State of Texas
Regional ITS Architectures

El Paso Region

Executive Summary

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

TABLE OF CONTENTS
EXECUTIVE SUMMARY

LIST OF FIGURES

LIST OF TABLES

PROJECT APPROACH

The Federal Highway Administration (FHWA) issued a final rule to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21) in January of 2001. This final rule requires that Intelligent Transportation System (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. FHWA has further established a deadline of April 2005 for regions to have an ITS architecture in place.

To meet these requirements and ensure future federal funding eligibility for ITS, the Texas Department of Transportation (TxDOT) initiated the development of regional ITS architectures throughout the State of Texas. There are several metropolitan regions in the state that already have ITS architectures in place or under development. The focus of the State of Texas Regional ITS Architectures and Deployment Plans program is to develop architectures in those areas outside of the Austin, Dallas, Fort Worth, Houston, and San Antonio Regions.

TxDOT's process for developing the regional ITS architectures followed a consensus-based approach to meeting the requirements in the FHWA Final Rule and supporting guidelines. This process was further tailored to meet the specific multi-agency needs of these regional plans, and was structured around stakeholder input and involvement. **Figure 1** shows the development process for the El Paso Regional ITS Architecture.
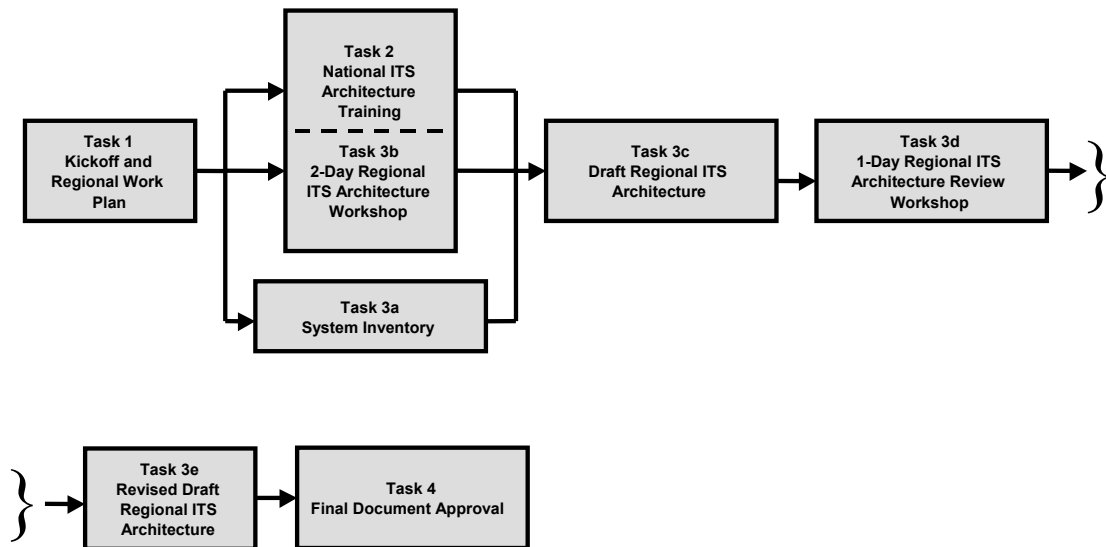
Figure 1 – El Paso Regional ITS Architecture Development Process

OVERVIEW OF THE EL PASO REGION

The El Paso Region is located at the westernmost tip of Texas and is bordered by Mexico, New Mexico and the Midland-Odessa District. The ITS stakeholders defined the regional boundaries to correspond with the boundaries of the TxDOT El Paso District and also to include southern New Mexico near the Texas Border and Ciudad Juarez, Mexico where connections are required. **Figure 2** illustrates the regional boundaries.

The primary city in the Region is El Paso, Texas. There are several major cities within or immediately adjacent to the Region, including Sunland Park in Texas, Las Cruces, University Park, and Anthony in New Mexico, and Ciudad Juarez in Mexico. The primary routes in the Region include I-10, US 54, US 62, US 85, SR 20, SR 375, and SR 487. Although I-25 does not continue into Texas, it terminates at I-10 just outside of the Region in Las Cruces, and Mexico's federal route 45 terminates in Juarez at the United States border, these routes have an influence on traffic in the Region.

Agencies in the El Paso Region have been deploying ITS technologies since for several years. Current ITS elements in the Region include:

- City and State Traffic Management Centers (TMCs);
- Traffic signal control systems;
- Dynamic message signs (DMS) for motorist information;
- Closed-circuit television (CCTV) cameras for traffic monitoring;
- Lane control signals;
- Fiber optic connectivity;
- Electronic toll collection; and
- Transit vehicle tracking.
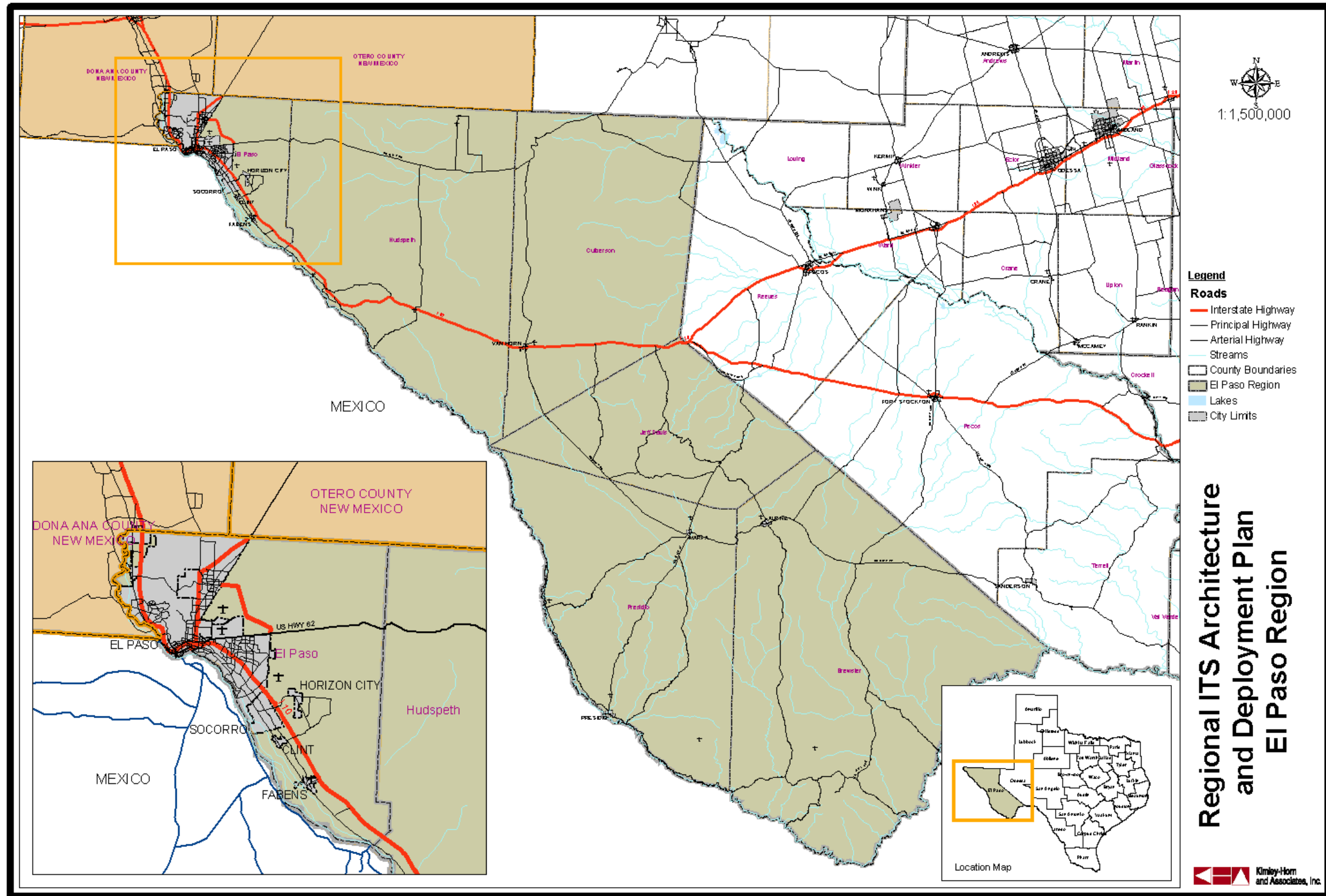
Figure 2 – El Paso Region

EL PASO REGION STAKEHOLDERS

Involving a range of perspectives in the development of a regional ITS architecture and deployment plan, and obtaining consensus on the vision and recommendations are key components to the process. Stakeholders from throughout the El Paso Region participated in the development of the El Paso Regional ITS Architecture, including representatives from TxDOT, cities, counties, municipal planning organizations (MPOs), transit agencies, police and fire, U.S. Customs, and the U.S. Border Patrol. These stakeholders provided input and review at key steps in the development process, including a project kick-off meeting and architecture development and review workshops.

El Paso Region stakeholders included:

- City of El Paso;
- County of El Paso;
- Doña Ana County, New Mexico;
- El Paso 911 Communications;
- El Paso Fire Department;
- El Paso MPO;
- El Paso Police;
- El Paso Sheriff's Office;
- International Boundary and Water Commission;
- Las Cruces MPO;
- New Mexico DOT;
- New Mexico State Police;
- Sun Metro;
- TxDOT El Paso District;
- TxDOT Traffic Operations Division (Austin);
- U.S. Border Patrol; and
- U.S. Customs.

EL PASO REGIONAL ITS ARCHITECTURE

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

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

Inventory and Needs in the Region

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

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

Table 1 – El Paso Region: Summary of ITS Needs

El Paso Region
Summary of ITS Needs
El Paso Regional ITS Architecture Kick-Off Meeting
December 18, 2002

Institutional Issues/Needs
- Need to restart Traffic Management Team
- Need to develop incident management agreements
- Need to develop incident response/diversion plans
- Need to develop telecommunications map for multi-agency use
- Need to coordinate with 3C (continuous, comprehensive, and cooperative) planning process and security planning
- Need to develop policy and an implementation plan for 511 system
- Need a policy for staffing TMC at TxDOT

Travel and Traffic Management Needs
- Need to identify alternate routes for International bridge crossings
- Need bridge management system
- Need to develop diversion routing
- Need to develop plans for multiple road closure/detour plans
- Need communications access from the City of El Paso communication to signal controllers and video surveillance
- Need improved highway rail crossings
- Need to make traffic video feeds available at truck stops and on private access network
- Need to involve radio stations with traffic information dissemination
- Need kiosks with possible locations at:
  – Tourist Bureau
  – Truck stops
  – Airport
  – Large employment centers
  – Malls
- Need trailblazer signs
- Need cellular on wheels
- Need to coordinate information on international bridges along the border (fiber)
- Need English and International symbols on DMS
- Need coordination with Mexico for major events
- Need to develop interagency communications network, including inventory of assets
- Need policies and infrastructure to allow video sharing, including the following agencies:
  – Fort Bliss
  – Ports of Entry
  – US Border Patrol
  – US Customs
  – Sun Metro
  – FBI
  – Towing contractors
- Need traffic counts and classification data
- Need bridge management system information
- Need to use ISD vehicles as probes (AVL)
- Need National Weather Service information
- Need to develop air quality monitoring system (Fort Bliss and the University of Texas at El Paso)

Table 1 – El Paso Region: Summary of ITS Needs (continued)

Public Transportation Management Needs
- Need bus signal priority system
- Need Sun Metro connections for traffic information
- Need AVL for Sun Metro buses
- Need AVL for rural transit
- Need provisions for ITS in light rail transit
- Need staged deployment of Smart cards for fare collection

Electronic Payment Needs
- Need Sun Metro electronic payment
- Need International bridge electronic payment

Commercial Vehicle Operations Needs
- Need special response strategy for truck traffic, including:
    - Special lanes
    - Weigh-in-motion
    - Permitting
- Need truck information

Emergency Management Needs
- Need preemption for fire and emergency vehicles
- Need to integrate emergency management network for:
    - City of El Paso
    - TxDOT
    - 911
    - DPS
    - New Mexico State Police
- Need to coordinate incident management
- Need railroad incident management coordination
- Need AVL for TxDOT courtesy patrol
- Need common radio frequency for all agencies
- Need rural security information

Advanced Vehicle Safety System Needs
None Identified

Information Management Needs (Data Archiving)
- Need data for web pages

Maintenance and Construction Management Needs
- Need AVL for TxDOT maintenance vehicles
- Need portable electronic messaging
- Need to identify locations and deploy flood detection systems at low water crossings
- Need to initiate pump monitoring system
- Need to develop ice warning system

1998 City of El Paso ITS Deployment Plan Needs
- Need to improve information for bus driver dispatch
- Need emergency vehicle preemption
- Need to clear incidents on freeways faster
- Need to improve ability to manage arterial traffic on corridors during incidents
- Need to reduce traffic congestion on I-10
- Need to improve traffic management for special events
- Need to improve use of DMS
- Need to improve use of standards and interoperability between PSAPs and traffic operations for incidents
- Need to reduce congestion and time to cross international borders
- Need information on roadway conditions
- Need to use websites more effectively

Market Packages

A 2-Day ITS Architecture Workshop was held in El Paso in February 2003. At this workshop stakeholders were provided with architecture training that included background information about the National ITS Architecture, the purpose and benefits of a regional ITS architecture, and the process that would be used to develop the El Paso Regional ITS Architecture.

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

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

Of the 75 market packages in the National ITS Architecture, stakeholders identified 37 as being applicable to the El Paso Region.

Interconnects, Interfaces, and Standards

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

Figure 3 – El Paso Regional System Interconnect Diagram

LEGEND

- National ITS Architecture Entity — No Regional Architecture Elements Map To National ITS Architecture
- National ITS Architecture Entity — Regional Architecture Elements Map To National ITS Architecture

Transit Management Subsystem
- El Paso County Rural Transit System Dispatch
- Independent School District Dispatch
- Private Sector Transit System Dispatch
- Private Taxi Provider Dispatch
- Sun Metro Fixed Route Transit Vehicle Maintenance Facility
- Sun Metro LIFT Maintenance Facility
- Sun Metro Paratransit Dispatch
- Sun Metro Transit Fixed Route Dispatch

Maintenance & Construction Management
- City of El Paso Maintenance Dispatch
- City of El Paso Traffic Engineering
- City of El Paso Traffic Signal Maintenance Dispatch
- County Road and Bridge
- Municipal PWD
- New Mexico DOT Maintenance Dispatch
- Other TxDOT District Maintenance Sections
- TxDOT El Paso District Area Engineers Office
- TxDOT El Paso District Maintenance Sections
- TxDOT El Paso District Office
- TxDOT Highway Conditions Reporting System
- Utility Company Dispatch

Emergency Management Subsystem
- City of El Paso 911 Communications Center
- City of El Paso EOC
- City of El Paso Fire and FMS Dispatch
- City of El Paso Traffic Management Center
- Correctional Facilities Operations
- County Public Safety Dispatch and PSAP
- DPS Administration
- DPS Communications Service
- *FBI El Paso Dispatch
- Fort Bliss Operations Center
- Independent School District Police Dispatch
- Municipal Public Safety Dispatch
- New Mexico County EOCs
- NM State Police Dispatch
- Private Ambulance Dispatch
- Private Tow/Wrecker Dispatch
- Regional University/College Police
- Rural County EOCs
- State EOC
- US BCBP Border Patrol Communications Center
- US BCBP Border Patrol Stations
- US BCBP Web Site

Emergency Vehicle Administration
- US BCBP Bridge Operations Office
- US BCBP CASC
- US BCBP Customs Sector Communications
- William Beaumont Army Medical Center

Information Service Provider Subsystem
- City of El Paso Web Site
- El Paso MPO Website
- New Mexico DOT Website
- *Private Sector Traveler Information Services
- Statewide Crash Records Information System
- *Sun Metro IVR System
- Sun Metro Transit Fixed Route Dispatch
- Sun Metro Transit Web Site
- TransVista Web Site
- *TxDOT 511 System
- *TxDOT El Paso District Public Information Office
- TxDOT El Paso District Web Page
- TxDOT Highway Conditions Reporting System
- TxDOT Motor Carrier Routing Information
- US BCBP Customs Web Site
- US BCBP Web Site

Traffic Management Subsystem
- City of El Paso 911 Communications Center
- City of El Paso Traffic Engineering
- City of El Paso Traffic Management Center
- City of El Paso Traffic Signal Maint. Dispatch
- *IBWC Operations Center
- New Mexico DOT TMC
- Other Texas District TMCs
- TransVista
- TxDOT Fort Worth TMC (TransVision)

Archived Data Management Subsystem
- City of El Paso Crash Records Database
- City of El Paso Pavement Management System
- *El Paso MPO Data System
- *Juarez IMIP (like an MPO)
- *Las Cruces MPO
- Statewide Crash Records Information System
- Sun Metro Public Transportation Archive
- TxDOT El Paso District Pavement Mgmt Sys
- TxDOT El Paso District PTMS
- TxDOT Statewide Pavement Management Sys

Commercial Vehicle Administration
- *TxDOT Credentials Administration and Safety Information Exchange
- *US BCBP Customs Product Manifest System

Fleet and Freight Management Subsystem
- Commercial Vehicle Operator Systems

Toll Administration Subsystem
- International Bridge Audit System

Emissions Management
- TCEQ Monitor Operations Section

Remote Traveler Support Subsystem
- *El Paso Transportation Hub
- *Sun Metro International Transit Terminal
- *Sun Metro Transit Information Display
- *Sun Metro Transit Kiosks
- *TxDOT Rest Areas/Visitor Center Kiosks

Personal Information Access Subsystem
- *Private Travelers Personal Computing Devices

Transit Vehicle Subsystem
- El Paso County Rural Transit Vehicles
- Independent School District Buses
- Sun Metro Fixed Route Transit Vehicles
- Sun Metro LIFT Vehicles
- Sun Metro Maintenance Vehicles
- Sun Metro Support Vehicles

Vehicle Subsystem
- Private Vehicles

Commercial Vehicle Subsystem
- Commercial Vehicles

Maintenance and Const Vehicle Subsystem
- City of El Paso Street Department Vehicles
- County Road and Bridge Vehicles
- TxDOT El Paso District Maintenance Vehicles

Emergency Vehicle Subsystem
- City of El Paso Fire and FMS Vehicles
- City of El Paso Police Vehicles
- DPS Vehicles
- Independent School District Police Vehicles
- Municipal or County Emergency Vehicles
- Private Ambulance Vehicle
- Private Tow/Wrecker Vehicles
- Regional University/College Police Vehicles
- TxDOT Courtesy Patrol Vehicles
- US BCBP Border Patrol Vehicles

Archived Data User Systems
- *Crash Data Users
- *El Paso MPO Data System Users
- Pavement Management Data Users
- Public Transportation Archive Data Users
- TxDOT El Paso District Pavement Mgmt Sys

Asset Management
- TxDOT BRINSAP
- TxDOT El Paso District Pavement Mgmt Sys

Care Facility
- Regional Medical Center
- William Beaumont Army Medical Center

Enforcement Agency
- DPS License and Weights Division

Equipment Repair Facility
- City of El Paso Vehicle Repairs
- TxDOT El Paso District Shop

Event Promoters
- El Paso Convention and Visitors Bureau
- Regional Event Facilities

Financial Institution
- *City of El Paso Comptroller
- *Financial Institution

Intermodal Freight Depot
- *El Paso Transportation Hub

Maintenance & Construction Admin
- TxDOT El Paso District Area Engineers Office

Media
- Local Print and Broadcast Media

Multimodal Transportation Service Provider
- AMTRAK Passenger Terminal
- El Paso International Airport

Other CVAS
- *Other States Credentials Admin & Safety Sys

Other EM
- *El Paso Regional Incident and Mutual Aid Network

Other TM
- Sunland Park Municipal Traffic Signal System

Rail Operations
- Rail Operations Centers

Traveler Card
- *El Paso Regional Smart Card

Traveler Card Reader System
- *City of El Paso Electronic Parking Meter Sys.
- *Smart Card Reader

Wayside Equipment
- Rail Operators Wayside Equipment

Yellow Pages Service Providers
- *Travel Service Providers

Roadway Subsystem
- City of El Paso Field Equipment
- *City of El Paso International Bridge Field Equipment
- City of El Paso Water Level Sensors
- *County Road and Bridge Field Equipment
- *IBWC BOTA Field Equipment
- TCEQ Field Emissions Monitors
- TxDOT El Paso District CCTV
- TxDOT El Paso District DMS
- TxDOT El Paso District Field Sensors

Roadway Subsystem
- *TxDOT El Paso District HAR
- TxDOT El Paso District Lane Control Signals
- *TxDOT El Paso District Ramp Meters and Ramp Gates
- *TxDOT El Paso District Traffic Signals
- *TxDOT El Paso District Work Zone Equipment
- *TxDOT Water Level Sensors
- US BCBP Border Patrol Stations
- US BCBP Customs Field Equipment
- US Border Patrol Checkpoints

Weather Service
- National Weather Service
- *UTEP Weather Systems

Commercial Vehicle Check Subsystem
- DPS Electronic Screening Stations
- *US BCBP Electronic Clearance System

Parking Management
- *City of El Paso Parking Meter Reader System

Toll Collection Subsystem
- International Bridge Toll Plazas

Diagram labels: Travelers — Remote Traveler Support, Personal Information Access; Centers — Emissions Management, Traffic Management, Emergency Management, Toll Administration, Commercial Vehicle Administration, Information Service Provider, Maintenance & Construction Management, Transit Management, Fleet and Freight Management, Archived Data Management; Wide Area Wireless (Mobile) Communications; Wireline Communications; Terminators; Vehicle to Vehicle Communications; Vehicles — Vehicle, Transit Vehicle, Commercial Vehicle, Emergency Vehicle, Maintenance & Construction Vehicle; Dedicated Short Range Communications; Roadside — Roadway, Toll Collection, Parking Management, Commercial Vehicle Check.

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

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

Figure 4 is an example of an ATMS market package for Traffic Information Dissemination that has been customized for the El Paso Region. This market package shows the three subsystems, Transit Management, Traffic Management, and Roadway, and the associated entities (El Paso County Rural Transit System Dispatch, Independent School District Dispatch, Sun Metro Paratransit Dispatch, Sun Metro Transit Fixed Route Dispatch, City of El Paso Traffic Management Center, and City of El Paso Field Equipment). Data flows between the subsystems and the terminators (Media) indicate what information is being shared. The solid data flow lines in this market package indicate existing information flows and the dashed lines indicate planned or future flows. All of the El Paso Region market package diagrams are included in the Regional ITS Architecture report.
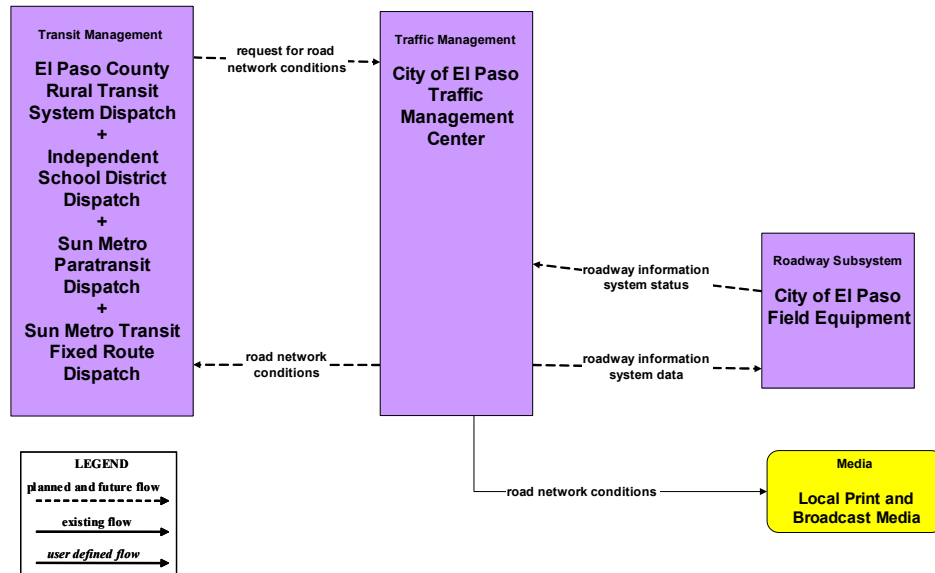
Figure 4 – Customized Market Package for City of El Paso Traffic Management Center

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

While it is important to identify the various systems and stakeholders as part of a regional ITS, a primary purpose of the architecture is to identify the connectivity between transportation systems in the El Paso Region. There are 152 different elements identified as part of the El Paso Regional ITS Architecture. These elements include local and state traffic operations centers, transit vehicles, dispatch systems, emergency management agencies, media outlets, and others – essentially, all of the existing and planned physical components that contribute to a regional ITS.

Interfaces have been identified for each element in the El Paso Regional ITS Architecture, and each element has been mapped to those other elements with which it must interface.

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

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

El Paso

TxDOT	City of El Paso Fire Department
TransVista	City of El Paso Fire and FMS Vehicles

Rail Operators	TxDOT
Rail Operators Wayside Equipment	TxDOT El Paso District Traffic Signals

————————— Existing
————————— Planned
————————— Future
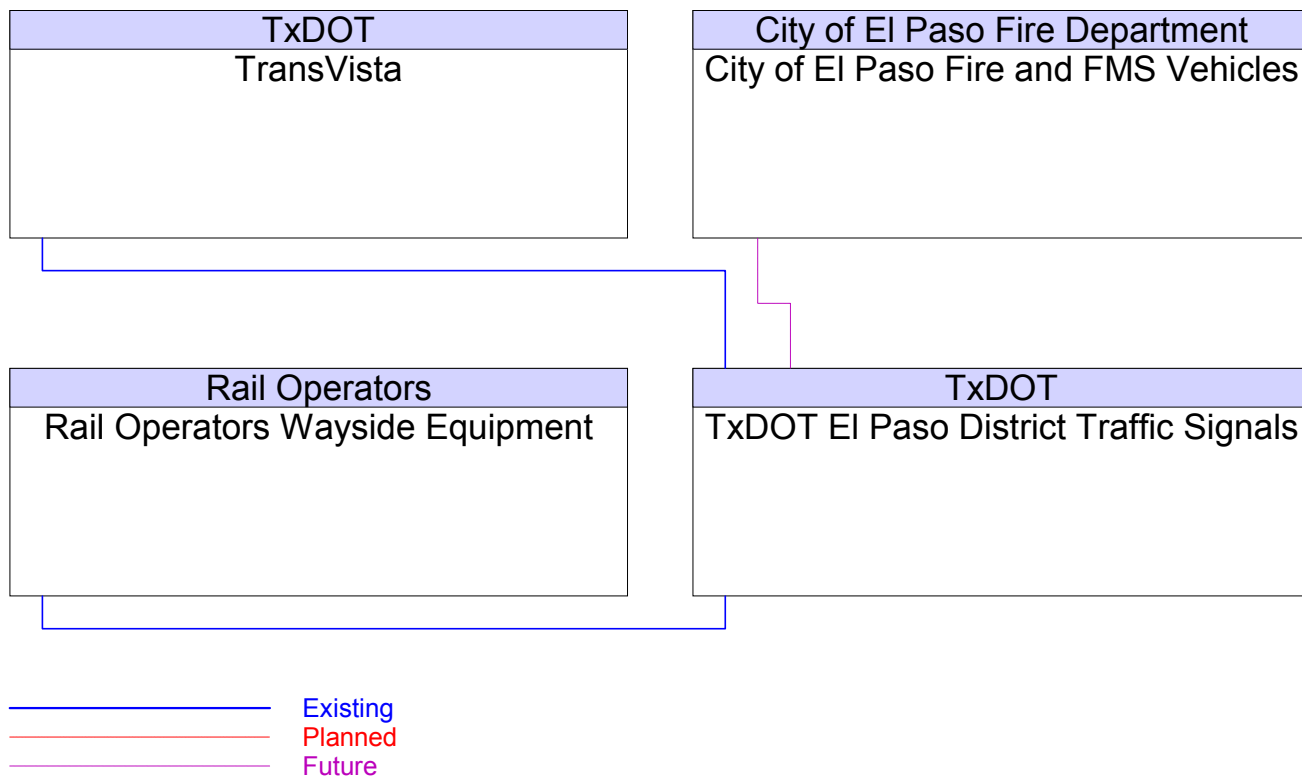
Figure 5 – TxDOT El Paso District Traffic Signals Interfaces

An example of the architecture flows between two elements is shown in **Figure 6**. In this interface, the flows between the City of El Paso TMC and 911 Communications Center show information that is recommended to go from the City of El Paso TMC to the City of El Paso 911 Communications Center, as well as information that the TMC needs from the 911 Center. Similar to the interfaces, architecture flows also are defined as existing, planned, or future. All of the architecture flows between elements have been included on the project website.
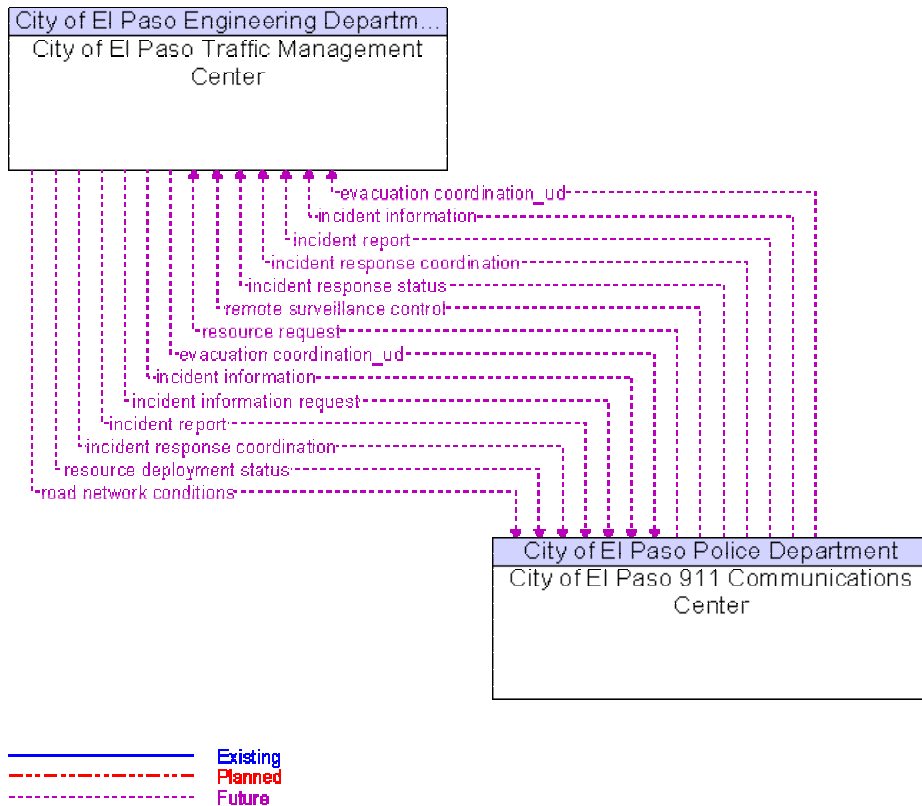
Figure 6 – City of El Paso TMC to City of El Paso 911 Communications Center Architecture Flows

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

Market Package Prioritization

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**.

These priorities identified the key needs and services that are desired in the El Paso Region, as well as the interfaces that need to be established to provide integrated functionality and establish communication between elements.

These priorities identified the key needs and services that are desired in the El Paso Region, as well as the interfaces that need to be established to provide integrated functionality and establish communication between elements.

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

Table 2 – Summary of Prioritized Market Packages for the El Paso Region

High Priority	Medium Priority	Low Priority
■ Network Surveillance	■ Electronic Toll Collection	■ Probe Surveillance
■ Surface Street Control	■ Maintenance and Construction Vehicle Tracking	■ Maintenance and Construction Vehicle Maintenance
■ Freeway Control	■ Weather Information Processing and Distribution	■ Transit Maintenance
■ Traffic Information Dissemination	■ Roadway Maintenance and Construction	■ ISP Based Route Guidance
■ Regional Traffic Information	■ Work Zone Management	
■ Incident Management System	■ Work Zone Safety Monitoring	
■ Emissions Monitoring and Management	■ Demand Response Transit Operations	
■ Standard Railroad Grade Crossing	■ Multimodal Coordination	
■ Railroad Operations Coordination	■ Freight Administration	
■ Parking Facility Management	■ HAZMAT Management	
■ Maintenance and Construction Activity Coordination		
■ Transit Vehicle Tracking		
■ Transit Fixed-Route Operations		
■ Transit Passenger and Fare Management		
■ Transit Security		
■ Transit Traveler Information		
■ Broadcast Traveler Information		
■ Electronic Clearance		
■ Emergency Response		
■ Emergency Routing		
■ Roadway Service Patrol		
■ ITS Data Mart		
■ ITS Virtual Data Warehouse		

Operational Concept and Scenarios

An operational concept for the El Paso Region was developed as part of the architecture process to illustrate how systems, components, and agencies will be integrated and function as a result of the framework provided by the Regional ITS Architecture. For the El Paso Region, two concepts were illustrated. The first was a major freeway incident that resulted in multiple lane closures that lasted several hours. The operational concept shows through ITS deployment, agency information sharing, and regional connectivity, that agencies are able to work together and benefit from the technologies and systems in place to manage the Region's transportation system. The second concept illustrates a sequence of events during a hazardous materials spill, and how TxDOT,

emergency services, public safety, and other key agencies can put pre-determined strategies into effect as well as utilize technology and communications infrastructure to respond effectively and minimize traffic impacts.

Agreements

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

Currently, there are a few formal agreements in place in the El Paso Region. These agreements define data sharing between agencies including CCTV images, traffic signal maintenance and fiber sharing. With the continued implementation of ITS technologies, integration of systems from one or more agencies, and the anticipated level of information exchange identified in the architecture, it is likely that additional formal agreements will be needed.

The following is a list of potential agreements for the El Paso Region based on the interfaces identified in the Regional ITS Architecture:

- Data sharing and usage agreements among public agencies; including video sharing;
- Joint operations/shared control agreements among transportation and emergency services agencies; and
- Mutual aid agreements among public sector agencies, primarily fire, police, emergency services, and TxDOT.

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

ITS Architecture Documentation

The Regional ITS Architecture for the El Paso Region is documented in a final report. A website with all of the Regional ITS Architecture also was maintained. The website allowed stakeholders to review the architecture and provide comments directly to the project team through the website. At the time this report was published, the El Paso Regional ITS Architecture website was being hosted at www.consystec.com. The site can be accessed by selecting the link to Texas, and then the link to El Paso.   TxDOT plans to permanently host the site in the future at www.dot.state.tx.us/trf/its.

MAINTAINING THE REGIONAL ITS ARCHITECTURE

With the substantial amount of effort invested by stakeholders in the El Paso Region to develop the Regional ITS Architecture, developing a plan for maintaining this important tool was a key component of the process.

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

At the final project meeting held in El Paso in April 2003, stakeholders in the Region agreed that the Regional ITS Architecture would need to be periodically updated in order to reflect current deployment status as well as re-evaluate priorities. A two-year timeframe was selected by the stakeholders for this update to correspond with the El Paso MPO's Transportation Improvement Plan (TIP) update. The El Paso MPO was identified as the agency that should take the lead in maintaining and updating the Region's ITS Architecture, with support from a multijurisidictional committee in the Region.

MEMORANDUM OF UNDERSTANDING

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

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

- City of El Paso;
- County of El Paso;
- Doña Ana County New Mexico;
- El Paso Metropolitan Planning Organization;
- Las Cruces Metropolitan Planning Organization;
- New Mexico State Highway and Transportation Department;
- Sun Metro;
- Texas Department of Transportation;
- U.S. Border Patrol; and
- U.S. Customs.