State of Texas
Regional ITS Architectures and Deployment Plans

Lower Rio Grande Valley Region

Regional ITS Architecture Report

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LIST OF ACRONYMS

3C	Continuing, Comprehensive, and Cooperative
AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society for Testing and Materials
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automatic Vehicle Location
BCS	Bridge Coordination System
BRINSAP	Bridge Inventory Inspection System
BUS	Brownsville Urban System
CC	Control Center
CCTV	Closed-Circuit Television
CPT	Common Public Transportation
CVISN	Commercial Vehicle Information Systems Network
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
DOT	Department of Transportation
DPS	Department of Public Safety
DSRC	Dedicated Short Range Communications
EMS	Emergency Medical Services
EOC	Emergency Operations Center
ETMCC	External TMC Communication
EV	Emergency Vehicle
FC	Fare Collection
FHWA	Federal Highway Administration
GIS	Geographic Information System
HAR	Highway Advisory Radio

LIST OF ACRONYMS

HAZMAT	Hazardous Materials
HCRS	Highway Condition Reporting System
HRI	Highway-Rail Intersections
I/F	Interface
IM	Incident Management
IMMS	Incident Management Message Sets
ISP	Information Service Provider
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
MCM	Maintenance and Construction Management
MCV	Maintenance and Construction Vehicle
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
MS	Message Sets
NEMA	National Electrical Manufacturers Association
NOAA	National Oceanic and Atmospheric Administration
NTCIP	National Transportation Communications for ITS Protocol
OB	Onboard
PI	Passenger Information
RGV	Rio Grande Valley
SAE	Society of Automotive Engineers
SDO	Standards Development Organization
SP	Spatial Representation
TCIP	Transit Communication Interface Protocol
TEA-21	Transportation Equity Act for the 21st Century
TM	Traffic Management

LIST OF ACRONYMS

TMC	Traffic Management Center
TMDD	Traffic Management Data Directory
TOC	Traffic Operations Center
TxDOT	Texas Department of Transportation
USDOT	United States Department of Transportation
VIVDS	Video Image Vehicle Detector System
WIM	Weigh-in-Motion

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, in 2001 the Texas Department of Transportation (TxDOT) initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. The Lower Rio Grande Valley (RGV) Region was the fourth in the series of regional ITS architectures to be prepared as part of this initiative.

The Lower RGV Region is located in the southernmost tip of Texas. The ITS stakeholders defined the regional boundaries to correspond with the boundaries of the TxDOT Pharr District. Unlike other Regions in the state of Texas, no single city in the Lower RGV Region stands out as the main city in the Region. There are several major cities within the Region, including the cities of Brownsville, Edinburg, Harlingen, McAllen, Mission, Pharr, San Benito, and South Padre Island on the United States side, as well as several cities immediately adjacent to the Region, the cities of Reynosa and Matamoros, in Mexico.

The ITS Architecture for the Lower RGV Region followed a comprehensive process focused on stakeholder outreach and education, identifying market packages and interfaces tailored to the needs of the Lower Rio Grande Valley Region, and developing a consensus-based architecture for the Region. This architecture provides a framework for ITS infrastructure to be deployed and integrated in the Lower RGV Region over the next 20 years.

Stakeholders from throughout the Region participated in the development of the Regional ITS Architecture, including representatives from TxDOT, cities, counties, municipal planning organizations (MPOs), transit agencies, police and fire, U.S. Customs, and the U.S. Border Patrol. These stakeholders provided input and review at key steps in the architecture development process, including a project kick-off meeting, architecture development and review workshops, and final review of the architecture documentation.

An inventory of existing and planned ITS infrastructure in the Region provided the basis for the architecture development. Stakeholder needs that could be addressed by ITS technologies guided the selection of market packages, data flows, and integration requirements. A diverse range of needs were identified by stakeholders in the Region. The highest priority needs focused on improving freeway and arterial control, transit operations, emergency coordination and response, hurricane evacuation, and commercial vehicle operations. Coordination of traffic at the multiple international border crossings was also a priority for stakeholders.

Market packages were selected that corresponded to the desired services and functions identified for the Region, and were customized for Lower RGV Region agencies and equipment. These market packages included high priority 'foundation' services and functions, such as network surveillance, surface street control, and transit vehicle tracking, as well as market packages to address coordination needs, including incident management system and regional traffic control and coordination. Stakeholders then prioritized these market packages as high, medium, and low. These priorities were used in the second phase of the project to develop the ITS Deployment Plan for the Lower RGV Region.

An interconnect, or "Sausage Diagram" was developed for the Lower RGV Region which provided a top-level overview of system functions and primary interconnects. More detailed interfaces were then

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

Functional requirements for the Lower RGV Region were identified through customized market packages and data flows, and the equipment packages that deliver specific capabilities. The equipment packages that were identified provide more detailed descriptions of functionality and can be deployed incrementally. Standards that could apply to the Lower RGV Region also were identified as part of the architecture development process.

An Operational Concept for the Lower RGV Region was developed to illustrate how systems, components, and agencies will be integrated and function as a result of the framework provided by the Regional ITS Architecture. The purpose of the Operational Concept is to demonstrate the roles and responsibilities of the various stakeholders in the Lower RGV Region.

The Regional ITS Architecture for the Lower Rio Grande Valley Region is documented in the final report. In addition, a companion web page was developed that contains all of the architecture information, stakeholders, regional inventory, customized market packages, interfaces, and standards.

1. INTRODUCTION

1.1 Project Overview

In January 2001, FHWA issued a final rule to implement Section 5206(e) of the TEA-21. This rule required 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. In addition to meeting the federal requirements for funding, the development of regional ITS architectures provides a framework for implementing ITS on a regional level, encourages interoperability and resource sharing, identifies applicable standards, and allows for cohesive long range planning among stakeholders in the Region. Although not required by the FHWA final rule, TxDOT also sought to have an ITS deployment plan developed for each Region. An ITS deployment plan identifies and prioritizes projects that are needed to implement the ITS architecture on a short-, medium-, and long-term basis.

A key goal in the development of the Lower RGV Regional ITS Architectures was to develop a consensus-based architecture with as many stakeholders as possible involved. Each stakeholder had an equal voice in determining the direction of the architecture for the Region. Stakeholders included representatives from TxDOT, cities, counties, MPOs, Department of Public Safety (DPS), transit agencies, police and fire, U.S. Customs, and the U.S. Border Patrol. A series of five meetings were held with the ITS stakeholders to discuss the development and gather input into the Lower RGV Regional ITS Architecture and Deployment Plan. In addition, a project web site was developed which contains all of the information on the Lower RGV Regional ITS Architecture and provides stakeholders with an opportunity to review and comment on the architecture directly from the web.

The result is an ITS architecture that establishes a vision and direction for the Region. ITS needs of the Lower RGV Region were established early in the project. Existing and planned elements of the architecture have been identified and the key agencies required to develop the ITS services, or market packages as they are referred to in the National ITS Architecture, for the Lower RGV Region have been identified. An operational concept has been developed that focuses on the roles and responsibilities of the various agencies involved in the Lower RGV Region. A separate ITS Deployment Plan was developed that identifies projects in the Lower RGV Region that are required to implement the architecture.

1.2 Document Overview

The Lower RGV Regional ITS Architecture report is organized into five key sections:

Section 1 – Introduction

This section provides an overview of the Lower RGV Regional ITS Architecture for, as well as an overview of some of the key features and stakeholder agencies in the Lower RGV Region.

Section 2 – Integration Strategy

This section discusses Lower RGV Region stakeholder needs and issues, regional ITS initiatives and potential regional ITS programs, as well as opportunities for integration to achieve regional goals and contribute to regional and national ITS interoperability.

Section 3 – Regional ITS Architecture Development Process

An overview of the key steps involved in developing the ITS architecture for the Lower RGV Region is provided in this section. It includes a discussion of the methodology, stakeholder involvement, architecture workshops, and architecture development process.

Section 4 – Conceptual Design

The conceptual design contains the key sections of the Lower RGV Regional ITS Architecture. The inventory of existing and planned systems is presented in Section 4, and is sorted by both stakeholder as well as by entity for easy reference. The market packages that were selected for the Lower RGV Region also are included in this section, as are the system functional requirements. The Lower RGV Region interconnects are presented, including the "Sausage Diagram" showing the relationships of the key subsystems and elements in the Region, system interfaces, and the physical subsystem architecture flows. Standards that apply to the Lower RGV Regional ITS Architecture also are listed.

Section 5 – Operational Concept

An Operational Concept has been prepared that discusses the key functions and services of the envisioned ITS for the Lower RGV Region. As part of this concept, several operational scenarios are described and roles and responsibilities of stakeholders are discussed. Potential agreements that could be required to support integration and information sharing are described.

The Lower RGV Regional ITS Architecture also contains three appendices:

- Appendix A – Customized Market Packages;
- Appendix B – Interface Diagrams; and
- Appendix C – Agreements.

A project web site has been established that contains the architecture documentation, inventories, interconnects, market packages, interfaces, and functional requirements. The web site provides hyperlinks to more detailed information about the Lower Rio Grande Valley Regional ITS Architecture than what could feasibly be included in the printed document. In certain sections of the document, readers are referred to the project web site for additional information and details. (At the time this report was published, the Lower Rio Grande Valley Regional ITS Architecture web site was being hosted at www.consystec.com. The site can be accessed by selecting the link to Texas, and then the link to the Lower Rio Grande Valley. TxDOT plans to permanently host the site in the future at www.dot.state.tx.us/trf/its.)

1.3 The Lower Rio Grande Valley Region

1.3.1 Geographic Overview

The Lower RGV Region is located in the southernmost tip of Texas. The ITS stakeholders defined the regional boundaries to correspond with the TxDOT Pharr District Boundaries. **Figure 1** presents a geographical overview of the Lower Rio Grande Valley Region.

There are eight counties included in the Lower Rio Grande Valley Region, which comprise the TxDOT Pharr District:

- Brooks;
- Cameron;
- Hildago;
- Jim Hogg;
- Kenedy;
- Starr;
- Willacy; and
- Zapata.

Unlike other regions in the state of Texas, no single city in the Lower RGV Region stands out as the main city in the Region. There are several major cities within and immediately adjacent to the Region. Within the Region, the cities of Brownsville, Edinburg, Harlingen, McAllen, Mission, Pharr, San Benito, and South Padre Island comprise the major population centers and the cities of Reynosa and Matamoros are immediately adjacent 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 Cities of Brownsville, Harlingen, and McAllen are currently the only cities in the Lower RGV Region with a population that exceeds TxDOT's threshold. Pharr is anticipated to exceed this threshold by 2005.

The Brownsville/Matamoros area is a major manufacturing center in the Region. The City of Harlingen is also a strategic transportation hub and international trade center with easy access to markets in Texas and Mexico. The Los Indios Free Trade Bridge is located ten miles south of Harlingen and San Benito and offers a fast route to border cities in Mexico, such as Matamoros, Reynosa, and Valle Hermoso, as well as the industrial city of Monterrey.

The McAllen/Hidalgo/Reynosa area is also a leading industrial border location in the Lower RGV Region. The McAllen/Hidalgo/Reynosa International Bridge is one of the most active border crossing points facilitating trade between Mexico and the United States. Another bridge that serves as one of the major gateways to Mexico is the Pharr/Reynosa International Bridge, which currently handles almost all commercial truck traffic moving north between Harlingen (30 miles east) and Laredo (145 miles west).

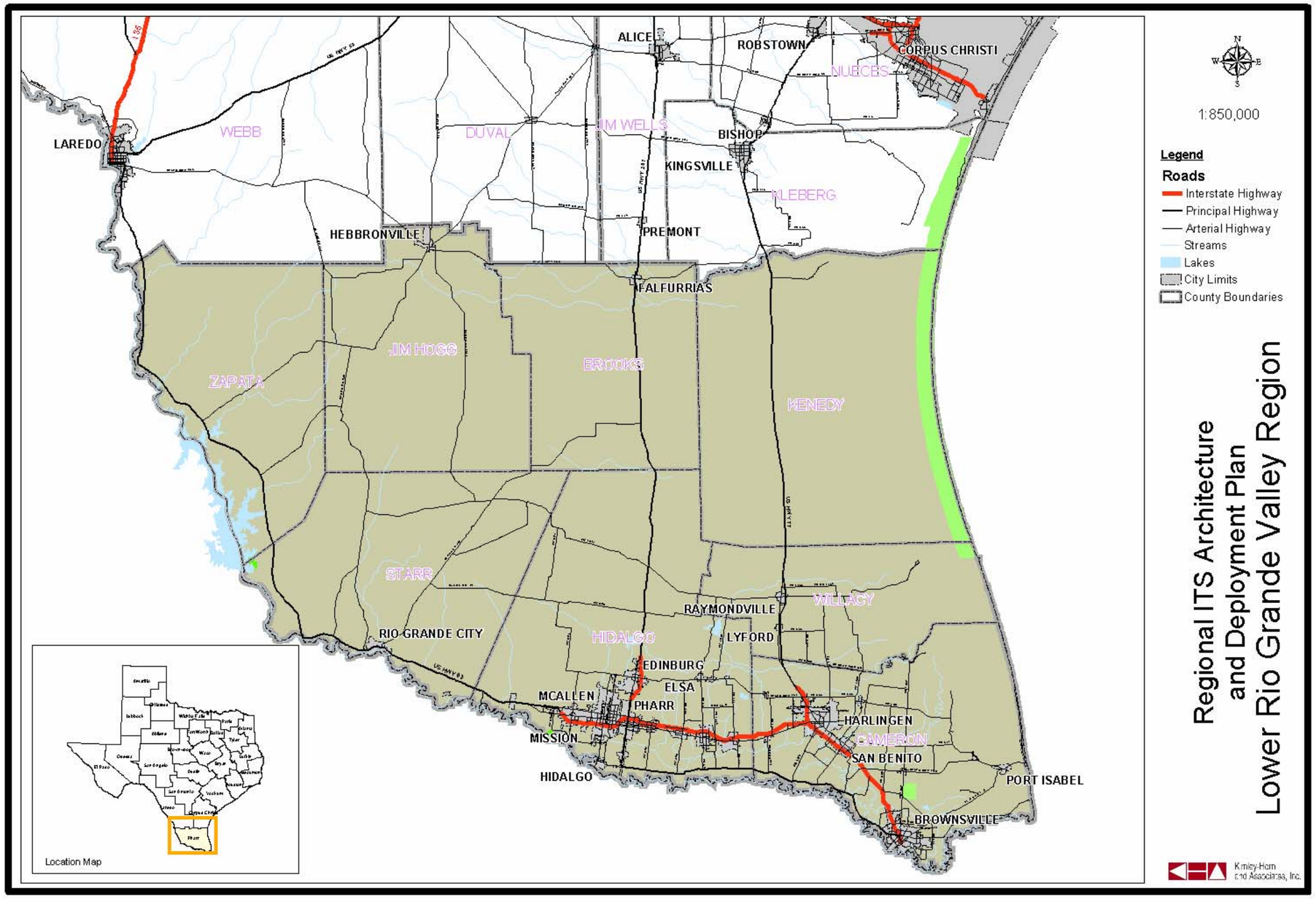


Figure 1 – Lower Rio Grande Valley Region Map

1.3.2 Roadway Infrastructure

As illustrated in **Figure 1**, the Lower RGV Region connects major cities of the United States to Mexico through Brownsville, Harlingen, McAllen, Edinburg, and Pharr, among others. The roadway network is well developed but lacks a route designated as an interstate. Texas has been proactive in this regard and three expressways have been developed on a standards concept that is very similar to the interstate design standard. The primary facilities include US 77, US 83, US 281, and Mexico's State Route 2.

US 77 is a principal highway that travels through the heartland of the United States in a north-south direction, connecting south Texas to Iowa. It begins at Sioux City, Iowa and terminates at the City of Brownsville, Texas.

US 83 starts at the bottom tip of Texas in Brownsville, and goes all the way up through the Panhandle, connecting the Valley to West Texas. US 281 is another primary roadway that runs north/south, connecting south Texas to North Dakota. US 83 and US 281 connect McAllen with I-35 and I-37. A proposed I-69 corridor, extending from Mexico City to Detroit, would run through McAllen and connect with other Interstate Highways throughout the United States.

Numerous other state highways and farm-to-market roadways traverse the Lower RGV Region.

Mexico SR 2, which follows the Rio Grande down into Matamoros, is one of the key roadways connections on the Mexico side.

1.3.3 Lower Rio Grande Valley Region ITS Plans

TxDOT and the local agencies are in the process of implementing ITS throughout the Region. Fiber optic connectivity is being stage-constructed in several large projects and will form the nucleus for the communication infrastructure within the Region. There also is a large fiber deployment available to the Border Patrol along the Rio Grande.

TxDOT is beginning to plan a Traffic Operations Center (TOC) and expects a regional center to develop jointly with the major cities in the Region. Freeway operations such as dynamic message signing, closed-circuit television (CCTV) monitoring, congestion management, and other services are being planned and small scale projects are being developed.

There are several closed-loop signal systems for which initial discussions have occurred to create seamless traffic signal timing plans enabling residents to progress from city to city without arbitrary boundaries to the quality of flow. The MPOs have already initiated a congestion management response for one site. There are plans to expand this concept.

TxDOT is also deploying Commercial Vehicle Information Systems and Network (CVISN)—truck monitoring, weigh-in-motion, automatic vehicle identification, and intelligent permitting systems—on the major international crossings. A traveler information system to route commercial and general traffic to appropriate lanes and appropriate bridges is needed.

In relation to the public transportation management, Brownsville Urban System (BUS) has plans to deploy an electronic fare collection system that allows transit users to use an electronic payment device on-board transit vehicles. Another system that has been proposed

is a Transit Traveler Information System; with this system, transit schedules, operating hours, routes, and fare information would be available on the web and through information kiosks. Reservations for specialized transportation services also would be available. An on-board transit security system, which would include installing on-board security cameras (linked to a recorder on the bus) to monitor the safety of transit vehicles also is desired.

Computer Aided Dispatch systems; including mobile data terminals, are planned for Fire and Emergency vehicles. 911 coordination and the implementation of Life Link are also part of the ITS plans in the Region.

In addition, part of the Lower RGV Region is on the Gulf Coast and is subject to hurricane conditions. There is a limited set of roadway evacuation choices. The stakeholders desire to enhance the current evacuation planning process with ITS device capabilities.

1.3.4 Stakeholders

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

The following is a list of stakeholders in the Lower RGV Region who have participated in the project workshops or provided input to the study team as to the needs and issues that should be considered as part of the Lower Rio Grande Valley Regional ITS Architecture:

- Brownsville MPO;
- Cameron County;
- City of Brownsville;
- City of Edinburg;
- City of Harlingen;
- City of McAllen;
- City of Mission;
- City of Pharr Fire;
- City of San Benito;
- Harlingen Emergency Services;
- Harlingen-San Benito MPO;
- Hidalgo County Sheriff's Office;
- Hidalgo County MPO;
- McAllen-Miller Airport;
- Texas Department of Public Safety;
- TxDOT Pharr District;
- TxDOT Traffic Operations Division (Austin);
- U.S. Border Patrol;
- U.S. Customs; and
- U.S. Immigration and Naturalization Service.

1.3.5 Major Industries and Employers

Manufacturing, agriculture, and tourism are among the major economic forces in the Lower RGV Region.

The large industrial community in the Region includes technology corporations, automotive equipment suppliers, as well as manufacturers of microelectronics, electrical equipment, medical/dental instruments, and household consumer durables.

Agriculture also is a vital industry for the economic development of the Region. The Lower RGV produces more than 40 crops, primarily cotton, citrus, grain sorghum, sugar cane vegetables, and melons.

Tourism is another growing industry in South Texas. South Padre Island draws beach visitors from across the country and around the world during the summer months. However, winter Texans remain the largest tourist group. This group is comprised primarily of retirees from cooler climates who spend the winter in the Lower RGV Region.

An increased deployment of ITS infrastructure has the potential to improve people and goods movement in the Lower RGV Region, which would benefit all sectors of the economy.

2. INTEGRATION STRATEGY

2.1 Integration Purpose

The purpose of the integration strategy is to identify the needs, stakeholders, and strategy for regional integration in the Lower RGV Region.

For each operating agency or stakeholder entity identified through the development of the Regional ITS Architecture, there are operations that currently exist as normal practice in order to accomplish the primary business goals and objectives for each stakeholder. The integration of each agency with any of the other stakeholders will not change the agency's primary function or disrupt its typical business practices. The integration process will require that the data that is exchanged between the two entities meet certain requirements for that particular data type. Identifying the need for this connection between agencies and the opportunities for integration and interoperability in the Region are key purposes of this section.

This section will provide an overview of the major issues and stakeholders' needs within the Lower RGV Region and the primary areas of concern that were uncovered in the preparation of the Lower RGV Regional ITS Architecture. Additionally, this section will discuss the need for interregional communications with agencies external to the Lower RGV Region such as the Mexican states.

A key step in developing any regional ITS architecture is identifying major stakeholders in the Region. Key stakeholders that participated in the development of the Lower RGV Regional ITS Architecture are listed in **Table 1**. A number of other stakeholders were identified and invited to participate. In many cases, these stakeholders were not able to attend due to time constraints. Minutes of meetings, copies of reports, and access to the project web site was provided to these stakeholders to encourage their participation as much as possible.

Table 1 – Lower Rio Grande Valley Stakeholder Agencies and Contacts

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
Brownsville MPO	Mark Lund	P.O. Box 911 Brownsville, Texas 78520	(956) 548-6150	bmpo@ci.brownsville.tx.us
Cameron County	Conrado Cantu	964 E. Harrison Brownsville, TX 78520	(956) 554-6700	sheriff@co.cameron.tx.us
Cameron County	Pete Sepulveda, Jr.	3300 South Expressway 77 Brownsville, Texas 78520	(956) 574-8771	ccbrgdir@flash.net
City of Brownsville	Dale Levsen	P.O. Box 911 Brownsville, Texas 78520	(956) 541-1012	dalelevsen@ci.brownsville.tx.us
City of Brownsville	Tom Logan	700 Jose Colunga Jr. Street Brownsville, Texas 78521	(956) 541-4881	tomlog@ci.brownsville.tx.us
City of Brownsville	Alex Lorio	700 Jose Colunga Jr. Street Brownsville, Texas 78521	(956) 541-4881	allorio@cob.us
City of Brownsville	Alfonso Vallejo	P.O. Box 911 Brownsville, Texas 78520	(956) 548-6150	avallejo@cob.us
City of Brownsville	Norma Zamora	700 Jose Colunga Jr. Street Brownsville, Texas 78521	(956) 541-4881	nzamora@ci.brownsville.tx.us
City of Edinburg	Joe Zamora	P.O. Box 1079 Edinburg, Texas 78540	(956) 381-5635	N/A
City of Harlingen	Julio Cerda	P.O. Box 2207 Harlingen, Texas 78550	(956) 430-6604	jcerda55@hotmail.com
City of McAllen	Kristina Hernandez	1300 Houston Avenue McAllen, Texas 78501	(956) 972-7070	khernandez@mcanet.net
City of McAllen	Francisco Rivas	210 North 20th McAllen, Texas 78501	(956) 686-7241	frivas@mcanet.net
City of McAllen	Pilar Rodriguez	1300 Houston Avenue McAllen, Texas 78501	(956) 972-7070	prodriguez@mcanet.net
City of Mission	Joe Swindle	1200 East 8th Mission, Texas 78572-4130	(956) 584-5000	N/A
City of Mission	Daniel Tijerina	900 Doherty Mission, Texas 78572-4130	(956) 580-8672	N/A
City of Pharr	Jaime Guzman	P.O. Box B Pharr, Texas 78577	(956) 787-2761	pharrfirechief@yahoo.com
City of Pharr	Yesenia Guajardo	P.O. Box B Pharr, Texas 78577	(956) 787-2761	pharrfireaa@yahoo.com
City of Pharr	Jorge Jalomo	118 S. Cage Pharr, TX 78577	(956) 768-2761	N/A
City of Pharr	Jesse Medina	P.O. Box B Pharr, Texas 78577	(956) 787-3030	rvillescas@pharrpd.net
City of Pharr	Juan Ruiz	P.O. Box B Pharr, Texas 78577	(956) 787-2761	pharrfireprev@yahoo.com

Table 1 – Lower Rio Grande Valley Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
City of Pharr	Ruben Vescas	202 E. Clark Pharr, Texas 78577	(956) 787-8546	rvillescas@pharrpd.net
City of San Benito	Hector Jalomo	P.O. Box 1870 San Benito, Texas 78586	(956) 361-3800	hjalomo@ci.san-benito.tx.us
City of San Benito	Gloria Berlanga	P.O. Box 1870 San Benito, Texas 78586	(956) 361-3800	N/A
DPS	Maritza Cerda	1414 North Bicentennial Blvd. McAllen, Texas 78501	(956) 984-5600	N/A
DPS	Laurencia Saenz	1414 North Bicentennial Blvd. McAllen, Texas 78501	(956) 984-5600	N/A
Harlingen Emergency Services	Dennis Hebner	P.O. Box 533668 Harlingen, Texas 78553	(956) 364-2711	dhebner@stec-ems.org
Harlingen-San Benito MPO	Michelle Leftwich	P.O. Box 2207 Harlingen, Texas 78550	(956) 427-8724	N/A
Hidalgo County MPO	David DeLeon	3211 North 15th McAllen, Texas 78501	(956) 682-3481	ddeleon@lrgvdc.org
Hidalgo County MPO	Ed Molitor	3211 North 15th McAllen, Texas 78501	(956) 682-3481	emolitor@lrgvdc.org
Hidalgo County Sheriff's Office	Joe Rodriguez	P.O. Box 1228 Edinburg, Texas 78540	(956) 384-8114	N/A
Hidalgo County Sheriff's Office	Homar Veneci	P.O. Box 1228 Edinburg, Texas 78540	(956) 384-8114	N/A
Hidalgo County Sheriff's Office	Raul Salazar	P.O. Box 1228 Edinburg, Texas 78540	(956) 384-8114	N/A
McAllen-Miller Airport	Fred Segundo	2500 S. Bicentennial, Ste. 100 McAllen, Texas 78503	(956) 682-9101	fsegundo@mcanet.net
TxDOT – Pharr District	Gracie Cantu	P.O. Drawer EE Pharr, Texas 78577	(956) 702-6147	gcantu@dot.state.tx.us
TxDOT – Pharr District	Eligio Alvarez	P.O. Drawer EE Pharr, Texas 78577	(956) 702-6225	ealvarez@dot.state.tx.us
TxDOT – Pharr District	Stuart Jenkins	P.O. Drawer EE Pharr, Texas 78577	(956) 702-6224	sjenkins@dot.state.tx.us
TxDOT – Pharr District	Jesse Leal	600 West U.S. Expressway 83 Pharr, TX 78577-1231	(956) 702-6127	jleal1@dot.state.tx.us
TxDOT – Pharr District	Ruby Martinez	P.O. Drawer EE Pharr, Texas 78577	(956) 782-2508	N/A
TxDOT – Pharr District	Amy Rodriguez	P.O. Drawer EE Pharr, Texas 78577	(956) 702-6102	arodrigu@dot.state.tx.us
TxDOT – Pharr District	Gerardo Vallejo	P.O. Drawer EE Pharr, Texas 78577	(956) 702-6153	gvallejo@dot.state.tx.us

Table 1 – Lower Rio Grande Valley Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
TxDOT – Traffic Operations Division	Alesia Gamboa	120 East 11th Street Austin, Texas 78701-2486	(512) 416-2780	agamboa@dot.state.tx.us
TxDOT – Traffic Operations Division	Janie Light	120 East 11th Street Austin, Texas 78701-2486	(512) 416-3258	jlight@dot.state.tx.us
U.S. Border Patrol	Fernando Lopez	2301 South Main Street McAllen, Texas 78503	(956) 984-3800	fernando.g.lopez@usdoj.gov
U.S. Customs Service	David Higgerson	9901 S. Cage Blvd., Suite B Pharr, Texas 78577	(956) 283-2100	david.p.higgerson@customs.treas.gov
U.S. Customs Service	Severiano Solis	9901 S. Cage Blvd., Suite B Pharr, Texas 78577	(956) 283-2051	severiano.n.solis@customs.treas.gov
U.S. Customs Service	Darlene Wilder	9901 S. Cage Blvd., Suite B Pharr, Texas 78577	(956) 283-2020	darlene.langum.wilder@customs.treas.gov
US I.N.S.	Manuel Sloss	3300 S. Expressway 83 Brownsville, TX 78520	(956) 983-5710	manuel.sloss.jr@usdoj.gov
US I.N.S.	Alex Castillo	3300 S. Expressway 83 Brownsville, TX 78520	(956) 983-5710	N/A

2.2 Regional Needs

Needs from the Region were identified in the project kick-off meeting held on July 10, 2002. Stakeholders participating in that meeting identified the needs in the Region according to the eight user service areas defined in the National ITS Architecture. The needs identified in the project kick-off meeting are documented in **Table 2**.

Table 2 – Lower Rio Grande Valley Region: Summary of ITS Needs

Lower Rio Grande Valley Region

Summary of ITS Needs
Lower Rio Grande Valley Regional ITS Architecture and Deployment Plan Kick-Off Meeting
July 10, 2002

Institutional Issues/Needs

- Need a regional Traffic Management Center (TMC)
- Need to consider how cities will take on operations and maintenance role for signals once they reach the TxDOT 50,000 population threshold
- Need agency to provide bridge operations
- Need improved coordination with border sites to share information (closures, restrictions, etc.)
- Need improved coordination with railroads
- Need coordination with CVISN
- Need to develop a regional telecommunications plan

Traffic Management Needs

- Need to coordinate the five major city signal systems with TxDOT
- Need to tie international traffic to local traffic
- Need advanced traffic management system (ATMS) for congestion management
- Need to develop diversion routing
- Need detours for hurricane evacuation
- Need to develop plans for multiple road closure/detour plans
- Need to know locations of trains when stopped

Corridor Control/Freeway Control Systems

- Need improved traffic coordination
- Need expressway control
- Need additional dynamic message signs (DMS)
- Need additional CCTV
- Need additional VIVDS and detectors
- Need improved congestion management
- Need improved incident detection

Diversion Planning

- Need to tie the international bridge crossings together to minimize queuing
- Need to divert traffic around major work zones
- Need to divert traffic around railroad grade crossings

Table 2 – Lower Rio Grande Valley: Summary of ITS Needs (continued)

Traveler Information Needs

- Need advanced transit management (In-vehicle security, electronic payment, route information)
- Need to provide prioritization of bus movements through coordinated signals
- Need preemption for fire and emergency vehicles
- Need to communicate better with travelers and general public
- Need to identify next steps for 511 implementation
- Need to use DMS to provide en-route information
- Need to provide ramp closure information to travelers
- Need to coordinate information on international bridges along the border (fiber)
- Need English and International symbols on DMS
- Need coordination with Mexico for major events

Data Needs (Collecting, Sharing)

- Need real-time data
- Need volume information
- Need permanent count stations
- Need system traffic management and flow information
- Need to provide information on bridge crossings on Military Road
- Need surveillance/CCTV at intersections
- Need traveler information on routes leading to bridges (approximately 14)
- Need more detectors
- Need upgrades to video detection
- Need VIVDS and CCTVs
- Need volume information
- Need permanent count stations
- Need to coordinate information on freeways and arterials
- Need improved system traffic management and flow information

High Speed Communications

- Need ring of fiber
- Need to be sure that all data that communicates into systems is usable
- Need improved GIS data throughout the Valley that all agencies can use

Public Transportation Management Needs

- Need computer aided dispatch for paratransit
- Need coordinated jitney service
- Need improved transition from public bus to private services
- Need access to information about closures, maintenance, weather, etc. for transit operators/agencies
- Need automatic vehicle location (AVL) on vehicles
- Need to add 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 2 – Lower Rio Grande Valley: Summary of ITS Needs (continued)

Electronic Payment Needs

- Need to consider parking fare collection in future
- Need Smart Fare collection on buses
- Need electronic payment for border crossings
- Need to add CVISN common transponder

Commercial Vehicle Operations Needs

- Need commercial vehicle coordination (where do vehicles go, what is the optimum route, etc.)
- Need to separate through traffic from local traffic
- Need electronic screening - CVISN is under development – will implement some electronic screening
- Need to consider Card Swipe Technology for ID of Auto/Commercial Vehicle Operations (CVO) Crossing
- Need to add counters at bridges – McAllen south bound bridge is only one that currently has counters
- Need to add detection system on all bridge crossings
- Need early notification and communication with CVO about closures, restrictions, etc. (just-in-time delivery has made this more critical)
- Need regional study for hazardous materials (HAZMAT) shipping and routing

Emergency Management Needs

Hurricane Evacuation Plans

- Need to coordinate with each City and County
- Need reversible lane management

Hazardous Materials Notification

- Need to improve public information on spills
- Need to improve HAZMAT routing
- Need a center to collocate 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 TMC/EOC and places that handle emergencies

Advanced Vehicle Safety Systems Needs

- None identified

Information Management Needs (Data Archiving)

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

Special Event Management and Planning

- Need to provide traffic information and coordination during the following events:
  - Sombrero Festival
  - South Padre Island (Spring Break)
- Need to provide transit Information

Table 2 – Lower Rio Grande Valley: Summary of ITS Needs (continued)

Maintenance and Construction Management Needs

- Need to coordinate Maintenance with Traffic Operations during closures

Other Needs

- Need to look for opportunities to tie the ITS Architecture and Deployment Plan into Homeland Defense/Security where possible
- Need to enhance border safety and security
- Need transportation improvements for continued economic development
- Need a central, physical location for communications infrastructure sharing
- Need to facilitate congestion management on freeways and arterials

2.3 Regional Integration and Interoperability

A vision for the Lower RGV Region is to integrate systems both on an intra-regional and an inter-regional basis.

Road closures due to maintenance or incidents lead to a number of opportunities for improved operations through integration. TxDOT and other transportation agencies would like to be able to share this information throughout the Region so that as soon as one agency is aware of a closure, whether planned or unplanned, other agencies also can be made aware of the closure and make appropriate plans.

Operators of the transportation system have many opportunities to improve performance through integration. The BUS can improve performance and schedule adherence by integrating closure information from operators of the transportation network.

In addition to the integration opportunities within the Lower RGV Region, integrating the Lower RGV Region with surrounding Regions offers additional opportunity for improvements to the system.

The TxDOT Pharr District also has a need to gather information from Mexico on closures of the border or major routes in Mexico, which would require coordination with Border Patrol, U.S. Customs, as well as with transportation agencies. For example, if Mexico has closed its borders, it is crucial that the TxDOT Pharr District have this information in order to update motorists and commercial vehicles as soon as possible before they approach the border crossing.

Systems such as TxDOT's Highway Condition Reporting System (HCRS) provide an integrated method to gather consistent traveler information on a statewide basis. This type of system could eventually feed into a 511 traveler information service which would provide consistent traveler information throughout the state.

One of the primary purposes in developing a Lower RGV Regional ITS Architecture is to ensure that while various agencies are deploying ITS components, there are some commonalties between them that will allow and facilitate the exchange of data fairly seamlessly and automatically. This is not to say that all technologies or media that are used by the various agencies will be the same, but that there is an acknowledgement that the data that is being collected and disseminated is

valuable to many different agencies; therefore, the integration strategy has to be implemented to ensure the data exchange is possible.

The Regional MPOs are at the threshold required by statute to become the distribution agent for the Congestion Mitigation and Air Quality funds and other planning funds. Federal funding for planning and implementing transportation projects depends upon the projects being derived from a continuing, comprehensive, and cooperative (3C) planning process. The MPOs are the bodies charged with carrying out the 3C process. Coordination between the MPOs will be necessary to make sure that integration is complete and that projects have region wide continuity.

3. REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

Development of the Regional ITS Architecture and Deployment Plan for the Lower RGV Region relied heavily on stakeholder input to ensure that the architecture reflected local needs. A series of five meetings was held with stakeholders to gather input, and a web site with the components of the regional architecture, as well as hard copies of documents, were made available to stakeholders for review and comment.

3.1 Lower Rio Grande Valley Process

The process followed for the Lower RGV Region was designed to ensure that stakeholders could provide input and review to the development of the Region's ITS Architecture.

Prior to the project kick-off meeting with the contractor and stakeholders, TxDOT identified relevant stakeholders in the Region to begin discussions on the development of a Regional ITS Architecture and Deployment Plan. The TxDOT District Traffic Operations Engineer led this effort. Stakeholders signed a memorandum of understanding (MOU) stating that they would work together in the Region to develop the ITS architecture.

After selecting a contractor, the process shown in **Figure 2** was used to develop the Region's ITS Architecture. In addition to the architecture, an ITS Deployment Plan for the Region also was developed to identify projects needed to implement the architecture.

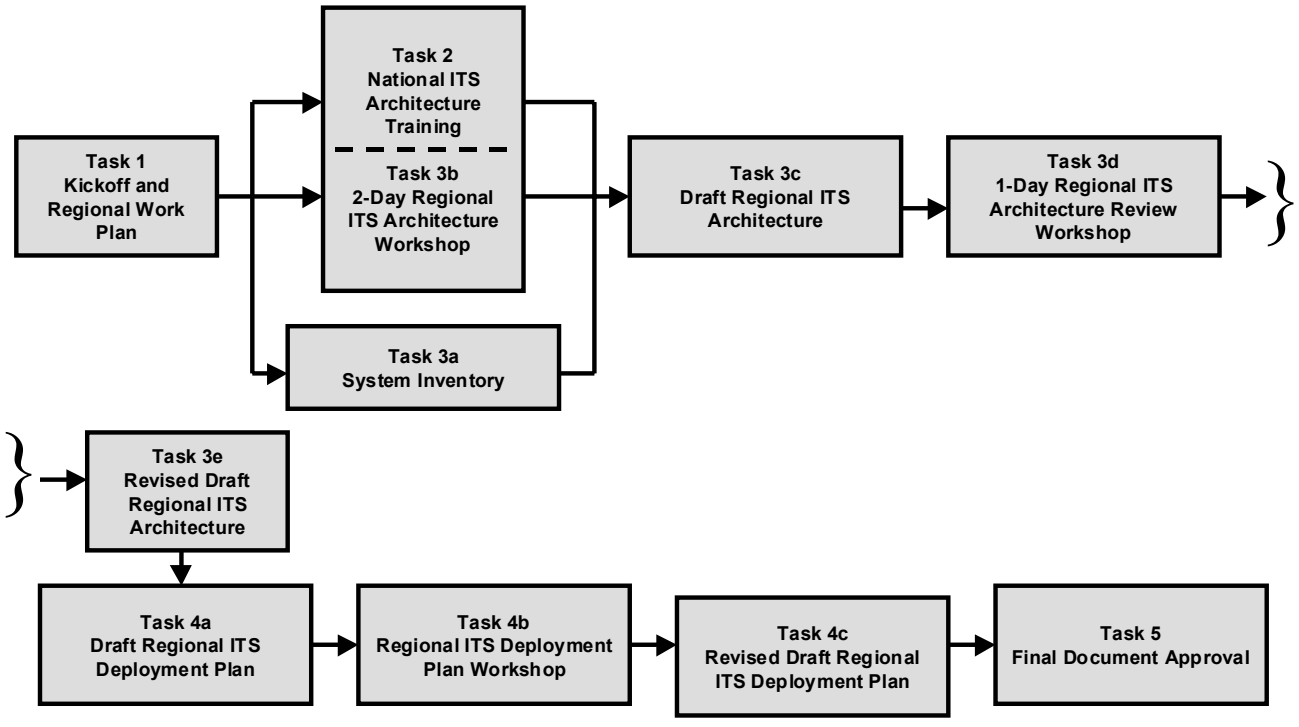


Figure 2 – Lower RGV Regional ITS Architecture and Deployment Plan Development Process

A total of five meetings with stakeholders over a period of eleven months was used to develop the Lower RGV Regional ITS Architecture and Deployment Plan. These meetings included:

- 1-Day Kick-off and Regional Work Plan Meeting;
- 2-Day Regional ITS Architecture Workshop;
- 1-Day Regional ITS Architecture Review Workshop;
- ITS Deployment Plan Workshop; and
- Final Comment Resolution Review and Final Meeting.

Key components of the process are described below:

Task 1 – Kick-Off and Regional Work Plan: Based on the initial stakeholder meeting and MOU that was signed, a number of key stakeholders were identified. Additional stakeholders that did not sign the initial MOU also were identified and invited to the project kick-off meeting. At this meeting, the regional work plan was presented to stakeholders for review and comment. Subsequent meeting dates were identified and agreed upon by the stakeholders.

As part of this meeting, a workshop was held with the stakeholders to identify three additional areas of information:

- Additional stakeholders to invite to participate in the process;
- Needs of the stakeholders in the Lower RGV Region; and
- Existing and planned ITS elements in the Region.

Task 2 – National ITS Architecture Training: Task 2 was the development and presentation of training on the National ITS Architecture. The purpose of the training was to familiarize stakeholders with the architecture terminology to the extent needed to allow them to provide input and review on the Lower RGV Region's ITS Architecture. The National ITS Architecture training was presented in conjunction with the 2-Day Regional ITS Architecture Workshop described in Task 3B.

Task 3A – System Inventory: Collecting information for the system inventory began at the kick-off meeting through the workshop with the stakeholders to determine existing and planned ITS elements in the region. After the kick-off meeting, follow-up calls were conducted with a number of local stakeholders to gather additional input for the architecture. To complete the inventory, stakeholders were presented with the results of the inventory in the 2-Day ITS Architecture Workshop described in Task 3B.

Task 3B – 2-Day Regional ITS Architecture Workshop: The purpose of the 2-Day Regional ITS Architecture Workshop was to review the inventory with stakeholders and begin the development of the Lower RGV Regional ITS Architecture. Training on the National ITS Architecture also was integrated into the workshop so that key elements of the architecture, such as market packages, could be explained prior to selecting and customizing these elements. The result of the 2-Day Regional ITS Architecture Workshop was a Regional ITS Architecture for Lower RGV, which included a complete system inventory, interconnect diagram, customized market packages, identification of functional requirements through process specifications, system interfaces, and relevant ITS standards.

Task 3C – Draft Regional ITS Architecture: After the 2-Day Regional ITS Architecture Workshop was completed, a project web site (www.consystec.com) was developed with a dedicated link to the Texas Regional ITS Architecture program. Stakeholders were asked to review the web site and provide comments through an email link set up on the site. A hard copy of the Draft Regional ITS Architecture for the Lower RGV Region was sent to stakeholders prior to the 1-Day Regional ITS Architecture Review Workshop.

Task 3D – 1-Day Regional ITS Architecture Review Workshop: The 1-Day Regional ITS Architecture Review workshop was designed to allow stakeholders to review the draft architecture and provide comments. The primary focus of the workshop was to review the architecture flows between elements in the market packages. Training on architecture flows as well as ITS standards also was completed.

Task 3E – Revised Draft Regional ITS Architecture: Input from stakeholders in the 1-Day Regional ITS Architecture Review Workshop, as well as comments from stakeholders reviewing the web site and hard copy document, were used to revise the Draft Regional ITS Architecture. The revisions were incorporated into the web site as well as into the hard copy document. The Revised Draft Regional ITS Architecture was mailed to stakeholders for additional review.

Task 4A – Draft Regional ITS Deployment Plan: A Draft Regional ITS Deployment Plan was developed based on the prioritization of market packages and needs expressed by the stakeholders in the Region. The Draft Regional ITS Deployment Plan included a list of recommended projects in a 5-year, 10-year, and 20-year timeframe. Each project was linked to one or more market packages from the Lower RGV Regional ITS Architecture.

Task 4B – Regional ITS Deployment Plan Workshop: The Draft Regional ITS Deployment Plan was presented to stakeholders at the Regional ITS Deployment Plan Workshop. Stakeholders were asked to provide input on the recommended projects, priority, and deployment timeframe.

Task 4C – Revised Draft Regional ITS Deployment Plan: Based on the review and input from stakeholders at the Regional ITS Deployment Plan Workshop, as well as review comments received from stakeholders outside of the workshop, a Revised Draft Regional ITS Deployment Plan was developed and sent to stakeholders.

Task 5 – Final Document Approval: A final comment resolution meeting was held with stakeholders to review the Revised Draft Regional ITS Architecture and the Revised Draft Regional ITS Deployment Plan. Next steps for the Region also were discussed. Comments were incorporated and a final Regional ITS Architecture and Regional ITS Deployment Plan were developed.

3.2 USDOT Regional ITS Architecture Guidance

On October 12, 2001, the U.S. Department of Transportation (USDOT) issued guidance on development of a regional ITS architecture through the document "Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region." **Figure 3** summarizes the guidance provided by the USDOT.

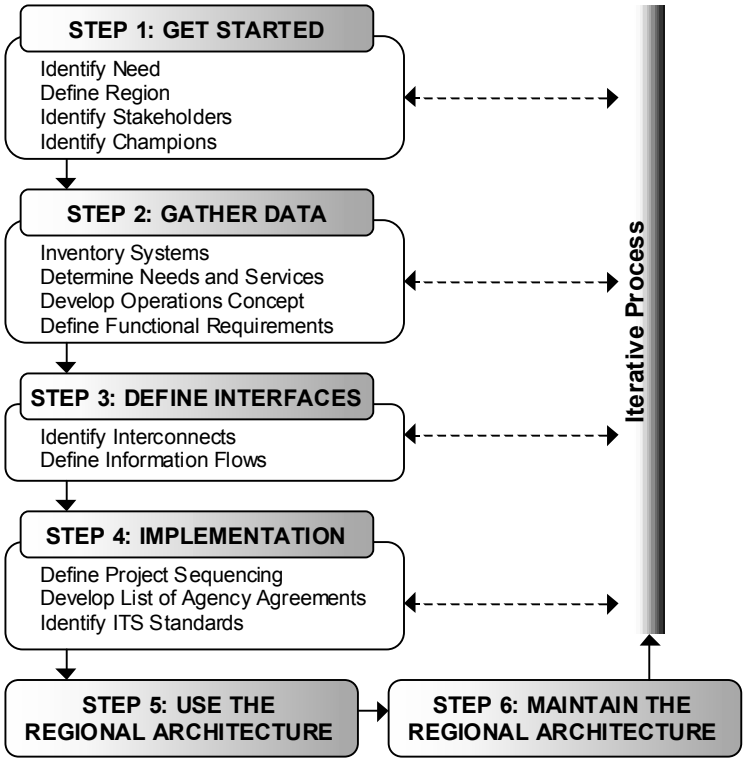
The process used to develop the Lower RGV Regional ITS Architecture and Deployment Plan follows Steps 1 through 4 of the guidance. Steps 5 and 6 are designed to provide guidance upon the completion of the development of the Regional ITS Architecture.

Step 1, Get Started, of the guidance was completed in Task 1 – Kick-off and Regional Work Plan, as well as preliminary work completed by TxDOT to identify initial stakeholders and the need to complete the architecture for the Lower RGV Region. Through these efforts, the need for an architecture, appropriate stakeholders, and the Region was defined.

Step 2, Gather Data, was completed through Task 1 – Kick-off and Regional Work Plan, Task 3A – System Inventory, and Task 3B – 2-Day Regional ITS Architecture Workshop. These efforts allowed the inventory for the Lower RGV Region to be completed, identified ITS needs in the Region, and led to the development of an operational concept and definition of functional requirements.

Step 3, Define Interfaces, was completed in Task 3B – 2-Day Regional ITS Architecture Workshop and Task 3D – 1-Day Regional ITS Architecture Review Workshop. These workshops engaged stakeholders in customizing Market Packages for the Region, which included identifying interconnects among elements in the architecture and reviewing and selecting data flows between elements.

Step 4, Implementation, was completed in Task 3D – 1-Day Regional ITS Architecture Review Workshop through the prioritization of market packages. Sequencing of projects began in this process and was completed in the ITS Deployment Plan. Applicable ITS standards to match the identified data flows also were identified through the 1-Day ITS Architecture Review Workshop.



(Source: Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region, USDOT)

Figure 3 – USDOT Guidance on Regional ITS Architecture Development

4. CONCEPTUAL DESIGN

4.1 Systems Inventory

One of the key initial steps in the architecture development process is to establish an inventory of existing ITS elements. At the project kick-off meeting and through subsequent discussions with agency representatives throughout the Region, Lower RGV stakeholders provided the team with a list of existing, planned, and future systems that would play a role in the Region's ITS architecture. "Planned" is defined as a system with funding identified while "future" is defined as a system that does not yet have funding identified.

Existing, planned, and future systems in the Lower RGV Region were identified in the following categories:

- ***Travel and Traffic Management*** – includes state and local traffic management centers, traffic signal systems, detection systems, CCTV, fixed and portable dynamic message signs, bridge system field equipment, and other related technologies.
- ***Public Transportation Management*** – includes transit and dial-a-ride automated dispatch, and transit travel information systems.
- ***Electronic Payment*** – Lower RGV Trade Tag System.
- ***Commercial Vehicle Operations*** – includes electronic screening systems, commercial vehicle administrative processes, and weigh-in-motion.
- ***Emergency Management*** – includes dispatch for police, fire/emergency medical services (EMS), HAZMAT, county emergency operations/management centers, and U.S. Customs/Border Patrol dispatch.
- ***Information Management*** – includes electronic data management and archiving systems.
- ***Maintenance and Construction Management*** – includes road and bridge maintenance systems.

The system inventory is a valuable task for several reasons. First, it provides a baseline of existing and planned ITS projects and systems in the Region. Second, it outlines which agencies are currently deploying and operating ITS, as well as those that are planning to implement ITS programs. Third, it provides a foundation for identifying needed elements or agency participation for the regional ITS, which will be important for subsequent tasks including the market package identification and prioritization, system interface and integration requirements in the Region, and ultimately the ITS Deployment Plan.

4.1.1 Subsystems and Terminators

Each identified system or component in the Lower RGV Regional ITS inventory was mapped to a subsystem or terminator in the National ITS Architecture. Subsystems and terminators are the 'entities' that represent systems in ITS. 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. Each of these major classes includes various subsystems that represent a set of transportation functions (or processes) that are likely to be collected together under one agency, jurisdiction, or location, and correspond to physical elements, such as traffic operations centers, traffic signals, vehicles, and so on. **Figure 4** shows the National ITS Architecture subsystems. This figure,

also known as the "sausage diagram" is a standard interconnect diagram, showing the relationships of the various subsystems within the architecture; a customized interconnect diagram for the Lower RGV Region is included in Section 4.3.1 of this report. Communication functions between the subsystems are represented in the ovals. It should be noted that "wireline" communication refers to fixed-point to fixed-point communications, which include not only twisted pair and fiber optic technologies, but also such wireless technologies as microwave and spread spectrum.

Terminators are the people, systems, other facilities, and environmental conditions outside of ITS that need to communicate or interface with ITS subsystems. They help to define the boundaries of the National ITS Architecture as well as a regional system. Examples of terminators include drivers, traffic operations personnel, information service providers, weather effects (snow, rain, fog), telecommunications systems, and government reporting systems, among others.

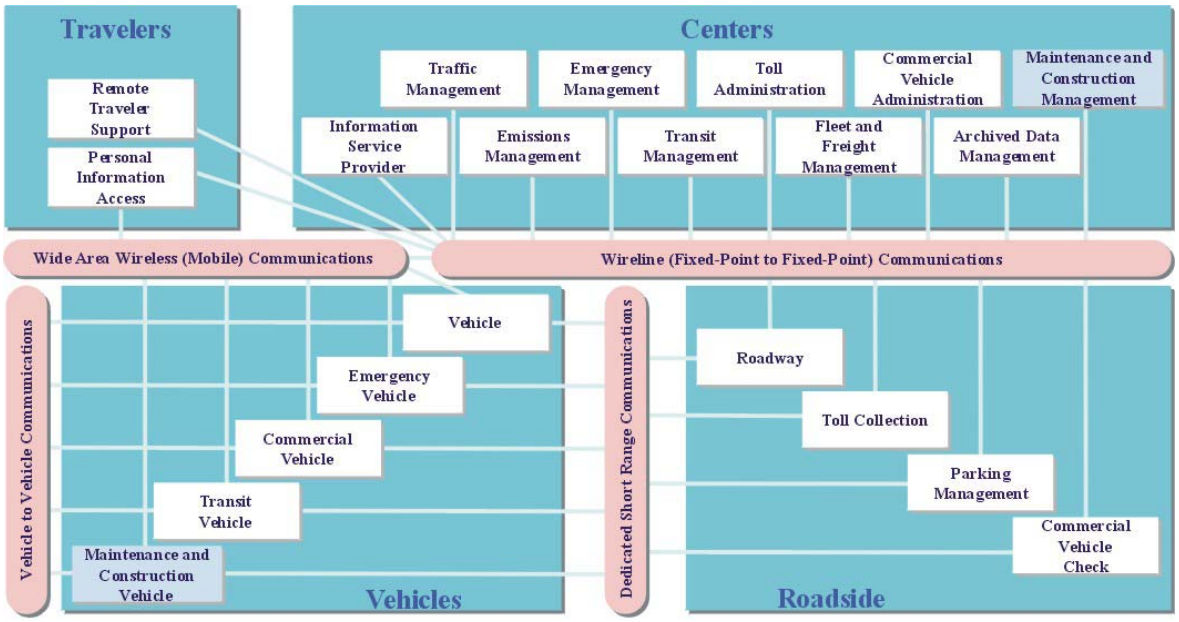


Figure 4 – Physical Subsystem Interconnect Diagram

4.1.2 Lower Rio Grande Valley ITS Inventory by Stakeholder

Each stakeholder is associated with one or more systems or elements (subsystems and terminators) that make up the transportation system in the Lower Rio Grande Region. **Table 3** sorts the inventory by stakeholder, so each stakeholder can easily identify and review all their relevant assets that are identified in the Lower Rio Grande Valley Regional ITS Architecture.

The information in **Table 3** also is included on the Lower Rio Grande Valley ITS Architecture web site, which is accessible by selecting the link to the Texas Regional ITS Architecture, the Lower Rio Grande Valley Region, and then selecting the "Inventory by Stakeholder" button which will open the stakeholder list. Each element in the list contains a hyperlink to more detailed information, including status, description, stakeholder, and other

elements within the inventory with which it interfaces. (At the time this report was published, the Lower Rio Grande Valley Regional ITS Architecture web site was being hosted at www.consystec.com. TxDOT plans to permanently host the site in the future at www.dot.state.tx.us/trf/its.)

4.1.3 Lower Rio Grande Valley ITS Inventory by Entity

The Lower Rio Grande Valley Regional ITS Architecture inventory is made up of the transportation and communications centers, the field equipment, the vehicles, and other systems in the regional transportation system. These components have been assigned to an entity (subsystem or terminator) as defined by the National ITS Architecture. **Table 4** presents the Lower Rio Grande Valley Region inventory using the associated National ITS Architecture subsystem or terminator. This sorts elements that perform similar functions together, so elements of a particular type can be easily identified. This inventory also can be accessed from the Lower Rio Grande Valley Regional ITS Architecture web site by selecting the "Inventory by Entity" button.

Table 3 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Stakeholder)

Stakeholder	Element	Entity	Status
Brownsville MPO	Brownsville MPO Field Equipment	Roadway Subsystem	Planned
	Brownsville MPO Traffic Management System	Traffic Management Subsystem	Planned
Brownsville Navigation District	Port of Brownsville	Emergency Management Subsystem	Existing
Brownsville/Matamoros	Lower RGV Trade Tag	Traveler Card	Existing
	Lower RGV Trade Tag	Vehicle Subsystem	Existing
BUS	BUS Transit Dispatch	Transit Management Subsystem	Existing
	BUS Transit Electronic Fare Collection System	Transit Management Subsystem	Planned
	BUS Transit Planning System	Archived Data Management Subsystem	Existing
	BUS Transit Planning System Users	Archived Data User Systems	Planned
	BUS Transit Vehicles	Transit Vehicle Subsystem	Existing
	BUS Transit Web Site	Information Service Provider Subsystem	Existing
Cameron County International Bridge Division	Cameron County International Bridge Field Equipment	Roadway Subsystem	Planned
	Cameron County International Bridge Management System	Traffic Management Subsystem	Existing
Cities and Counties Emergency Management Coordinators	City/County EOC	Emergency Management Subsystem	Existing
Cities of McAllen, Harlingen, and Brownsville	Airport Public Safety	Emergency Management Subsystem	Existing
City and Community Parking Providers	City and Community Parking Management Systems	Parking Management Subsystem	Planned
City and County Public Safety	City/County Police and Fire Dispatch	Emergency Management Subsystem	Existing
	City/County Police and Fire Vehicles	Emergency Vehicle Subsystem	Existing
City of Brownsville	City of Brownsville Field Equipment	Roadway Subsystem	Existing
	City of Brownsville TMC	Traffic Management Subsystem	Planned
City of Harlingen	City of Harlingen Field Equipment	Roadway Subsystem	Planned
	City of Harlingen TMC	Traffic Management Subsystem	Planned

Table 3 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
City of McAllen	City of McAllen Field Equipment	Roadway Subsystem	Planned
	City of McAllen TMC	Traffic Management Subsystem	Existing
City of Pharr	City of Pharr and B/M Bridge Electronic Toll Collection System	Toll Administration Subsystem	Existing
	City of Pharr and B/M Bridge ETC Equipment	Toll Collection Subsystem	Existing
	City of Pharr Field Equipment	Roadway Subsystem	Existing
	City of Pharr TMC	Traffic Management Subsystem	Existing
	Pharr/Reynosa Bridge Field Equipment	Roadway Subsystem	Planned
	Pharr/Reynosa Bridge Management System	Traffic Management Subsystem	Planned
Comm. Action Council of S. Texas	Rainbow Lines Transit Dispatch	Transit Management Subsystem	Planned
	Rainbow Lines Transit Planning System	Archived Data Management Subsystem	Planned
	Rainbow Lines Transit Planning System Users	Archived Data User Systems	Planned
	Rainbow Lines Transit Vehicles	Transit Vehicle Subsystem	Existing
	Rainbow Lines Transit Web Site	Information Service Provider Subsystem	Existing
Commercial Vehicle Operators	Commercial Vehicle Operator Systems	Fleet and Freight Management Subsystem	Existing
	Commercial Vehicles	Commercial Vehicle Subsystem	Existing
	Commercial Vehicles	Vehicle Subsystem	Existing
County Road and Bridge	County Road and Bridge	Maintenance and Construction Management Subsystem	Existing
	County Road and Bridge Equipment Repair	Equipment Repair Facility	Existing
	County Road and Bridge Field Equipment	Roadway Subsystem	Planned
	County Road and Bridge Maintenance Yard	Storage Facility	Existing
	County Road and Bridge Vehicles	Maintenance and Construction Vehicle Subsystem	Existing

Table 3 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
DPS	DPS Administration	CVO Information Requestor	Existing
	DPS Administration	Emergency Management Subsystem	Existing
	DPS Communications Dispatch	Emergency Management Subsystem	Existing
	DPS Electronic Screening Stations	Commercial Vehicle Check Subsystem	Existing
	DPS License and Weights Division	Enforcement Agency	Existing
	DPS Vehicles	Emergency Vehicle Subsystem	Existing
	State EOC	Emergency Management Subsystem	Existing
Financial Institution	Financial Institution	Financial Institution	Existing
Hidalgo County MPO	Hidalgo County Archived Data System Users	Archived Data User Systems	Planned
	Hidalgo County Congestion Management System	Archived Data Management Subsystem	Existing
	Hidalgo County Field Equipment	Roadway Subsystem	Planned
	Hidalgo County Pavement Data Collection System	Roadway Subsystem	Planned
	Hidalgo County Pavement Management System	Archived Data Management Subsystem	Existing
	Hidalgo County Traffic Data Collection System	Roadway Subsystem	Existing
Independent School Districts	Independent School District Buses	Transit Vehicle Subsystem	Existing
	Independent School District Dispatch	Transit Management Subsystem	Existing
International Boundary and Water Commission	IBWC Rio Grande River Flood Monitoring System	Emergency Management Subsystem	Existing
Joint Brownsville, Harlingen/San Benito MPO	Cameron County Congestion Management System	Archived Data Management Subsystem	Planned
	Cameron County Congestion Management System Users	Archived Data User Systems	Planned
	Cameron County Traffic Data Collection System	Roadway Subsystem	Planned
Local Cities	Municipal Public Works Department	Maintenance and Construction Management Subsystem	Existing
	Municipal Public Works Department Equipment Repair	Equipment Repair Facility	Existing
	Municipal Public Works Department Field Equipment	Roadway Subsystem	Existing

Table 3 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
Local Cities (continued)	Municipal Public Works Department Maintenance Yard	Storage Facility	Existing
	Municipal Public Works Department Vehicles	Maintenance and Construction Vehicle Subsystem	Planned
Lower RGV Bridge Operators	Lower RGV Bridge ETC Equipment	Toll Collection Subsystem	Planned
	Lower RGV Bridge Toll Collection Systems	Toll Administration Subsystem	Planned
Lower RGV MPOs	Lower RGV MPO Transportation Data Archival System	Archived Data Management Subsystem	Planned
	Lower RGV MPO Transportation Data Archival System Users	Archived Data User Systems	Planned
Lower RGV Public Transit Operators	Lower RGV Transit Fare Card	Traveler Card	Existing
	Lower RGV Transit Kiosk and Information Displays	Remote Traveler Support Subsystem	Planned
Lower RGV Urban Development Council	Lower RGV Development Council Transit Dispatch	Transit Management Subsystem	Existing
	Lower RGV Development Council Transit Planning System	Archived Data Management Subsystem	Planned
	Lower RGV Development Council Transit Planning System Users	Archived Data User Systems	Planned
	Lower RGV Development Council Transit Vehicles	Transit Vehicle Subsystem	Existing
	Lower RGV Development Council Transit Web Site	Information Service Provider Subsystem	Existing
Lower Rio Grande Valley Regional Transportation and Public Safety Agencies	Lower RGV Regional Traffic Information Network	Emergency Management Subsystem	Planned
	Lower RGV Regional Traffic Information Network	Traffic Management Subsystem	Planned
Major Employers/Academic Institutions	Major Employers/Academic Institutions Ride Sharing Web Site	Information Service Provider Subsystem	Planned
McAllen Bridge Board	Hidalgo/Reynosa Bridge Field Equipment	Roadway Subsystem	Planned
	Hidalgo/Reynosa Bridge Management System	Traffic Management Subsystem	Planned
Mexico DOT (SCT)	Mexico DOT (SCT)	Traffic Management Subsystem	Existing
Mexico Emergency Management Agencies	Mexico Emergency Management Systems	Emergency Management Subsystem	Existing
NOAA	National Weather Service	Weather Service	Existing

Table 3 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
Print and Broadcast Media	Print and Broadcast Media	Media	Existing
Private Freight Shippers	Private Freight Shippers	Intermodal Freight Shipper	Existing
Private Information Providers	Private Sector Traveler Information Services	Information Service Provider Subsystem	Planned
Private International Bridge Owners	Private International Bridge Field Equipment	Roadway Subsystem	Planned
	Private International Bridge Management Systems	Traffic Management Subsystem	Planned
Private Transit Operators	Private Transit Systems	Transit Management Subsystem	Existing
Private Traveler	Private Traveler Personal Computing Devices	Personal Information Access Subsystem	Existing
Private Vehicle Owners	Private Vehicles	Vehicle Subsystem	Existing
Public/Private EMS Providers	Public/Private EMS Dispatch	Emergency Management Subsystem	Existing
	Public/Private EMS Vehicles	Emergency Vehicle Subsystem	Existing
Rail Operators	Rail Cars	Commercial Vehicle Subsystem	Existing
	Rail Cars	Vehicle Subsystem	Existing
	Rail Operators	Fleet and Freight Management Subsystem	Existing
	Rail Operators	Rail Operations	Existing
	Rail Operators Wayside Equipment	Wayside Equipment	Existing
Regional Hospitals	Regional Hospitals	Care Facility	Planned
Tourism and Event Information Providers	Tourism and Event Information Systems	Event Promoters	Planned
Town of South Padre Island	The Wave Transit Dispatch	Transit Management Subsystem	Planned
	The Wave Transit Planning System	Archived Data Management Subsystem	Planned
	The Wave Transit Planning System Users	Archived Data User Systems	Planned
	The Wave Transit Vehicles	Transit Vehicle Subsystem	Existing
	The Wave Transit Web Site	Information Service Provider Subsystem	Existing

Table 3 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
TxDOT	TxDOT 511 System	Information Service Provider Subsystem	Planned
	TxDOT BRINSAP	Asset Management	Existing
	TxDOT Courtesy Patrol Dispatch	Emergency Management Subsystem	Planned
	TxDOT Courtesy Patrol Vehicles	Emergency Vehicle Subsystem	Planned
	TxDOT Credentials Administration and Safety Information Exchange	Commercial Vehicle Administration Subsystem	Existing
	TxDOT District Shop	Equipment Repair Facility	Existing
	TxDOT Motor Carrier Routing Information System	Information Service Provider Subsystem	Existing
	TxDOT Pharr District Bridge Corridor System	Roadway Subsystem	Planned
	TxDOT Pharr District CCTV	Roadway Subsystem	Planned
	TxDOT Pharr District DMS	Roadway Subsystem	Planned
	TxDOT Pharr District Field Sensors	Roadway Subsystem	Existing
	TxDOT Pharr District Flood Monitoring System	Roadway Subsystem	Existing
	TxDOT Pharr District HAR	Roadway Subsystem	Planned
	TxDOT Pharr District HCRS	Information Service Provider Subsystem	Existing
	TxDOT Pharr District Lane Control Signals	Roadway Subsystem	Planned
	TxDOT Pharr District Maintenance Section Yard	Storage Facility	Existing
	TxDOT Pharr District Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
	TxDOT Pharr District Maintenance Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
	TxDOT Pharr District Pavement Data Collection System	Roadway Subsystem	Existing
	TxDOT Pharr District Pavement Management System	Archived Data Management Subsystem	Existing
	TxDOT Pharr District TMC	Maintenance and Construction Management Subsystem	Planned

Table 3 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
TxDOT (continued)	TxDOT Pharr District TMC	Traffic Management Subsystem	Planned
	TxDOT Pharr District Traffic Signals	Roadway Subsystem	Existing
	TxDOT Pharr District Transportation Operational Data Archive	Archived Data Management Subsystem	Existing
	TxDOT Pharr District Transportation Operational Data Archive System Users	Archived Data User Systems	Planned
	TxDOT Pharr District Web Page	Information Service Provider Subsystem	Existing
	TxDOT Pharr District Web Page	Maintenance and Construction Management Subsystem	Existing
	TxDOT Pharr District Work Zone Equipment	Roadway Subsystem	Planned
	TxDOT Weigh-in-Motion Sites	Commercial Vehicle Check Subsystem	Existing
	TxDOT/BND Overweight Corridor System	Commercial Vehicle Check Subsystem	Existing
TxDOT/DPS	TxDOT/DPS Crash Record Information System	Archived Data Management Subsystem	Existing
	TxDOT/DPS Crash Record Information System Users	Archived Data User Systems	Existing
TxDOT/International Bridge Operators	TxDOT/International Bridges Corridor Archive	Archived Data Management Subsystem	Planned
	TxDOT/International Bridges Corridor Archive Users	Archived Data User Systems	Planned
US Border Patrol	US Border Patrol Dispatch	Emergency Management Subsystem	Existing
	US Border Patrol Dispatch	Traffic Management Subsystem	Existing
	US Border Patrol Field Equipment	Roadway Subsystem	Existing
	US Border Patrol Video Surveillance System	Traffic Management Subsystem	Existing
US Coast Guard	US Coast Guard Causeway Management System	Emergency Management Subsystem	Existing
US Customs	US Customs	Emergency Management Subsystem	Existing
	US Customs	Enforcement Agency	Existing
	US Customs	Trade Regulatory Agencies	Existing
US DOT	US DOT Inspections	Enforcement Agency	Existing

Table 4 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Entity)

Entity	Element	Stakeholder	Status
Archived Data Management Subsystem	BUS Transit Planning System	BUS	Existing
	Cameron County Congestion Management System	Joint Brownsville, Harlingen/San Benito MPO	Planned
	Hidalgo County Congestion Management System	Hidalgo County MPO	Existing
	Hidalgo County Pavement Management System	Hidalgo County MPO	Existing
	Lower RGV Development Council Transit Planning System	Lower RGV Urban Development Council	Planned
	Lower RGV MPO Transportation Data Archival System	Lower RGV MPOs	Planned
	Rainbow Lines Transit Planning System	Comm. Action Council of S. Texas	Planned
	The Wave Transit Planning System	Town of South Padre Island	Planned
	TxDOT Pharr District Pavement Management System	TxDOT	Existing
	TxDOT Pharr District Transportation Operational Data Archive	TxDOT	Existing
	TxDOT/DPS Crash Record Information System	TxDOT/DPS	Existing
	TxDOT/International Bridges Corridor Archive	TxDOT/International Bridge Operators	Planned
Archived Data User Systems	BUS Transit Planning System Users	BUS	Planned
	Cameron County Congestion Management System Users	Joint Brownsville, Harlingen/San Benito MPO	Planned
	Hidalgo County Archived Data System Users	Hidalgo County MPO	Planned
	Lower RGV Development Council Transit Planning System Users	Lower RGV Urban Development Council	Planned
	Lower RGV MPO Transportation Data Archival System Users	Lower RGV MPOs	Planned
	Rainbow Lines Transit Planning System Users	Comm. Action Council of S. Texas	Planned
	The Wave Transit Planning System Users	Town of South Padre Island	Planned
	TxDOT Pharr District Transportation Operational Data Archive System Users	TxDOT	Planned

Table 4 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Archived Data User Systems (continued)	TxDOT/DPS Crash Record Information System Users	TxDOT/DPS	Existing
	TxDOT/International Bridges Corridor Archive Users	TxDOT/International Bridge Operators	Planned
Asset Management	TxDOT BRINSAP	TxDOT	Existing
Care Facility	Regional Hospitals	Regional Hospitals	Planned
Commercial Vehicle Administration Subsystem	TxDOT Credentials Administration and Safety Information Exchange	TxDOT	Existing
Commercial Vehicle Check Subsystem	DPS Electronic Screening Stations	DPS	Existing
	TxDOT Weigh-in-Motion Sites	TxDOT	Existing
	TxDOT/BND Overweight Corridor System	TxDOT	Existing
Commercial Vehicle Subsystem	Commercial Vehicles	Commercial Vehicle Operators	Existing
	Rail Cars	Rail Operators	Existing
CVO Information Requestor	DPS Administration	DPS	Existing
Emergency Management Subsystem	Airport Public Safety	Cities of McAllen, Harlingen, and Brownsville	Existing
	City/County EOC	Cities and Counties Emergency Management Coordinators	Existing
	City/County Police and Fire Dispatch	City and County Public Safety	Existing
	DPS Administration	DPS	Existing
	DPS Communications Dispatch	DPS	Existing
	IBWC Rio Grande River Flood Monitoring System	International Boundary and Water Commission	Existing
	Lower RGV Regional Traffic Information Network	Lower Rio Grande Valley Regional Transportation and Public Safety Agencies	Planned
	Mexico Emergency Management Systems	Mexico Emergency Management Agencies	Existing
	Port of Brownsville	Brownsville Navigation District	Existing
	Public/Private EMS Dispatch	Public/Private EMS Providers	Existing

Table 4 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Emergency Management Subsystem (continued)	State EOC	DPS	Existing
	TxDOT Courtesy Patrol Dispatch	TxDOT	Planned
	US Border Patrol Dispatch	US Border Patrol	Existing
	US Coast Guard Causeway Management System	US Coast Guard	Existing
	US Customs	US Customs	Existing
Emergency Vehicle Subsystem	City/County Police and Fire Vehicles	City and County Public Safety	Existing
	DPS Vehicles	DPS	Existing
	Public/Private EMS Vehicles	Public/Private EMS Providers	Existing
	TxDOT Courtesy Patrol Vehicles	TxDOT	Planned
Enforcement Agency	DPS License and Weights Division	DPS	Existing
	US Customs	US Customs	Existing
	US DOT Inspections	US DOT	Existing
Equipment Repair Facility	County Road and Bridge Equipment Repair	County Road and Bridge	Existing
	Municipal Public Works Department Equipment Repair	Local Cities	Existing
	TxDOT District Shop	TxDOT	Existing
Event Promoters	Tourism and Event Information Systems	Tourism and Event Information Providers	Planned
Financial Institution	Financial Institution	Financial Institution	Existing
Fleet and Freight Management Subsystem	Commercial Vehicle Operator Systems	Commercial Vehicle Operators	Existing
	Rail Operators	Rail Operators	Existing
Information Service Provider Subsystem	BUS Transit Web Site	BUS	Existing
	Lower RGV Development Council Transit Web Site	Lower RGV Urban Development Council	Existing
	Major Employers/Academic Institutions Ride Sharing Web Site	Major Employers/Academic Institutions	Planned
	Private Sector Traveler Information Services	Private Information Providers	Planned
	Rainbow Lines Transit Web Site	Comm. Action Council of S. Texas	Existing

Table 4 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Information Service Provider Subsystem (continued)	The Wave Transit Web Site	Town of South Padre Island	Existing
	TxDOT 511 System	TxDOT	Planned
	TxDOT Motor Carrier Routing Information System	TxDOT	Existing
	TxDOT Pharr District HCRS	TxDOT	Existing
	TxDOT Pharr District Web Page	TxDOT	Existing
Intermodal Freight Shipper	Private Freight Shippers	Private Freight Shippers	Existing
Maintenance and Construction Management Subsystem	County Road and Bridge	County Road and Bridge	Existing
	Municipal Public Works Department	Local Cities	Existing
	TxDOT Pharr District Maintenance Sections	TxDOT	Existing
	TxDOT Pharr District TMC	TxDOT	Planned
	TxDOT Pharr District Web Page	TxDOT	Existing
Maintenance and Construction Vehicle Subsystem	County Road and Bridge Vehicles	County Road and Bridge	Existing
	Municipal Public Works Department Vehicles	Local Cities	Planned
	TxDOT Pharr District Maintenance Vehicles	TxDOT	Existing
Media	Print and Broadcast Media	Print and Broadcast Media	Existing
Parking Management Subsystem	City and Community Parking Management Systems	City and Community Parking Providers	Planned
Personal Information Access Subsystem	Private Traveler Personal Computing Devices	Private Traveler	Existing
Rail Operations	Rail Operators	Rail Operators	Existing
Remote Traveler Support Subsystem	Lower RGV Transit Kiosk and Information Displays	Lower RGV Public Transit Operators	Planned
Roadway Subsystem	Brownsville MPO Field Equipment	Brownsville MPO	Planned
	Cameron County International Bridge Field Equipment	Cameron County International Bridge Division	Planned
	Cameron County Traffic Data Collection System	Joint Brownsville, Harlingen/San Benito MPO	Planned
	City of Brownsville Field Equipment	City of Brownsville	Existing
	City of Harlingen Field Equipment	City of Harlingen	Planned

Table 4 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Roadway Subsystem (continued)	City of McAllen Field Equipment	City of McAllen	Planned
	City of Pharr Field Equipment	City of Pharr	Existing
	County Road and Bridge Field Equipment	County Road and Bridge	Planned
	Hidalgo County Field Equipment	Hidalgo County MPO	Planned
	Hidalgo County Pavement Data Collection System	Hidalgo County MPO	Planned
	Hidalgo County Traffic Data Collection System	Hidalgo County MPO	Existing
	Hidalgo/Reynosa Bridge Field Equipment	McAllen Bridge Board	Planned
	Municipal Public Works Department Field Equipment	Local Cities	Existing
	Pharr/Reynosa Bridge Field Equipment	City of Pharr	Planned
	Private International Bridge Field Equipment	Private International Bridge Owners	Planned
	TxDOT Pharr District Bridge Corridor System	TxDOT	Planned
	TxDOT Pharr District CCTV	TxDOT	Planned
	TxDOT Pharr District DMS	TxDOT	Planned
	TxDOT Pharr District Field Sensors	TxDOT	Existing
	TxDOT Pharr District Flood Monitoring System	TxDOT	Existing
	TxDOT Pharr District HAR	TxDOT	Planned
	TxDOT Pharr District Lane Control Signals	TxDOT	Planned
	TxDOT Pharr District Pavement Data Collection System	TxDOT	Existing
	TxDOT Pharr District Traffic Signals	TxDOT	Existing
	TxDOT Pharr District Work Zone Equipment	TxDOT	Planned
	US Border Patrol Field Equipment	US Border Patrol	Existing
Storage Facility	County Road and Bridge Maintenance Yard	County Road and Bridge	Existing
	Municipal Public Works Department Maintenance Yard	Local Cities	Existing
	TxDOT Pharr District Maintenance Section Yard	TxDOT	Existing

Table 4 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Toll Administration Subsystem	City of Pharr and B/M Bridge Electronic Toll Collection System	City of Pharr	Existing
	Lower RGV Bridge Toll Collection Systems	Lower RGV Bridge Operators	Planned
Toll Collection Subsystem	City of Pharr and B/M Bridge ETC Equipment	City of Pharr	Existing
	Lower RGV Bridge ETC Equipment	Lower RGV Bridge Operators	Planned
Trade Regulatory Agencies	US Customs	US Customs	Existing
Traffic Management Subsystem	Brownsville MPO Traffic Management System	Brownsville MPO	Planned
	Cameron County International Bridge Management System	Cameron County International Bridge Division	Existing
	City of Brownsville TMC	City of Brownsville	Planned
	City of Harlingen TMC	City of Harlingen	Planned
	City of McAllen TMC	City of McAllen	Existing
	City of Pharr TMC	City of Pharr	Existing
	Hidalgo/Reynosa Bridge Management System	McAllen Bridge Board	Planned
	Lower RGV Regional Traffic Information Network	Lower Rio Grande Valley Regional Transportation and Public Safety Agencies	Planned
	Mexico DOT (SCT)	Mexico DOT (SCT)	Existing
	Pharr/Reynosa Bridge Management System	City of Pharr	Planned
	Private International Bridge Management Systems	Private International Bridge Owners	Planned
	TxDOT Pharr District TMC	TxDOT	Planned
	US Border Patrol Dispatch	US Border Patrol	Existing
	US Border Patrol Video Surveillance System	US Border Patrol	Existing
Transit Management Subsystem	BUS Transit Dispatch	BUS	Existing
	BUS Transit Electronic Fare Collection System	BUS	Planned
	Independent School District Dispatch	Independent School Districts	Existing

Table 4 – Lower RGV Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Transit Management Subsystem (continued)	Lower RGV Development Council Transit Dispatch	Lower RGV Urban Development Council	Existing
	Private Transit Systems	Private Transit Operators	Existing
	Rainbow Lines Transit Dispatch	Comm. Action Council of S. Texas	Planned
	The Wave Transit Dispatch	Town of South Padre Island	Planned
Transit Vehicle Subsystem	BUS Transit Vehicles	BUS	Existing
	Independent School District Buses	Independent School Districts	Existing
	Lower RGV Development Council Transit Vehicles	Lower RGV Urban Development Council	Existing
	Rainbow Lines Transit Vehicles	Comm. Action Council of S. Texas	Existing
	The Wave Transit Vehicles	Town of South Padre Island	Existing
Traveler Card	Lower RGV Trade Tag	Brownsville/Matamoros	Existing
	Lower RGV Transit Fare Card	Lower RGV Public Transit Operators	Existing
Vehicle Subsystem	Commercial Vehicles	Commercial Vehicle Operators	Existing
	Lower RGV Trade Tag	Brownsville/Matamoros	Existing
	Private Vehicles	Private Vehicle Owners	Existing
	Rail Cars	Rail Operators	Existing
Wayside Equipment	Rail Operators Wayside Equipment	Rail Operators	Existing
Weather Service	National Weather Service	NOAA	Existing

4.2 Regional Market Packages

Upon completion of the system inventory, the next step in the development of the architecture was to identify the transportation services that are important to the Lower RGV Region. In the National ITS Architecture, services are referred to as market packages. Market packages could 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.

In the Lower RGV Region, the National ITS Architecture market packages were reviewed by the stakeholders and selected based on the relevance of the service that the market package could provide to the Region. All of the market packages that stakeholders in the Lower RGV selected for implementation in the Region are identified in **Table 5**, as well as the primary stakeholders responsible for implementing the market packages and the elements in the Region that serve a key role in providing the market package service. The market packages are identified as existing, planned, or future for the Region. In many cases, existing market packages might still need to be enhanced to increase the service that the market package provides.

Upon selecting the market packages that were applicable for the Region, stakeholders then reviewed each market package and the elements that could be included to customize it for the Region. This customization is discussed further in the following section.

Table 5 – Lower Rio Grande Valley Region Selected Market Packages

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
ATMS01	Network Surveillance	Brownsville MPO Field Equipment	Cameron County	Future
		Brownsville MPO Traffic Management System	Brownsville MPO	Future
		Cameron County International Bridge Field Equipment	City of Brownsville	Future
		Cameron County International Bridge Management System	City of Harlingen	Future
		City of Brownsville Field Equipment	City of McAllen	Future
		City of Brownsville TMC	City of Pharr	Future
		City of Harlingen Field Equipment	Hidalgo County	Future
		City of Harlingen TMC	TxDOT Pharr District	Future
		City of McAllen Field Equipment	US Border Patrol	Existing
		City of McAllen TMC	Private International Bridge	Future
		City of Pharr Field Equipment		
		City of Pharr TMC		
		Hidalgo/Reynosa Bridge Field Equipment		
		Hidalgo/Reynosa Bridge Management System		
		Pharr/Reynosa Bridge Field Equipment		
		Pharr/Reynosa Bridge Management System		
		Private International Bridge Field Equipment		
		Private International Bridge Management Systems		
		Private Sector Traveler Information Services		
		TxDOT Pharr District CCTV		
		TxDOT Pharr District Field Sensors		
		TxDOT Pharr District TMC		
		TxDOT Pharr District Web Page		
		US Border Patrol Field Equipment		
		US Border Patrol Video Surveillance System		
ATMS02	Probe Surveillance	City of Pharr and B/M Bridge Electronic Toll Collection System	TxDOT Pharr District	Future
		Commercial Vehicles		
		Lower RGV Bridge Toll Collection Systems		
		Private Vehicles		
		TxDOT Pharr District Bridge Corridor System		
		TxDOT Pharr District TMC		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
ATMS03	Surface Street Control	Brownsville MPO Field Equipment	Brownsville MPO	Future
		Brownsville MPO Traffic Management System	City of Brownsville	Existing
		City of Brownsville Field Equipment	City of Harlingen	Existing
		City of Brownsville TMC	City of McAllen	Existing
		City of Harlingen Field Equipment	City of Pharr	Existing
		City of Harlingen TMC	TxDOT Pharr District	Existing
		City of McAllen Field Equipment		
		City of McAllen TMC		
		City of Pharr Field Equipment		
		City of Pharr TMC		
		TxDOT Pharr District TMC		
		TxDOT Pharr District Traffic Signals		
ATMS04	Freeway Control	TxDOT Pharr District Lane Control Signals	TxDOT Pharr District	Planned
		TxDOT Pharr District TMC		
ATMS06	Traffic Information Dissemination	Brownsville MPO Field Equipment	Cameron County Intnl Bridge Mgmt	Future
		Brownsville MPO Traffic Management System	Hidalgo County Intnl Bridge Mgmt	Future
		BUS Transit Dispatch	City of Pharr Intnl Bridge Mgmt	Future
		Cameron County International Bridge Field Equipment	Private International Bridge Mgmt	Future
		Cameron County International Bridge Management System	Brownsville MPO	Future
		City of Brownsville Field Equipment	City of Brownsville	Future
		City of Brownsville TMC	City of Harlingen	Future
		City of Harlingen Field Equipment	City of McAllen	Future
		City of Harlingen TMC	City of Pharr	Future
		City of McAllen Field Equipment	TxDOT Pharr District	Existing
		City of McAllen TMC		
		City of Pharr Field Equipment		
		City of Pharr TMC		
		City/County EOC		
		City/County Police and Fire Dispatch		
		County Road and Bridge		
		DPS Communications Dispatch		
		Hidalgo/Reynosa Bridge Field Equipment		
		Hidalgo/Reynosa Bridge Management System		
		Independent School District Dispatch		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
ATMS06 (continued)	Traffic Information Dissemination (continued)	Lower RGV Development Council Transit Dispatch Lower RGV Regional Traffic Information Network Municipal Public Works Department Pharr/Reynosa Bridge Field Equipment Pharr/Reynosa Bridge Management System Port of Brownsville Print and Broadcast Media Private International Bridge Field Equipment Private International Bridge Management Systems Private Transit Systems Public/Private EMS Dispatch Rainbow Lines Transit Dispatch State EOC The Wave Transit Dispatch TxDOT Courtesy Patrol Dispatch TxDOT Pharr District DMS TxDOT Pharr District HAR TxDOT Pharr District Maintenance Sections TxDOT Pharr District TMC TxDOT Pharr District Web Page US Border Patrol Dispatch US Coast Guard Causeway Management System		
ATMS07	Regional Traffic Control	Brownsville MPO Traffic Management System Cameron County International Bridge Management System City of Brownsville TMC City of Harlingen TMC City of McAllen TMC City of Pharr TMC Hidalgo/Reynosa Bridge Management System Lower RGV Regional Traffic Information Network Mexico DOT (SCT) Other Texas Region TMCs Pharr/Reynosa Bridge Management System	Lower RGV Traffic Mgmt Agencies	Future

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
ATMS07 (continued)	Regional Traffic Control (continued)	Private International Bridge Management Systems TxDOT Pharr District TMC		
ATMS08	Incident Management System	Airport Public Safety Brownsville MPO Traffic Management System BUS Transit Dispatch Cameron County International Bridge Management System City of Brownsville TMC City of Harlingen TMC City of McAllen TMC City of Pharr TMC City/County EOC City/County Police and Fire Dispatch City/County Police and Fire Vehicles County Road and Bridge DPS Communications Dispatch DPS Vehicles Hidalgo/Reynosa Bridge Management System IBWC Rio Grande River Flood Monitoring System Independent School District Dispatch Lower RGV Regional Traffic Information Network Lower RGV Development Council Transit Dispatch Mexico DOT (SCT) Mexico Emergency Management Systems Municipal Public Works Department National Weather Service Pharr/Reynosa Bridge Management System Port of Brownsville Private International Bridge Management Systems Private Transit Systems Public/Private EMS Dispatch Public/Private EMS Vehicles Rainbow Lines Transit Dispatch State EOC	Lower RGV Traffic Mgmt Agencies Lower RGV Emergency Mgmt Agencies	Future Future

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
ATMS08 (continued)	Incident Management System (continued)	Tourism and Event Information Systems The Wave Transit Dispatch TxDOT Courtesy Patrol Dispatch TxDOT Courtesy Patrol Vehicles TxDOT Pharr District Flood Monitoring System TxDOT Pharr District Maintenance Sections TxDOT Pharr District TMC US Border Patrol Dispatch US Coast Guard Causeway Management System		
ATMS10	Electronic Toll Collection	City of Pharr and B/M Bridge Electronic Toll Collection System City of Pharr and B/M Bridge ETC Equipment Commercial Vehicle Operator Systems Financial Institution Lower RGV Bridge ETC Equipment Lower RGV Bridge Toll Collection Systems Lower RGV Trade Tag	City of Brownsville City of Pharr	Existing Existing
ATMS13	Standard Railroad Grade Crossing	City of Brownsville Field Equipment City of Brownsville TMC City of Harlingen Field Equipment City of Harlingen TMC City of McAllen Field Equipment City of McAllen TMC City/County Police and Fire Dispatch DPS Communications Dispatch Public/Private EMS Dispatch Rail Operators Rail Operators Wayside Equipment TxDOT Pharr District TMC TxDOT Pharr District Traffic Signals	City of Brownsville City of Harlingen City of McAllen TxDOT Pharr District	Future Future Future Future
ATMS14	Advanced Railroad Grade Crossing	City of Harlingen TMC City of Harlingen Field Equipment Rail Operators Wayside Equipment	City of Harlingen	Future

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
ATMS15	Railroad Operations Coordination	City of Brownsville TMC	City of Brownsville	Future
		City of Harlingen TMC	City of Harlingen	Future
		City of McAllen TMC	City of McAllen	Future
		Rail Operators	TxDOT Pharr District	Future
		TxDOT Pharr District TMC		
ATMS16	Parking Facility Management	City and Community Parking Management Systems	Lower RGV Traffic Mgmt Agencies	Future
		Private Sector Traveler Information Services		
		TxDOT Pharr District Web Page		
ATMS17	Regional Parking Management	Brownsville MPO Traffic Management System	Lower RGV Traffic Mgmt Agencies	Future
		BUS Transit Dispatch		
		City and Community Parking Management Systems		
		City of Brownsville TMC		
		City of Harlingen TMC		
		City of McAllen TMC		
		City of Pharr TMC		
		Lower RGV Development Council Transit Dispatch		
		TxDOT Pharr District TMC		
EM1	Emergency Response	Airport Public Safety	Lower RGV Emergency Mgmt Agencies	Future
		City/County EOC		
		City/County Police and Fire Dispatch		
		DPS Communications Dispatch		
		Lower RGV Incident and Mutual Aid Network		
		Port of Brownsville		
		Public/Private EMS Dispatch		
		State EOC		
		US Border Patrol Dispatch		
		US Coast Guard Causeway Management System		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
EM2	Emergency Routing	Brownsville MPO Field Equipment	Lower RGV Emergency Mgmt Agencies and Traffic Mgmt Agencies	Future
		Brownsville MPO Traffic Management System		
		City of Brownsville Field Equipment		
		City of Brownsville TMC		
		City of Harlingen Field Equipment		
		City of Harlingen TMC		
		City of McAllen Field Equipment		
		City of McAllen TMC		
		City of Pharr Field Equipment		
		City of Pharr TMC		
		City/County Police and Fire Dispatch		
		City/County Police and Fire Vehicles		
		Public/Private EMS Dispatch		
		Public/Private EMS Vehicles		
		Regional Hospitals		
		TxDOT Pharr District TMC		
		TxDOT Pharr District Traffic Signals		
MC01	Maintenance and Construction Vehicle Tracking	County Road and Bridge	TxDOT Pharr District	Future
		County Road and Bridge Vehicles	Municipal Public Works	Future
		Municipal Public Works Department	County Road and Bridge	Future
		Municipal Public Works Department Vehicles		
		TxDOT Pharr District Maintenance Sections		
		TxDOT Pharr District Maintenance Vehicles		
MC02	Maintenance and Construction Vehicle Maintenance	County Road and Bridge	TxDOT Pharr District	Future
		County Road and Bridge Equipment Repair	Municipal Public Works	Future
		County Road and Bridge Vehicles	County Road and Bridge	Future
		Municipal Public Works Department		
		Municipal Public Works Depart. Equipment Repair		
		Municipal Public Works Department Vehicles		
		TxDOT District Shop		
		TxDOT Pharr District Maintenance Sections		
		TxDOT Pharr District Maintenance Vehicles		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
MC03	Road Weather Data Collection	National Weather Service	TxDOT Pharr District	Future
		TxDOT Pharr District Field Sensors		
		TxDOT Pharr District Flood Monitoring System		
		TxDOT Pharr District TMC		
MC04	Weather Information Processing and Distribution	Private Sector Traveler Information Services	TxDOT Pharr District	Future
		TxDOT Pharr District Maintenance Sections		
		TxDOT Pharr District TMC		
		TxDOT Pharr District Web Page		
MC07	Roadway Maintenance and Construction	Brownsville MPO Traffic Management System	TxDOT Pharr District	Future
		Cameron County International Bridge Management System	County Road and Bridge	Future
		City of Brownsville TMC	Municipal Public Works	Future
		City of Harlingen TMC		
		City of McAllen TMC		
		City of Pharr TMC		
		County Road and Bridge		
		County Road and Bridge Maintenance Yard		
		County Road and Bridge Vehicles		
		Hidalgo/Reynosa Bridge Management System		
		Lower RGV Regional Traffic Information Network		
		Municipal Public Works Department		
		Municipal Public Works Department Maintenance Yard		
		Municipal Public Works Department Vehicles		
		National Weather Service		
		Pharr/Reynosa Bridge Management System		
		Private International Bridge Management Systems		
		TxDOT BRINSAP		
		TxDOT Pharr District Maintenance Section Yard		
		TxDOT Pharr District Maintenance Sections		
		TxDOT Pharr District Maintenance Vehicles		
		TxDOT Pharr District TMC		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
MC08	Work Zone Management	Airport Public Safety	TxDOT Pharr District	Future
		Brownsville MPO Traffic Management System	County Road and Bridge	Future
		BUS Transit Dispatch	Municipal Public Works Depts	Future
		Cameron County International Bridge Management System		
		City of Brownsville TMC		
		City of Harlingen TMC		
		City of McAllen TMC		
		City of Pharr TMC		
		City/County Police and Fire Dispatch		
		County Road and Bridge		
		County Road and Bridge Field Equipment		
		County Road and Bridge Vehicles		
		DPS Communications Dispatch		
		Hidalgo/Reynosa Bridge Management System		
		Independent School District Dispatch		
		Lower RGV Development Council Transit Dispatch		
		Municipal Public Works Department		
		Municipal Public Works Department Field Equipment		
		Municipal Public Works Department Vehicles		
		Pharr/Reynosa Bridge Management System		
		Port of Brownsville		
		Print and Broadcast Media		
		Private International Bridge Management Systems		
		Private Transit Systems		
		Rainbow Lines Transit Dispatch		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
MC08 (continued)	Work Zone Management (continued)	The Wave Transit Dispatch TxDOT Courtesy Patrol Dispatch TxDOT Pharr District DMS TxDOT Pharr District HAR TxDOT Pharr District HCRS TxDOT Pharr District Maintenance Sections TxDOT Pharr District Maintenance Vehicles TxDOT Pharr District TMC TxDOT Pharr District Web Page US Border Patrol Dispatch US Coast Guard Causeway Management System		
MC09	Work Zone Safety Monitoring	County Road and Bridge County Road and Bridge Field Equipment County Road and Bridge Vehicles Municipal Public Works Department Municipal Public Works Department Field Equipment Municipal Public Works Department Vehicles TxDOT Pharr District Maintenance Sections TxDOT Pharr District Maintenance Vehicles TxDOT Pharr District Work Zone Equipment	TxDOT Pharr District County Road and Bridge Municipal Public Works Depts	Future Future Future
APTS1	Transit Vehicle Tracking	BUS Transit Dispatch BUS Transit Vehicles Lower RGV Development Council Transit Dispatch Lower RGV Development Council Transit Vehicles Rainbow Lines Transit Dispatch Rainbow Lines Transit Vehicles The Wave Transit Dispatch The Wave Transit Vehicles	BUS Transit Lower RGV Development Council Transit Rainbow Lines The Wave	Future Future Future Future

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
APTS2	Transit Fixed-Route Operations	BUS Transit Dispatch	BUS Transit	Existing
		BUS Transit Vehicles	Lower RGV Development Council Transit	Existing
		BUS Transit Web Site	Rainbow Lines	Existing
		County Road and Bridge	The Wave	Existing
		Independent School District Buses	Independent School Districts	Existing
		Independent School District Dispatch		
		Lower RGV Dev. Council Transit Dispatch		
		Lower RGV Dev. Council Transit Vehicles		
		Lower RGV Development Council Transit Web Site		
		Lower RGV Regional Traffic Information Network		
		Municipal Public Works Department		
		Private Sector Traveler Information Services		
		Rainbow Lines Transit Dispatch		
		Rainbow Lines Transit Vehicles		
		Rainbow Lines Transit Web Site		
		The Wave Transit Dispatch		
		The Wave Transit Vehicles		
		The Wave Transit Web Site		
		TxDOT Pharr District Maintenance Sections		
APTS3	Demand Response Transit Operations	BUS Transit Dispatch	BUS Transit	Future
		BUS Transit Vehicles	Lower RGV Development Council Transit	Future
		BUS Transit Web Site	Rainbow Lines	Future
		Lower RGV Dev. Council Transit Dispatch		
		Lower RGV Dev. Council Transit Vehicles		
		Lower RGV Dev. Council Transit Web Site		
		Lower RGV Regional Traffic Information Network		
		Rainbow Lines Transit Dispatch		
		Rainbow Lines Transit Vehicles		
		Rainbow Lines Transit Web Site		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
APTS4	Transit Passenger and Fare Management	BUS Transit Electronic Fare Collection System BUS Transit Vehicles BUS Transit Web Site Financial Institution Lower RGV Development Council Transit Dispatch Lower RGV Development Council Transit Vehicles Lower RGV Development Council Transit Web Site Lower RGV Transit Fare Card Lower RGV Transit Kiosk and Information Displays Rainbow Lines Transit Dispatch Rainbow Lines Transit Vehicles Rainbow Lines Transit Web Site The Wave Transit Dispatch The Wave Transit Vehicles The Wave Transit Web Site	BUS Transit	Future
			Lower RGV Development Council Transit	Future
			Rainbow Lines	Future
			The Wave	Future
APTS5	Transit Security	BUS Transit Dispatch BUS Transit Vehicles City/County Police and Fire Dispatch Lower RGV Dev. Council Transit Dispatch Lower RGV Dev. Council Transit Vehicles Lower RGV Transit Kiosk and Information Displays Rainbow Lines Transit Dispatch Rainbow Lines Transit Vehicles The Wave Transit Dispatch The Wave Transit Vehicles	BUS Transit	Future
			Lower RGV Development Council Transit	Future
			Rainbow Lines	Future
			The Wave	Future
			City/County Police and Fire Depts	Future

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
APTS8	Transit Traveler Information	BUS Transit Dispatch BUS Transit Web Site Lower RGV Development Council Transit Dispatch Lower RGV Development Council Transit Web Site Lower RGV Transit Kiosk and Information Displays Private Traveler Personal Computing Devices Rainbow Lines Transit Dispatch Rainbow Lines Transit Web Site The Wave Transit Dispatch The Wave Transit Web Site	BUS Transit Lower RGV Development Council Transit Rainbow Lines The Wave	Future Future Future Future
CVO01	Fleet Administration	Commercial Vehicle Operator Systems Commercial Vehicles Private Sector Traveler Information Services TxDOT Motor Carrier Routing Information System TxDOT Pharr District Web Page	Commercial Vehicle Operators	Future
CVO02	Freight Administration	Commercial Vehicle Operator Systems Commercial Vehicles	Commercial Vehicle Operators	Future
CVO03	Electronic Clearance	Commercial Vehicle Operator Systems Commercial Vehicles DPS Electronic Screening Stations DPS License and Weights Division Other States Credentials Administration and Safety Systems TxDOT Credentials Administration and Safety Information Exchange	TxDOT Pharr District DPS	Future Future
CVO04	CV Administrative Processes	Commercial Vehicle Operator Systems DPS Administration DPS License and Weights Division Financial Institution Other States Credentials Administration and Safety Systems TxDOT Credentials Administration and Safety Information Exchange US Customs US DOT Inspections	TxDOT Pharr District	Future

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
CVO05	International Border Electronic Clearance	Commercial Vehicle Operator Systems Commercial Vehicles DPS Electronic Screening Stations Mexico Credentials Administration and Safety Systems Private Freight Shippers TxDOT Credentials Administration and Safety Information Exchange US Customs	TxDOT/DPS	Future
CVO06	Weigh-In-Motion	Commercial Vehicles DPS Electronic Screening Stations TxDOT Weigh-in-Motion Sites TxDOT/BND Overweight Corridor System TxDOT Credentials Administration and Safety Information Exchange	TxDOT Pharr District	Future
CVO10	HAZMAT Management	City/County Police and Fire Dispatch Commercial Vehicle Operator Systems Commercial Vehicles DPS Communications Dispatch Rail Cars Rail Operators US Border Patrol Dispatch US Customs	City/County Police and Fire Depts/DPS	Future
ATIS1	Broadcast Traveler Information	Cameron County International Bridge Management System Hidalgo/Reynosa Bridge Management System Lower RGV Regional Traffic Information Network Pharr/Reynosa Bridge Management System Print and Broadcast Media Private International Bridge Management Systems Private Sector Traveler Information Services TxDOT 511 System TxDOT Pharr District HCRS TxDOT Pharr District Maintenance Sections TxDOT Pharr District TMC TxDOT Pharr District Web Page	TxDOT Pharr District Private Sector Traveler Information	Future Future

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
ATIS5	ISP Based Route Guidance	Commercial Vehicle Operator Systems	TxDOT Pharr District	Future
		TxDOT Motor Carrier Routing Information System		
		TxDOT Pharr District Maintenance Sections		
		TxDOT Pharr District TMC		
ATIS8	Dynamic Ridesharing	BUS Transit Dispatch	Regional Transit Agencies	Future
		Lower RGV Development Council Transit Dispatch		
		Major Employers/Academic Institutions Ride Sharing Web Site		
		Private Transit Systems		
		Private Traveler Personal Computing Devices		
		Rainbow Lines Transit Dispatch		
		The Wave Transit Dispatch		
AD1	ITS Data Mart	BUS Transit Dispatch	BUS Transit	Future
		BUS Transit Electronic Fare Collection System	Lower RGV Development Council Transit	Future
		BUS Transit Planning System	Rainbow Lines	Future
		BUS Transit Planning System Users	The Wave	Future
		Cameron County Congestion Management System	Hidalgo County	Future
		Cameron County Congestion Management System Users	Cameron County	Future
		Cameron County International Bridge Management System	TxDOT Pharr District	Future
		Cameron County Traffic Data Collection System	TxDOT/DPS Crash Record Information System	Future
		City/County Police and Fire Dispatch	City/County Police and Fire Depts	Future
		DPS Administration		
		DPS Communications Dispatch		
		Hidalgo County Archived Data System Users		
		Hidalgo County Congestion Management System		
		Hidalgo County Pavement Data Collection System		
		Hidalgo County Pavement Management System		
		Hidalgo County Traffic Data Collection System		
		Hidalgo/Reynosa Bridge Management System		

Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
AD1 (continued)	ITS Data Mart (continued)	Lower RGV Development Council Transit Dispatch Lower RGV Development Council Transit Planning System Lower RGV Development Council Transit Planning System Users Pharr/Reynosa Bridge Management System Private International Bridge Management Systems Rainbow Lines Transit Dispatch Rainbow Lines Transit Planning System Rainbow Lines Transit Planning System Users The Wave Transit Dispatch The Wave Transit Planning System The Wave Transit Planning System Users TxDOT Pharr District Pavement Data Collection System TxDOT Pharr District Pavement Management System TxDOT Pharr District Pavement Management System Users TxDOT Pharr District TMC TxDOT Pharr District Transportation Operational Data Archive TxDOT Pharr District Transportation Operational Data Archive System Users TxDOT/DPS Crash Record Information System TxDOT/DPS Crash Record Information System Users TxDOT/International Bridges Corridor Archive TxDOT/International Bridges Corridor Archive Users		

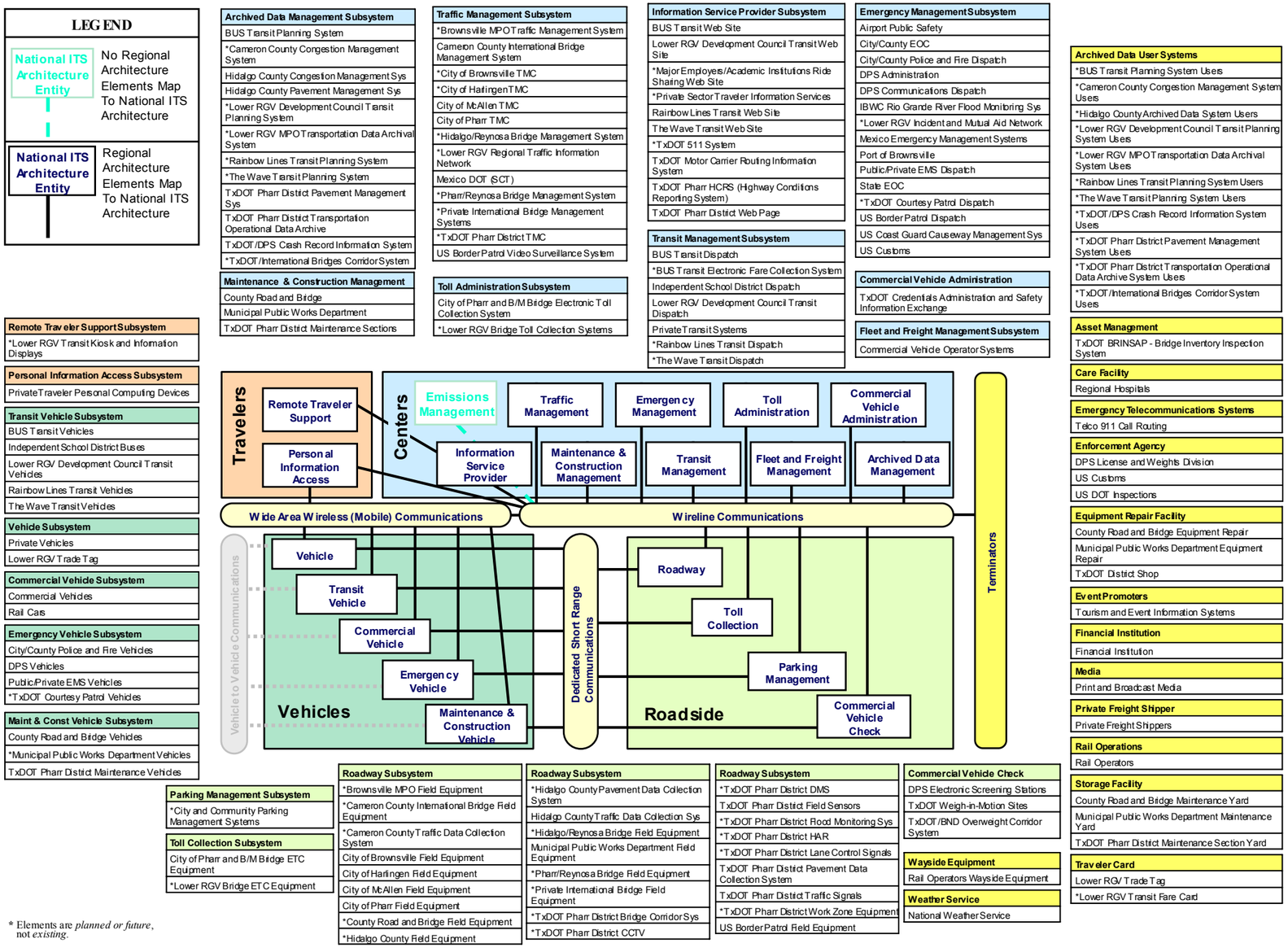
Table 5 – Lower Rio Grande Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Status
AD3	ITS Virtual Data Warehouse	BUS Transit Planning System	Lower RGV MPOs	Future
		Cameron County Congestion Management System		
		Hidalgo County Congestion Management System		
		Lower RGV Development Council Transit Planning System		
		Lower RGV MPO Transportation Data Archival System		
		Lower RGV MPO Transportation Data Archival System Users		
		Rainbow Lines Transit Planning System		
		The Wave Transit Planning System		
		TxDOT Pharr District Transportation Operational Data Archive		
		TxDOT/DPS Crash Record Information System		

4.3 Interconnections

4.3.1 Top Level Regional System Interconnect Diagram

A system interconnect diagram, or sausage diagram (shown previously in **Figure 4**), shows the systems and primary interconnects in the Region. The National ITS Architecture interconnect diagram has been customized for the Lower RGV Region based on the information gathered from the stakeholders and system inventory. **Figure 5** on the following page summarizes the existing, planned, and future ITS elements for the Lower RGV Region in the context of a physical interconnect. Subsystems and elements specific to Lower RGV are called out in the boxes surrounding the main interconnect diagram, and these are color-coded to the subsystem to which they are associated. The rectangles represent the architecture subsystems, and the terminators are represented by the rounded rectangles. Elements with an asterisk (*) are planned and future system elements.



* Elements are *planned or future*, not *existing*.

Figure 5 – Lower Rio Grande Valley Regional System Interconnect Diagram

4.3.2 Customized Market Packages

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

Figure 6 is an example of an ATMS market package for Surface Street Control that has been customized for the Lower RGV Region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated entities (City of Pharr Street Services TMC and City of Pharr Field Equipment). Data flows between the subsystems and the terminators (Other Roadway) indicate what information is being shared.

Market packages that were customized for the Lower RGV Region are shown in **Appendix A**. These market packages also are included on the Lower RGV Regional ITS Architecture web page by selecting the "Market Package" button. Market packages are grouped by functional area (Traffic Management, Maintenance and Construction, Public Transportation, etc.), and each of the customized market packages can be viewed by clicking on the Market Package Diagram icon under each area heading. It is important to note that while the market package table on the web page shows all of the available market packages from the National ITS Architecture, only those selected for the Lower RGV Region are included in the diagrams. The selected market packages on the web page also are highlighted in the table with bold print, and are indicated as existing or planned.

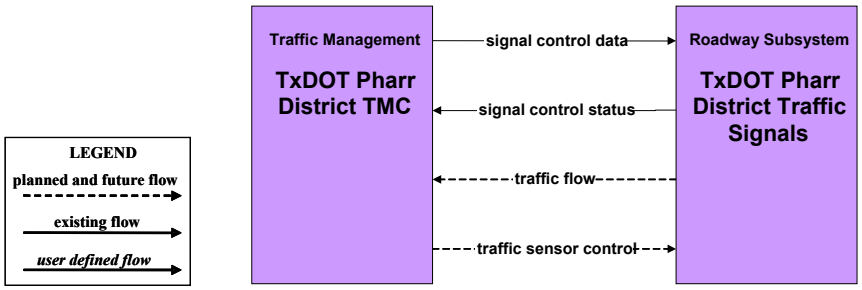


Figure 6 – Custom Market Package for TxDOT Pharr District Surface Street Control

4.3.3 Lower Rio Grande Valley Architecture Interfaces

While it is important to identify the various systems and stakeholders as part of a regional ITS, a primary purpose of the architecture is to identify the *connectivity* between transportation systems in the Lower RGV Region. The interconnect diagram shown previously in **Figure 5** showed the high-level relationships of the subsystems and terminators in the Lower RGV Region and the associated local projects and systems. The customized market packages represent services that can be deployed as an integrated capability, and the market package diagrams show the information flows between the subsystems and terminators that are most important to the operation of the market packages. How these systems interface with each other is an integral part of the overall ITS architecture.

There are 145 different elements identified as part of the Lower RGV Regional ITS Architecture. These elements include local and state TOCs, 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 Lower RGV Regional ITS Architecture, and each element has been mapped to those other elements with which it must interface. For example, the City of Pharr TMC has existing or planned interfaces with 19 other elements in the Lower RGV Region, ranging from field equipment and dispatch centers, to transit and Border Patrol. Other interfaces are far less complex, such as the interface between the DPS Vehicles and the DPS Communications Dispatch.

An example of one of the system interfaces is shown in **Figure 7**. This graphic shows the TxDOT Pharr District Traffic Signals and the existing and planned 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.

Each element and its defined interfaces are listed in **Appendix B**. Elements and their interfaces also are accessible via the Lower RGV Regional ITS Architecture web page by clicking on the "Interfaces" button. Elements are listed alphabetically in the column on the left, and each entry in the Interfacing Element column on the right is a link to more detailed information about the particular interface. The architecture flows between the individual element interfaces are described in more detail in the following section.

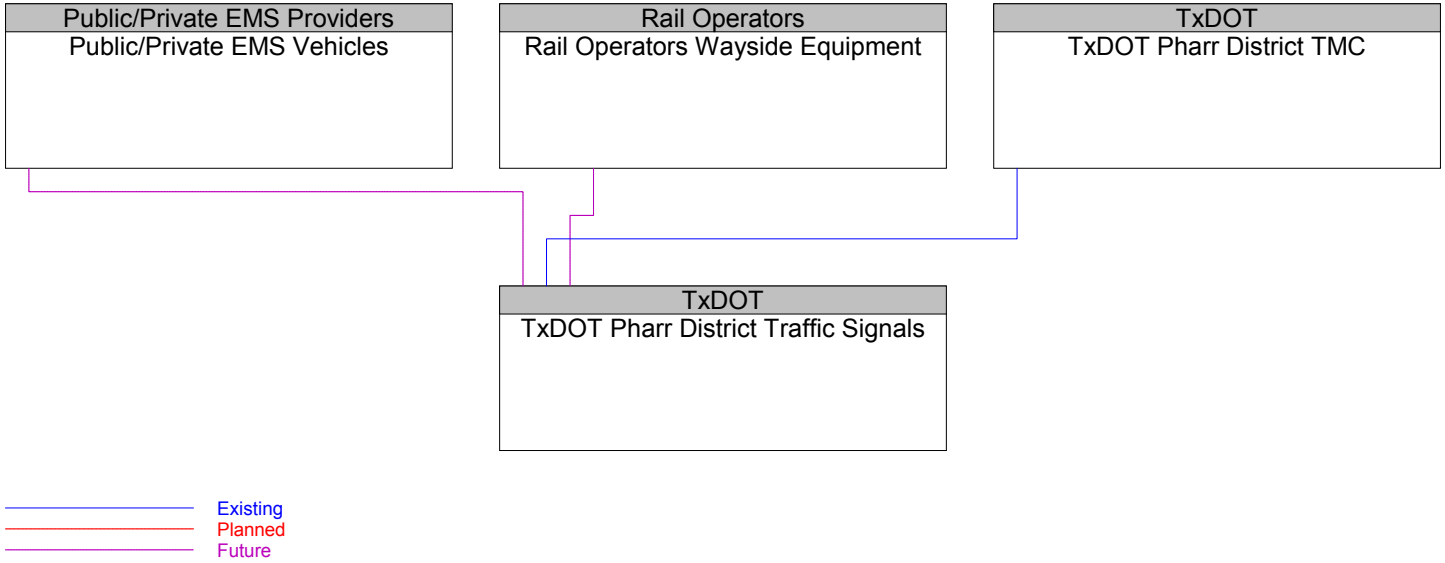


Figure 7 – TxDOT Pharr Traffic Signals Interfaces

4.3.4 Physical Subsystem Architecture Flows

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. These data flows could be requests for information, alerts and messages, status requests, broadcast advisories, event messages, confirmations, electronic credentials, and other key information requirements. These architecture flows define the interface requirements between the various elements in the Lower RGV Regional ITS Architecture.

An example of the architecture flows between two elements is shown in **Figure 8**. In this interface, the flows between the City of Pharr TMC and the City's Field Equipment show information that must go from the TMC to the field equipment, as well as information that the TMC needs from devices. Similar to the interfaces, architecture flows also are defined as existing, planned, or future.

Each of the individual element interfaces can be accessed on the Lower RGV Regional ITS Architecture web page by clicking on the "Interfaces" button. Selecting any of the interfacing elements from the column on the right will display an interface diagram and architecture flows between two specific elements, similar to the diagram shown in **Figure 8**. Each data flow is defined, and any standards associated with that data flow are noted. Standards as they apply to the Lower RGV Region are discussed in more detail in Section 4.5.

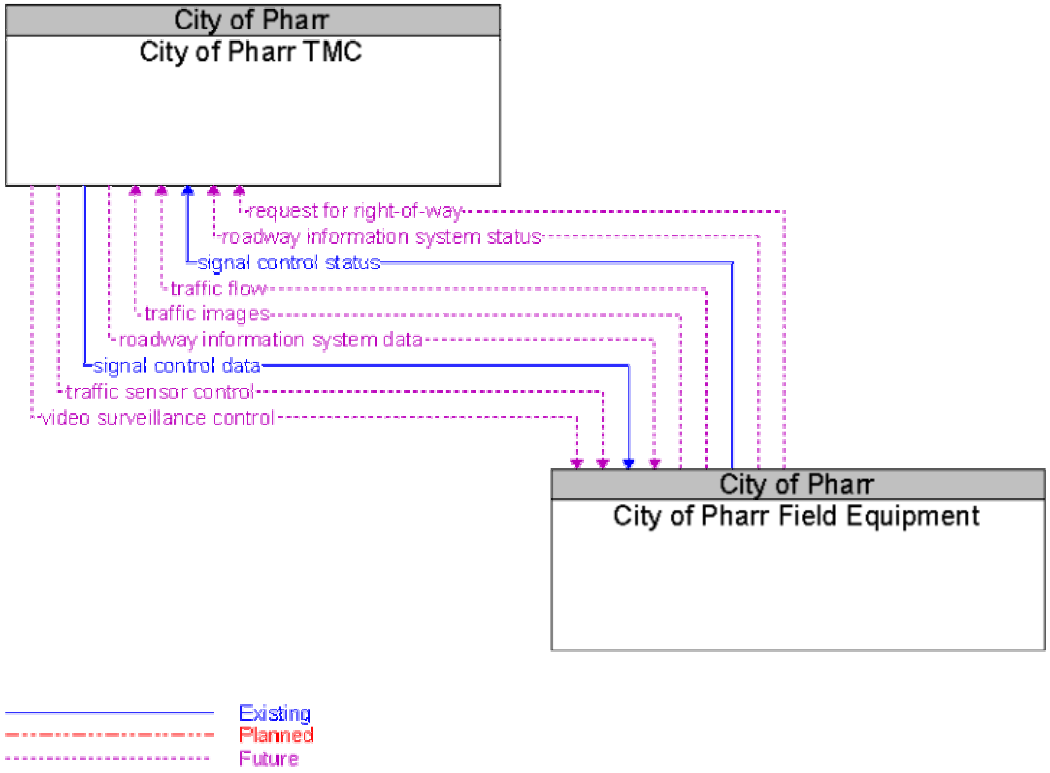


Figure 8 – Pharr TMC to Field Equipment Architecture Flows

4.4 Functional Requirements

Functions are a description of what the system has to do. In the National ITS Architecture, functions are defined at several different levels, ranging from general subsystem descriptions through somewhat more specific equipment package descriptions to Process Specifications that include substantial detail. Guidance from the USDOT on developing a Regional ITS Architecture recommends that each Region determine the level of detail of the functional requirements for their Region. In the Lower RGV Region, it is recommended that the development of detailed functional requirements such as the "shall" statements included in Process Specifications for a system be developed at the project level. These detailed "shall" statements identify all functions that a project or system needs to perform.

For the Lower RGV Regional ITS Architecture, functional requirements have been identified at two levels. The customized market packages, included in Section 4.3.2, describe the services that ITS needs to provide in the Region and the architecture flows between the elements. These market packages and data flows describe what the ITS system in Lower RGV has to do and the data that needs to be shared among elements.

At a more detailed level, functional requirements for the Lower RGV Region also are described in terms of equipment packages that are associated with one or more subsystems in the Lower RGV Regional ITS Architecture as shown in **Table 6**. An equipment package is a functional capability that could be deployed at a specific time. Each equipment package can be linked in the National ITS Architecture to the Process Specifications that might be applicable. It is recommended that during the design concept stage of a project, the applicable equipment package and associated Process Specifications from the National ITS Architecture be reviewed by the implementer to determine the appropriate functional requirements for the project. A link for each equipment package is available on the Lower RGV Regional ITS Architecture web page by clicking on the "Functions" button.

Table 6 – Lower Rio Grande Valley Region Equipment Packages

Subsystem	Equipment Package
Archived Data Management Subsystem	Government Reporting Systems Support
	ITS Data Repository
	Traffic and Roadside Data Archival
	Virtual Data Warehouse Services
Commercial Vehicle Administration Subsystem	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
	International CV Administration
Commercial Vehicle Check Subsystem	Citation and Accident Electronic Recording
	International Border Crossing
	Roadside Electronic Screening
	Roadside WIM
Commercial Vehicle Subsystem	On-board Cargo Monitoring
	On-board CV Electronic Data
	On-board Trip Monitoring

Table 6 – Lower Rio Grande Valley Region Equipment Packages (continued)

Subsystem	Equipment Package
Emergency Management Subsystem	Emergency Call-Taking
	Emergency Data Collection
	Emergency Dispatch
	Emergency Environmental Monitoring
	Emergency Response Management
	Mayday Support
Emergency Vehicle Subsystem	On-board EV En Route Support
Fleet and Freight Management Subsystem	Fleet Administration
	Fleet Credentials and Taxes Management and Reporting
	Fleet HAZMAT Management
	Fleet Maintenance Management
	Freight Administration and Management
Information Service Provider Subsystem	Basic Information Broadcast
	Infrastructure Provided Dynamic Ridesharing
	Infrastructure Provided Route Selection
	Interactive Infrastructure Information
Maintenance and Construction Management Subsystem	MCM Data Collection
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Maintenance Decision Support
	MCM Roadway Maintenance and Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Vehicle Tracking
	MCM Work Zone Management
	MCM Work Zone Safety Management
Maintenance and Construction Vehicle Subsystem	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Work Zone Support
Parking Management Subsystem	Parking Coordination
	Parking Electronic Payment
	Parking Management
	Parking Surveillance
Personal Information Access Subsystem	Personal Interactive Information Reception

Table 6 – Lower Rio Grande Valley Region Equipment Packages (continued)

Subsystem	Equipment Package
Remote Traveler Support Subsystem	Remote Mayday I/F
	Remote Transit Fare Management
	Remote Transit Information Services
	Secure Area Monitoring
Roadway Subsystem	Advanced Rail Crossing
	Roadside Data Collection
	Roadside Signal Priority
	Roadway Basic Surveillance
	Roadway Environmental Monitoring
	Roadway Equipment Coordination
	Roadway Freeway Control
	Roadway Incident Detection
	Roadway Probe Beacons
	Roadway Signal Controls
	Roadway Traffic Information Dissemination
	Roadway Work Zone Safety
	Roadway Work Zone Traffic Control
	Standard Rail Crossing
Toll Administration Subsystem	Toll Administration
Toll Collection Subsystem	Toll Plaza Toll Collection
Traffic Management Subsystem	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Signal Control
	TMC Traffic Information Dissemination
	TMC Work Zone Traffic Management
	Traffic Data Collection
	Traffic Maintenance

Table 6 – Lower Rio Grande Valley Region Equipment Packages (continued)

Subsystem	Equipment Package
Transit Management Subsystem	Transit Center Fare and Load Management
	Transit Center Fixed-Route Operations
	Transit Center Information Services
	Transit Center Paratransit Operations
	Transit Center Security
	Transit Center Tracking and Dispatch
	Transit Data Collection
	Transit Garage Operations
Transit Vehicle Subsystem	On-board Fixed Route Schedule Management
	On-board Paratransit Operations
	On-board Transit Fare and Load Management
	On-board Transit Security
	On-board Transit Trip Monitoring
Vehicle Subsystem	Vehicle Location Determination
	Vehicle Mayday I/F
	Vehicle Probe Support
	Vehicle Toll/Parking Interface

4.5 Standards

Standards are an important tool that will allow efficient implementation of the elements in the Lower RGV Regional ITS Architecture over time. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and as new approaches evolve. The USDOT's ITS Joint Program Office is supporting Standards Development Organizations (SDOs) with an extensive, multi-year program of accelerated, consensus-based standards development to facilitate successful ITS deployment in the United States. **Table 7** identifies each of the ITS standards that could apply to the Lower RGV Regional ITS Architecture. These standards are based on the physical subsystem architecture flows identified in Section 4.3.4. The connection of each standard to the applicable architecture flows between elements can be viewed on the Lower RGV Regional ITS Architecture web page by clicking on the "Interfaces" or "Standards" buttons.

Table 7 – Applicable ITS Standards for the Lower Rio Grande Valley Region

SDO	Document ID	Title	Type
AASHTO/ITE/NEMA	NTCIP 1201	Global Object Definitions	Message
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units	Message
	NTCIP 1203	Object Definitions for Dynamic Message Signs	Message
	NTCIP 1205	Data Dictionary for Closed Circuit Television (CCTV)	Message
	NTCIP 1206	Data Collection and Monitoring Devices	Message
	NTCIP 1207	Ramp Meter Controller Objects	Message
	NTCIP 1208	Object Definitions for Video Switches	Message
	NTCIP 1209	Transportation System Sensor Objects	Message
	NTCIP 1210	Objects for Signal Systems Master	Message
	NTCIP 1211	Objects for Signal Control Priority	Message
	NTCIP 1301	Message Set for Weather Reports	Message
	NTCIP 1401	TCIP – Common Public Transportation (CPT) Business Area Standard	Message
	NTCIP 1402	TCIP – Incident Management (IM) Business Area Standard	Message
	NTCIP 1403	TCIP – Passenger Information (PI) Business Area Standard	Message
	NTCIP 1404	TCIP – Scheduling/Runcutting (SCH) Business Area Standard	Message
	NTCIP 1405	TCIP – Spatial Representation (SP) Business Area Standard	Message
	NTCIP 1406	TCIP – Onboard (OB) Business Area Standard	Message
	NTCIP 1407	TCIP – Control Center (CC) Business Area Standard	Message
	NTCIP 1408	TCIP – Fare Collection (FC) Business Area Standard	Message
	Various	NTCIP Center-to-Center Standards Group	Communication
	Various	NTCIP Center-to-Field Standards Group	Communication
ANSI	ANSI TS285	Commercial Vehicle Safety and Credentials Information Exchange	Message
	ANSI TS286	Commercial Vehicle Credentials	Message
ASTM	ASTM 5 GHz Data Link	Standard Specification for 5.9 GHz Data Link Layer	Communication
	ASTM 5 GHz Phys	Standard Specification for 5.9 GHz Physical Layer	Communication
	ASTM DD 17.54.00.2	ADMS Data Dictionary Specifications	Data
	ASTM PS 105-99	Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	Communication
	ASTM PS 111-98	Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz	Communication

Table 7 – Applicable ITS Standards for the Lower Rio Grande Valley Region (continued)

SDO	Document ID	Title	Type
IEEE	IEEE P1512.1	Standard for Traffic Incident Management Message Sets for Use by EMCs	Message
	IEEE P1512.2	Standard for Public Safety IMMS for use by EMCs	Message
	IEEE P1512.3	Standard for Hazardous Material IMMS for use by EMCs	Message
	IEEE P1512.a	Standard for Emergency Management Data Dictionary	Data
	IEEE P1512-2000	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	Message
	IEEE P1556	Security/Privacy of Vehicle/RS Communications including Smart Card Communications	Communication
	IEEE P1570	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	Message
	IEEE Std 1455-1999	Standard for Message Sets for Vehicle/Roadside Communications	Message
ITE	ITE TM 1.03	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	Data
	ITE TM 2.01	Message Sets for External TMC Communication (MS/ETMCC)	Message
SAE	SAE J1746	ISP-Vehicle Location Referencing Standard	Data
	SAE J2313	On-Board Land Vehicle Mayday Reporting Interface	Message
	SAE J2353	Data Dictionary for Advanced Travel Information System (ATIS)	Data
	SAE J2354	Message Set for Advanced Travel Information System (ATIS)	Message
	SAE J2529	Rules for Standardizing Street Names and Route IDs	Message
	SAE J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards	Message

4.6 Phases of Implementation

The Regional ITS Architecture will be implemented through a series of projects led by both public sector and private sector agencies. Key foundation systems will need to be implemented in order to support other systems that have been identified in the Regional ITS Architecture. The deployment of all of the systems required to achieve the final Regional ITS Architecture build out will occur over many years.

A sequence of projects and recommended time frames has been identified in the Lower Rio Grande Valley Regional ITS Deployment Plan. These projects have been sequenced over a 20-year period, with projects identified for deployment in a 5-, 10-, and 20-year timeframe.

Some of the key market packages that will provide the functions for the key foundation systems in the Lower RGV Region are listed below. Projects associated with these and other market packages identified for the Region have been included in the Lower RGV Regional ITS Deployment Plan.

- Network Surveillance;
- Surface Street Control;
- Standard Railroad Grade Crossing;
- Transit Vehicle Tracking;
- Broadcast Traveler Information; and
- ITS Data Mart.

In addition to the above market packages, the implementation of an appropriate communications system in the Region to support ITS is critical for continued deployment of projects.

5. OPERATIONAL CONCEPT

The operational concept for the Lower RGV Region provides a description of the stakeholders' roles and responsibilities in the operation of the systems that exist or that are being proposed. This operational concept provides an "executive summary" view of the way the Lower RGV Region's systems will work together, and documents the roles and responsibilities for each of the services that the intelligent transportation system will provide. The approach to describing the operational concept is to present specific operational scenarios that describe and define the stakeholders' general roles in providing the services.

In addition to the operational scenarios that illustrate the roles and responsibilities of each agency, a list of the key agencies that are responsible for operations in the eight ITS areas is presented. This list will serve as a high level overview of the different roles and responsibilities in this operational concept. In addition, specific roles and coordination requirements for operations are illustrated through the customized market package diagrams presented in **Appendix A**.

In **Appendix C**, a copy of existing MOUs between agencies in the Lower Rio Grande Valley Region has been included. Additional MOUs between agencies might need to be developed for operations of new systems as they are incorporated.

5.1 Operational Scenarios

Scenario 1

In the first scenario, a multi-vehicle crash has occurred on US 281 northbound just as the afternoon rush hour is about to begin. Motorists call 911 from cell phones and reach the DPS dispatch, which is now informed of the crash. An alert is automatically sent from DPS to the City of McAllen TMC and the TxDOT Pharr District TMC. TxDOT places advisory messages on DMS and monitors the situation with a CCTV camera that is near the accident. The City of McAllen Fire Department uses the video feed from TxDOT to determine the severity of the accident and the number and type of fire and rescue vehicles to dispatch. Using AVL on the fire vehicles, those vehicles that are closest to the scene with the appropriate equipment are dispatched. The Rio Grande General Hospital is also put on alert through an automated message from DPS so that they are aware of the possible incoming trauma patients.

US 281 northbound is completely closed and the City of McAllen police begin setting up a closure and detour. The City of McAllen uses its closed loop signal system to implement a timing plan on alternate routes along the arterials to accommodate the increased traffic volumes.

TxDOT enters the closure on the Highway Condition Reporting System, which also feeds the statewide 511 traveler information number. DMS and HAR continue to advise motorists that US 281 Northbound is closed. The CCTV camera feed, which has been turned away from the crash to focus on the traffic condition on the freeway, is shared with the media which broadcasts the live shots of US 281 on the evening news to advise motorists that US 281 northbound remains closed.

Scenario 2

The second operational scenario describes how the integrated elements of the Lower Rio Grande Valley Region's ITS program will function together in the event of a major incident caused by a turned-over truck that has spilled flammable chemicals on US 281 approaching the

McAllen/Hidalgo/Reynosa International Bridge. This commercial vehicle was on its way to Mexico and is now blocking all lanes on the approach to the bridge. A Bridge Coordination System (BCS) has been implemented to optimize the flow of traffic at border crossings. The BCS includes CVISN, detectors, decision support system (software), DMS, and trailblazer signs. The congestion caused by this incident is identified by the BCS detector system and a flag is sent to the center that manages the BCS. The conditions are verified using a CCTV camera. Automatic notifications including incident location and a description of the nature of the incident are sent from the center to DPS, the Fire Department, the local Emergency Operations Center, City of McAllen TMC, TxDOT Pharr District TMC, and the media. In addition, HAZMAT coordination leaders are informed of the spill and a response plan is initiated according to the nature of the incident and the type of HAZMAT material.

Simultaneously, the BCS is used to manage traffic flow from the United States to Mexico. Messages are sent to the BCS DMS informing commercial vehicles and motorists of the closure conditions ahead. All border crossing traffic is directed towards the Pharr/Reynosa International Bridge using DMS and trailblazer signs.

At the scene, DPS has placed barricades isolating the area affected by the spill. All access roads to McAllen/Hidalgo/Reynosa International Bridge have been closed by DPS. An emergency vehicle is taking the injured truck driver to the McAllen Medical Center. An emergency routing system is in place that supports automated vehicle location and dynamic routing of emergency vehicles. Coordination between the emergency vehicle and the TMC is established in order to collect detailed road network conditions and request special priority on the selected route(s). Information is exchanged between McAllen Medical Center and the emergency vehicle in order to establish the conditions of the patient and have the personnel and equipment ready to assist him/her.

Meanwhile the incident has been cleared. The truck has been removed from the road and the spill was cleaned by HAZMAT crews. The McAllen/Hidalgo/Reynosa International Bridge is open to traffic and the BCS starts the process of balancing the flow of traffic on both Bridges. Data provided by the detectors at both bridges is used by the Decision Support System software to estimate the queue time at each bridge. This information is sent to DMS located at strategic locations so drivers can decide which bridge to use to cross the border. This information is updated every minute in order to maintain a balanced flow of vehicles to the bridges. After two hours, conditions are back to normal.

5.2 Roles and Responsibilities

The operational scenarios described in the previous section illustrate the interagency cooperation and coordination that is required in two situations that might occur in the Lower RGV Region. During any operational scenario, a number of agencies will be required to coordinate closely to perform their operational responsibilities. The key agencies that have a lead role or responsibility during operations are listed below for each ITS area. It is recognized that a number of other agencies also will need to be involved during a scenario in addition to the ones listed below, although it is not expected that these agencies will play as critical a role in operations.

Traffic Management

- Traffic Departments (Cities of Brownsville, Edinburg, Harlingen, McAllen, Pharr, and San Benito)
- Lower RGV MPOs (Brownsville MPO, Harlingen-San Benito MPO, Hidalgo County MPO)
- County Road and Bridge
- Other Texas Department of Transportation Districts
- Texas Department of Transportation

Public Transportation Management

- Independent School Districts
- BUS
- Lower RGV Development Corporation
- Rainbow Lines
- The Wave

Commercial Vehicle Operations

- Texas Department of Public Safety
- Texas Department of Transportation
- U.S. Border Patrol
- U.S. Customs

Emergency Management

- City/County Police, Fire, Emergency Medical Services
- Regional Hospitals
- Texas Department of Public Safety
- Texas Department of Transportation
- U.S. Border Patrol
- U.S. Customs

Traveler Information

- Texas Department of Transportation
- Private Sector ISP

Advanced Vehicle Safety Systems

- Not Applicable

Archived Data Management

- Hidalgo County
- Lower RGV MPOs (Brownsville MPO, Harlingen-San Benito MPO, Hidalgo County MPO)
- Texas Department of Transportation

Maintenance and Construction Management

- Municipal Public Works Department
- County Road and Bridge
- Texas Department of Transportation

5.3 Lower Rio Grande Valley Agreements

The Regional ITS Architecture for the Lower RGV Region has identified several agency interfaces, information exchanges, and integration strategies that would be needed to provide the ITS services and systems identified by the stakeholders in the Region. Interfaces and data flows among public and private entities in the Lower RGV Region will require agreements among agencies that establish parameters for sharing agency information to support traffic management, incident management, provide traveler information, and other functions identified in the Regional ITS Architecture.

Currently, the only formal agreements in place in the Lower RGV related to ITS are between TxDOT and local cities for the operation and maintenance of traffic signals along freeway frontage roads. A copy of the agreements between TxDOT and the cities of Harlingen and Brownsville have been included in **Appendix C**.

Stakeholders indicated that while there is a high degree of cooperation among agencies, there hasn't been a need for many formal agreements to facilitate multi-jurisdictional resource sharing and cooperation. With the implementation of ITS technologies, integrating systems from one or more agencies, the anticipated level of information exchange identified in the architecture, it is likely that more formal agreements will be needed. These agreements, while perhaps not requiring a financial commitment from agencies in the Region, should outline specific roles, responsibilities, data exchanges, levels of authority, and other facets of regional operations. Some agreements also will outline specific funding responsibilities, where appropriate and applicable.

Table 8 provides a list of potential agreements for the Lower RGV Region based on the interfaces identified in the Regional Architecture. 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.

Table 8 – Potential Agreements for the Lower Rio Grande Valley Region

Agreement and Agencies	Status	Agreement Description	Considerations
Data Sharing and Usage (Public) TxDOT Pharr District and Public Agencies within the Region	Future	This agreement would define the parameters, guidelines and policies for inter- and intra-agency ITS data sharing. This data sharing would support regional activities related to traffic management, incident management, and traveler information, and other functions. Data also would include video images from CCTV cameras. The terms of this agreement should generally address such items as: ▪ Types of data and information to be shared ▪ Repository for information (i.e., TxDOT Pharr TMC as central hub) ▪ How the information will be used (traffic incident management, displayed on web site for travel information, distributed to private media, etc.) ▪ Parameters for data format, quality, security	These agreements are typically zero-dollar agreements, in that there is no charge among agencies for the actual data, although there might be some cost incurred for infrastructure, systems or fiber to enable communications between agencies.
Data Sharing and Usage (Public-Private) TxDOT Pharr District and Private Media/Information Service Providers	Future	This agreement would define the parameters, guidelines and policies for private media use of regional ITS-related information from the TxDOT Pharr District. This type of agreement is recommended between TxDOT (data provider) and the media (data user) to define terms of use for broadcasting public-agency information regarding traffic conditions, closures, restrictions, as well as video images. Agreements can also include requirements for the media to 'source' the information (i.e., using the TxDOT logo on all video images broadcast).	These agreements can be zero-dollar agreements, although some agencies have stipulated identifying the information, public service announcements by the media, or other requirements as a term of use. The private media entity is typically responsible for paying any necessary costs for access (i.e., communications infrastructure to link to the TxDOT database or video switch). These agreements also typically include a sunset clause to allow the agency to periodically review the agreement and make any modifications prior to renewal.

Table 8 – Potential Agreements for the Lower Rio Grande Valley Region (continued)

Agreement and Agencies	Status	Agreement Description	Considerations
Shared Video Monitoring (Public) TxDOT Pharr District, Municipal Traffic and Emergency Management Agencies, State EOC	Future	This agreement would enable shared video monitoring of TxDOT CCTV cameras by public safety and emergency services agencies in the Lower RGV Region for incident management purposes. This agreement would define the parameters and policies for public safety agencies to access video images via the TxDOT video switch. It is recommended that the agreement include any TxDOT policies relating to video images (including archiving, privacy, disclaimers, use of video and redistribution) as well as processes for agency requests for specific views. Shared video monitoring does not address shared use or shared control of video equipment functions.	These agreements are typically zero-dollar agreements, in that there is no charge among agencies for the actual data, although there might be some cost incurred for infrastructure, systems or fiber to enable communications between agencies, particularly with the high bandwidth required for transmitting live video images.
Mutual Aid Agreements (Public) DPS, Municipal Emergency Management Agencies, TxDOT Pharr District	Existing (Informal)	Mutual aid agreements currently exist as informal arrangements in the Lower RGV Region, although they are a routine practice among public safety and emergency services agencies. Formal mutual aid agreements will become more important as agencies integrate systems and capabilities, particularly automated dispatch and notification.	These agreements are typically zero-dollar agreements, although there might be some funding required to support regional incident management activities. The agreement also would outline resource commitments that would be part of any mutual aid arrangement (personnel, equipment, facilities, etc.).
Joint Operations/Shared Control Agreements (Public) TxDOT Pharr District, Municipal TMCs, DPS (potential)	Future	These agreements are formal arrangements to allow joint operations or control of certain systems and equipment. The agreement would need to define the terms of this arrangement, such as hours of operation and time of day/time of week where shared control would take effect, circumstances or incidents where shared control would take effect, notification procedures between the agencies agreeing to shared control arrangements, etc. Additional agencies (such as DPS) could be part of a joint operations/shared control agreement for certain types of devices.	Joint operations/shared control agreements could consider some form of mutual funding for certain system elements, primarily communication links.