State of Texas
Regional ITS Architectures and Deployment Plans

Lower Rio Grande Valley Region

Regional ITS Deployment Plan

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LIST OF ACRONYMS

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

LIST OF ACRONYMS

IFTA	International Fuel Tax Agreement
INS	Immigration and Naturalization Service
IRP	International Registration Plan
ISP	Information Service Provider
ITS	Intelligent Transportation System
LAN	Local Area Network
LED	Light Emitting Diode
MDT	Mobile Data Terminal
MPO	Metropolitan Planning Organization
RF	Radio Frequency
RGV	Rio Grande Valley
RWIS	Road Weather Information System
TEA-21	Transportation Equity Act for the 21st Century
TMC	Traffic Management Center
TOC	Traffic Operations Center Transit Operations Center
TxDOT	Texas Department of Transportation
USDOT	United States Department of Transportation
VIVDS	Video Image Vehicle Detector System

SUMMARY

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

To meet these requirements the Texas Department of Transportation (TxDOT) initiated the development of Regional ITS Architectures and Deployment Plans throughout the State of Texas. Although not required by the FHWA final rule, TxDOT took the opportunity to also develop an ITS Deployment Plan for each Region. The Lower Rio Grande Valley Regional ITS Deployment Plan was prepared as part of this initiative.

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

Stakeholders from throughout the Region participated in the development of the Regional ITS Deployment Plan. Participants included representatives from TxDOT, Federal Highway Administration, cities, counties, the Texas Department of Public Safety (DPS), transit agencies, police and fire, metropolitan planning organizations (MPOs), U.S. Customs, U.S. Border Patrol, U.S. Immigration and Naturalization Service, and others.

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

The majority of ITS projects recommended for the Lower Rio Grande Valley Region were identified in the following key areas:

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

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

With the substantial amount of effort invested by stakeholders in the Lower Rio Grande Valley Region to develop both the Regional ITS Architecture and the Deployment Plan, developing a plan for maintaining these important tools was a key component of the process. Stakeholders agreed that both the Regional ITS Architecture and Deployment Plan would need to be periodically reviewed and potentially updated in order to reflect current deployment status as well as re-evaluate priorities. The

Regional Transportation Management Team will update project status and descriptions as well as funding status at their quarterly meetings. This information will be incorporated in to an official update that will be performed on a two-year schedule to correspond with the Transportation Improvement Plan updates of the Regional MPOs and involve all stakeholders in the Region. The TxDOT Pharr District was identified as the agency that should take the lead in maintaining and updating the Region's ITS Architecture and Deployment Plan.

1. INTRODUCTION

1.1 Project Overview

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

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

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

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

1.2 Document Overview

The Lower RGV Regional ITS Deployment Plan is organized into four key sections:

Section 1 – Introduction

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

Section 2 – Prioritization of Market Packages

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

Section 3 – Prioritization of Planned Projects

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

Section 4 – Maintaining the Regional ITS Architecture and Deployment Plan

A procedure for maintaining the Regional ITS Architecture and Deployment Plan is recommended in this section.

1.3 The Lower Rio Grande Valley Region

1.3.1 Geography and Regional Characteristics

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. The Pharr District is bounded to the northeast by the TxDOT Corpus Christi District, to the northwest by the TxDOT Laredo District, and to the west and south by Mexico.

There are eight counties included in the Lower RGV Region:

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

There are several major cities within and immediately adjacent to the Region, including the cities of Brownsville, Edinburg, Harlingen, McAllen, Mission, Pharr, San Benito, and South Padre Island in the United States, and the cities of Reynosa and Matamoros in Mexico.

1.3.2 Transportation Infrastructure

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. Within the Lower RGV Region, this

flat four-lane highway runs through Willacy County to Harlingen where it joins US 83. From there, US 77/83 runs southeast to Brownsville.

US 83 starts at the southern 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 serving the heartland of the United States in a north-south direction, connecting south Texas to North Dakota. US 83 and US 281 connect McAllen with I-35 and I-37 running north and south. A proposed I-69 corridor, extending from Mexico City to Detroit, will run through McAllen and connect with other Interstate highways throughout the United States. Now four lanes, this highway will be expanded to six lanes in the future to accommodate Interstate and international commerce.

1.3.3 Existing ITS in the Lower Rio Grande Valley Region

There are several ITS programs and initiatives underway in the Region that are in various stages of implementation. 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 U.S. Border Patrol along the Rio Grande.

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.

1.3.4 Lower Rio Grande Valley Stakeholders

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

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

- 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.

Contact information for stakeholders that are participating in the development of the Lower RGV Regional ITS Deployment Plan is listed in **Table 1**.

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

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

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
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
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

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

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
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
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. PRIORITIZATION OF MARKET PACKAGES

2.1 Prioritization Process

Of the 75 available market packages in the National ITS Architecture, the stakeholders selected 39 and customized them for deployment in the Lower RGV Region. Stakeholders were asked to prioritize the market packages into high, medium, and low priorities, based on regional needs, feasibility and likelihood of deployment, and overall contribution of the market package to the goals and vision for ITS functionality in the Region. A summary of these prioritized market packages is shown in **Table 2**.

Table 2 – Summary of Prioritized Market Packages for the Lower Rio Grande Valley Region

High Priority	Medium Priority	Low Priority
▪ Network Surveillance ▪ Surface Street Control ▪ Freeway Control ▪ Traffic Information Dissemination ▪ Regional Traffic Control ▪ Incident Management System ▪ Standard Railroad Grade Crossing ▪ Advanced Railroad Grade Crossing ▪ Railroad Operations Coordination ▪ Work Zone Management ▪ Transit Vehicle Tracking ▪ Transit Fixed-Route Operations ▪ Demand Response Transit Operations ▪ Transit Passenger and Fare Management ▪ Transit Security ▪ Transit Traveler Information ▪ Broadcast Traveler Information ▪ Electronic Clearance ▪ International Border Electronic Clearance ▪ Weigh-in-Motion ▪ HAZMAT Management ▪ Emergency Response ▪ Emergency Routing ▪ ITS Data Mart ▪ ITS Virtual Data Warehouse	▪ Probe Surveillance ▪ Electronic Toll Collection ▪ Parking Facility Management ▪ Regional Parking Management ▪ Road Weather Data Collection ▪ Weather Information Processing and Distribution ▪ Work Zone Safety Monitoring ▪ Dynamic Ridesharing ▪ Commercial Vehicle Administrative Processes	▪ Maintenance and Construction Vehicle Tracking ▪ Maintenance and Construction Vehicle Maintenance ▪ Roadway Maintenance and Construction ▪ Fleet Administration ▪ Freight Administration

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

This section includes detailed descriptions of the prioritized market packages for the Lower RGV Region. The market packages are organized into high, medium and low priorities. It is important to note that the high, medium and low prioritization does not necessarily correspond to any specific time frame (such as five-year, ten-year or twenty-year deployment horizon). For example, a market package can be a high priority, but because of funding or prerequisite project requirements, it might not be feasible for deployment for several years. Maturity and availability of technology was another factor for prioritizing the market packages. Other considerations included whether or not the market package was better suited for private deployment and operations rather than public.

Each market package in the following subsections includes:

- A brief definition of the market package (which have been modified from the National ITS Architecture definitions);
- Any existing infrastructure from that market package that is already existing in the Lower RGV Region;
- Agencies currently operating or maintaining systems that apply to that market package;
- Planned projects that will address some or all of the services that are contained in the market package (projects are defined as planned if funding has been identified); and
- Additional projects needed to bring the market package to the desired level of deployment or functionality.

2.2 High Priority Market Packages

Market packages that were selected as high priorities for the Lower RGV Region are listed and described in **Table 3**. These market packages typically represent systems or functions that serve as foundations for which to build regional ITS programs. Listed in this section are market packages that address baseline control and monitoring technologies for surface streets, commercial vehicle operations, and for coordinating incident management and emergency response services.

Many of these high priority market packages have components that are in various stages of deployment and operation in the Lower RGV Region; that is, there are already systems and technologies deployed to deliver some of these high priority services and functions. For example, the City of Brownsville has a traffic signal system in place that is monitored by a TMC, which is a key component of the Surface Street Control market package. Although a signal system and TMC are in place, this market package is still listed as a high priority. There are additional capabilities and functionality as part of this market package that are planned for implementation in the near-term, thus building on the existing infrastructure and expanding the services of this particular market package in the Lower RGV Region.

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region

Network Surveillance (ATMS01)	**High Priority**
This market package includes traffic detectors, other surveillance equipment, the supporting field equipment, and wire-line communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally or remotely. The data generated by this market package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data also can be analyzed and made available to users and the Information Service Provider Subsystem.	
Existing Infrastructure ▪ TxDOT VIVDS ▪ Cameron County CCTV Cameras ▪ City of Pharr CCTV Cameras ▪ City of Pharr TMC ▪ City of McAllen CCTV Cameras ▪ City of McAllen TMC ▪ US Border Patrol CCTV Cameras	**Agency** ▪ Cameron County ▪ City of McAllen ▪ City of Pharr ▪ US Border Patrol ▪ TxDOT Pharr District
Planned Projects ▪ US Border Patrol Video Surveillance ▪ TxDOT Conduit Installation ▪ City of McAllen CCTV Deployment ▪ Regional Bridge Coordination System	
Additional Needs ▪ TxDOT Interim Regional Transportation Management Center (TMC) ▪ TxDOT Regional Transportation Management Center (TMC) ▪ TxDOT TMC to Local TMC Communication ▪ TxDOT TMC to Local TMC Communication for Smaller Cities ▪ TxDOT Regional CCTV Deployment ▪ City of Harlingen CCTV Deployment ▪ Cameron County Bridge Coordination System ▪ TxDOT Flood Detection Stations ▪ City of Brownsville TMC ▪ City of Harlingen TMC ▪ Hidalgo/Reynosa Bridge Management System ▪ Pharr/Reynosa Bridge Management System ▪ Lower RGV Regional Communications Master Plan ▪ TxDOT Freeway Communications Network	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Surface Street Control (ATMS03)	**High Priority**
This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. This market package is consistent with typical urban traffic signal control systems.	
Existing Infrastructure ▪ City of Brownsville Traffic Signal System ▪ City of McAllen Traffic Signal System ▪ City of McAllen TMC ▪ City of Pharr Traffic Signal System ▪ City of Pharr TMC ▪ Hidalgo County Traffic Data Collection System ▪ TxDOT Pharr District Traffic Signals ▪ TxDOT Pharr District Vehicle Detection Equipment (including VIVDS) ▪ TxDOT Pharr District Pavement Data Collection System	**Agency** ▪ City of Brownsville ▪ City of McAllen ▪ City of Pharr ▪ Hidalgo County MPO ▪ TxDOT Pharr District
Planned Projects ▪ City of Harlingen Traffic Signal System ▪ City of Edinburg Traffic Signal System ▪ TxDOT Conduit Installation ▪ Regional Bridge Coordination System ▪ ITS Element Implementation as Part of West Rail Relocation	
Additional Needs ▪ TxDOT Interim Regional TMC ▪ TxDOT Regional TMC ▪ TxDOT TMC to Local TMC Communication ▪ TxDOT TMC to Local TMC Communication for Smaller Cities ▪ TxDOT Freeway Communications Network ▪ Regional Integrated Closed Loop Signal Systems ▪ Emergency Vehicle Signal Preemption ▪ Emergency Vehicle Signal Preemption Expansion ▪ Incident Management Plan ▪ Lower RGV Regional Communication Master Plan ▪ Cameron County Bridge Coordination System ▪ TxDOT Highway/Rail Crossings	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Surface Street Control (ATMS03) (continued)	**High Priority**
Additional Needs (continued) ▪ City of McAllen Highway/Rail Crossings ▪ City of Harlingen Highway/Rail Coordination ▪ City of San Benito Highway/Rail Coordination ▪ Hurricane Evacuation Plan ▪ Emergency Response Plans ▪ City of Brownsville TMC ▪ City of Harlingen TMC ▪ Hidalgo/Reynosa Bridge Management System ▪ Pharr/Reynosa Bridge Management System	

Freeway Control (ATMS04)	**High Priority**
This market package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. This package is consistent with typical urban traffic freeway control systems. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option. This market package also includes the capability to utilize surveillance information for detection of incidents.	
Existing Infrastructure ▪ City of McAllen CCTV	**Agency** ▪ City of McAllen
Planned Projects ▪ Regional Bridge Coordination System ▪ TxDOT Conduit Installation	
Additional Needs ▪ TxDOT Interim Regional TMC ▪ TxDOT Regional TMC ▪ Incident Management Plans ▪ TxDOT Lane Control Signals ▪ Lower RGV Regional Communications Master Plan ▪ TxDOT Freeway Communications Network ▪ Hurricane Evacuation Plan ▪ Emergency Response Plans	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Traffic Information Dissemination (ATMS06)	**High Priority**
This market package allows traffic information and road/bridge closures due to construction, maintenance, and weather, to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), Transit Management, Emergency Management, and Information Service Providers.	
Existing Infrastructure	**Agency**
▪ TxDOT Motor Carrier Information System	▪ TxDOT
Planned Projects	
▪ Regional Bridge Coordination System ▪ TxDOT Conduit Installation ▪ TxDOT District Webpage ▪ ITS Element Implementation as Part of West Rail Relocation	
Additional Needs	
▪ TxDOT Interim Regional TMC ▪ TxDOT Regional TMC ▪ TxDOT TMC to Local TMC Communications ▪ TxDOT TMC to Local TMC Communications for Smaller Cities ▪ Cameron County Bridge Coordination System ▪ Hidalgo County DMS Deployment (Freight Routes) ▪ Cameron County DMS Deployment ▪ US Customs Solar Powered DMS ▪ Incident Management Plans ▪ MPOs/Cities/TxDOT Webpage ▪ Media Liaison and Coordination ▪ Hurricane Evacuation Plan ▪ Regional 511 Advanced Traveler Information System Server ▪ TxDOT Flood Detection Stations ▪ City of McAllen DMS ▪ ISP Based Route Guidance ▪ Lower RGV Regional Communications Plan ▪ TxDOT Highway/Rail Crossings ▪ City of McAllen Highway/Rail Crossings ▪ City of Harlingen Highway/Rail Coordination ▪ City of San Benito Highway/Rail Coordination	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Traffic Information Dissemination (ATMS06) (continued)	**High Priority**
Additional Needs (continued) ▪ Emergency Response Plans ▪ TxDOT Freeway Communications Network ▪ City of Brownsville TMC ▪ City of Harlingen TMC ▪ Hidalgo/Reynosa Bridge Management System ▪ Pharr/Reynosa Bridge Management System	

Regional Traffic Control (ATMS07)	**High Priority**
This market package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy. This package relies on roadside instrumentation supported by the Surface Street Control and Freeway Control Market Packages and adds hardware, software, and communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. The extent of information and control sharing is determined through working arrangements between jurisdictions. At the request of stakeholders in the Lower RGV Region, this market package was expanded to include coordination and information sharing with TxDOT Districts and neighboring states.	
Existing Infrastructure ▪ Cameron County International Bridge Management System ▪ City of McAllen TMC ▪ City of Pharr TMC	**Agency** ▪ Cameron County International Bridge Division ▪ City of McAllen ▪ City of Pharr
Planned Projects ▪ City of Edinburg Traffic Signal System Upgrades ▪ City of Harlingen Traffic Signal System Upgrades	
Additional Needs ▪ TxDOT Interim Regional TMC ▪ TxDOT Regional TMC ▪ TxDOT TMC to Local TMC Communication ▪ TxDOT TMC to Local TMC Communication for Smaller Cities ▪ Regional Integrated Closed Loop Signal Systems ▪ TxDOT Center-to-Center Communication (Statewide) ▪ Lower RGV Regional Communication Master Plan ▪ TxDOT Freeway Communications Network	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Incident Management System (ATMS08)	**High Priority**
This market package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. The market package includes incident detection capabilities through roadside surveillance devices (e.g., CCTV) and through regional coordination with other traffic management, maintenance and construction management and emergency management centers as well as weather service entities and event promoters. Information from these diverse sources are collected and correlated by this market package to detect and verify incidents and implement an appropriate response. The response may include traffic control strategy modifications or resource coordination between center subsystems. The coordination with emergency management might be through a CAD system or through other communication with emergency field personnel. The coordination also can extend to tow trucks and other allied response agencies and field service personnel. Incident response also includes presentation of information to affected travelers using the Traffic Information Dissemination, Broadcast Traveler Information or Interactive Traveler Information market packages.	
Existing Infrastructure ▪ City/County EOCs ▪ IBWC Rio Grande River Flood Monitoring System ▪ Public/Private EMS Dispatch (911 Services) ▪ State EOC ▪ US Border Patrol Dispatch ▪ City of McAllen TMC ▪ City of Pharr TMC	**Agency** ▪ City of McAllen ▪ City of Pharr ▪ DPS ▪ IBWC ▪ City and County Public Safety ▪ TxDOT ▪ US Border Patrol
Planned Projects ▪ TxDOT Conduit Installation ▪ US Customs HAZMAT Management ▪ Regional Bridge Coordination System ▪ City of McAllen CCTV Deployment ▪ US Border Patrol Video Surveillance ▪ Fire Mobile Data System	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Incident Management System (ATMS08) (continued)	High Priority
Additional Needs	
▪ TxDOT Interim Regional TMC	
▪ TxDOT Regional TMC	
▪ TxDOT TMC to Local TMC Communications	
▪ TxDOT TMC to Local TMC Communications for Smaller Cities	
▪ TxDOT Regional CCTV Deployment	
▪ City of Harlingen CCTV Deployment	
▪ Cameron County Bridge Coordination System	
▪ Hidalgo County DMS Deployment (Freight Routes)	
▪ Cameron County DMS Deployment	
▪ US Customs Solar Powered DMS	
▪ Regional Integrated Closed Loop Signal Systems	
▪ Incident Management Plans	
▪ TxDOT Center-to-Center Communication	
▪ Emergency Vehicle Signal Preemption	
▪ Emergency Vehicle Signal Preemption Expansion	
▪ Hurricane Evacuation Plan	
▪ Emergency Response Plan	
▪ City of Brownsville TMC	
▪ City of Harlingen TMC	
▪ City of McAllen DMS	
▪ Fire/EMS/HAZMAT Management	
▪ Lower RGV Regional Communications Master Plan	
▪ Computer Aided Dispatch	
▪ AVL on Emergency Vehicles	
▪ TxDOT Freeway Communications Network	
▪ TxDOT Lane Control Signals	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Standard Railroad Grade Crossing (ATMS13)	**High Priority**
This market package manages highway traffic at highway-rail intersections (HRIs) where rail operational speeds are less than 80 miles per hour. Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. These traditional HRI warning systems also may be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI also may be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem.	
Existing Infrastructure ▪ City of McAllen TMC ▪ City of Pharr TMC	**Agency** ▪ City of McAllen ▪ City of Pharr
Planned Projects ▪ ITS Implementation as Part of West Rail Relocation	
Additional Needs ▪ TxDOT Highway/Rail Crossings ▪ City of McAllen Highway/Rail Crossings ▪ City of San Benito Highway/Rail Coordination ▪ City of Harlingen Highway/Rail Coordination ▪ Railroad Operations Coordination	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Advanced Railroad Grade Crossing (ATMS14)	**High Priority**
This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements demand advanced features (e.g., where speeds are greater than 80 miles per hour). This market package includes all capabilities from the Standard Railroad Grade Crossing Market package and augments these with additional safety features to mitigate the risks associated with higher rail speeds. The active warning systems supported by this market package include positive barrier systems that preclude entrance in to the intersection when the barriers are activated. Like the standard package, the HRI equipment is activated on notification by wayside interface equipment which detects, or communicates with the approaching train. In this market package the wayside equipment provides additional information about the arriving train so that the train's direction of travel, estimated time of arrival and estimated duration of closure may be derived. This enhanced information may be conveyed to the driver prior to, or in context with, warning system activation. This market package also includes additional detection capabilities that enable it to detect an entrapped or otherwise immobilized vehicle within the HRI and provide an immediate notification to highway and railroad officials.	
Existing Infrastructure ▪ City of McAllen TMC ▪ City of Pharr TMC	**Agency** ▪ City of McAllen ▪ City of Pharr
Planned Projects ▪ ITS Implementation as Part of West Rail Relocation	
Additional Needs ▪ TxDOT Highway/Rail Crossings ▪ City of McAllen Highway/Rail Crossings ▪ City of Harlingen Highway/Rail Coordination ▪ City of San Benito Highway/Rail Coordination ▪ Railroad Operations Coordination	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Railroad Operations Coordination (ATMS15)	**High Priority**
This market package provides an additional level of strategic coordination between rail operations and traffic management centers. Rail operations provides train schedules, maintenance schedules, and any other forecast events that will result in highway-rail intersection (HRI) closures. This information is used to develop forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information.	
Existing Infrastructure ▪ City of McAllen TMC ▪ City of Pharr TMC	**Agency** ▪ City of McAllen ▪ City of Pharr
Planned Projects ▪ ITS Implementation as Part of West Rail Relocation	
Additional Needs ▪ TxDOT Interim Regional TMC ▪ TxDOT Regional TMC ▪ TxDOT Highway/Rail Crossings ▪ City of McAllen Highway/Rail Crossings ▪ City of Harlingen Highway/Rail Coordination ▪ City of San Benito Highway/Rail Coordination ▪ Railroad Operations Coordination	

Workzone Management (MC08)	**High Priority**
This market package directs activity in work zones, controlling traffic through portable DMS and informing other groups of activity (e.g., ISP, TM, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.	
Existing Infrastructure ▪ TxDOT Portable DMS ▪ TxDOT Permanent DMS ▪ City of McAllen Portable DMS	**Agency** ▪ TxDOT ▪ City of McAllen
Planned Projects ▪ TxDOT District Webpage	
Additional Needs ▪ TxDOT Interim Regional TMC ▪ TxDOT Regional TMC ▪ TxDOT Workzone Management ▪ City of McAllen DMS Deployment ▪ MPOs/Cities/TxDOT Webpage ▪ Media Liaison and Coordination	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Transit Vehicle Tracking (APTS1)	**High Priority**
This market package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time.	
Existing Infrastructure ▪ BUS AVL System	**Agency** ▪ BUS
Planned Projects ▪ BUS Automated Vehicle Location (AVL) Expansion and Mobile Data Terminals ▪ BUS Computer Aided Dispatch and Transit Operations Center ▪ BUS Smart Stop ▪ BUS Public Announcement	
Additional Needs ▪ McAllen Express AVL and MDTs ▪ McAllen Express CAD and Transit Operations Center ▪ Rio Metro AVL and MDTs ▪ Rio Metro CAD and Transit Operations Center ▪ Harlingen Express AVL and MDTs ▪ Harlingen Express CAD and Transit Operations Center ▪ The Wave CAD and Transit Operations Center ▪ The Wave AVL and MDTs ▪ Rio Transit CAD and Transit Operations Center ▪ Rio Transit AVL and MDTs ▪ Rainbow Lines CAD and Transit Operations Center ▪ Rainbow Lines AVL and MDTs ▪ BUS Transit Traveler Information System/Travel Data and Route Guidance ▪ McAllen Express Transit Traveler Information System/Travel Data and Route Guidance ▪ Rio Metro Transit Traveler Information System/Travel Data and Route Guidance ▪ Harlingen Express Transit Traveler Information System/Travel Data and Route Guidance ▪ The Wave Transit Traveler Information System/Travel Data and Route Guidance ▪ Rio Transit Traveler Information System/Travel Data and Route Guidance ▪ Rainbow Lines Transit Traveler Information System/Travel Data and Route Guidance	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Transit Fixed-Route Operations (APTS2)	**High Priority**
This market package performs vehicle routing and scheduling, as well as automatic driver assignment and system monitoring for fixed-route transit services. This service determines current schedule performance using AVL data and provides information displays at the Transit Management Subsystem. Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g., rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.	
Existing Infrastructure	**Agency**
▪ BUS AVL System	▪ BUS
Planned Projects	
▪ BUS Automated Vehicle Location (AVL) Expansion and Mobile Data Terminals	
▪ BUS Computer Aided Dispatch and Transit Operations Center	
▪ BUS Smart Stop	
▪ BUS Public Announcement	
▪ BUS Kiosks and Information Displays	
Additional Needs	
▪ McAllen Express AVL and MDTs	
▪ McAllen Express CAD and Transit Operations Center	
▪ McAllen Smart Stop	
▪ McAllen Public Announcement	
▪ McAllen Kiosks and Information Displays	
▪ Rio Metro AVL and MDTs	
▪ Rio Metro CAD and Transit Operations Center	
▪ Rio Metro Smart Stop	
▪ Rio Metro Public Announcement	
▪ Rio Metro Kiosks and Information Displays	
▪ The Wave CAD and Transit Operations Center	
▪ The Wave AVL and MDTs	
▪ The Wave Smart Stop	
▪ The Wave Public Announcement	
▪ The Wave Kiosks and Information Displays	
▪ Rio Transit CAD and Transit Operations Center	
▪ Rio Transit AVL and MDTs	
▪ Rio Transit Smart Stop	
▪ Rio Transit Public Announcement	
▪ Rio Transit Kiosks and Information Displays	
▪ Rainbow Lines CAD and Transit Operations Center	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Transit Fixed-Route Operations (APTS2) (continued)	**High Priority**
Additional Needs (continued) ▪ Rainbow Lines AVL and MDTs ▪ Rainbow Lines Smart Stop ▪ Rainbow Lines Public Announcement ▪ Rainbow Lines Kiosks and Information Displays ▪ BUS Transit Traveler Information System/Travel Data and Route Guidance ▪ McAllen Express Transit Traveler Information System/Travel Data and Route Guidance ▪ The Wave Transit Traveler Information System/Travel Data and Route Guidance ▪ Rio Transit Traveler Information System/Travel Data and Route Guidance ▪ Rainbow Lines Transit Traveler Information System/Travel Data and Route Guidance	

Demand Response Transit Operations (APTS3)	**High Priority**
This market package performs vehicle routing and scheduling as well as automatic driver assignment and monitoring for demand responsive transit services. This package monitors the current status of the transit fleet and supports allocation of these fleet resources to service incoming requests for transit service while also considering traffic conditions. The Transit Management Subsystem provides the necessary data processing and information display to assist the transit operator in making optimal use of the transit fleet. This service includes the capability for a traveler request for personalized transit services to be made through the Information Service Provider (ISP) Subsystem.	
Existing Infrastructure ▪ BUS AVL System ▪ BUS Computer Aided Dispatch (CAD)	**Agency** ▪ BUS
Planned Projects ▪ BUS Automated Vehicle Location (AVL) Expansion and Mobile Data Terminals ▪ BUS Computer Aided Dispatch and Transit Operations Center ▪ BUS Kiosks and Information Displays	
Additional Needs ▪ Harlingen Express AVL and MDTs ▪ Harlingen Express CAD and Transit Operations Center ▪ Rainbow Lines CAD and Transit Operations Center ▪ Rainbow Lines AVL and MDTs ▪ Rainbow Lines Kiosks and Information Displays ▪ BUS Transit Traveler Information System/Travel Data and Route Guidance ▪ Harlingen Express Transit Traveler Information System/Travel Data and Route Guidance ▪ Rainbow Lines Transit Traveler Information System/Travel Data and Route Guidance	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Transit Passenger and Fare Management (APTS4)	**High Priority**
This market package manages passenger loading and fare payments on-board vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Sensors mounted on the vehicle permit the driver and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicle allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem.	
Existing Infrastructure ▪ BUS Transit Planning System	**Agency** ▪ BUS
Planned Projects ▪ BUS Electronic Fare Collection ▪ BUS Kiosks and Information Displays	
Additional Needs ▪ McAllen Express Electronic Fare Collection ▪ Rio Metro Electronic Fare Collection ▪ Harlingen Express Electronic Fare Collection ▪ The Wave Transit Electronic Fare Collection ▪ Rio Transit Electronic Fare Collection ▪ Rainbow Lines Transit Electronic Fare Collection ▪ BUS Automatic Passenger Counters ▪ McAllen Express Automatic Passenger Counters ▪ Rio Metro Automatic Passenger Counters ▪ Harlingen Express Automatic Passenger Counters ▪ The Wave Automatic Passenger Counters ▪ Rio Transit Automatic Passenger Counters ▪ Rainbow Lines Automatic Passenger Counters ▪ McAllen Express Kiosks and Information Displays ▪ Rio Metro Kiosks and Information Displays ▪ The Wave Kiosks and Information Displays ▪ Rio Transit Kiosks and Information Displays ▪ Rainbow Lines Kiosks and Information Displays	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Transit Security (APTS5)	**High Priority**
This market package provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g., stops, park and ride lots, stations) also are monitored. Information is communicated to the Transit Management Subsystem using wireless or wireline infrastructure. Security related information also is transmitted to the Emergency Management Subsystem when an emergency is identified that requires an external response. Incident information is communicated to the Information Service Provider.	
Existing Infrastructure None identified at this time	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ BUS On Board Video Security System ▪ McAllen Express On Board Video Security System ▪ Rio Metro On Board Video Security System ▪ The Wave On Board Video Security System ▪ Rio Transit On Board Video Security System ▪ Rainbow Lines On Board Video Security System	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Broadcast Traveler Information (ATIS01)	**High Priority**
This market package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and broadly disseminates this information through existing infrastructure and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). This market package differs from the Traffic Information Dissemination market package, which provides localized HAR and DMS information capabilities. The information may be provided directly to travelers by an information service provider (ISP) or other traveler service providers so that they can better inform travelers of conditions. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources.	
Existing Infrastructure ▪ TxDOT Pharr District Highway Condition Reporting System (HCRS) ▪ Emergency Broadcast Warning Systems	**Agency** ▪ TxDOT ▪ Private Sector Radio and Television Stations
Planned Projects ▪ TxDOT District Webpage	
Additional Needs ▪ TxDOT Interim Regional TMC ▪ TxDOT TMC ▪ Incident Management Plans ▪ MPOs/Cities/TxDOT Webpage ▪ Media Liaison and Coordination ▪ Hurricane Evacuation Plan ▪ Regional 511 Advanced Traveler Information System Server ▪ Lower RGV Regional Communications Master Plan ▪ ISP Based Route Guidance	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Electronic Clearance (CVO03)	**High Priority**
This market package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration subsystem to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using transponders and dedicated short range communications to the roadside. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, transponder read/write devices and computer workstations.	
Existing Infrastructure ▪ TxDOT Credentials Administration and Safety Information Exchange ▪ International Transportation Data System ▪ City of Pharr AVI and Bridge Cargo Check System ▪ TxDOT Overweight Corridor System ▪ TxDOT/DPS Electronic Screening Stations	**Agency** ▪ TxDOT ▪ US Customs ▪ City of Pharr ▪ DPS
Planned Projects ▪ Electronic Clearance Sites ▪ City of Pharr Bridge AVI System ▪ Border Checkpoints ▪ CVISN Expansion	
Additional Needs ▪ CVISN Cameras ▪ CVISN Fiber Connection	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

International Border Electronic Clearance (CVO05)	**High Priority**
This market package provides for automated clearance at international border crossings. This package augments the electronic clearance package by allowing interface with customs related functions.	
Existing Infrastructure ▪ International Transportation Data System ▪ City of Pharr AVI and Bridge Cargo Check System ▪ Cameron County International Bridge Management System	**Agency** ▪ US Customs ▪ City of Pharr ▪ Cameron County International Bridge Division
Planned Projects ▪ Electronic Clearance Sites ▪ City of Pharr Bridge AVI System ▪ Border Checkpoints ▪ CVISN Expansion	
Additional Needs None identified at this time	

Weigh-In-Motion (CVO06)	**High Priority**
This market package provides for high speed weigh-in-motion with or without automated vehicle Identification (AVI) capabilities. This market package provides the roadside equipment that could be used as a stand-alone system or to augment the Electronic Clearance (CVO03) market package.	
Existing Infrastructure ▪ WIM Sites ▪ TxDOT Overweight Corridor System	**Agency** ▪ TxDOT
Planned Projects ▪ Electronic Clearance Sites	
Additional Needs ▪ Overweight Commercial Vehicle Payment Verification System	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

HAZMAT Management (CVO10)	**Medium Priority**
This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents. HAZMAT tracking is performed by the Fleet and Freight Management Subsystem. The Emergency Management subsystem is notified by the Commercial Vehicle if an incident occurs and coordinates the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Subsystem. The latter information can be provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation.	
Existing Infrastructure ▪ HAZMAT Management	**Agency** ▪ City of Pharr Fire Department ▪ DPS
Planned Projects ▪ US Customs HAZMAT Management	
Additional Needs ▪ Incident Management Plan ▪ Fire/EMS/HAZMAT Management	

Emergency Response (EM1)	**High Priority**
This market package includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification and coordinated response between agencies.	
Existing Infrastructure ▪ City/County EOC ▪ State EOC ▪ Public/Private EMS Dispatch (911 Services)	**Agency** ▪ DPS ▪ Cities/Counties
Planned Projects ▪ US Customs HAZMAT Management ▪ Fire Mobile Data System	
Additional Needs ▪ Incident Management Plans ▪ AVL on Emergency Vehicles ▪ Computer Aided Dispatch ▪ Fire/EMS/HAZMAT Management	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Emergency Routing (EM2)	High Priority
This market package supports automated vehicle location and dynamic routing of emergency vehicles. The service also supports coordination with the Traffic Management Subsystem, collecting detailed road network conditions and requesting special priority or other specific emergency traffic control strategies on the selected route(s). The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.	
Existing Infrastructure ▪ Local signal preemption for fire/ambulance vehicles	**Agency** ▪ City of McAllen
Planned Projects ▪ Fire Mobile Data System	
Additional Needs ▪ AVL on Emergency Vehicles ▪ Emergency Vehicle Signal Preemption ▪ Emergency Vehicle Signal Preemption Expansion ▪ Incident Management Plans ▪ Computer Aided Dispatch	

ITS Data Mart (AD1)	High Priority
This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides general query and report access to archive data users.	
Existing Infrastructure ▪ BUS Transit Planning System ▪ Hidalgo County Congestion Management System ▪ Hidalgo County Pavement Management System ▪ TxDOT Crash Record Information System ▪ TxDOT Pharr District Pavement Management System ▪ TxDOT Pharr District Transportation Operational Data Archive ▪ TxDOT Credentials Administration and Safety Information	**Agency** ▪ BUS ▪ Hidalgo County MPO ▪ TxDOT
Planned Projects None identified at this time	
Additional Needs ▪ Regional Transportation Data Archival System	

Table 3 – High Priority Market Packages for the Lower Rio Grande Valley Region (continued)

ITS Virtual Data Warehouse (AD4)	High Priority
This market package provides the same broad access to multimodal, multidimensional data from varied data sources as in the ITS Data Warehouse Market Package, but provides this access using enhanced interoperability between physically distributed ITS archives that are each locally managed. Requests for data that are satisfied by access to a single repository in the ITS Data Warehouse Market Package are parsed by the local archive and dynamically translated to requests to remote archives which relay the data necessary to satisfy the request.	
Existing Infrastructure None identified at this time	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ TxDOT TMC Database Query System ▪ Regional Transportation Data Archival System	

2.3 Medium Priority Market Packages

Table 4 outlines market packages that were deemed medium priority by stakeholders in the Lower RGV Region. These market packages were identified as useful and desirable services and functions for the Region, although very few of these market packages have existing infrastructure in place or planned over the next few years (through 2005). The feasibility of funding for these market packages also was a factor in the prioritization. Availability and maturity of technology also was a consideration, particularly for the maintenance and construction management market packages. These market packages were recently developed and added to the National ITS Architecture, and are not yet widely deployed. It is recommended that stakeholders in the Lower RGV Region review deployments of some of the maintenance and construction technologies in other areas over the next several years to assess how well they have performed, benefits, and cost-effectiveness.

Table 4 – Medium Priority Market Packages for the Lower Rio Grande Valley Region

<table>
<tr><th>Probe Surveillance (ATMS02)</th><th>Medium Priority</th></tr>
<tr><td colspan="2">This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: 1) wide-area wireless communications between the vehicle and Information Service Provider is used to communicate current vehicle location and status, and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem. The first approach leverages wide area communications equipment that may already be in the vehicle to support personal safety and advanced traveler information services. The second approach utilizes vehicle equipment that supports toll collection, in-vehicle signing, and other short range communications applications identified within the architecture.

The market package enables traffic managers to monitor road conditions, identify incidents, analyze and reduce the collected data, and make it available to users and private information providers. It requires one of the communications options identified above, roadside beacons and wireline communications for the short range communications option, data reduction software, and utilizes wireline links between the Traffic Management Subsystem and Information Service Provider Subsystem to share the collected information. Both “Opt out” and “Opt in” strategies are available to ensure the user has the ability to turn off the probe functions to ensure individual privacy. Due to the large volume of data collected by probes, data reduction techniques are required, such as the ability to identify and filter out-of-bounds or extreme data reports.</td></tr>
<tr><td>Existing Infrastructure

▪ Lower RGV Bridge Electronic Toll Collection System</td><td>Agency

▪ Lower RGV Bridge Operators</td></tr>
<tr><td colspan="2">Planned Projects

None identified at this time</td></tr>
<tr><td colspan="2">Additional Needs

None identified at this time</td></tr>
</table>

Table 4 – Medium Priority Market Packages for the Lower Rio Grande Valley Region (continued)

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

Parking Facility Management (ATMS16)/ Regional Parking Management (ATMS17)	**Medium Priority**
This market package provides enhanced monitoring and management of parking facilities. It assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees. This market package collects current parking status, shares this data with Information Service Providers and Traffic Management, and collects parking fees using the same in-vehicle equipment utilized for electronic toll collection or contact or proximity traveler cards used for electronic payment. The ATMS17 market package supports coordination between parking facilities to enable regional parking management strategies.	
Existing Infrastructure ▪ City of Pharr TMC ▪ City of McAllen TMC ▪ TxDOT District Webpage	**Agency** ▪ City of Pharr ▪ City of McAllen ▪ TxDOT
Planned Projects None identified at this time	
Additional Needs None identified at this time	

Table 4 – Medium Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Road Weather Data Collection (MC03)	**Medium Priority**
This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway. In addition to fixed RWIS stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction vehicles. The collected environmental data is used by the Weather Information Processing and Distribution Market Package to process the information and help operators make decisions on operations.	
Existing Infrastructure None Identified at this time	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ TxDOT Flood Detection Stations	

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

Table 4 – Medium Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Work Zone Safety Monitoring (MC09)	**Medium Priority**
This market package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. This market package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment or other potential safety hazards. The market package supports both stationary and mobile work zones. The intrusion detection and alarm systems may be collocated or distributed, allowing systems that detect safety issues far upstream from a work zone (e.g., detection of over-dimension vehicles before they enter the work zone).	
Existing Infrastructure ▪ TxDOT Portable DMS	**Agency** ▪ TxDOT
Planned Projects None identified at this time	
Additional Needs ▪ Work Zone Safety Monitoring (Engineering) ▪ Work Zone Safety Monitoring (Equipment) ▪ TxDOT Workzone Management	

Table 4 – Medium Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Transit Traveler Information (APTS8)	**Medium Priority**
This market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services also are represented by this market package.	
Existing Infrastructure ▪ BUS Transit Website ▪ Lower RGV Development Council Transit Website ▪ Rainbow Lines Transit Website ▪ The Wave Transit Website	**Agency** ▪ BUS ▪ Lower RGV Development Council ▪ Community Action Council of South Texas ▪ Town of South Padre Island
Planned Projects ▪ BUS AVL Expansion and Mobile Data Terminals ▪ BUS Computer Aided Dispatch and Transit Operations Center ▪ BUS Smart Stop ▪ BUS Public Announcements ▪ BUS Kiosks and Information Displays	
Additional Needs ▪ McAllen Express AVL and MDTs ▪ McAllen Express CAD and Transit Operations Center ▪ McAllen Express Smart Stop ▪ McAllen Express Public Announcements ▪ McAllen Express Kiosks and Information Displays ▪ Rio Metro AVL and MDTs ▪ Rio Metro CAD and Transit Operations Center ▪ Rio Metro Smart Stop ▪ Rio Metro Public Announcements ▪ Rio Metro Kiosks and Information Displays ▪ Harlingen Express AVL and MDTs ▪ Harlingen Express CAD and Transit Operations Center ▪ The Wave CAD System and Transit Operations Center ▪ The Wave AVL and MDTs ▪ The Wave Smart Stop ▪ The Wave Public Announcements ▪ The Wave Kiosks and Information Displays ▪ Rio Transit CAD System and Transit Operations Center	

Table 4 – Medium Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Transit Traveler Information (APTS8) (continued)	**Medium Priority**
Additional Needs (continued) ▪ Rio Transit AVL and MDTs ▪ Rio Transit Smart Stop ▪ Rio Transit Public Announcements ▪ Rio Transit Kiosks and Information Displays ▪ Rainbow Lines CAD System and Transit Operations Center ▪ Rainbow Lines AVL and MDTs ▪ Rainbow Lines Smart Stop ▪ Rainbow Lines Public Announcements ▪ Rainbow Lines Kiosks and Information Displays ▪ BUS Transit Traveler Information System/Travel Data and Route Guidance ▪ McAllen Express Transit Traveler Information System/Travel Data and Route Guidance ▪ Rio Metro Transit Traveler Information System/Travel Data and Route Guidance ▪ Harlingen Express Transit Traveler Information System/Travel Data and Route Guidance ▪ The Wave Transit Traveler Information System/Travel Data and Route Guidance ▪ Rio Transit Traveler Information System/Travel Data and Route Guidance ▪ Rainbow Lines Transit Traveler Information System/Travel Data and Route Guidance	

Dynamic Ridesharing (ATIS8)	**Medium Priority**
This market package provides dynamic ridesharing/ride matching services to travelers. This service could allow near real time ridesharing reservations to be made through the same basic user equipment used for Interactive Traveler Information. This ridesharing/ride matching capability also includes arranging connections to transit or other multimodal services	
Existing Infrastructure None identified at this time	**Agency**
Planned Projects None identified at this time	
Additional Needs ▪ Ridesharing Website	

Table 4 – Medium Priority Market Packages for the Lower Rio Grande Valley Region (continued)

CV Administrative Processes (CVO04)	Medium Priority
This market package provides for electronic application, processing, fee collection, issuance, and distribution of Commercial Vehicle Operations (CVO) credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in the electronic clearance program provided by a separate market package, which allows commercial vehicles to be screened at mainline speeds at roadside check facilities. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration subsystem and snapshots of this database are made available to the roadside check facilities at the roadside to support the electronic clearance process.	
Existing Infrastructure ▪ Credentials Administration and Safety Information Exchange	**Agency** ▪ TxDOT
Planned Projects ▪ Internet Enabled IRP Registration ▪ Internet Enabled Motor Carrier Registration ▪ Internet Enabled International Fuel Tax Agreement Registration ▪ Electronic Clearance Sites ▪ City of Pharr Bridge AVI System ▪ Border Checkpoints ▪ CVISN Expansion	
Additional Needs ▪ Overweight Commercial Vehicle Payment Verification System ▪ CVISN Cameras	

2.4 Low Priority Market Packages

Five market packages were identified and customized for the Lower RGV Region, but were ranked as low priority by stakeholders. These market packages are listed in **Table 5**. The services contained in these lower priority market packages were deemed useful and desirable for the Region, but stakeholders did not feel that public agencies should put a strong focus on these market packages in the near-term. Stakeholders also did not want to preclude these market packages from future deployment in the Region, so it was decided to keep these market packages as part of the Regional ITS Architecture.

Table 5 – Low Priority Market Packages for the Lower Rio Grande Valley Region

Market Package Name	Description	Comments
Maintenance and Construction Vehicle Tracking (MC01)	This market package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.	This market package was not identified as needed for the Lower RGV architecture at this time; however, it was expected that the information from Maintenance and Construction Vehicle Tracking may be useful to the Region some time in future if these activities were to become more automated. Included in this market package would be instrumentation of maintenance and construction vehicles with AVL.
Maintenance and Construction Vehicle Maintenance (MC02)	This market package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment. It includes on-board sensors capable of automatically performing diagnostics for maintenance and construction vehicles, and the systems that collect this diagnostic information and use it to schedule and manage vehicle maintenance.	The Lower RGV Region did not have a need for this market package based on the current state of technology. As technology evolves, the Region may consider implementation in the future.
Roadway Maintenance and Construction (MC07)	This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal, routine maintenance activities, and repair and maintenance of both ITS and non-ITS equipment on the roadway. Environmental conditions information also is received from various weather sources to aid in scheduling maintenance and construction activities.	The Lower RGV Region did not have a need for this market package at this time but might want to consider this market package as a future deployment to assist with maintenance functions.

Table 5 – Low Priority Market Packages for the Lower Rio Grande Valley Region (continued)

Market Package Name	Description	Comments
Fleet Administration (CV01)	This market package provides the capabilities to manage a fleet of commercial vehicles. The Fleet and Freight Management subsystem would provide the route for a commercial vehicle by either utilizing an in-house routing software package or an Information Service Provider. A route would be electronically sent to the commercial vehicle with any appropriate dispatch instructions. The location of the commercial vehicle can be monitored by the Fleet and Freight Management subsystem and routing changes can be made depending on current road network conditions. The Fleet and Freight Management subsystem can process and respond to requests for assistance and general information from the commercial vehicle. The market package also provides the Fleet and Freight Management subsystem with the capability of monitoring on-board vehicle data.	Implementation of CVISN will help in defining this service. This market package is expected to be deployed by both the public and private sector.
Freight Administration (CV02)	This market package tracks the movement of cargo and monitors the cargo condition. Interconnections are provided to intermodal freight shippers and intermodal freight depots for tracking of cargo from source to destination.	Implementation of this market package will be influenced by Homeland Security forthcoming cargo regulations. This market package is expected to be deployed by both the public and private sector.

3. PRIORITIZATION OF PROJECTS

To achieve the vision of the Regional ITS Architecture, the Lower RGV Region must deploy carefully developed projects that provide the functionality and interoperability identified in the architecture. A key step in the deployment of those projects is the development of an ITS Deployment Plan that identifies specific projects, timeframes, and responsible agencies.

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

To receive input from stakeholders, a workshop was held in the Lower RGV Region on January 8, 2003 to present the draft Regional ITS Deployment Plan and discuss potential projects. Each project recommended for the Regional ITS Deployment Plan was discussed, and consensus was reached by the stakeholders on the project description and the timeframe for implementation.

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

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

3.1 Short-Term Projects (5-Year)

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

3.2 Mid-Term Projects (10-Year)

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

3.3 Long-Term Projects (20-Year)

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

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT Interim Regional Transportation Management Center (TMC)	Installation of equipment needed to monitor and manage traffic flow in the Lower RGV Region. Incidents will be detected and verified and incident information provided to the appropriate agencies. This will be an interim location.	TxDOT Pharr District	$750,000	No	18 months
TxDOT Center-to-Center Communication (Statewide)	Enhance coordination with other TxDOT Districts through implementation of center-to-center communications between each TxDOT TMC	TxDOT Traffic Operations Division (Austin)	N/A	No	1 year
TxDOT TMC to Local TMC Communication	Project to link TxDOT TMC with local TMCs including McAllen, Harlingen, and Brownsville	TxDOT/McAllen/Harlingen/ Brownsville	$100,000 plus $7,000/year	No	6 months
City of Harlingen Traffic Signal System Upgrades	Perform feasibility study and deploy system upgrade	City of Harlingen Traffic Department	$400,000	Partial	2 years
City of Edinburg Traffic Signal System Upgrades	Perform feasibility study and deploy system upgrade	City of Edinburg Traffic Department	$400,000	Partial	2 years
City of Brownsville Traffic Signal System Upgrades	Perform feasibility study and deploy system upgrade	City of Brownsville Traffic Department	$500,000	No	2 years
Regional Integrated Closed Loop Signal Systems	Integrate Brownsville, Harlingen, McAllen, TxDOT and MPO closed loop signal systems	Brownsville, Harlingen, McAllen, TxDOT, MPOs	$500,000	No	2 years
TxDOT Regional CCTV Deployment	Install CCTV cameras at various locations. Includes site investigation, permitting, power, and other requirements for funding sources.	TxDOT	$20,000-$25,000/site	No	6 months
City of McAllen CCTV Deployment	Install CCTV cameras at various locations within the city	City of McAllen	$10,000/site using existing poles	Yes	6 months
City of Harlingen CCTV Deployment	Install CCTV cameras near hospital intersections, schools, and major highway intersections	City of Harlingen	$20,000-$25,0000/site	No	6 months

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management (continued)					
US Border Patrol Video Surveillance	Install additional CCTV cameras along the Rio Grande River. Includes several cameras per pole using microwave communication links. US Border Patrol plans to deploy over the next 10 years.	US Border Patrol	$200,000/site	Yes	On-going
Cameron County Dynamic Message Sign (DMS) Deployment	Install DMS at various locations within Cameron County	Cameron County/Cameron County MPO	$100,000/sign	No	12 months
Hidalgo County DMS Deployment	Install DMS on freight routes throughout Hidalgo County	Hidalgo County/Hidalgo County MPO	$100,000/sign	No	12 months
US Customs Solar Powered DMS	Install DMS at various locations in the Region	US Customs	$150,000/sign	No	12 months
TxDOT Conduit Installation	Install communications conduit as part of future roadway projects throughout the Region	TxDOT	$75,000 – $100,000 per mile	Yes	Dependent on roadway construction project
Lower RGV Regional Communications Master Plan	Develop Communications Master Plan, including needs analysis and recommendations	TxDOT/MPOs	$200,000	No	6 months
Regional Bridge Coordination System	Implement system to optimize the flow of traffic from the United States to Mexico at bridges throughout the Lower RGV Region	TxDOT	$500,000	Yes	1 year
Cameron County Bridge Coordination System	Implement system in Cameron County to optimize the flow of traffic from the United States to Mexico at border crossings throughout the Region	Cameron County	$400,000	No	1 year
Brownsville/Matamoros Electronic Toll Collection	Install electronic toll collection (ETC) lanes/facilities at Brownsville/Matamoros border crossings	City of Brownsville/Matamoros	$250,000/site	Partial	1 year

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management (continued)					
Incident Management Plans	Develop incident management plans for special events and emergency conditions	Transportation and Emergency Management Agencies	$30,000/plan	No	8 months
MPOs/Cities/TxDOT Webpage	Develop joint website for MPOs, cities and TxDOT for information about traffic conditions, road/bridge closures, construction zones, etc.	MPOs, Cities, TxDOT	$20,000 plus $10,000/year	No	Annual update
TxDOT District Webpage	Update and add new functionalities to the website which currently provides information about traffic conditions, road/bridge closures, construction zones, etc.	TxDOT	$20,000 plus $10,000/year	Yes	Annual update
Media Liaison and Coordination	Develop agreements/enhanced coordination with local media to improve information sharing and dissemination. Provide CCTV camera feeds to media.	TxDOT/Cities	N/A	N/A	6 months
TxDOT Highway/Rail Crossings	Install highway-rail intersection (HRI) equipment on at-grade rail crossings	TxDOT	To Be Determined	No	8 months
City of McAllen Highway/Rail Crossings	Install HRI equipment on at grade rail crossings	City of McAllen	To Be Determined	No	8 months
City of Harlingen Highway/Rail Coordination	Rail coordination project to install cameras and detectors along routes in Harlingen	City of Harlingen	$770,000	No (MPO has applied for a grant)	8 months
City of San Benito Highway/Rail Coordination	Install HRI equipment on at grade rail crossings	City of San Benito	To Be Determined	No	8 months
ITS Element Implementation as Part of West Rail Relocation	Install ITS elements for highway/rail coordination as part of West Rail relocation	Brownsville MPO	$500,000	Yes	8 months

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Emergency Management					
Computer Aided Dispatch (CAD)	Implement CAD system for dispatching fire/emergency vehicles, communications between dispatch and fire/emergency vehicles, and storing incident and call-out information	Emergency Management Agencies	To Be Determined	No	1 year
AVL on Emergency Vehicles	Install automatic vehicle location system on emergency vehicles	Emergency Management Agencies	$10,000/vehicle	No	6 months
Fire Mobile Data System	Install mobile data terminals in fire vehicles to provide communications with CAD system	Fire Agencies	To Be Determined	Yes	1 year
Emergency Vehicle Signal Preemption	Implement signal preemption for emergency vehicles	Emergency Management Agencies	To Be Determined	No	1 year
Hurricane Evacuation Plan	Develop a hurricane evacuation plan for the Lower RGV Region	MPOs	$100,000	No	1 year
Emergency Response Plans	Develop emergency response plans for 30 different scenarios	MPOs	$150,000	No	8 months
Maintenance and Construction Management					
TxDOT Flood Detection Stations	Implement high water/flood warning systems on flood-prone roadways in the Lower RGV Region	TxDOT	$25,000/site	No	2-6 months
TxDOT Workzone Management	Deploy temporary diversion plans using DMS, CCTV, and trailblazer signs for maintenance and construction workzones	TxDOT	$200,000	No	6-12 months
Public Transportation Management					
BUS Automated Vehicle Location (AVL) Expansion and Mobile Data Terminals (MDTs)	Install additional AVL on fixed routes buses and paratransit vehicles. The system also includes MDTs.	BUS	$10,000/vehicle	Yes	6 months
BUS Electronic Fare Collection	Install system to allow transit users to use an electronic payment device on-board transit vehicles	BUS	$5,000/vehicle	Yes	6 months

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
BUS Computer Aided Dispatch (CAD) and Transit Operations Center	Implement CAD system for dispatching BUS transit vehicles and establish a centralized transit management and operations center	BUS	$420,000	Yes	1 year
BUS Kiosks and Information Displays	Implement traveler information and electronic payment card kiosks	BUS	$300,000	Yes	1 year
BUS Smart Stop	Equip bus stops with signs to provide enhanced passenger route and schedule information	BUS	$30,000/stop	Yes	6 months
BUS Public Announcement	Install equipment to annunciate the next bus stop automatically	BUS	$100,000	Yes	6 months
McAllen Express AVL and MDTs	Install AVL and MDTs on transit vehicles (10 vehicles in fleet)	Lower Rio Grande Valley Development Council	$10,000/vehicle	No	6 months
McAllen Express Electronic Fare Collection	Install system to allow transit users to use an electronic payment device on-board transit vehicles.	Lower Rio Grande Valley Development Council	$5,000/vehicle	No	6 months
McAllen Express CAD and Transit Operations Center	Implement CAD system for dispatching McAllen Express transit vehicles and establish a centralized transit management and operations center	Lower Rio Grande Valley Development Council	$200,000	No	1 year
McAllen Express Kiosks and Information Displays	Implement traveler information and electronic payment card kiosks	Lower Rio Grande Valley Development Council	$200,000	No	1 year
McAllen Express Smart Stop	Equip bus stops with signs to provide enhanced passenger route and schedule information	Lower Rio Grande Valley Development Council	$30,000/stop	No	6 months
McAllen Express Public Announcement	Install equipment to annunciate the next bus stop automatically	Lower Rio Grande Valley Development Council	$100,000	No	6 months
Rio Metro AVL and MDTs	Install AVL and MDTs on transit vehicles (8 vehicles in fleet)	Lower Rio Grande Valley Development Council	$10,000/vehicle	No	6 months
Rio Metro Electronic Fare Collection	Install system to allow transit users to use an electronic payment device on-board transit vehicles	Lower Rio Grande Valley Development Council	$5,000/vehicle	No	6 months

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Rio Metro CAD and Transit Operations Center	Implement CAD system for dispatching Rio Metro transit vehicles and establish a centralized transit management and operations center	Lower Rio Grande Valley Development Council	$200,000	No	1 year
Rio Metro Kiosks and Information Displays	Implement traveler information and electronic payment card kiosks	Lower Rio Grande Valley Development Council	$200,000	No	1 year
Rio Metro Smart Stop	Equip bus stops with signs to provide enhanced passenger route and schedule information	Lower Rio Grande Valley Development Council	$30,000/stop	No	6 months
Rio Metro Public Announcement	Install equipment to annunciate the next bus stop automatically	Lower Rio Grande Valley Development Council	$100,000	No	6 months
Harlingen Express AVL and MDTs	Install AVL and MDTs on transit vehicles (2 vehicles in fleet)	Lower Rio Grande Valley Development Council	$10,000/vehicle	No	6 months
Harlingen Express Electronic Fare Collection	Install system to allow transit users to use an electronic payment device on-board transit vehicles	Lower Rio Grande Valley Development Council	$5,000/vehicle	No	6 months
Harlingen Express CAD and Transit Operations Center	Implement CAD system for dispatching Harlingen Express transit vehicles and establish a centralized transit management and operations center	Lower Rio Grande Valley Development Council	$100,000	No	1 year
Rio Transit AVL and MDTs	Install AVL and MDTs on transit vehicles (16 vehicles in fleet)	Lower Rio Grande Valley Development Council	$10,000/vehicle	No	6 months
Rio Transit Electronic Fare Collection	Install system to allow transit users to use an electronic payment device on-board transit vehicles	Lower Rio Grande Valley Development Council	$5,000/vehicle	No	6 months
Rio Transit CAD and Transit Operations Center	Implement CAD system for dispatching Rio Transit vehicles and establish a centralized transit management and operations center	Lower Rio Grande Valley Development Council	$200,000	No	6 months
Rio Transit Kiosks and Information Displays	Implement traveler information and electronic payment card kiosks	Lower Rio Grande Valley Development Council	$200,000	No	1 year

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Rio Transit Smart Stop	Equip bus stops with signs to provide enhanced passenger route and schedule information	Lower Rio Grande Valley Development Council	$30,000/stop	No	6 months
Rio Transit Public Announcement	Install equipment to annunciate the next bus stop automatically	Lower Rio Grande Valley Development Council	$100,000	No	6 months
The Wave AVL and MDTs	Install AVL and MDTs on transit vehicles (4 vehicles in fleet)	Town of South Padre Island	$10,000/vehicle	No	6 months
The Wave Electronic Fare Collection	Install system to allow transit users to use an electronic payment device on-board transit vehicles	Town of South Padre Island	$5,000/vehicle	No	6 months
The Wave CAD and Transit Operations Center	Implement CAD system for dispatching The Wave transit vehicles and establish a centralized transit management and operations center	Town of South Padre Island	$100,000	No	6 months
The Wave Kiosks and Information Displays	Implement traveler information and electronic payment card kiosks	Town of South Padre Island	$100,000	No	1 year
The Wave Smart Stop	Equip bus stops with signs to provide enhanced passenger route and schedule information	Town of South Padre Island	$30,000/stop	No	6 months
The Wave Public Announcement	Install equipment to annunciate the next bus stop automatically	Town of South Padre Island	$100,000	No	6 months
Rainbow Lines AVL and MDTs	Install AVL and MDTs on transit vehicles (28 vehicles in fleet)	Community Action Council of South Texas	$10,000/vehicle	No	6 months
Rainbow Lines Electronic Fare Collection	Install system to allow transit users to use an electronic payment device on-board transit vehicles	Community Action Council of South Texas	$5,000/vehicle	No	6 months
Rainbow Lines CAD and Transit Operations Center	Implement CAD system for dispatching Rainbow Lines transit vehicles and establish a centralized transit management and operations center	Community Action Council of South Texas	$200,000	No	6 months
Rainbow Lines Kiosks and Information Displays	Implement traveler information and electronic payment card kiosks	Community Action Council of South Texas	$200,000	No	1 year

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Rainbow Lines Smart Stop	Equip bus stops with signs to provide enhanced passenger route and schedule information	Community Action Council of South Texas	$30,000/stop	No	6 months
Rainbow Lines Public Announcement	Install equipment to annunciate the next bus stop automatically	Community Action Council of South Texas	$100,000	No	6 months
Commercial Vehicle Operations					
CVISN Cameras	Install CVISN cameras at sites throughout the Lower RGV Region	TxDOT	$25,000 – $30,000 per site	No	5 years
CVISN Fiber Connection	Deployment of fiber connection to all CVISN sites	TxDOT	To Be Determined	No	3 years
Electronic Clearance Sites	Install additional electronic screening stations	US Customs	To Be Determined	Yes	1 year
City of Pharr Bridge AVI System	Install an automated vehicle clearance system at international border crossing in the City of Pharr	City of Pharr	$100,000-$150,000	Yes	3 months
Border Checkpoints	Construct new border checkpoints	US Border Patrol	To Be Determined	Yes	1-3 years
Overweight Commercial Vehicle Payment Verification System	Implement method to check on fee payment for trucks over 80,000 pounds	TxDOT	To Be Determined	No	12 months
Internet Enabled IRP Registration	Implement system to allow commercial vehicles to perform on-line IRP registration	TxDOT/USDOT	To Be Determined	Yes	To Be Determined
Internet Enabled Motor Carrier Registration	Implement system to allow commercial vehicles to perform on-line motor carrier registration	TxDOT/USDOT/DPS	To Be Determined	Yes	To Be Determined
Internet Enabled International Fuel Tax Agreement Registration	Implement system to allow commercial vehicles to perform on-line International Fuel Tax Agreement Registration	USDOT	To Be Determined	Yes	To Be Determined

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Commercial Vehicle Operations (continued)					
US Customs HAZMAT Management	Integrate incident management and commercial vehicle tracking to facilitate HAZMAT management	US Customs	To Be Determined	Yes	1 year
Information Management					
Regional Transportation Data Archival System	Implement system to archive ITS data from multiple agencies	Hidalgo County MPO/Brownsville MPO/Harlingen-San Benito MPO/TxDOT	$200,000	No	2 years
TxDOT TMC Database Query System	User interfaces will be installed at TxDOT TMC to access, search, and upload archived data as needed	TxDOT	$100,000	No	1 year

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

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

Lower RGV Region
Short-Term Projects (5-Year)

Travel and Traffic Management

TxDOT Interim Regional Transportation Management Center (TMC)

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Railroad Operations Coordination (ATMS15)
- Work Zone Management (MC08)
- Broadcast Traveler Information (ATIS01)

Prerequisite Projects: None

Description: The TMC will be a central facility for monitoring, controlling, and managing transportation systems in the Lower RGV Region. Incidents will be detected and verified and incident information will be provided to the appropriate agencies, such as DPS, fire and police dispatch, and also to third party providers. Some ITS technologies that will be used by this center are DMS, CCTV cameras, and traffic detectors. The Regional TMC will serve as the US Customs' point of contact to provide bridge conditions.

The interim TMC site will be located under the US 281/83 interchange. This location is already connected to the TxDOT office and all hardware associated with deployed ITS elements is currently controlled from this location. To construct the interim TMC at this location it would be necessary to make some expansion and upgrades as well as deploy the TxDOT ATMS software. The estimated cost for the interim TMC is $750,000, which includes approximately $250,000 for the node building and $500,000 for communications.

TxDOT Center-to-Center Communication (Statewide)

Associated Market Packages:

- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- ITS Virtual Data Warehouse (AD3)

Prerequisite Projects: TxDOT Interim Regional TMC

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

TxDOT TMC to Local TMC Communication

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan, TxDOT Interim Regional TMC

Description: Implement communications link between TxDOT TMC and local TMCs to allow shared viewing of video (Lower RGV Region wants to use full motion video), traffic information, and other mutually beneficial data. McAllen, Harlingen and Brownsville will be connected as part of this project

One server is needed at each center, which will be connected via fiber optic cable (conduit does exist along some routes). Shared monitoring and control capabilities provided through the connection could also allow for joint operations of City equipment (i.e., traffic signals) by TxDOT TMC staff, such as for after-hours or on weekends, if the TxDOT TMC serves as a 24/7 facility. Data/video sharing and other joint operation policies will need to be developed and agreed upon between TxDOT and the cities. The cost of this project is estimated to be $100,000 plus $7,000 a year for leasing fees. The cost estimate

includes approximately $25,000 for a communication vault at TxDOT and server costs of approximately $40,000.

City of Harlingen Traffic Signal System Upgrades

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan

Description: The City will perform a feasibility study and upgrade its signal system software and controllers to closed loop signal systems that can be controlled from a central server location. If this upgrade is done in coordination with other area cities, compatible systems can be used so that control can be shared on a Regional level. The estimated deployment cost for this project is $400,000.

City of Edinburg Traffic Signal System Upgrades

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan

Description: The City will perform a feasibility study and upgrade its signal system software and controllers to closed loop signal systems that can be controlled from a central server location. If this upgrade is done in coordination with other area cities, compatible systems can be used so that control can be shared on a Regional level. The estimated deployment cost for this project is $400,000.

City of Brownsville Traffic Signal System Upgrades

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan

Description: The City will perform a feasibility study and upgrade its signal system software and controllers to closed loop signal systems that can be controlled from a central server location. If this upgrade is done in coordination with other area cities, compatible systems can be used so that control can be shared on a Regional level. The estimated deployment cost for this project is $500,000.

Regional Integrated Closed Loop Signal Systems

Associated Market Packages:

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

Prerequisite Projects: City of Harlingen Traffic Signal System Upgrades, City of Edinburg Traffic Signal System Upgrades, City of Brownsville Traffic Signal System Upgrades, and Lower RGV Regional Communications Master Plan

Description: Integrate Brownsville, Harlingen, McAllen, TxDOT and MPO closed-loop signal systems. This project would allow for the creation of seamless traffic signal timing plans enabling residents to progress from city to city without arbitrary boundaries negatively impacting the quality of flow.

Some long-term cost savings may be realized if the Lower RGV Regional Communications Master Plan is completed prior to establishing locations and routing of communications infrastructure. The estimated cost for this project is $500,000.

TxDOT Regional CCTV Deployment

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan.

Description: This TxDOT project consists of the deployment of CCTV cameras at various locations within the Lower RGV Region for purposes of traffic monitoring and incident management. The estimated cost per CCTV site is between $20,000 and $25,000. This includes the camera, physical infrastructure and required communications equipment as well as installation costs.

City of McAllen CCTV Deployment

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan.

Description: This project consists of the deployment of CCTV cameras at various locations within the City of McAllen for purposes of traffic monitoring and incident management. The estimated cost per CCTV site is approximately $10,000. Typical costs for a CCTV installation would be estimated at $20,000-$25,000 per site. This would include the camera, physical infrastructure and required communications equipment as well as installation costs. A cost savings is realized in the City of McAllen, reducing the costs to $10,000 per site since the City intends to use existing poles and City

labor for the installation. If a new pole had to be installed the estimated cost would be $12,000 per site, which includes the $2,000 required to procure a new pole.

City of Harlingen CCTV Deployment

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan.

Description: This project consists of the deployment of CCTV cameras near hospital intersections, schools, and major highway intersections within the City of Harlingen for purposes of traffic monitoring and incident management. The estimated cost per CCTV site is between $20,000 and $25,000. This includes the camera, physical infrastructure and required communications equipment as well as installation costs.

US Border Patrol Video Surveillance

Associated Market Packages:

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

Prerequisite Projects: None

Description: Install additional CCTV cameras along the Rio Grande River for surveillance purposes. This will be an on-going project that the US Border Patrol plans to deploy over the next 10 years. The estimated cost per site is $200,000. This estimate includes costs associated with installing several cameras per pole, a specialty pole designed to accommodate multiple cameras and microwave communications links.

Cameron County DMS Deployment

Associated Market Packages:

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

Prerequisite Projects: None

Description: This project consists of the deployment of DMS at various locations within Cameron County for purposes of traffic information dissemination and incident management. When appropriate, special messaging may be provided for special events. DMS will also be utilized in conjunction with emergency evacuation coordination (i.e., HAZMAT, weather, etc.).

The cost of DMS implementation varies depending on factors such as the technology used (e.g., fiber optic, LED, etc.) and the sign size. For this estimate, a cost of $100,000 per sign was used.

Hidalgo County DMS Deployment (Freight Routes)

Associated Market Packages:

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

Prerequisite Projects: None

Description: This project consists of the deployment of DMS on freight routes throughout Hidalgo County for purposes of traffic information dissemination and incident management. When appropriate, special messaging may be provided for special events. DMS will also be utilized in conjunction with emergency evacuation coordination (i.e., HAZMAT, weather, etc.).

The cost of DMS implementation varies depending on factors such as the technology used (e.g., fiber optic, LED, etc.) and the sign size. For this estimate a cost of $100,000 was used.

US Customs Solar Powered DMS

Associated Market Packages:

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

Prerequisite Projects: None

Description: This project consists of the deployment of solar powered DMS at various locations within the Lower RGV Region for purposes of traffic management and information dissemination to motorists near border crossings. When appropriate, special messaging may be provided for special events. DMS signs may also be used in conjunction with emergency evacuation coordination (i.e., HAZMAT, weather, etc.).

The cost of DMS implementation varies depending on several factors including the technology used (e.g., fiber optic, LED, etc.) and the sign size. A cost of $150,000 was estimated for this application.

TxDOT Conduit Installation

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan

Description: Install communications conduit as part of future roadway projects throughout the Region. This approach will avoid the unnecessary expense and inconvenience caused by separate conduit

installation projects on already built infrastructure. Some long-term cost savings may be realized if the Lower RGV Regional Communications Master Plan is completed prior to establishing conduit locations and routing of communications infrastructure as part of future roadway projects. The estimated cost for this type of project is between $75,000 and $100,000 per mile. Cost will depend on the construction project and could be as low as $15 a foot (approximately $75,000 a mile).

Lower RGV Regional Communications Master Plan

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Regional Parking Management (ATMS17)
- Broadcast Traveler Information (ATIS01)
- ITS Virtual Data Warehouse (AD3)

Prerequisite Projects: None

Description: Develop a Regional Communications Master Plan for the Lower RGV Region. The Plan would include needs identification and technology alternatives analysis, and will ultimately develop recommendations for region-wide ITS and traffic-related communications. A network to serve center-to-center needs (among traffic management centers, emergency management centers, and 911 centers, both within the Region and inter-state) and field-to-center links (from the TMCs out to the ATMS field devices, traffic signals, etc.) will be defined. The report will investigate technology and transmission media options, comparing technologies, bandwidths, life cycle costs, and other requirements against the Region's needs and goals.

The outcome of these efforts will be a phased plan for transportation and ITS communications throughout the Region over a 20-year period. Strong coordination with public safety is encouraged since there may be significant benefits in combining capital improvement funds to install telecommunications infrastructure to support interagency coordination needs. The estimated cost to develop this plan is $200,000.

Regional Bridge Coordination System

Associated Market Packages:

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

Prerequisite Projects: None

Description: A bridge coordination system will be implemented to optimize the flow of traffic from the United States to Mexico at bridges throughout the Lower RGV Region. The purpose is to balance the flow of traffic to the bridges using a combination of ITS technologies such as detectors, decision support system (software), DMS, trailblazers, and the related communications equipment. Data provided by the detectors at the bridges will be used by a decision support system software to estimate the queue time at each bridge. This information will be sent to strategically located DMS, so drivers can decide which bridge to use to cross the border. This information will be updated every minute in order to maintain a balanced flow of vehicles to the bridges. In addition, trailblazers will be placed on primary roads with access to the bridges to guide drivers to their destination. A diversion plan should be developed for this purpose. The decision support system software will be included as part of the planned TxDOT TMC.

The Immigration and Naturalization Service (INS) identified the need for this same type of system on the Mexican side to reduce queues, as traffic on Mexican side has a direct impact on traffic operations on the US side. Coordination between the countries during the development of this project could prove beneficial if both countries were to implement systems.

The estimated cost for this system varies considerably depending upon the technologies selected for deployment and the desired functionality. The estimated cost for this project is $500,000. This estimate was developed based on the following prices of some components that would need to be included.

Diversion Plan –	$20,000
Trailblazers –	$10,000-$20,000 per sign
DMS –	$70,000 per sign
Detection –	method to be determined (Loop detection $5,000/site, VIVDS $10,000/site)
Communications –	Will vary with technology chosen, could be a significant cost to consider
HAR –	$25,000
CCTV –	$20,000-$25,000 per installation

Cameron County Bridge Coordination System

Associated Market Packages:

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

Prerequisite Projects: None

Description: A bridge coordination system will be implemented in Cameron County to optimize the flow of traffic from the United States to Mexico at bridges throughout Cameron County. This system will provide data to the Regional Bridge Coordination System for decision making and traffic routing. The purpose is to balance the flow of traffic to the bridges using a combination of ITS technologies such as detectors, decision support system (software), DMS, trailblazers, and the related communications equipment. Data provided by the detectors at the bridges will be used by a decision support system software to estimate the queue time at each bridge. This information will be sent to strategically located DMS, so drivers can decide which bridge to use to cross the border. This information will be updated every minute in order to maintain a balanced flow of vehicles to the bridges. In addition, trailblazers will be placed on primary roads with access to the bridges to guide drivers to their destination. A diversion plan should be developed for this purpose. The decision support system software will be included as part of the planned TxDOT TMC.

The estimated cost for this system varies considerably depending upon the technologies selected for deployment and the desired functionality. The estimated cost for this project is $400,000. This estimate was developed based on the Regional Bridge Coordination System. It is expected that the Cameron County Bridge Coordination System would be installed only on selected routes in the County and therefore the total cost is estimated to be lower than the Regional Bridge Coordination System.

Brownsville/Matamoros Electronic Toll Collection

Associated Market Packages:

- Electronic Toll Collection (ATMS10)

Prerequisite Projects: None

Description: Install lanes and facilities for electronic toll collection (ETC) at Brownsville/Matamoros border crossings. ETC systems allow commercial vehicles, residents, daily commuters, and visitors to pass through the toll lanes without stopping for payment of tolls. To participate in this program a customer must purchase a transponder and establish a pre-paid account. Transponders are small wireless devices that are installed on the inside of a vehicle windshield. Each a time motorist travels in the designated ETC lane(s), an overhead antenna reads the transponder and debits the toll amount from the pre-paid account.

The estimated cost per site is $250,000.

Incident Management Plans

Associated Market Packages:

- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Broadcast Traveler Information (ATIS01)
- Emergency Response (EM1)
- Emergency Routing (EM2)
- Hazmat Management (CVO10)

Prerequisite Projects: None

Description: Develop incident management plans for special events and emergency conditions in the Region. Traveler and traffic information dissemination guidelines, traffic control and emergency response procedures, emergency routing, and multi-agency coordination are all important aspects that should be addressed during the preparation of these plans. The estimated cost per plan is approximately $30,000.

MPOs/Cities/TxDOT Webpage

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: Develop joint website for MPOs, cities and TxDOT to provide information about traffic conditions, bridge/road closures, construction zones, etc. The purpose of this project is to keep the public informed so they can optimize their use of the transportation network. The initial investment on this project will be approximately $20,000 and will require annual updates of $10,000.

TxDOT District Webpage

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: Update and add new functionalities to the TxDOT Pharr District website, which currently provides information about traffic conditions, bridge/road closures, construction zones, etc. The initial cost of this project will be approximately $20,000 and it will require annual updates of $10,000.

Media Liaison and Coordination

Associated Market Packages:

- Traffic Information Dissemination (ATMS06)
- Broadcast Traveler Information (ATIS01)
- Work Zone Management (MC08)

Prerequisite Projects: None

Description: Develop stronger liaison and coordination with local media to disseminate traveler information. Develop a link for local media to tap into CCTV camera images for dissemination of traffic and weather advisories to the public via television and radio news broadcasts. Most TV and radio stations already have microwave licenses and infrastructure in place to support wireless transmission of video; therefore, TxDOT should provide a connection point at the TMC for media providers (e.g., video switch including video images and traffic conditions map), but not design and install the entire connection between the TMC and the media. An initial task in the project will be to meet with interested news providers to determine information needs to support media interface design. The cost of required equipment at the TMC is expected to be paid for by the media; however, this will be dependent on what type of agreement is put in place between TxDOT and the media.

TxDOT Highway/Rail Crossings

Associated Market Packages:

- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Standard Railroad Grade Crossing (ATMS13)
- Advanced Railroad Grade Crossing (ATMS14)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

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

City of McAllen Highway/Rail Crossings

Associated Market Packages:

- Surface Street Control (ATMS03)
- Traffic Information Dissemination
- Standard Railroad Grade Crossing (ATMS13)
- Advanced Railroad Grade Crossing (ATMS14)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: Install HRI equipment on at-grade rail crossings to improve safety and traveler information at several highway-rail intersections within the City of McAllen. The project will include traffic signal coordination, detector stations (speed and presence), gates, trapped vehicle alarm systems, and dynamic estimated time of arrival/departure signs. More sophisticated systems may include DMS, trailblazer signs, and CCTV. The DMS would display an advisory message informing motorists of the event ahead and suggesting the use of an alternate route. This route would be indicated through the use of trailblazers located strategically along the suggested route. In addition, CCTV cameras would provide visual confirmation of the events taking place at the highway-rail intersection. Performance monitoring of the equipment and interfaces should be incorporated into the system; detected abnormalities will be reported to both highway and railroad officials through wayside interfaces and interfaces to the TMC.

City of Harlingen Highway/Rail Coordination

Associated Market Packages:

- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Standard Railroad Grade Crossing (ATMS13)
- Advanced Railroad Grade Crossing (ATMS14)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: Install cameras and detector equipment along routes in the City of Harlingen to improve safety and provide enhanced rail operations coordination. Performance monitoring of the equipment and interfaces should be incorporated into the system; detected abnormalities will be reported to both highway and railroad officials through wayside interfaces and interfaces to the TMC.

The estimated cost for this project is approximately $770,000. The city has applied for a grant through the MPO but has not yet received it.

City of San Benito Highway/Rail Coordination

Associated Market Packages:

- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Standard Railroad Grade Crossing (ATMS13)
- Advanced Railroad Grade Crossing (ATMS14)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: Install HRI equipment on at-grade rail crossings to improve safety and traveler information at several highway-rail intersections within the City of San Benito. The project will include traffic signal coordination, detector stations (speed and presence), gates, trapped vehicle alarm systems, and dynamic estimated time of arrival/departure signs. More sophisticated systems may include DMS, trailblazer signs, and CCTV. The DMS would display an advisory message informing motorists of the event ahead and suggesting the use of an alternate route. This route would be indicated through the use of trailblazers located strategically along the suggested route. In addition, CCTV cameras would provide visual confirmation of the events taking place at the highway-rail intersection. Performance monitoring of the equipment and interfaces should be incorporated into the system; detected abnormalities will be reported to both highway and railroad officials through wayside interfaces and interfaces to the TMC.

ITS Element Implementation as Part of West Rail Relocation

Associated Market Packages:

- Surface Street Control (ATMS03)
- Traffic Information Dissemination (ATMS06)
- Standard Railroad Grade Crossing (ATMS13)
- Advanced Railroad Grade Crossing (ATMS14)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: Install ITS elements for HRI coordination as part of the West Rail Relocation project. The project will include traffic signal coordination, detector stations (speed and presence), gates, trapped vehicle alarm systems, and other ITS technologies. Performance monitoring of the equipment and interfaces should be incorporated into the system; detected abnormalities will be reported to both highway and railroad officials through wayside interfaces and interfaces to the TMC.

The estimated cost for this project is approximately $500,000. Funding has already been identified.

Emergency Management

Computer-Aided Dispatch (CAD)

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement CAD system for dispatching fire/emergency vehicles, communications between dispatch and fire/emergency vehicles, and storing incident and call-out information. CAD fully automates call taking and dispatching functions. Multiple emergency management agencies will be able to use the same system to initiate and manage incidents and dispatch resources for more effective incident response. During a major event requiring a multi-agency response, all agencies will work from the same incident data and immediately will know what resources have been committed.

AVL on Emergency Vehicles

Associated Market Packages:

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

Prerequisite Projects: None

Description: Install AVL on emergency vehicles. The AVL system will convey information regarding real-time vehicle location to an Emergency Dispatch Center, which will allow for enhanced system monitoring and routing (or re-routing), as well as provide for precise vehicle location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of vehicles, and relay that information back to an emergency management center, usually via global positioning system. Used with a geographic information system (GIS) map, emergency vehicle locations can be displayed for any vehicles in the fleet equipped with an on-board AVL unit. AVL, in conjunction with Computer Aided Dispatch, allows for improved vehicle tracking capability, as well as archiving and managing historical data. The estimated cost is $10,000 per vehicle.

Fire Mobile Data System

Associated Market Packages:

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

Prerequisite Projects: None

Description: This project is currently funded and is already in process. Funding will be used to purchase mobile data terminals (MDTs), computer hardware, and computer software needed to implement the new technology in fire vehicles. This system will enable fire officers to access information regarding the nearest route and geographical location of an incident. Fire officers will be able to view essential operational information such as water supplies, the storage of hazardous materials, type of occupancy, etc. Communication with the CAD system will be provided which will offer the opportunity to benefit from other information and datasets held and maintained by other fire departments, the counties and other agencies such as police departments, ambulance services, and utility companies.

Emergency Vehicle Signal Preemption

Associated Market Packages:

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

Prerequisite Projects: None

Description: Equip intersections and emergency vehicles (including police, fire and EMS vehicles) with traffic signal preemption equipment. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have been proven to improve safety of emergency personnel and apparatus en-route to an incident.

Hurricane Evacuation Plan

Associated Market Packages:

- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Emergency Response (EM1)
- Emergency Routing (EM2)

Prerequisite Projects: None

Description: Develop a hurricane evacuation plan for the Lower RGV Region. These plans will include the use of DMS and signal timing plan modifications in order to achieve timely and efficient evacuation of the Region. The estimated cost is approximately $100,000.

Emergency Response Plans

Associated Market Packages:

- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Incident Management System (ATMS08)
- Emergency Response (EM1)
- Emergency Routing (EM2)

Prerequisite Projects: None

Description: Develop emergency response plans for a total of 30 scenarios, to respond to emergencies and disasters in the Lower RGV Region. The purpose of this project is to design policies to guide disaster management planners and emergency responders, and to provide a consistently high level of preparedness at the different agencies in the Region. The estimated cost is $150,000 (30 plans at $5,000 each).

Maintenance and Construction Management

TxDOT Flood Detection Stations

Associated Market Packages:

- Network Surveillance (ATMS01)
- Traffic Information Dissemination (ATMS06)
- Road Weather Data Collection (MC03)
- Weather Information Processing and Distribution (MC04)
- Roadway Maintenance and Construction (MC07)

Prerequisite Projects: None

Description: Implement warning systems on flood-prone low water crossings in the Lower RGV Region. This will enable faster response times by maintenance crews to close flooded or near flooded roadway segments as necessary. The typical flood detection station is composed of a stream gauge, a rain gauge, a temperature sensor, a wind speed sensor, and a wind direction sensor as well as remote communications support. Other upgrades that may support operational decision making include sensors to measure relative humidity, soil moisture content, solar radiation, and air and water quality. The flood detection systems will be monitored from the TxDOT Regional TMC. Communications between the flood detection stations and the TMC can be achieved through a variety of wireline and wireless telemetry methods. Satellite and cellular communications technologies are currently being considered for this project.

Costs for this project will vary based on the number of locations and detection stations installed, as well as the communications method selected. The estimated cost is $25,000 per site, including communications.

TxDOT Workzone Management

Associated Market Packages:

- Workzone Management (MC08)
- Work Zone Safety Monitoring (MC09)

Prerequisite Projects: None

Description: Deploy temporary diversion plans using DMS, CCTV, and trailblazer signs for maintenance and construction workzones. The following aspects should be covered as part this project:

- Coordination with TMCs to help support workzone monitoring;
- Enhanced information sharing with public and private entities;
- Implementation of speed warning signs for workzones; and
- Contractor requirements to implement consistent workzone management and safety procedures.

The estimated cost for this project is $200,000.

Public Transportation Management

BUS Automated Vehicle Location (AVL) Expansion and Mobile Data Terminals (MDTs)

Associated Market Packages:

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

Prerequisite Projects: None

Description: Install AVL and MDT units on additional fixed route buses and paratransit vehicles. The AVL system will convey information regarding real-time vehicle location to the TMC, which will allow for enhanced system monitoring, scheduling, routing (or re-routing), as well as provide for precise bus location information in the event of a breakdown or emergency situation. AVL systems measure actual, real-time position of transit vehicles, and relay that information back to the TMC, usually via global positioning system. Used with a GIS map, bus locations can be displayed for any vehicles in the fleet equipped with the on-board AVL unit. AVL, in conjunction with computer aided dispatch, allows for improved bus tracking capability, as well as archiving and managing historical data. AVL systems also can be equipped with additional features, including tie-ins to alarm/security systems, vehicle component monitoring, and automatic passenger counter and fare payment systems. In areas where AVL technology has been installed on buses, agencies report a 5-25 percent increase in on-time performance, which translates directly to improved efficiency and operations.

MDTs will allow bus operators to send and receive digital messages. MDTs can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the scheduled route for both fixed-route and demand-response transit operations. MDTs also can transmit information from the

driver to the dispatch center, including status, disruptions, or silent alarms. An additional feature that can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

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

BUS Electronic Fare Collection

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: None

Description: Install system to allow transit users to use an electronic payment device on-board transit vehicles. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patrons. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

BUS estimates the cost per bus to be approximately $5,000.

BUS Computer Aided Dispatch (CAD) and Transit Operations Center

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a centralized transit dispatch and operations center with CAD system. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information (including a customer call center) and other functions. Communications links between this location and the Lower RGV TMCs will be added to facilitate information sharing.

The total estimated cost of the project is $420,000.

BUS Kiosks and Information Displays

Associated Market Packages:

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Passenger and Fare Management (APTS04)
- Transit Traveler Information (APTS08)

Prerequisite Projects: BUS Computer Aided Dispatch and Transit Operations Center, BUS Electronic Fare Collection

Description: Install traveler information and electronic payment card kiosks at major transfer centers or hubs (i.e., civic centers and buildings, event venues, etc.). The project also includes the installation of information displays at the central transfer station showing current bus locations. The estimated cost for this project is $300,000.

BUS Smart Stop

Associated Market Packages:

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

Prerequisite Projects: BUS Computer Aided Dispatch and Transit Operations Center

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

Costs will vary depending on the number of bus stops equipped with the proposed technologies. For planning purposes, it is estimated that the cost per stop is approximately $30,000.

BUS Public Announcement

Associated Market Packages:

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

Prerequisite Projects: BUS AVL Expansion and Mobile Data Terminals

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

the stop. Routes and their stops are programmed into the system and bus operators recalibrate the system at the origination stop for the route they will travel.

These automated systems use a number of different technologies, including a global positioning system (GPS) receiver and an odometer sensor. It is estimated that the cost for this project is approximately $100,000.

McAllen Express AVL and MDTs

Associated Market Packages:

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

Prerequisite Projects: None

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

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

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

McAllen Express Electronic Fare Collection

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: None

Description: Install system to allow transit users to use an electronic payment device on-board transit vehicles. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patrons. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

The cost per vehicle is approximately $5,000. The McAllen Express has 10 buses in their fleet.

McAllen Express CAD and Transit Operations Center

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a centralized transit dispatch and operations center with CAD system. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information and other functions. Communications links between this location and the Lower RGV TMCs will be added to facilitate information sharing.

The total estimated cost of the project is $200,000.

McAllen Express Kiosks and Information Displays

Associated Market Packages:

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Passenger and Fare Management (APTS04)
- Transit Traveler Information (APTS08)

Prerequisite Projects: McAllen Express CAD and Transit Operations Center, McAllen Express Electronic Fare Collection

Description: Install traveler information and electronic payment card kiosks at major transfer centers or hubs (i.e., civic centers and buildings, event venues, etc.). The project also includes the installation of

information displays at the central transfer station showing current bus locations. The estimated cost for this project is $200,000.

McAllen Express Smart Stop

Associated Market Packages:

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

Prerequisite Projects: McAllen Express CAD and Transit Operations Center

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

Costs will vary depending on the number of bus stops equipped with the proposed technologies. For planning purposes, it is estimated that the cost per stop is approximately $30,000.

McAllen Express Public Announcement

Associated Market Packages:

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

Prerequisite Projects: McAllen Express AVL and MDTs

Description: Install equipment to annunciate the next bus stop automatically. These systems usually perform several functions. They automatically announce the next stop within the bus; at the same time, a visual stop announcement appears on a lighted digital display sign located inside the bus; and, when the bus door opens, it triggers an external speaker that announces the bus route to passengers waiting at the stop. Routes and their stops are programmed into the system and bus operators recalibrate the system at the origination stop for the route they will travel.

These automated systems use a number of different technologies, including a global positioning system (GPS) receiver and an odometer sensor. It is estimated that the cost for this project is approximately $100,000.

Rio Metro AVL and MDTs

Associated Market Packages:

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

Prerequisite Projects: None

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

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

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

Rio Metro Electronic Fare Collection

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: None

Description: Install system to allow transit users to use an electronic payment device on-board transit vehicles. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patrons. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

The cost per vehicle is approximately $5,000. Rio metro has a fleet of eight vehicles.

Rio Metro CAD and Transit Operations Center

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a centralized transit dispatch and operations center with CAD system. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information and other functions. Communications links between this location and the Lower RGV TMCs will be added to facilitate information sharing.

The total estimated cost of the project is $200,000.

Rio Metro Kiosks and Information Displays

Associated Market Packages:

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Passenger and Fare Management (APTS04)
- Transit Traveler Information (APTS08)

Prerequisite Projects: Rio Metro CAD and Transit Operations Center, Rio Metro Electronic Fare Collection

Description: Install traveler information and electronic payment card kiosks at major transfer centers or hubs (i.e., civic centers and buildings, event venues, etc.). The project also includes the installation of

information displays at the central transfer station showing current bus locations. The estimated cost for this project is $300,000.

Rio Metro Smart Stop

Associated Market Packages:

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

Prerequisite Projects: Rio Metro CAD and Transit Operations Center

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

Costs will vary depending on the number of bus stops equipped with the proposed technologies. For planning purposes, it is estimated that the cost per stop is approximately $30,000.

Rio Metro Public Announcement

Associated Market Packages:

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

Prerequisite Projects: Rio Metro AVL and MDTs

Description: Install equipment to annunciate the next bus stop automatically. These systems usually perform several functions. They automatically announce the next stop within the bus; at the same time, a visual stop announcement appears on a lighted digital display sign located inside the bus; and, when the bus door opens, it triggers an external speaker that announces the bus route to passengers waiting at the stop. Routes and their stops are programmed into the system and bus operators recalibrate the system at the origination stop for the route they will travel.

These automated systems use a number of different technologies, including a global positioning system (GPS) receiver and an odometer sensor. It is estimated that the cost for this project is approximately $100,000.

Harlingen Express AVL and MDTs

Associated Market Packages:

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

Prerequisite Projects: None

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

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

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

Harlingen Express Electronic Fare Collection

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: None

Description: Install system to allow transit users to use an electronic payment device on-board transit vehicles. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patrons. Electronic fare payment technology is rapidly advancing, and there will be several technological

considerations that will need to be examined, such as standards for smart cards and interoperability issues.

The cost per vehicle is approximately $5,000. The Harlingen Express fleet has two vehicles.

Harlingen Express CAD and Transit Operations Center

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a centralized transit dispatch and operations center with CAD system. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information and other functions. Communications links between this location and the Lower RGV TMCs will be added to facilitate information sharing.

The total estimated cost of the project is $100,000.

Rio Transit AVL and MDTs

Associated Market Packages:

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

Prerequisite Projects: Rio Transit CAD and TOC

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

MDTs will allow bus operators to send and receive digital messages. MDTs can be used by dispatchers to notify drivers of adverse conditions, route changes, or other impacts to the scheduled route for both fixed-route and demand-response transit operations. MDTs also can transmit information from the driver to the dispatch center, including status, disruptions, or silent alarms. An additional feature that

can be built-in to the MDT is the ability for vehicle-to-vehicle digital communications, in addition to the vehicle-to-center communications.

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions). For planning purposes, the estimated cost is $10,000 per vehicle. There are 16 vehicles in the Rio Transit fleet.

Rio Transit Electronic Fare Collection

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: None

Description: Install system to allow transit users to use an electronic payment device on-board transit vehicles. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patrons. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

The cost per vehicle is approximately $5,000. The Rio Transit fleet has 16 vehicles.

Rio Transit CAD and Transit Operations Center

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a centralized transit management and operations center for transit vehicles. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information (including customer call center) and other functions. Upgrading to computer-aided dispatch (CAD) will streamline communications between dispatchers and drivers. A CAD system also improves the system reporting functions by automatically logging all communications between the dispatch center and the driver, including time, vehicle/driver, nature of the communication, and response. The estimated cost to deploy this system is $100,000.

Rio Transit Kiosks and Information Displays

Associated Market Packages:

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Passenger and Fare Management (APTS04)
- Transit Traveler Information (APTS08)

Prerequisite Projects: Rio Transit CAD and Transit Operations Center, Rio Transit Electronic Fare Collection

Description: Install traveler information and electronic payment card kiosks at major transfer centers or hubs (i.e., civic centers and buildings, event venues, etc.). The project also includes the installation of information displays at the central transfer station showing current bus locations. The estimated cost for this project is $300,000.

Rio Transit Smart Stop

Associated Market Packages:

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

Prerequisite Projects: Rio Transit CAD and Transit Operations Center

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

Costs will vary depending on the number of bus stops equipped with the proposed technologies. For planning purposes, it is estimated that the cost per stop is approximately $30,000.

Rio Transit Public Announcement

Associated Market Packages:

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

Prerequisite Projects: Rio Transit AVL and MDTs

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

the stop. Routes and their stops are programmed into the system and bus operators recalibrate the system at the origination stop for the route they will travel.

These automated systems use a number of different technologies, including a global positioning system (GPS) receiver and an odometer sensor. It is estimated that the cost for this project is approximately $100,000.

The Wave AVL and MDTs

Associated Market Packages:

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

Prerequisite Projects: The Wave CAD and TOC

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

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

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

The Wave Electronic Fare Collection

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: None

Description: Install system to allow transit users to use an electronic payment device on-board transit vehicles. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patrons. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

The cost per vehicle is approximately $5,000. The Wave fleet has four vehicles.

The Wave CAD and Transit Operations Center

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a centralized transit management and operations center for transit vehicles. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information (including customer call center) and other functions. Upgrading to computer-aided dispatch (CAD) will streamline communications between dispatchers and drivers. A CAD system also improves the system reporting functions by automatically logging all communications between the dispatch center and the driver, including time, vehicle/driver, nature of the communication, and response. The estimated cost to deploy this system is $100,000.

The Wave Kiosks and Information Displays

Associated Market Packages:

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Passenger and Fare Management (APTS04)
- Transit Traveler Information (APTS08)

Prerequisite Projects: The Wave CAD and Transit Operations Center, The Wave Electronic Fare Collection

Description: Install traveler information and electronic payment card kiosks at major transfer centers or hubs (i.e., civic centers and buildings, event venues, etc.). The project also includes the installation of information displays at the central transfer station showing current bus locations. The estimated cost for this project is $300,000.

The Wave Smart Stop

Associated Market Packages:

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

Prerequisite Projects: The Wave CAD and Transit Operations Center

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

Costs will vary depending on the number of bus stops equipped with the proposed technologies. For planning purposes, it is estimated that the cost per stop is approximately $30,000.

The Wave Public Announcement

Associated Market Packages:

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

Prerequisite Projects: The Wave AVL and MDTs

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

the stop. Routes and their stops are programmed into the system and bus operators recalibrate the system at the origination stop for the route they will travel.

These automated systems use a number of different technologies, including a global positioning system (GPS) receiver and an odometer sensor. It is estimated that the cost for this project is approximately $100,000.

Rainbow Lines AVL and MDTs

Associated Market Packages:

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

Prerequisite Projects: Rainbow Lines CAD and TOC

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

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

Cost will vary depending on the number of vehicles equipped with AVL/MDT systems, as well as the functions and features designed into the systems (above the basic location and digital communication functions). For planning purposes, the estimated cost is $10,000 per vehicle. There are 28 vehicles in the Rainbow Lines fleet.

Rainbow Lines Electronic Fare Collection

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: None

Description: Install system to allow transit users to use an electronic payment device on-board transit vehicles. There are three primary benefits of these electronic fare collection systems. The first is enhanced revenue collection ability. The second is increased security by not having large amounts of cash or tokens on the vehicle. The third is the increased convenience and security for the transit patrons. Electronic fare payment technology is rapidly advancing, and there will be several technological considerations that will need to be examined, such as standards for smart cards and interoperability issues.

The cost per vehicle is approximately $5,000. The Rainbow Lines fleet has 28 vehicles.

Rainbow Lines CAD and Transit Operations Center

Associated Market Packages:

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

Prerequisite Projects: None

Description: Implement a centralized transit management and operations center for transit vehicles. A centralized transit management center will serve as the hub for transit operations, dispatch, transit travel information (including customer call center) and other functions. Upgrading to computer-aided dispatch (CAD) will streamline communications between dispatchers and drivers. A CAD system also improves the system reporting functions by automatically logging all communications between the dispatch center and the driver, including time, vehicle/driver, nature of the communication, and response. The estimated cost to deploy this system is $100,000.

Rainbow Lines Kiosks and Information Displays

Associated Market Packages:

- Transit Fixed Route Operations (APTS02)
- Demand-Response Transit Operations (APTS03)
- Transit Passenger and Fare Management (APTS04)
- Transit Traveler Information (APTS08)

Prerequisite Projects: Rainbow Lines CAD and Transit Operations Center, Rainbow Lines Electronic Fare Collection

Description: Install traveler information and electronic payment card kiosks at major transfer centers or hubs (i.e., civic centers and buildings, event venues, etc.). The project also includes the installation of information displays at the central transfer station showing current bus location. The estimated cost for this project is $300,000.

Rainbow Lines Smart Stop

Associated Market Packages:

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

Prerequisite Projects: Rainbow Lines CAD and Transit Operations Center

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

Costs will vary depending on the number of bus stops equipped with the proposed technologies. For planning purposes, it is estimated that the cost per stop is approximately $30,000.

Rainbow Lines Public Announcement

Associated Market Packages:

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

Prerequisite Projects: Rainbow Lines AVL and MDTs

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

waiting at the stop. Routes and their stops are programmed into the system and bus operators recalibrate the system at the origination stop for the route they will travel.

These automated systems use a number of different technologies, including a global positioning system (GPS) receiver and an odometer sensor. It is estimated that the cost for this project is approximately $100,000.

Commercial Vehicle Operations

CVISN Cameras

Associated Market Packages:

- Electronic Clearance (CV03)
- CV Administrative Processes (CVO04)

Prerequisite Projects: CVISN Fiber Connection

Description: This project consists of the deployment of Commercial Vehicle Information Systems and Networks (CVISN) cameras at selected locations throughout the Lower RGV Region. This project will provide for the delivery of real-time safety information to roadside inspectors to more precisely target unsafe carriers; the creation of systems to facilitate electronic processing of registration, tax credentials and permits; and the electronic clearance of commercial vehicles past weigh stations along highways. CVISN is a statewide project. The estimated deployment cost per site is between $25,000 and $30,000.

CVISN Fiber Connection

Associated Market Packages:

- Electronic Clearance (CV03)

Prerequisite Projects: Lower RGV Regional Telecommunications Master Plan

Description: This project consists of the deployment of fiber connections to all CIVSN sites throughout the Lower RGV Region. This is a statewide project. Cost for this project is to be determined.

Electronic Clearance Sites

Associated Market Packages:

- Electronic Clearance Sites (CVO03)
- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CVO05)

Prerequisite Projects: None

Description: This project consists of the installation of additional electronic screening stations for electronic clearance of commercial vehicles at international border crossings in the Lower RGV. The

purpose of these deployments is the integration of electronic information systems and technologies in order to facilitate the safe and efficient movement of goods between the United States and Mexico. These systems usually consist of dedicated short-range communications (DSRC) equipment, a radio frequency (RF) local area network (LAN), and signaling devices. The system will be designed to provide an interface between vehicles traversing the border and United States agencies such as INS, U.S. Customs, and the U.S. Border Patrol. Operating in a manner consistent with weigh station bypass systems currently in operation throughout the United States, information stored on a transponder placed inside the vehicle is retrieved for use in processing vehicles across the border.

A similar system may be added in the future for passenger vehicles at international border crossings.

City of Pharr Bridge AVI System

Associated Market Packages:

- Electronic Clearance (CVO03)
- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CVO05)

Prerequisite Projects: None

Description: Implement automated vehicle identification (AVI) system to allow for automated clearance at this City of Pharr international border crossing. The system is typically comprised of a data processing system, the field reader system, and the AVI tags. As vehicles equipped with AVI tags pass by the reader site, antennas recognize the tags and report the tag reads to the data processing system. The facility at the bridge will communicate with the commercial vehicle administration subsystem to retrieve critical carrier, vehicle, and driver data to be used to sort passing vehicles. This will allow a good driver/vehicle/carrier to cross the international border at highway speed. Interfaces with government agencies such as customs and immigration will be used to check compliance with import/export and immigration regulations to allow release of cargo, vehicle, and driver across the international border. The cost for this system is estimated to range between $100,000 and $150,000.

Border Checkpoints

Associated Market Packages:

- Electronic Clearance (CV03)
- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CV05)

Prerequisite Projects: None

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

Overweight Commercial Vehicle Payment Verification System

Associated Market Packages:

- CV Administrative Processes (CVO04)
- Weigh-In-Motion (CVO06)

Prerequisite Projects: CVISN

Description: Implement a method to check on fee payment for trucks over 80,000 pounds. The system would allow enforcement officers to quickly verify the payment of overweight fees on trucks. It is expected that this system would tie in to other types of electronic clearance sites implemented in the Region. The cost and extent of deployment of this type of system has not been determined.

Internet Enabled IRP Registration

Associated Market Packages:

- CV Administrative Processes (CVO04)

Prerequisite Projects: CVISN

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

Internet Enabled Motor Carrier Registration

Associated Market Packages:

- CV Administrative Processes (CVO04)

Prerequisite Projects: CVISN

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

This process is currently performed by mail, fax, or in person. After the implementation of the internet-based process, the carrier will enter application data through the on-line application, an automated system will review the application for completion and compliance with department requirements, fees

will be calculated immediately, and a payment will be submitted electronically (charged against a credit card). The system will issue credentials within minutes of application.

Internet Enabled International Fuel Tax Agreement (IFTA) Registration

Associated Market Packages:

- CV Administrative Processes (CVO04)

Prerequisite Projects: CVISN

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

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

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

US Customs HAZMAT Management

Associated Market Packages:

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

Prerequisite Projects: None

Description: HAZMAT management integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents. The emergency management agencies are notified by the commercial vehicle on-board systems or other source if an incident occurs. The response is then tailored to the situation based on information that is provided as part of the incident notification. The project also includes the implementation of HAZMAT radiation detectors at border crossings.

Information Management

Regional Transportation Data Archival System

Associated Market Packages:

- ITS Virtual Data Warehouse (AD03)

Prerequisite Projects: TxDOT Interim Regional Transportation Management Center (TMC)

Description: Implement a system to archive ITS data from multiple agencies. A central archived data server will be developed at the TxDOT Regional TMC that will collect, process, store and provide access to historical ITS data from throughout the Region. Communication links will be necessary between TxDOT and the other data sources. This project will design the frequency, quantity, and quality of data to be collected and stored. Price will be very dependent on the amount of information that is desired and the functionality of the archival system. For planing purposes, the estimated cost to implement this system is approximately $200,000.

TxDOT TMC Database Query System

Associated Market Packages:

- ITS Virtual Data Warehouse (AD03)

Prerequisite Projects: TxDOT Interim Regional Transportation Management Center (TMC)

Description: User interfaces will be installed at the TxDOT Regional TMC to access, search, and upload archived data as needed. The interface will likely be web-based. The estimated cost to install this system is approximately $100,000 and includes software and training. This system would most likely be established concurrently with the interim TMC.

Table 7 – Mid-Term Projects (10-Year)

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
TxDOT Regional Transportation Management Center (TMC)	Installation of equipment needed to monitor and manage traffic flow in the Lower RGV Region. Incidents will be detected and verified and incident information provided to the appropriate agencies. This will be a permanent facility located at the TxDOT Pharr District Offices.	TxDOT Pharr District	$225-$350 per square foot	No	18 months
TxDOT Freeway Communications Network	Implement communications network to support center-to-field communications of freeway control infrastructure	TxDOT	To Be Determined	No	1 year
TxDOT Lane Control Signals	Install lane control signals on freeways	TxDOT	$15,000 per site	No	1 year
TxDOT TMC to Local TMC Communication for Smaller Cities	Project to link TxDOT TMC with local TMCs in San Benito, South Padre Island and other smaller cities as determined in the future	TxDOT/San Benito/South Padre Island/Local Cities	$100,000 plus $7,000/year	No	1 year
Regional 511 Advanced Traveler Information System Server	Implement an advanced traveler information system server in the TxDOT TMC that will collect, consolidate and distribute travel information to 511 phone based system, the web, and private Information Service Providers (ISPs)	TxDOT	To Be Determined	No	1 year
City of Brownsville TMC	Installation of equipment needed to monitor and manage traffic flow in the City of Brownsville	City of Brownsville	$200,000	No	1 year
City of Harlingen TMC	Installation of equipment needed to monitor and manage traffic flow in the City of Harlingen	City of Harlingen	$200,000	No	1 year
City of McAllen DMS Deployment	Install DMS on arterials approaching freeways	City of McAllen	$80,000/sign	No	1 year
Hidalgo/Reynosa Bridge Management System	Implement system to optimize the flow of traffic from the United States to Mexico	McAllen Bridge Board	$400,000	No	1 year
Pharr/Reynosa Bridge Management System	Implement system to optimize the flow of traffic from the United States to Mexico	City of Pharr	$400,000	No	1 year

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Emergency Management					
Emergency Vehicle Signal Preemption Expansion	Continue installation of signal preemption for emergency vehicles	Emergency Management Agencies	To Be Determined	No	1 year
Fire/EMS/HAZMAT Management	Implement a system to handle HAZMAT related incidents from a centralized location (Fire/EMS/HAZMAT Dispatch)	Fire/EMS/Hazmat Agencies	To Be Determined	No	2 years
Maintenance and Construction Management					
Work Zone Safety Monitoring (Engineering)	Require major construction contracts to include work zone safety monitoring procedures and equipment	TxDOT/Other maintenance agencies	N/A	No	On-going
Work Zone Safety Monitoring (Equipment)	Install detection equipment and warning systems for work zones	TxDOT/Other maintenance agencies	$500,000	No	6 months
Maintenance and Construction Vehicle AVL	Installation of AVL system on maintenance and construction vehicles	TxDOT/Other Maintenance Agencies	$100,000	No	1 year
Public Transportation Management					
BUS On Board Video Security System	Install security cameras on fixed route buses and paratransit vehicles	BUS	$15,000/vehicle	No	6 months
McAllen Express On Board Video Security System	Install security cameras on fixed route buses and paratransit vehicles	Lower Rio Grande Valley Development Council	$15,000/vehicle	No	6 months
Rio Metro On Board Video Security System	Install security cameras on fixed route buses and paratransit vehicles	Lower Rio Grande Valley Development Council	$15,000/vehicle	No	6 months
Harlingen Express On Board Video Security System	Install security cameras on fixed route buses and paratransit vehicles	Lower Rio Grande Valley Development Council	$15,000/vehicle	No	6 months
Rio Transit On Board Video Security System	Install security cameras on Rio Transit vehicles	Lower Rio Grande Valley Development Council	$15,000/vehicle	No	6 months
The Wave On Board Video Security System	Install security cameras on Wave transit buses	Town of South Padre Island	$15,000/vehicle	No	6 months

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Rainbow Lines On Board Video Security System	Install security cameras on Rainbow Lines transit vehicles	Community Action Council of South Texas	$15,000/vehicle	No	6 months
Ridesharing Website	Develop a website to enable commuter access to rideshare matching and transit schedule information	Transit Providers	$20,000	No	6 months
Commercial Vehicle Operations					
CVISN Expansion	Continued deployment of CVISN	TxDOT	To Be Determined	Yes	To Be Determined

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

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

Lower RGV Region
Mid-Term Projects (10-Year)

Travel and Traffic Management

TxDOT Regional Transportation Management Center (TMC)

Associated Market Packages:

- Network Surveillance (ATMS01)
- Surface Street Control (ATMS03)
- Freeway Control (ATMS04)
- Traffic Information Dissemination (ATMS06)
- Regional Traffic Control (ATMS07)
- Incident Management System (ATMS08)
- Railroad Operations Coordination (ATMS15)
- Work Zone Management (MC08)
- Broadcast Traveler Information (ATIS01)

Prerequisite Projects: TxDOT Interim Regional TMC

Description: The TMC will be a central facility for monitoring, controlling, and managing transportation systems in the Lower RGV Region. Incidents will be detected and verified and incident information will be provided to the appropriate agencies, such as DPS, fire and police dispatch, and also to third party providers. Some ITS technologies that will be used by this center are DMS, CCTV cameras, and traffic detectors. The Regional TMC will serve as the US Customs' point of contact to provide bridge conditions. The 511 traveler information phone services will also be incorporated.

This project builds a permanent TMC in conjunction with a regional training center planned for the TxDOT Pharr District. The cost estimate ranges from $225-$350 a square foot for addition of a TMC in the training center. Equipment from the interim TMC will be relocated to the new TMC once it is completed.

TxDOT Freeway Communications Network

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan

Description: Implement communications network to support center-to-field communications of freeway control infrastructure (e.g., from the TMCs out to the field devices, traffic signals, etc.). The project includes an analysis of technology and transmission media options and will compare technologies, bandwidths, life cycle costs, and other requirements against the Region's needs and goals. Strong coordination among transportation agencies is encouraged since there may be significant benefits in combining capital improvement funds to install telecommunications infrastructure to support interagency coordination needs. Cost for this project will be dependent on the technologies used and the extent of deployment.

TxDOT Lane Control Signals

Associated Market Packages:

- Freeway Control (ATMS04)
- Incident Management System (ATMS08)

Prerequisite Projects: TxDOT Interim Regional Transportation Management Center (TMC), Lower RGV Regional Communications Master Plan.

Description: Install lane control signals on freeways throughout the Lower RGV Region. These signals will indicate lane blockage to motorists. The signals can be utilized to provide drivers with early warning for congested lanes, incidents, or maintenance activities that are obstructing a lane. The estimated cost per site is approximately $15,000.

TxDOT TMC to Local TMC Communication for Smaller Cities

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan

Description: Implement communications link between the TxDOT Regional TMC and local TMCs to allow shared viewing of video, traffic information, and other mutually beneficial data. San Benito and South Padre Island are among the cities to be connected with this project. Other cities can be included as the need is determined.

One server is needed at each center, which will be connected via fiber optic cable (conduit does exist along some routes). Shared monitoring and control capabilities provided through the connection could also allow for joint operations of city equipment (i.e., traffic signals) by TxDOT Regional TMC staff, such as for after-hours or on weekends, if the TxDOT Regional TMC serves as a 24/7 facility. Data and video sharing and other joint operation policies will need to be developed and agreed upon between TxDOT and the cities. The cost of this project is estimated to be $100,000 plus $7,000 a year for leasing fees as required.

Regional 511 Advanced Traveler Information System Server

Associated Market Packages:

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

Prerequisite Projects: TxDOT Interim Regional TMC, TxDOT Center-to-Center Communications

Description: Install a server dedicated to traveler information in the TxDOT Lower RGV Regional TMC. This server would be installed as part of a 511 phone based traveler information system rollout in Texas and would provide a gateway for public and private entities to access current conditions, closures, restrictions, weather, and other valuable travel information. Relevant data would be sent to the server where it would be consolidated and 'packaged' for distribution via phone (511) and web as well as to private partners who desire access to information in the Lower RGV Region. These private partners could include local media and information service providers, which would link to the server to download information, or obtain real-time feeds, depending on the link provided by the private partner. Appropriate security measures and firewalls should be designed into the server to allow or restrict access to registered, authorized users only. By fusing various types of data from a variety of sources (traffic management, incident management, weather, etc.), usable information can be provided to travelers as well as other agencies. The cost for this project has not been determined.

City of Brownsville TMC

Associated Market Packages:

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

Prerequisite Projects: TxDOT TMC to Local TMC Communication, City of Brownsville Traffic Signal System

Description: Installation of equipment needed to monitor and manage traffic flow in the city of Brownsville. Incidents will be detected and verified using VIVDS and CCTV cameras. Control of closed loop signal systems in the City of Brownsville will also occur from the TMC. The estimated cost for this TMC is approximately $200,000.

City of Harlingen TMC

Associated Market Packages:

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

Prerequisite Projects: TxDOT TMC to Local TMC Communication, City of Harlingen Traffic Signal System

Description: Installation of equipment needed to monitor and manage traffic flow in the city of Harlingen. Incidents will be detected and verified using VIVDS and CCTV cameras. Control of closed loop signal systems in the City of Harlingen also will occur from the TMC. The estimated cost for this TMC is approximately $200,000.

City of McAllen DMS Deployment

Associated Market Packages:

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

Prerequisite Projects: Lower RGV Regional Communications Master Plan

Description: This project consists of the deployment of permanent DMS at locations along arterial facilities approaching freeways within the City of McAllen for purposes of traffic information dissemination and incident management. When appropriate, special messaging may be provided for special events. DMS also will be utilized in conjunction with emergency evacuation coordination (i.e., HAZMAT, weather, etc.). The estimated cost per sign is approximately $80,000.

Hidalgo/Reynosa Bridge Management System

Associated Market Packages:

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

Prerequisite Projects: None

Description: A bridge coordination system will be implemented to optimize the flow of traffic from the United States to Mexico. The data collected from the Hidalgo/Reynosa Bridge will be used to make regional coordination decisions. The purpose is to balance the flow of traffic to the bridges using a combination of ITS technologies such as detectors, decision support system (software), DMS, trailblazers, and the related communications equipment. Data provided by the detectors at the bridges will be used by a decision support system software to estimate the queue time at each bridge. This information will be sent to strategically located DMS, so drivers can decide which bridge to use to cross the border. This information will be updated every minute in order to maintain a balanced flow of vehicles to the bridges. In addition, trailblazers will be placed on primary roads with access to the bridges to guide drivers to their destination. A diversion plan should be developed for this purpose. The decision support system software will be included as part of the planned TxDOT TMC.

The estimated cost for this system varies considerably depending upon the technologies selected for deployment and the desired functionality. The estimated cost for this project is $400,000. This was developed based on prices identified under the Regional Bridge Coordination System. It is expected that this project would be implemented for local needs only and therefore the cost is estimated lower that the Regional Bridge Coordination System.

Pharr/Reynosa Bridge Management System

Associated Market Packages:

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

Prerequisite Projects: None

Description: A bridge coordination system will be implemented to optimize the flow of traffic from the United States to Mexico. The data collected from the Pharr/Reynosa Bridge will be used to make regional coordination decisions. The purpose is to balance the flow of traffic to the bridges using a combination of ITS technologies such as detectors, decision support system (software), DMS, trailblazers, and the related communications equipment. Data provided by the detectors at the bridges will be used by a decision support system software to estimate the queue time at each bridge. This information will be sent to strategically located DMS, so drivers can decide which bridge to use to cross the border. This information will be updated every minute in order to maintain a balanced flow of vehicles to the bridges. In addition, trailblazers will be placed on primary roads with access to the bridges to guide drivers to their destination. A diversion plan should be developed for this purpose. The decision support system software will be included as part of the planned TxDOT TMC.

The estimated cost for this system varies considerably depending upon the technologies selected for deployment and the desired functionality. The estimated cost for this project is $400,000. This was developed based on prices identified under the Regional Bridge Coordination System. It is expected that this project would be implemented for local needs only and therefore the cost is estimated lower that the Regional Bridge Coordination System.

Emergency Management

Emergency Vehicle Signal Preemption Expansion

Associated Market Packages:

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

Prerequisite Projects: Emergency Vehicle Signal Preemption.

Description: Equip additional intersections and emergency vehicles (police, fire and EMS) with traffic signal preemption equipment. Typical installations include mounting hardware at the intersection and on each vehicle authorized to preempt the signal. The intersection equipment includes a detector(s) positioned at the intersection approach(es) connected to the traffic signal controller. As a vehicle equipped with a preemption emitter approaches an intersection, the detector activates a change in signal timing to allow fast and safe passage. Preemption systems have been proven to improve safety of emergency personnel and apparatus en-route to an incident.

Fire/EMS/HAZMAT Management

Associated Market Packages:

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

Prerequisite Projects: None

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

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

Maintenance and Construction Management

Work Zone Safety Monitoring (Engineering)

Associated Market Packages:

- Work Zone Safety Monitoring (MC09)

Prerequisite Projects: None

Description: Implement procedures to require major construction contracts to have work zone safety monitoring procedures and equipment. Work zone safety monitoring involves advanced warning systems to detect unauthorized vehicles that have entered the perimeter of the work zone. The intent of such systems is to help decrease the number of accidents in work zones due to motorists getting too close to workers or their equipment. Intrusion detection devices can alert construction workers and the motorist that the motorist has entered the safe zone and should take evasive action. It is anticipated that these systems will be required on TxDOT projects on a project by project basis.

Work Zone Safety Monitoring (Equipment)

Associated Market Packages:

- Work Zone Safety Monitoring (MC09)

Prerequisite Projects: None

Description: Install detection equipment and warning systems for work zones. Work zone safety monitoring involves the use of advanced warning systems to detect unauthorized vehicles that have entered the perimeter of the work zone. The intent of such systems is to help decrease the number of accidents in work zones due to motorists getting too close to workers or their equipment. Intrusion detection devices can alert construction workers and the motorist that the motorist has entered the safe zone and should take evasive action. It is anticipated that this project will be conducted on and possibly required by TxDOT on a per-project basis. The estimated cost for this project is approximately $500,000.

Maintenance and Construction Vehicle AVL

Associated Market Packages:

- Maintenance and Construction Vehicle Tracking (MC01)

Prerequisite Projects: None

Description: Install AVL system on maintenance and construction vehicles. The system consists of a tracking device and tracking software connected over wireless networks. A Web-enabled software will be used to track and monitor the maintenance and construction vehicles in real time. The system is automatic, so a dispatcher always has a real-time view of the location of all active crews in the field. The software can be configured to display only those crews for which a particular dispatcher is responsible. The fleet can be managed by "exception" events such as emergency alarms, over speed

reports, geographic-based boundary alarms, or text messages. Automatic reporting rates are customizable. Inherent in interactive two-way wireless data communications are capabilities such as two-way text messages and security features such as the control and monitoring of vehicle interlocks so dispatchers can enable/disable vehicles remotely. The estimated cost for this project is approximately $100,000.

Public Transportation Management

BUS On Board Video Security System

Associated Market Packages:

- Transit Security (APTS05)

Prerequisite Projects: None

Description: Install security cameras on BUS fixed route buses and paratransit vehicles. Cameras will be for on-board recording only and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time on video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The estimated cost per vehicle is $15,000.

McAllen Express On Board Video Security System

Associated Market Packages:

- Transit Security (APTS05)

Prerequisite Projects: None

Description: Install security cameras on McAllen Express transit vehicles. Cameras will be for on-board recording only and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time on video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The estimated cost per vehicle is $15,000.

Rio Metro On Board Video Security System

Associated Market Packages:

- Transit Security (APTS05)

Prerequisite Projects: None

Description: Install security cameras on Rio Metro transit vehicles. Cameras will be for on-board recording only and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time on video tape or emerging digital video recording technology. While the

main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The estimated cost per vehicle is $15,000.

Harlingen Express On Board Video Security System

Associated Market Packages:

- Transit Security (APTS05)

Prerequisite Projects: None

Description: Install security cameras on Harlingen Express transit vehicles. Cameras will be for on-board recording only and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time on video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The estimated cost per vehicle is $15,000.

Rio Transit On Board Video Security System

Associated Market Packages:

- Transit Security (APTS05)

Prerequisite Projects: None

Description: Install security cameras on Rio Transit vehicles. Cameras will be for on-board recording only and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time via video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The estimated cost per vehicle is $15,000.

The Wave On Board Video Security System

Associated Market Packages:

- Transit Security (APTS05)

Prerequisite Projects: None

Description: Install security cameras on The Wave transit vehicles. Cameras will be for on-board recording only and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time via video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The estimated cost per vehicle is $15,000.

Rainbow Lines On Board Video Security System

Associated Market Packages:

- Transit Security (APTS05)

Prerequisite Projects: None

Description: Install security cameras on Rainbow Lines transit vehicles. Cameras will be for on-board recording only and are not envisioned to be monitored remotely. Video will be stored for a pre-determined amount of time via video tape or emerging digital video recording technology. While the main objective of on-board surveillance projects has been to identify individuals committing criminal acts or creating disturbances on buses, there have been noticeable maintenance benefits such as a reduction of litter and debris. The estimated cost per vehicle is $15,000.

Ridesharing Website

Associated Market Packages:

- Dynamic Ridesharing (ATIS08)

Prerequisite Projects: None

Description: Develop a website that allows users to optimize their commute through the use of rideshare program information, park and ride information and transit schedules. The site would allow users to identify potential rideshare matches in their area and arrange those partnerships as well as schedule any necessary transit and explore park and ride options. The estimated cost of this website and interactive scheduling program is $20,000.

Commercial Vehicle Operations

CVISN Expansion

Associated Market Packages:

- Electronic Clearance (CV03)
- CV Administrative Processes (CVO04)
- International Border Electronic Clearance (CVO05)

Prerequisite Projects: CVISN

Description: Continued deployment of CVISN at selected locations throughout the Lower RGV Region. This project will provide for the delivery of real-time safety information to roadside inspectors to more precisely target unsafe carriers; the creation of systems to facilitate electronic processing of registration, tax credentials and permits; and the electronic clearance of commercial vehicles past weigh stations along highways. This is a statewide TxDOT project.

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Travel and Traffic Management					
Railroad Operations Coordination	Implement communications link between rail operations, TxDOT and cities in order to exchange HRI information and railroad advisories and schedules	Union Pacific/TxDOT/Cities	$100,000	No	1 year
ISP-based Route Guidance	Provide direct support to ISP-based route guidance systems through sharing of traveler information	Public Agencies/Private Sector	Public: $100,000	No	1 year
Maintenance and Construction Management					
Maintenance and Construction Vehicle Maintenance	Install on-board diagnostic systems on maintenance and construction vehicles to monitor vehicle condition, level of activity, etc.	TxDOT/Other maintenance agencies	To Be Determined	No	1 year
Public Transportation Management					
BUS Automatic Passenger Counters	Implement passive on-board systems to count passenger ridership	BUS	$2,000/vehicle	No	6 months
BUS Transit Traveler Information System/Travel Data and Route Guidance	Implement Dial-a-Ride and Internet based systems providing automated information to passengers seeking route guidance	BUS	$500,000	No	1 year
McAllen Express Automatic Passenger Counters	Implement passive on-board systems to count passenger ridership	Lower Rio Grande Valley Development Council	$2,000/vehicle	No	6 months
Mc Allen Express Transit Traveler Information System/Travel Data and Route Guidance	Implement Dial-a-Ride and Internet based systems providing automated information to passengers seeking route guidance	Lower Rio Grande Valley Development Council	$300,000	No	1 year
Rio Metro Automatic Passenger Counters	Implement passive on-board systems to count passenger ridership	Lower Rio Grande Valley Development Council	$2,000/vehicle	No	6 months
Rio Metro Transit Traveler Information System/Travel Data and Route Guidance	Implement Dial-a-Ride and Internet based systems providing automated information to passengers seeking route guidance	Lower Rio Grande Valley Development Council	$300,000	No	1 year

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Public Transportation Management (continued)					
Harlingen Express Automatic Passenger Counters	Implement passive on-board systems to count passenger ridership	Lower Rio Grande Valley Development Council	$2,000/vehicle	No	6 months
Harlingen Express Transit Traveler Information System/Travel Data and Route Guidance	Implement Dial-a-Ride and Internet based systems providing automated information to passengers seeking route guidance	Lower Rio Grande Valley Development Council	$200,000	No	1 year
Rio Transit Automatic Passenger Counters	Implement passive system to count passenger ridership	Lower Rio Grande Valley Development Council	$2,000/vehicle	No	1 year
Rio Transit Traveler Information System/Travel Data and Route Guidance	Implement Dial-a-Ride and Internet based systems providing automated information to passengers seeking route guidance	Lower Rio Grande Valley Development Council	$300,000	No	6 months
The Wave Automatic Passenger Counters	Implement passive system to count passenger ridership	Town of South Padre Island	$2,000/vehicle	No	1 year
The Wave Transit Traveler Information System/Travel Data and Route Guidance	Implement Dial-a-Ride and Internet based systems providing automated information to passengers seeking route guidance	Town of South Padre Island	$300,000	No	6 months
Rainbow Lines Automatic Passenger Counters	Implement passive system to count passenger ridership	Community Action Council of South Texas	$2,000/vehicle	No	1 year
Rainbow Lines Transit Traveler Information System/Travel Data and Route Guidance	Implement Dial-a-Ride and Internet based systems providing automated information to passengers seeking route guidance	Community Action Council of South Texas	$400,000	No	6 months

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

Program Area/Project	Description	Responsible Agency*	Probable Cost**	Funding Identified	Estimated Project Duration
Commercial Vehicle Operations					
Fleet Administration	Implement system to manage fleets of commercial vehicles. Functionalities include route guidance, in-vehicle navigation systems (including truck routes), AVL software, and the capability of monitoring on-board vehicle data.	Private Sector	N/A	No	1 year
Freight Administration	Implement system to track movement of cargo and monitor cargo condition from source to destination	Private Sector	N/A	No	1 year

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

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

Lower RGV Region
Long-Term Projects (20-Year)

Travel and Traffic Management

Railroad Operations Coordination

Associated Market Packages:

- Standard Railroad Grade Crossing (ATMS13)
- Advanced Railroad Grade Crossing (ATMS14)
- Railroad Operations Coordination (ATMS15)

Prerequisite Projects: None

Description: Implement communications link between rail operations and TxDOT and other TMCs to exchange Highway Rail Intersection (HRI) information and railroad advisories and schedules. This provides an additional level of strategic coordination between rail operations and traffic management centers. Rail operations will provide train schedules, maintenance schedules, and any other planned events that will result in HRI closures. This information will be used to forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information. The estimated cost for this project is $100,000.

ISP Based Route Guidance

Associated Market Packages:

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

Prerequisite Projects: None

Description: Provide information service providers (ISPs) with data relative to current travel conditions. The project extends current static capabilities of OnStar (or equivalent) in-vehicle route guidance systems currently being installed in new vehicles (Some GM, Acura, Audi, Saab, and Subaru models are equipped with OnStar). Currently, the OnStar system will help guide a motorist to a location based on static information. By providing real-time traveler information to ISPs, the guidance systems could modify the recommended route based on dynamic roadway conditions (e.g., a variation in congestion levels, accidents, roadwork, etc.). The project will require a public/private sector partnership because route guidance and navigation services are typically subscription services. The estimated cost for this project is $100,000. For the public sector to provide connection capability and format data in the form required for the ISPs.

Maintenance and Construction Vehicle Operations

Maintenance and Construction Vehicle Maintenance

Associated Market Packages:

- Maintenance and Construction Vehicle Maintenance (MC02)

Prerequisite Projects: None

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

Public Transportation Management

BUS Automatic Passenger Counters (APC)

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: BUS AVL Expansion and MDTs

Description: Install Automatic Passenger Counter (APC) systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

The current state-of-the-art methods of APCs in use include several technologies:

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

The technology that utilizes I-R beams computes the total number of boardings and alightings by tabulating the number of times the beam(s) is "interrupted" by a passenger entering or exiting the bus. Generally, the I-R beams are placed at the waist height of passengers. Algorithms are specifically built into the APC's proprietary software to take into account the under- and over-counting of passengers created by multiple passengers crossing the beam simultaneously and passengers exiting through the front door on a two-or-more-door bus. The other APC counting technologies are similar in operation but differ only in how the passenger's presence is detected and counted. This project is estimated to cost $2,000 per transit vehicle.

BUS Transit Traveler Information System/Travel Data and Route Guidance

Associated Market Packages:

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

Prerequisite Projects: BUS Computer Aided Dispatch and Transit Operations Center, BUS AVL Expansion, and MDTs

Description: Provide enhanced transit related traveler information to BUS customers. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel information systems. Web-based maps could show locations of transit vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination between TxDOT and the City of Brownsville would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information. The estimated cost of this system is approximately $500,000.

McAllen Express Automatic Passenger Counters (APC)

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: McAllen Express AVL Expansion and MDTs

Description: Install APC systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

This project is estimated to cost $2,000 per transit vehicle.

McAllen Express Transit Traveler Information System/Travel Data and Route Guidance

Associated Market Packages:

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

Prerequisite Projects: BUS Computer Aided Dispatch and Transit Operations Center, BUS AVL Expansion, and MDTs

Description: Provide enhanced transit related traveler information to McAllen Express customers. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel

information systems. Web-based maps could show locations of transit vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination with TxDOT and the City of McAllen would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information. The estimated cost of this system is approximately $300,000.

Rio Metro Automatic Passenger Counters (APC)

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: Rio Metro AVL and MDTs

Description: Install APC systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

This project is estimated to cost $2,000 per transit vehicle.

Rio Metro Transit Traveler Information System/Travel Data and Route Guidance

Associated Market Packages:

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

Prerequisite Projects: Rio Metro CAD and Transit Operations Center, Rio Metro AVL and MDTs

Description: Provide enhanced transit related traveler information to Rio Metro customers. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel information systems. Web-based maps could show locations of transit vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination with TxDOT would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information. The estimated cost of this system is approximately $300,000.

Harlingen Express Automatic Passenger Counters (APC)

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: Harlingen Express AVL and MDTs

Description: Install APC systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

This project is estimated to cost $2,000 per transit vehicle.

Harlingen Express Transit Traveler Information System/Travel Data and Route Guidance

Associated Market Packages:

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

Prerequisite Projects: Harlingen CAD and Transit Operations Center, Harlingen AVL and MDTs

Description: Provide enhanced transit related traveler information to Harlingen Express customers. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel information systems. Web-based maps could show locations of transit vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination with TxDOT would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information. The estimated cost of this system is approximately $200,000.

Rio Transit Automatic Passenger Counters (APC)

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: Rio Transit AVL and MDTs

Description: Install APC systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

This project is estimated to cost $2,000 per transit vehicle.

Rio Transit Traveler Information System/Travel Data and Route Guidance

Associated Market Packages:

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

Prerequisite Projects: Rio Transit CAD and Transit Operations Center, Rio Transit AVL and MDTs

Description: Provide enhanced transit related traveler information to customers of Rio Transit. The on-demand nature of the service requires that up-to-the minute information about pick-ups, drop-offs, vehicle location, and any disruptions in service be available not only to the TOC staff, but also to transit passengers pre-trip. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel information systems. Web-based maps could show locations of transit vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination with TxDOT would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information. The estimated cost of this system is approximately $300,000.

The Wave Automatic Passenger Counters (APC)

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: The Wave AVL and MDTs

Description: Install APC systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

This project is estimated to cost $2,000 per transit vehicle.

The Wave Transit Traveler Information System/Travel Data and Route Guidance

Associated Market Packages:

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

Prerequisite Projects: The Wave CAD and Transit Operations Center, The Wave AVL and MDTs

Description: Provide enhanced transit related traveler information to The Wave customers. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel information

systems. Web-based maps could show locations of transit vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination with TxDOT would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information. The estimated cost of this system is approximately $300,000.

Rainbow Lines Automatic Passenger Counters (APC)

Associated Market Packages:

- Transit Passenger and Fare Management (APTS04)

Prerequisite Projects: Rainbow Lines AVL and MDTs

Description: Install APC systems on transit vehicles to accurately count ridership. APC systems collect ridership information and can determine total boardings and alightings at each stop through the use of AVL to determine where those boardings and alightings take place.

This project is estimated to cost $2,000 per transit vehicle.

Rainbow Lines Transit Traveler Information System/Travel Data and Route Guidance

Associated Market Packages:

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

Prerequisite Projects: Rainbow Lines CAD and Transit Operations Center, Rainbow Lines AVL and MDTs

Description: Provide enhanced transit related traveler information to customers of Rainbow Lines transit. The on-demand nature of the service requires that up-to-the minute information about pick-ups, drop-offs, vehicle location, and any disruptions in service be available not only to the TOC staff, but also to transit passengers pre-trip. General (static) and near-real-time information about dial-a-ride services and status, as well as interactive trip scheduling and reservations could be made available to patrons via Internet-based travel information systems. Web-based maps could show locations of transit vehicles in near-real-time. This real-time information also would be available at the dispatch/call center for passengers who do not have access to the Internet. Coordination with TxDOT would allow for current traffic conditions, incidents, closures and other impacts to the roadway network to be displayed with the transit route and status information. The estimated cost of this system is approximately $400,000.

Commercial Vehicle Operations

Fleet Administration

Associated Market Packages:

- Fleet Administration (CVO01)

Prerequisite Projects: None

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

Freight Administration

Associated Market Packages:

- Freight Administration (CVO02)

Prerequisite Projects: None

Description: Implement system to track the movement of cargo and monitor cargo condition from source to destination. Trucking companies will be able to track individual loads by using, for instance, bar-coded containers and pallets to track cargo combined into a larger container. To minimize handling-expense, damage and waste of vehicle capacity, optimal-sized pallets may be constructed at distribution points to go to particular destinations. Controlled routes will allow trucks to avoid heavy traffic caused by rush-hour, accidents or road-work. If a truck gets off its route, or is delayed, the truck can be diverted to a better route, or urgent loads that are likely to be late can be diverted to air-freight. This project will be a private sector initiative.

4. MAINTAINING THE REGIONAL ITS ARCHITECTURE AND DEPLOYMENT PLAN

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

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

The Lower RGV stakeholders recommended that the ITS Deployment Plan be reviewed on a quarterly basis as part of the Traffic Management Team meeting. The Traffic Management Team meetings are an on-going series of meetings hosted by TxDOT that allow transportation stakeholders an opportunity to meet in a regional forum to discuss operational issues. At these meetings, stakeholders will identify which projects in the ITS Deployment Plan have been deployed. Project status (existing, planned, or future) may have to be updated for many of the projects as they move from the future to planned to existing status. New projects that are recommended by a stakeholder for inclusion in the ITS Deployment Plan should also be discussed to ensure that the Region as a whole feels that the project agrees with regional needs and priorities. This same type of consensus building should also be used should the geographic scope need to change or should additional stakeholders need to be added to the Regional ITS Architecture and ITS Deployment Plan. Projects that are added to the ITS Deployment Plan should also be reviewed closely to determine if they fit into the current ITS Architecture for the Lower RGV Region. If a new project does not fit into the ITS Architecture, then the ITS Architecture will need to be revised to include the necessary links and data flows for the project.

While the Lower RGV Regional ITS Architecture and ITS Deployment Plan will be reviewed on a quarterly basis, the plans themselves should be updated every two years prior to the TIP update. At that time, input and changes agreed upon at the quarterly traffic management team meetings will be incorporated into the document.

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