Aided Dispatch (CAD) and Transit Operations Center (TOC)	No
	Webb County Transit AVL and Mobile Data Terminals (MDTs)	No
Mid Term Projects 10-year Horizon	El Metro Computer Aided Dispatch (CAD)	No
	City of Laredo TMC/Paratransit Services Connection	No
	EL Metro Transit Traveler Information System	Yes (El Metro)
	El Metro Web-based Transit Information	No
	El Metro Transit Kiosks	No
	Webb County Electronic Fare Collection	No
	El Metro/El Aguila Dispatch Operations Center	No
	Webb County On Board Video Security System	No
Long Term Projects 20-year Horizon	Webb County Automatic Passenger Counters	No
	Webb County Transit Traveler Information System/Travel Data and Route Guidance	No
<b>Information Management</b>		
Short Term Projects 5-year Horizon	ITS Data Mart	No
Mid Term Projects 10-year Horizon	None Identified	No
Long Term Projects 20-year Horizon	None Identified	No



## **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.



## MEMORANDUM OF UNDERSTANDING

As a final step in the development of the Laredo Regional ITS Architecture and Deployment Plan, a Memorandum of Understanding (MOU) was prepared for the participating stakeholder agencies. The MOU was developed for stakeholders to acknowledge their participation and approval of the plan, and pledge their support in the implementation and operation of ITS in the Laredo Region. Also included in the MOU was a pledge to provide TxDOT with the information necessary to maintain the Regional ITS Architecture and ITS Deployment Plan.

Although there were a number of other very important stakeholders participating in the project, those stakeholders that were asked to sign the MOU represented agencies that will have the greatest impact in the Region in terms of ITS deployments and system operations. These stakeholders had also signed a MOU developed prior to the start of the project that was necessary to obtain the federal funding to complete the Regional ITS Architecture and Deployment Plan. Stakeholder agencies that were asked to sign the MOU for the Laredo Regional ITS Architecture and Deployment Plan included the following:

- City of Laredo (includes Traffic Safety, Bridge, El Metro Transit, Police and Fire);
- Texas Department of Transportation; and
- Webb County.

A number of participating agencies also pledged their support for the project, but due to their agency regulations they were not able to sign the MOU.