State of Texas
Regional ITS Architectures and Deployment Plans

Lubbock Region

Regional ITS Architecture Report

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TABLE OF CONTENTS

REGIONAL ITS ARCHITECTURE REPORT

TABLE OF CONTENTS

REGIONAL ITS ARCHITECTURE REPORT

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society for Testing and Materials
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
BRINSAP	Bridge Inventory Inspection System
CAD	Computer Aided Dispatch
Captrans	Caprock Community Action Association, Inc.
CC	Control Center
CCTV	Closed-Circuit Television
CEA	Consumer Electronics Association
CPT	Common Public Transportation
CV	Commercial Vehicle
DARC	Data Radio Channel
DMS	Dynamic Message Sign
DPS	Department of Public Safety
DSRC	Dedicated Short Range Communications
EIA	Electronic Industries Association
EMC	Emergency Management Center
EMS	Emergency Medical Services
EOC	Emergency Operations Center
ETMCC	External TMC Communication
EV	Emergency Vehicle
FC	Fare Collection
FHWA	Federal Highway Administration
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HCRS	Highway Condition Reporting System

LIST OF ACRONYMS

HRI	Highway-Rail Intersections
I/F	Interface
IEEE	Institute of Electrical and Electronics Engineers
IM	Incident Management
IMMS	Incident Management Message Sets
ISP	Information Service Provider
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
MCM	Maintenance and Construction Management
MCV	Maintenance and Construction Vehicle
MDT	Mobile Data Terminal
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
MS	Message Sets
NEMA	National Electrical Manufacturers Association
NOAA	National Oceanic and Atmospheric Administration
NTCIP	National Transportation Communications for ITS Protocol
OB	On-board
PI	Passenger Information
PSAP	Public Safety Answering Point
PTMS	Public Transportation Management System
PWD	Public Works Department
RWIS	Road Weather Information System
SAE	Society of Automotive Engineers
SDO	Standards Development Organization
SP	Spatial Representation
SPARTAN	South Plains Area Rural Transportation Assistance Network
STIC	Subcarrier Traffic Information Channel

LIST OF ACRONYMS

TCIP	Transit Communication Interface Protocol
TDCJ-ID	Texas Department of Criminal Justice – Institutional Division
TEA-21	Transportation Equity Act for the 21st Century
TM	Traffic Management
TMC	Traffic Management Center
TMDD	Traffic Management Data Directory
TOC	Traffic Operations Center
TTU	Texas Tech University
TxDOT	Texas Department of Transportation
UMC	University Medical Center
USDOT	United States Department of Transportation
VIVDS	Video Image Vehicle Detection Systems

SUMMARY

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

To meet these requirements, in 2001 the Texas Department of Transportation (TxDOT) initiated the development of Regional ITS Architectures and Deployment Plans throughout the State of Texas. The Lubbock Region was the sixteenth in the series of Regional ITS Architectures to be prepared as part of this initiative.

The Lubbock Region is located in west Texas. The Lubbock Region is bordered by the TxDOT Amarillo District to the north, the TxDOT Odessa District to the south, the TxDOT Childress and Abilene Districts to the east, and the State of New Mexico to the west.

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

Stakeholders from throughout the Region participated in the development of the Regional ITS Architecture, including representatives from TxDOT, cities, counties, public safety, transit, and Metropolitan Planning Organizations (MPOs). These stakeholders provided input and review at key steps in the architecture development process, including a project kick-off meeting, architecture development and review workshops, and final review of the architecture documentation.

An inventory of existing and planned ITS infrastructure in the Region provided the basis for the architecture development. Stakeholder needs that could be addressed by ITS technologies guided the selection of market packages, data flows, and integration requirements. A diverse range of needs were identified by stakeholders in the Region. High priority needs focused on traffic management, traffic and road condition information dissemination, and incident management. Coordination with the Amarillo District, particularly for closures or incidents on I-27 (and potentially I-40) also was cited as a high priority need.

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

An interconnect, or "Sausage Diagram" was developed for the Lubbock Region which provided a top-level overview of system functions and primary interconnects. More detailed interfaces were then developed which identified the connectivity between the systems and elements. Each element identified in the ITS architecture for the Lubbock Region was mapped to the other elements that it must interface with. These interfaces were further defined by architecture data flows between individual elements that specify the information to be exchanged. These data flows could include requests for information, alerts and messages, status requests, confirmations, and other information requirements.

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

An Operational Concept for the Lubbock Region was developed to illustrate how systems, components, and agencies will be integrated and function as a result of the framework provided by the Regional ITS Architecture. The purpose of the Operational Concept is to demonstrate the roles and responsibilities of the various stakeholders in the Lubbock Region. Potential agreements that could be required for maintenance and operations, data sharing (among agencies and with the private sector), or joint operations are listed.

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

1. INTRODUCTION

1.1 Project Overview

In January 2001, FHWA issued a final rule to implement Section 5206(e) of the TEA-21. This rule required that ITS projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. The rule requests that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a "Regional ITS Architecture."

In order to meet these requirements, TxDOT initiated the development of regional ITS architectures and deployment plans throughout the State of Texas. In addition to meeting the federal requirements for funding, the development of regional ITS architectures provides a framework for implementing ITS on a regional level, encourages interoperability and resource sharing, identifies applicable standards, and allows for cohesive long range planning among stakeholders in the Region. Although not required by the FHWA final rule, TxDOT also sought to have an ITS deployment plan developed for each Region. An ITS deployment plan identifies and prioritizes projects that are needed to implement the ITS architecture on a short-, medium-, and long-term basis.

A key goal in the development of the regional ITS architectures was to develop a consensus-based architecture with as many stakeholders as possible involved. Each stakeholder had an equal voice in determining the direction of the architecture for the Region. Stakeholders included representatives from TxDOT, cities, counties, public safety, transit, and MPOs. A series of five meetings were held with the ITS stakeholders to discuss the development and gather input into the Lubbock Regional ITS Architecture and Deployment Plan. In addition, a project web site was developed which contains all of the information on the Lubbock Regional ITS Architecture and provides stakeholders with an opportunity to review and comment on the architecture directly from the web.

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

1.2 Document Overview

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

Section 1 – Introduction

This section provides an overview of the State of Texas ITS Architectures and Deployment Plan Program, the ITS Architecture for the Lubbock Region, as well as an overview of some of the key features and stakeholders in the Lubbock Region.

Section 2 – Integration Strategy

This section discusses Lubbock Region stakeholder needs and issues, regional ITS initiatives and potential regional ITS programs, and opportunities for integration to achieve regional goals and contribute to regional and national ITS interoperability. Stakeholders and their contact information also are included.

Section 3 – Regional ITS Architecture Development Process

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

Section 4 – Conceptual Design

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

Section 5 – Operational Concept

An Operational Concept has been prepared that discusses the key functions and services of the envisioned ITS for the Lubbock Region. As part of this concept, operational scenarios are described and roles and responsibilities of stakeholders are discussed. Potential public-public and public-private agreements also have been identified.

The Lubbock Regional ITS Architecture also contains two appendices:

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

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

1.3 The Lubbock Region

1.3.1 Geographic Overview

The Lubbock Region is bordered by the TxDOT Amarillo District to the north, the TxDOT Odessa District to the south, the TxDOT Childress and Abilene Districts to the east, and the State of New Mexico to the west. For the Lubbock Regional ITS Architecture and Deployment Plan, the study area included all 17 counties that comprise the TxDOT Lubbock District. The geographic boundaries of the Lubbock Region are highlighted in **Figure 1**.

The counties included in the Lubbock Region area are:

- Bailey;
- Castro;
- Cochran;
- Crosby;
- Dawson;
- Floyd;
- Gaines;
- Garza;
- Hale;
- Hockley;
- Lamb;
- Lubbock;
- Lynn;
- Parmer;
- Swisher;
- Terry; and
- Yoakum.

TxDOT partners with local governments for roadway construction, maintenance, and traffic operations support, and serves as the responsible agency for on-system roadways in cities with populations less than 50,000. The City of Lubbock, with a population of over 200,000, is the only city in the project Region with a population that exceeds the 50,000 threshold.

1.3.2 Transportation Infrastructure

As illustrated in **Figure 1**, the Lubbock Region has an extensive transportation infrastructure. The primary roadway facilities include I-27, US-70, US-84, US-87, US-380/82, and US-385. Lubbock has the most centerline miles of any TxDOT District.

Interstate 27, which terminates in Lubbock, is the only interstate highway in the Region; it provides a vital link to Amarillo. Although I-40 does not traverse the Lubbock Region, any adverse conditions on I-40 that impact Amarillo will likely have an impact on I-27. Within the Lubbock Region, I-27 can be prone to high winds, dust storms, flooding, and snow and ice during the winter months. Within the Lubbock city limits, there are flyovers along I-27 that are particularly prone to icing during severe winter weather. Blockages along I-27 can have serious implications for drive-time for commercial vehicles and motorists alike due to the lack of north/south alternate routes. Knowing the road and travel conditions within this transportation corridor, coordinating with the Amarillo District for I-27 and I-40 conditions, and having the ability to disseminate this information to motorists are important elements that this project will be considering. For example, if I-27 has been closed due to a major incident or weather, and motorists are informed of the closure in advance, they can alter their travel plans with an alternate route or wait to begin their travels.
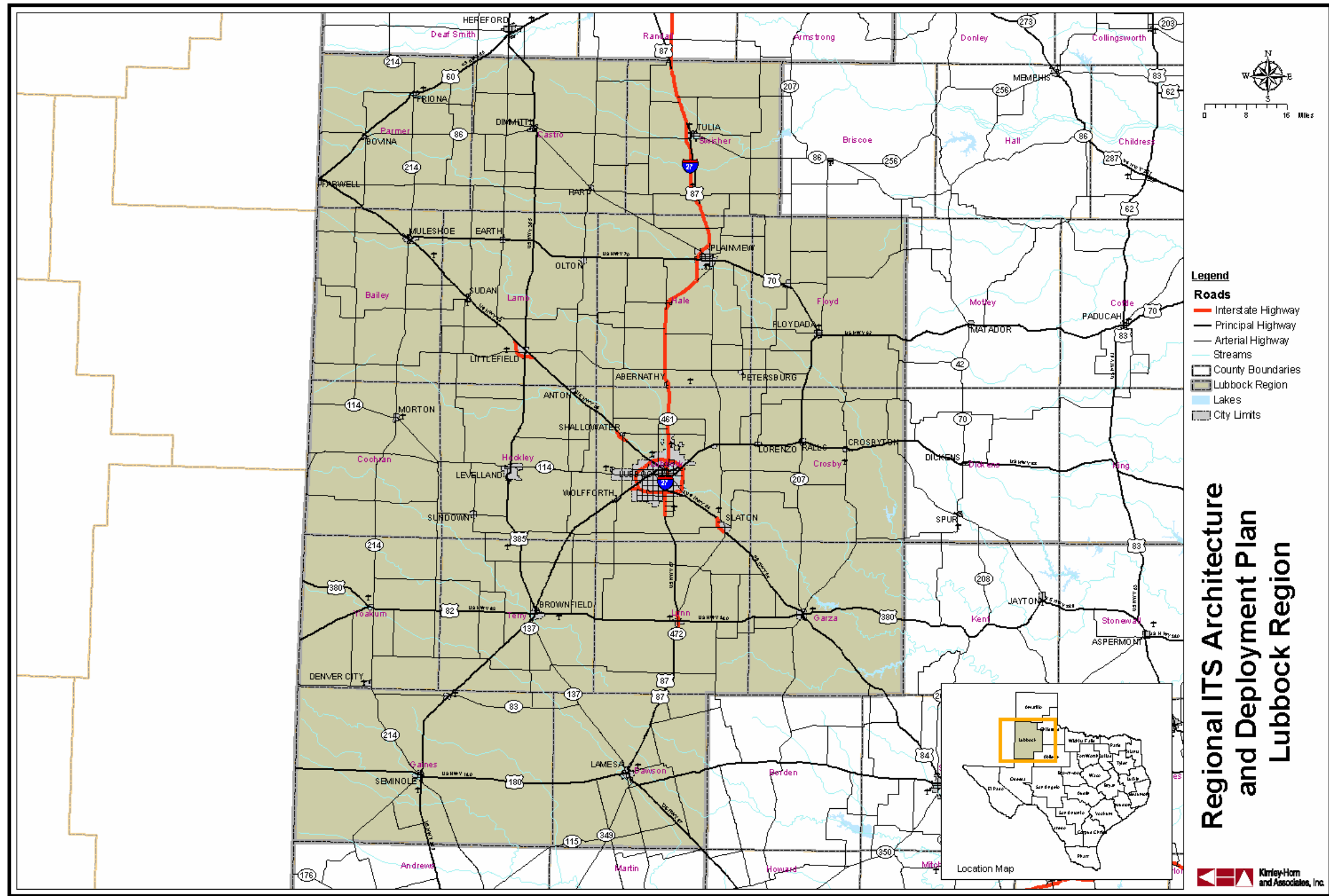
Figure 1 – Lubbock Region Map

1.3.3   Lubbock Region ITS Plans

There are several agencies in the Lubbock Region that have already deployed ITS components. It is important to recognize the initial deployment of ITS infrastructure in a Region because in order for that Region to receive federal funding for ITS projects, the United States Department of Transportation (USDOT) requires that the Region have an ITS architecture by April 2005.   This requirement is only for Regions with existing ITS infrastructure deployed. For Regions that do not have any ITS infrastructure deployed, the USDOT requires that they have an ITS architecture within four years of their first ITS project entering final design. As the Lubbock Region pursues funding opportunities for proposed projects, it will be necessary to show that the proposed project fits within the architecture developed for the Region as part of this project.

The City of Lubbock and TxDOT are partnering on the Marsha Sharp Freeway ITS planning activities. TxDOT and the City are looking to mainstream some ITS components, including freeway dynamic message signs (DMS) and closed-circuit television (CCTV) cameras along the freeway corridor. Although installing these components is likely a few years away, TxDOT and the City are already looking at potential priority locations, and what kinds of communication would be required so that it potentially could be included as part of the freeway construction. Shared control of ITS devices between TxDOT and the City of Lubbock is also a key consideration.

Currently, the Lubbock Region has several ITS components deployed in the field including distributed signal systems with video image vehicle detection systems (VIVDS) as well as loop detection, signal preemption for emergency vehicles, radar speed trailers, automated vehicle location (AVL) and mobile data terminals (MDT) on some transit vehicles, computer aided dispatch (CAD) for emergency vehicles, and portable DMS. The following sections discuss these deployments.

City of Lubbock Traffic Management Center

The City operates a Traffic Management Center (TMC), which is collocated in the same city building as the Emergency Operations Center. The City of Lubbock TMC uses the Pyramids software for traffic signal management.

Video Detection

TxDOT and the City of Lubbock are using VIVDS at several intersections within the Region. Unlike loop detection, VIVDS will not be affected by paving operations, and the detection zone of a VIVDS can be quickly changed to accommodate lane shifts during construction. VIVDS can detect vehicles approaching or stopping at a signalized intersection, and, under actuated conditions, place a call for the service of the appropriate phase for that vehicle. Loop detection also is in place at several locations.

Emergency Management

Several emergency management agencies in the Region have implemented CAD systems. The City of Lubbock uses CAD for fire and police, and the City of Plainview also uses CAD for emergency vehicles. CAD systems enhance dispatch capabilities and allow dispatch records and any incident information entered by the dispatcher to be saved for future reference in a dispatch log.

Currently, the City of Lubbock has signal preemption installed at approximately 110 out of 180 intersections within the city limits for fire, emergency medical services (EMS), and police vehicles. TxDOT also allowed the city to install preemption equipment on TxDOT traffic signals that are within the city's jurisdiction. It is the city's responsibility to purchase and install the equipment. Emergency vehicle preemption works when a vehicle equipped with a preemption emitter approaches an intersection and the detector activates a change in signal timing to allow fast and safe passage.

911 Call Centers are located at several agencies within the Region. The City of Lubbock Police serves as the 911 call center for the City of Lubbock metro area. Outside of Lubbock, 911 calls are taken at County Sheriffs, City of Plainview Police. Texas Tech also maintains a 911 call center for the campus.

Portable Dynamic Message Signs

TxDOT currently has several portable DMS in the Lubbock Region. These are controlled by the TxDOT Lubbock District Office and are used to display incident and construction related messages.

Transit Operations in the Lubbock Region

Transit services, including fixed-route and demand response, are provided through several entities in the Region. Citibus operates both fixed-route and demand response services in the Lubbock metro area. Citibus uses AVL/MDT technology on its demand-response vans, and plans to install security cameras on both fixed-route and demand response vehicles. Transit information for Citibus is available via phone and the Internet, as well as printed schedules. There are several planned transit enhancements through Citibus, including an electronic fare payment system, and real-time transit information signs (NextBus) at stops near the Texas Tech campus. Outside of the metro area, demand-response transportation services are provided by CapTrans (operated by Caprock Community Action Association, Inc.) and SPARTAN (South Plains Area Rural Transportation Assistance Network). CapTrans and SPARTAN use radio and cell phone communication between the dispatch center and drivers. Both agencies use Shah dispatch software.

1.3.4   Stakeholders

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

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

- Caprock Community Action Association, Inc.;
- Citibus;
- City of Levelland;
- City of Lubbock;
- City of Plainview;
- City of Slaton;
- City of Wolfforth;
- Federal Highway Administration;
- Lubbock Metropolitan Planning Organization;
- SPARTAN Rural Public Transportation;
- Texas Department of Public Safety;
- Texas Tech University;
- TxDOT Amarillo District;
- TxDOT Lubbock District; and
- TxDOT Traffic Operations Division (Austin).

2. INTEGRATION STRATEGY

2.1 Integration Purpose

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

For each operating agency or stakeholder entity identified through the development of the Regional ITS Architecture, there are operations that currently exist as a normal practice in order to accomplish the primary business goals and objectives for each stakeholder. As an example, a primary operation of the City of Lubbock Police Department dispatch is to dispatch emergency personnel to the appropriate locations when a call for help is placed within the city. The integration of the dispatch with any of the other stakeholders will not change this primary function of the dispatch or disrupt typical business practices. The integration of the Lubbock 911 Public Safety Answering Point (PSAP) with another agency, such as the TxDOT Lubbock District, will require that the data that will be exchanged between the two entities (such as the blockage of a lane of traffic due to a crash) meet certain requirements for that particular data type. Identifying the need for this connection between agencies and the opportunities for integration and interoperability in the Region are key purposes of this section.

This section will provide an overview of the major issues and stakeholders' needs within the Lubbock Region and the primary areas of concern that were uncovered in the preparation of the Lubbock Regional ITS Architecture. This section will also discuss the need for interregional integration with agencies external to the Lubbock Region, such as the need for integration with other TxDOT Districts.

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

Table 1 – Lubbock Stakeholder Agencies and Contacts

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
Caprock Community Action Association, Inc.	Claudia Cowley	224 South Berkshire Street Crosbyton, Texas 79322	(806) 675-7307	claudia.cowley@twc.state.tx.us
Caprock Community Action Association, Inc.	Rhonda Thornhill	224 South Berkshire Crosbyton, Texas 79322	(806) 675-7032	rhondat@llano.net
Citibus	Matthew Jacobs	801 Texas Ave Lubbock, Texas 79401	(806) 712-2008	mjacobs@citibus.com
City of Levelland	Rick Osburn	1709 Avenue H Levelland, Texas 79336	(806) 894-0113	rosburn@door.net
City of Lubbock	Jeryl (Jere) Hart, Jr.	915 Avenue J, Room 212 Lubbock, Texas 79457	(806) 775-2130	jhart@mail.ci.lubbock.tx.us

Table 1 – Lubbock Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
City of Lubbock	Ken Olson	916 Texas Avenue Lubbock, Texas 79401	(806) 775-3052	kolson@mail.ci.lubbock.tx.us
City of Plainview	Brice Clement	901 Broadway Street Plainview, Texas 79072	(806) 296-1151	bclements@ci.plainview.tx.us
City of Plainview	H. Gary Glass	901 Broadway Street Plainview, Texas 79072	(806) 296-1170	hglass@ci.plainview.tx.us
City of Slaton	Roger McKinney	130 South 9th Street Slaton, Texas 79364	(806) 828-2000	slatontx@hub.ofthe.net
City of Wolfforth	L.C. Childers	328 East Highway 62/82 Wolfforth, Texas 79382	(806) 866-4215	fpittman@wolfforthtx.us
DPS – Lubbock Region	Steve Shatley	1302 Sixth Street Lubbock, Texas 79401	(806) 472-2761	robert.shatley@txdps.state.tx.us
DPS – Lubbock Region	John Gonzales	1302 Sixth Street Lubbock, Texas 79401	(806) 472-2761	john.gonzales@txdps.state.tx.us
Federal Highway Administration	Mark Olson	300 East 8th Street Room 826 Austin, Texas 78701	(512) 536-5972	mark.olson@fhwa.dot.gov
Lubbock Metropolitan Planning Organization	Craig Farmer	916 Main Street, Suite 706 Lubbock, Texas 79401	(806) 775-2349	N/A
Lubbock Metropolitan Planning Organization	Samuel Woods	916 Main Street, Suite 706 Lubbock, Texas 79401	(806) 755-1676	swoods@mail.ci.lubbock.tx.us
SPARTAN	Brian Baker	411 Austin Street Levelland, Texas 79336	(806) 894-3800	brian.baker@spcaa.org
SPARTAN	Jane McIlroy	411 Austin Street Levelland, Texas 79336	(806) 894-3800	jane.mcilroy@spcaa.org
SPARTAN	Manuel Gonzales	411 Austin Street Levelland, Texas 79336	(806) 894-3800	manuel.gonzales@spcaa.org
Texas Tech University	Arthur Glick	MS2004 Texas Tech University Lubbock, TX 79409	(806) 742-1310	arthur.glick@ttu.edu
TxDOT – Amarillo District	Christopher Freeman	5715 Canyon Drive Amarillo, Texas 79110	(806) 356-3290	cfreema@dot.state.tx.us
TxDOT – Lubbock District	Lynn Castle	135 Slaton Road Lubbock, Texas 79404	(806) 748-4480	lcastle@dot.state.tx.us
TxDOT – Lubbock District	Ted Copeland	135 Slaton Road Lubbock, Texas 79404	(806) 748-4429	tcopela@dot.state.tx.us
TxDOT – Lubbock District	Randy Hopmann	135 Slaton Road Lubbock, Texas 79404	(806) 748-4420	rhopman@dot.state.tx.us
TxDOT – Lubbock District	Ted Moore	135 Slaton Road Lubbock, Texas 79404	(806) 745-4411	tmoore@dot.state.tx.us

Table 1 – Lubbock Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
TxDOT – Lubbock District	Frank Phillips	135 Slaton Road Lubbock, Texas 79404	(806) 748-4471	fphilli@dot.state.tx.us
TxDOT Austin Traffic Operations	Charles Brindell	Attn: TRF-Cedar Park #51, Wing E 125 East 11th Street Austin, Texas 78701-2483	(512) 506-5114	cbrinde@dot.state.tx.us
TxDOT Austin Traffic Operations	Alesia Gamboa	Attn: TRF-Cedar Park #51, Wing E 125 East 11th Street Austin, Texas 78701-2483	(512) 506-5154	agamboa@dot.state.tx.us

2.2 Regional Needs

Needs from the Region were identified in the project kick-off meeting held on January 15, 2004. Stakeholders participating in that meeting identified the needs in the Region according to the user service areas defined in the National ITS Architecture. The needs identified in the project kick-off meeting are documented in **Table 2**.

Table 2 – Lubbock Region: Summary of ITS Needs

Lubbock Region

Summary of ITS Needs
Lubbock Regional ITS Architecture and Deployment Plan Kick-Off Meeting
January 15, 2004

Institutional Issues/Needs

- Need to coordinate among TxDOT Districts (primarily Amarillo, but also Childress, Abilene and Odessa) as well as with New Mexico, particularly for weather and other major incidents
- Need statewide communication network

Travel and Traffic Management Needs

- Need improved congestion mitigation on key corridors during peak travel times, events, and incidents
- Need weather alerts for high winds, snow, ice, dust storms, flooding
- Need lane control signals
- Need ramp metering on metro area freeways
- Need closed loop signal systems
- Need special event management (coordination with Texas Tech)
- Need video surveillance capabilities on arterials to support congestion mitigation/management
- Need CCTV/video surveillance on freeways
- Need to do a better job of disseminating information to the public about incidents, closures, weather hazards (pre-trip, en-route)
- Need to provide up-to-date, accurate information to the public
- Need highway advisory radio in the Region to provide traveler info in the more rural areas
- Need additional dynamic message signs – AMBER Alert, construction info, incident info, special event traffic info

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Table 2 – Lubbock Region: Summary of ITS Needs (continued)

Public Transportation Management Needs

- Need accurate weather and road closure information
- Need weather radios for transit
- Need common radio frequency for transit (multiple providers)
- Need cameras on buses for security/monitoring
- Need multi-modal coordination among transit agencies, taxis, etc.
- Need automated vehicle location for rural/demand response transit fleets
- Need to involve and coordinate with transit (fixed route and demand-response) for evacuation planning

Electronic Payment Needs

None identified

Commercial Vehicle Operations Needs

- Need improved HAZMAT routing, tracking, and incident notification, including rail HAZMAT

Emergency Management Needs

- Need AMBER Alert processes, policies
- Need to coordinate with other Districts for evacuations
- Need emergency alerting system
- Need NOAA radios – beyond weather. Need public awareness and increased coverage
- Need to be able to track/monitor high risk areas
- Need to improve incident management, multi-agency coordination during incidents/emergencies
- Need HAZMAT evacuation/detour routes
- Need advance warning of water/flooding on road
- Need to improve coordination among public safety, medical transport, and area hospitals
- Need to improve incident management on key corridors – US 84 bypass detour information
- Need incident management on freeways – events, accidents

Advanced Vehicle Safety Systems Needs

None identified

Information Management Needs (Data Archiving)

None identified

Maintenance and Construction Management Needs

None identified

2.3   Regional Integration and Interoperability

A vision for the Lubbock Region is to integrate systems both on an intra-regional and an inter-regional basis. Within the Lubbock Region, nearly every stakeholder identified is involved in emergency management. Incidents that occur on major roadways either in the Lubbock Region or on roadways that could impact the movement of people and goods in the Lubbock Region should be shared. The integration of the State Emergency Operations Center (EOC) and the local EOCs can facilitate the clearing of such an incident more efficiently. As an example, a chemical

spill along I-27 between Plainview and Lubbock would require a major clean-up in addition to needing additional emergency personnel on site. Coordination between the EOCs could identify the closest clean-up crew that could respond to the spill and dispatch them to the scene. Similarly, once on scene, the response team could provide the State EOC and the local EOCs status reports on the clean-up and potential timing for return to normal operations.

The Lubbock Region is bordered by four other TxDOT Districts. Improved coordination with these surrounding Districts, particularly the Amarillo District for incident management and roadway closures is a very important need. Although there are few shared routes between the Lubbock District and the State of New Mexico, there is a need to coordinate for closures or other emergencies that could impact Highways 380, 84, or 60.

TxDOT and the City of Lubbock have a high degree of cooperation for regional traffic management. As systems are put into place, a key consideration will need to be shared control between these agencies of some devices in the metro area. For example, the City of Lubbock TMC is envisioned to provide after-hours or additional support to the TxDOT TMC by having shared operational control of devices such as freeway CCTV, DMS, and the ability to view environmental sensor data as well as traffic detectors. The City and TxDOT are proposing a project that would connect the TxDOT Lubbock District Office with the City's TMC. This integration would enhance both agencies' traffic, incident, and emergency management capabilities through real-time communications and sharing resources.

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

Operators of the transportation system have many opportunities to improve performance through integration. Citibus can improve performance and schedule adherence by integrating closure information from operators of the transportation network. Similarly, transit operators in the rural areas, including SPARTAN and CapTrans, would benefit from having current information about any closures or restrictions on corridors that have an impact on their routes and operations.

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

The headquarters of TxDOT maintains a database of traffic counts and accident records for roadways throughout the State of Texas. On occasion, agencies within the Lubbock Region will need access to these databases either to retrieve data or supply data to the database. These data exchanges also will require integrating the agencies' data flows such that neither of the agencies' normal business operations is disturbed to share these data.

One of the primary purposes of developing an ITS architecture is to ensure that while various agencies are deploying ITS components, there are some commonalities between them that will allow and facilitate the exchange of data fairly seamlessly and automatically. This is not to say that all technologies or media that are used by the various agencies will be the same, but that there is an acknowledgement that the data that is being collected and disseminated is valuable to many different agencies; therefore, the integration strategy has to be implemented to ensure the data exchange is possible.

3. REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

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

3.1 Lubbock Process

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

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

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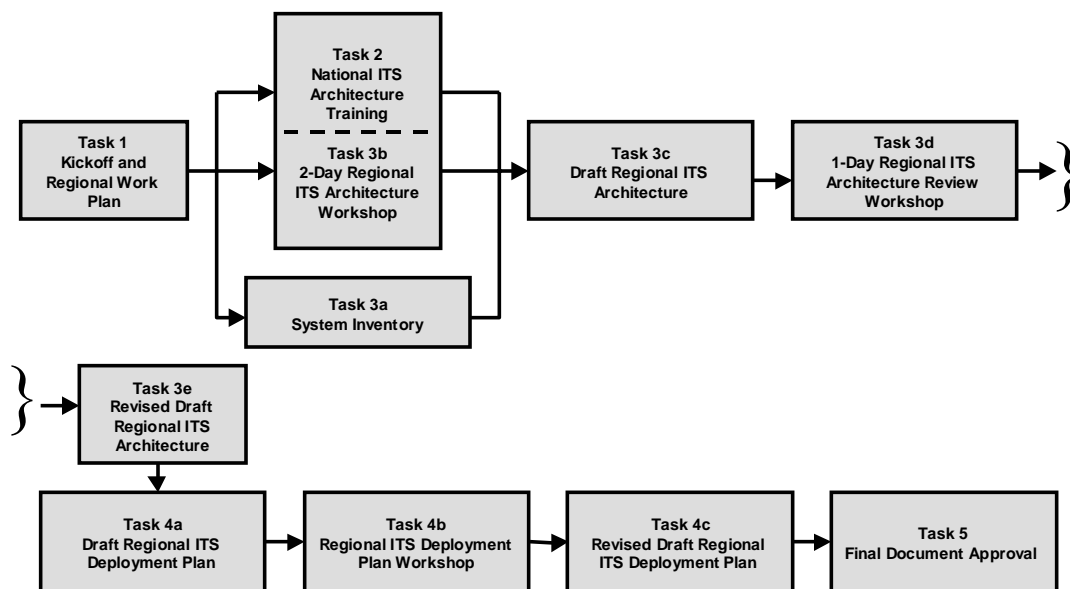
Figure 2 – Lubbock Regional ITS Architecture and Deployment Plan Development Process

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

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

Key components of the process are described below:

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

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

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

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

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

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

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

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

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

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

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

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

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

3.2 USDOT Regional ITS Architecture Guidance

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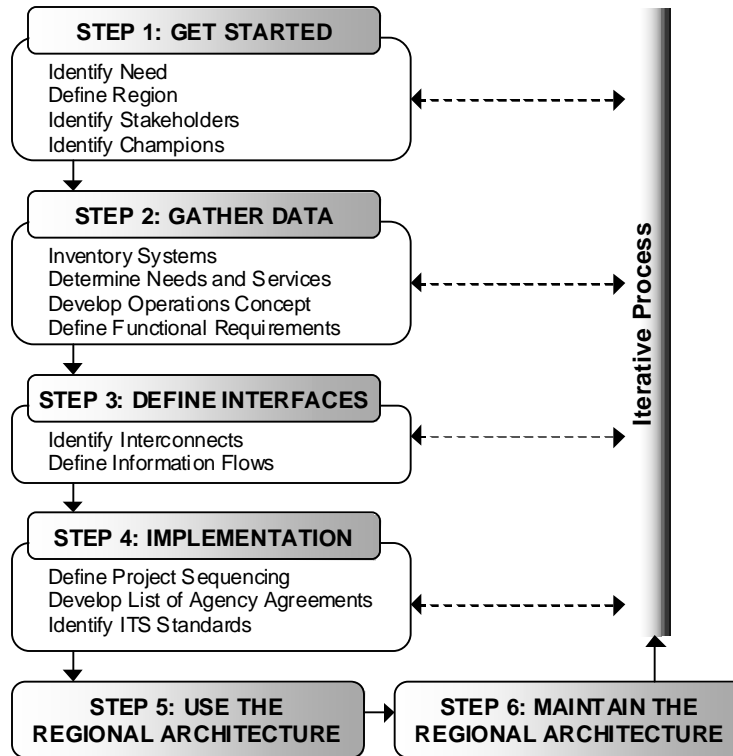
(Source: Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region, USDOT)

Figure 3 – USDOT Guidance on Regional ITS Architecture Development

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

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

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

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

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

4. CONCEPTUAL DESIGN

4.1 Systems Inventory

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

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

- *Travel and Traffic Management* – includes the City of Lubbock TMC, center-to-center links, detection systems (including VIVDS), fixed and portable dynamic message signs, broadcast traveler information, CCTV, and other related technologies.
- *Public Transportation Management* – includes transit and demand-response automated vehicle location, computer aided dispatch, and transit travel information systems.
- *Commercial Vehicle Operations* – Weigh-in-motion and coordination with TexView (CVISN) efforts.
- *Emergency Management* – includes emergency operations/management centers and improved information sharing among traffic and emergency services.
- *Information Management* – includes electronic data management and archiving systems.
- *Maintenance and Construction Management* – includes maintenance and construction vehicle tracking, roadway maintenance and construction information, and work zone safety and management applications.

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

4.1.1 Subsystems and Terminators

Each identified system or component in the Lubbock Regional ITS inventory was mapped to a subsystem or terminator in the National ITS Architecture. Subsystems and terminators are the 'entities' that represent systems in ITS. Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, Roadside, Vehicles, and Travelers. Each of these major classes includes various subsystems that represent a set of transportation functions (or processes) that are likely to be collected together under one agency, jurisdiction, or location, and correspond to physical elements, such as TMCs, traffic signals, vehicles, and so on. **Figure 4** shows the National ITS Architecture subsystems. This figure, also known as the "sausage diagram" is a standard interconnect diagram, showing the relationships of the various

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

Terminators are the people, systems, other facilities, and environmental conditions outside of ITS that need to communicate or interface with ITS subsystems. They help to define the boundaries of the National ITS Architecture as well as a regional system. Examples of terminators include drivers, traffic operations personnel, information service providers, weather effects (snow, rain, ice), telecommunications systems, and government reporting systems, among others.
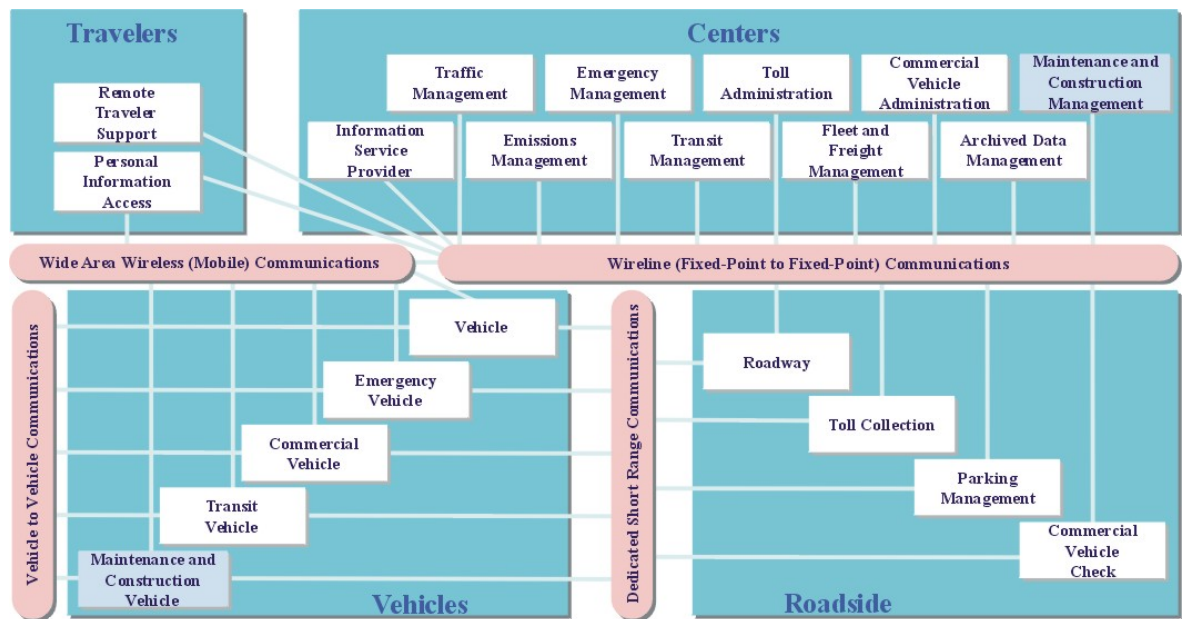
Figure 4 – Physical Subsystem Interconnect Diagram

4.1.2   Lubbock ITS Inventory by Stakeholder

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

The information in **Table 3** also is included on the Lubbock ITS Architecture web site, which is accessible by selecting the link to the Texas Regional ITS Architecture, the Lubbock Region, and then selecting the "Inventory by Stakeholder" button which will open the stakeholder list. Each element in the list contains a hyperlink to more detailed information, including status, description, stakeholder, and other elements within the inventory with which it interfaces. (At the time this report was published, the Lubbock

Regional ITS Architecture web site was being hosted at www.consystec.com. TxDOT plans to permanently host the site in the future at www.dot.state.tx.us/trf/its.)

4.1.3 Lubbock ITS Inventory by Entity

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

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

Stakeholder	Element	Entity	Status
Cannon AFB	Cannon AFB EOC	Emergency Management Subsystem	Existing
CapTrans	CapTrans Transit Dispatch	Transit Management Subsystem	Existing
	CapTrans Transit Vehicles	Transit Vehicle Subsystem	Existing
	CapTrans Website	Information Service Provider Subsystem	Existing
Citibus	Citibus Demand Response Vehicles	Transit Vehicle Subsystem	Existing
	Citibus Information Display / Point of Sale	Remote Traveler Support Subsystem	Future
	Citibus Transit Dispatch	Transit Management Subsystem	Existing
	Citibus Transit Vehicles	Transit Vehicle Subsystem	Existing
	Citibus Website	Information Service Provider Subsystem	Existing
	Lubbock Regional Smart Card	Traveler Card	Future
City of Lubbock	City and County of Lubbock EOC	Emergency Management Subsystem	Existing
	City of Lubbock Central Services Garage	Equipment Repair Facility	Existing
	City of Lubbock Field Equipment	Roadway Subsystem	Existing
	City of Lubbock Pavement Management System	Asset Management	Existing
	City of Lubbock Transportation Division and Public Works Department	Maintenance and Construction Management Subsystem	Existing
	City of Lubbock Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
	City of Lubbock Website	Information Service Provider Subsystem	Existing
City of Lubbock Public Safety Departments	City of Lubbock Emergency Vehicles	Emergency Vehicle Subsystem	Existing
	City of Lubbock Fire Dispatch	Emergency Management Subsystem	Existing
	City of Lubbock Police/911 Dispatch	Emergency Management Subsystem	Existing
City of Lubbock Traffic Engineering Department	City of Lubbock Traffic Management Center	Traffic Management Subsystem	Existing
City of Plainview	City of Plainview Emergency Vehicles	Emergency Vehicle Subsystem	Existing
	City of Plainview EOC	Emergency Management Subsystem	Existing
	City of Plainview Field Equipment	Roadway Subsystem	Existing

Stakeholder	Element	Entity	Status
City of Plainview (continued)	City of Plainview Police/Fire/EMS Dispatch	Emergency Management Subsystem	Existing
	City of Plainview Traffic Operations Center	Traffic Management Subsystem	Future
Commercial Vehicle Operators	Commercial Vehicles	Commercial Vehicle Subsystem	Existing
	Commercial Vehicles	Vehicle Subsystem	Existing
	Private Fleet Management Systems	Fleet and Freight Management Subsystem	Future
County Emergency Management Agencies	County EOC	Emergency Management Subsystem	Existing
County Road and Bridge	County Road and Bridge	Maintenance and Construction Management Subsystem	Existing
	County Road and Bridge Equipment Repair	Equipment Repair Facility	Existing
	County Road and Bridge Field Equipment	Roadway Subsystem	Future
	County Road and Bridge Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
County Volunteer Fire Departments	County Volunteer Fire Departments Dispatch	Emergency Management Subsystem	Existing
DPS	DPS Administration	Emergency Management Subsystem	Existing
	DPS Communications Service	Emergency Management Subsystem	Existing
	DPS Emergency Vehicles	Emergency Vehicle Subsystem	Existing
	DPS/District Disaster Committee EOC	Emergency Management Subsystem	Existing
	State Operations Center	Emergency Management Subsystem	Existing
	Statewide Crash Records Information System	Archived Data Management Subsystem	Existing
	Statewide Crash Records Information System Users	Archived Data User Systems	Existing
	UMC Emergency Vehicles	Emergency Vehicle Subsystem	Existing
	UMC EMS Dispatch	Emergency Management Subsystem	Existing
Financial Institution	Financial Institution	Financial Institution	Existing
Independent School Districts	Independent School District Buses	Transit Vehicle Subsystem	Existing
	Independent School District Dispatch	Transit Management Subsystem	Existing

Stakeholder	Element	Entity	Status
Local Media	Local Print and Broadcast Media	Media	Existing
Lubbock MPO	Lubbock MPO Archive	Archived Data Management Subsystem	Future
	Lubbock MPO Archive Data User Systems	Archived Data User Systems	Future
Lubbock Region Reconciliation Network Owners	Lubbock Region Transit Reconciliation Network	Transit Management Subsystem	Future
Municipal Convention and Visitors Bureau	Municipal Convention and Visitors Bureau	Event Promoters	Future
Municipal Government	Municipal TOCs	Traffic Management Subsystem	Future
	Municipal Websites	Information Service Provider Subsystem	Existing
Municipal or County Public Safety	Municipal or County Emergency Vehicles	Emergency Vehicle Subsystem	Existing
	Municipal or County Public Safety Dispatch and PSAP	Emergency Management Subsystem	Existing
Municipal Public Works Department	Municipal Field Equipment	Roadway Subsystem	Future
	Municipal PWD	Maintenance and Construction Management Subsystem	Existing
	Municipal PWD Garage	Equipment Repair Facility	Existing
	Municipal PWD Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
New Mexico DOT	New Mexico DOT TMC	Traffic Management Subsystem	Existing
	New Mexico Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
New Mexico State Police	New Mexico State Police Dispatch	Emergency Management Subsystem	Existing
NOAA	National Weather Service	Weather Service	Existing
Private Ambulance	Private Ambulance Dispatch	Emergency Management Subsystem	Existing
	Private Ambulance Vehicle	Emergency Vehicle Subsystem	Existing
Private Information Service Providers	Private Sector Traveler Information Services	Information Service Provider Subsystem	Future
Private Taxi Providers	Private Taxi Provider Dispatch	Transit Management Subsystem	Existing
Private Tow/Wrecker Providers	Private Tow/Wrecker Dispatch	Emergency Management Subsystem	Existing

Stakeholder	Element	Entity	Status
Private Travelers	Driver	Driver	Existing
	Private Travelers Personal Computing Devices	Personal Information Access Subsystem	Existing
Rail Operators	Rail Operations Centers	Fleet and Freight Management Subsystem	Existing
	Rail Operations Centers	Rail Operations	Existing
	Rail Operators Rail Cars	Commercial Vehicle Subsystem	Existing
	Rail Operators Wayside Equipment	Wayside Equipment	Existing
Regional Emergency and Public Safety Agencies	Lubbock Region Incident and Mutual Aid Network	Other EM	Future
Regional Medical Center	Regional Medical Centers	Care Facility	Existing
	Regional Medical Centers	Emergency Management Subsystem	Existing
SPARTAN	SPARTAN Transit Dispatch	Transit Management Subsystem	Existing
	SPARTAN Vehicles	Transit Vehicle Subsystem	Existing
	SPARTAN Website	Information Service Provider Subsystem	Future
Texas Department of Criminal Justice Institutional Division	TDCJ-ID Regional Dispatch	Emergency Management Subsystem	Existing
Texas Tech University	TTU Event Planning Office	Event Promoters	Future
	TTU Facilities and Maintenance Department	Maintenance and Construction Management Subsystem	Existing
	TTU Field Equipment	Roadway Subsystem	Future
	TTU Parking System	Parking Management Subsystem	Future
	TTU Parking System DMS	Roadway Subsystem	Future
	TTU Police Department Dispatch	Emergency Management Subsystem	Existing
	TTU Police Vehicles	Emergency Vehicle Subsystem	Existing
	TTU Traffic Operations Center	Traffic Management Subsystem	Future

Stakeholder	Element	Entity	Status
TxDOT	Lubbock Automated Roadway Information System	Maintenance and Construction Vehicle Subsystem	Future
	Other TxDOT District Area Engineers Office	Maintenance and Construction Management Subsystem	Existing
	Other TxDOT District Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
	Other TxDOT District TMCs	Traffic Management Subsystem	Existing
	TxDOT 511 System	Information Service Provider Subsystem	Future
	TxDOT BRINSAP	Asset Management	Existing
	TxDOT Fort Worth TMC (TransVision)	Traffic Management Subsystem	Existing
	TxDOT Highway Conditions Reporting System	Information Service Provider Subsystem	Existing
	TxDOT Highway Conditions Reporting System	Maintenance and Construction Management Subsystem	Existing
	TxDOT Lubbock District Anti-Icing Equipment	Roadway Subsystem	Future
	TxDOT Lubbock District Area Engineers Office	Maintenance and Construction Administrative Systems	Existing
	TxDOT Lubbock District Area Engineers Office	Maintenance and Construction Management Subsystem	Existing
	TxDOT Lubbock District CCTV	Roadway Subsystem	Future
	TxDOT Lubbock District DMS	Roadway Subsystem	Existing
	TxDOT Lubbock District Equipment Repair Garage	Equipment Repair Facility	Existing
	TxDOT Lubbock District Field Sensors	Roadway Subsystem	Existing
	TxDOT Lubbock District Flood Detection	Roadway Subsystem	Future
	TxDOT Lubbock District HAR	Roadway Subsystem	Future
	TxDOT Lubbock District Lane Use Control Signals	Roadway Subsystem	Future
	TxDOT Lubbock District Maintenance and Construction Vehicles	Maintenance and Construction Vehicle Subsystem	Existing

Stakeholder	Element	Entity	Status
TxDOT (continued)	TxDOT Lubbock District Maintenance Management Office	Maintenance and Construction Management Subsystem	Existing
	TxDOT Lubbock District Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
	TxDOT Lubbock District Pavement Management System	Archived Data Management Subsystem	Existing
	TxDOT Lubbock District Pavement Management System	Asset Management	Existing
	TxDOT Lubbock District Pavement Management System Users	Archived Data User Systems	Existing
	TxDOT Lubbock District Public Transportation Management System (PTMS)	Archived Data Management Subsystem	Existing
	TxDOT Lubbock District Ramp Metering	Roadway Subsystem	Future
	TxDOT Lubbock District Roadway Asset Inventory	Asset Management	Future
	TxDOT Lubbock District RWIS Sensors	Roadway Subsystem	Future
	TxDOT Lubbock District School Flashers	Roadway Subsystem	Existing
	TxDOT Lubbock District Speed Monitoring	Roadway Subsystem	Existing
	TxDOT Lubbock District TMC	Information Service Provider Subsystem	Existing
	TxDOT Lubbock District TMC	Traffic Management Subsystem	Existing
	TxDOT Lubbock District Traffic Signals	Roadway Subsystem	Existing
	TxDOT Lubbock District Website	Information Service Provider Subsystem	Future
	TxDOT Lubbock District Work Zone Equipment	Roadway Subsystem	Future
	TxDOT Motor Carrier Routing Information	Information Service Provider Subsystem	Existing
	TxDOT PTMS Archive Data Users Systems	Archived Data User Systems	Existing
	TxDOT Rest Area/Visitor Center/Service Plaza/Truck Stop Kiosks	Remote Traveler Support Subsystem	Future
	TxDOT Statewide Pavement Management System	Archived Data Management Subsystem	Existing

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

Entity	Element	Stakeholder	Status
Archived Data Management Subsystem	Lubbock MPO Archive	Lubbock MPO	Future
	Statewide Crash Records Information System	DPS	Existing
	TxDOT Lubbock District Pavement Management System	TxDOT	Existing
	TxDOT Lubbock District Public Transportation Management System (PTMS)	TxDOT	Existing
	TxDOT Statewide Pavement Management System	TxDOT	Existing
Archived Data User Systems	Lubbock MPO Archive Data User Systems	Lubbock MPO	Future
	Statewide Crash Records Information System Users	DPS	Existing
	TxDOT Lubbock District Pavement Management System Users	TxDOT	Existing
	TxDOT PTMS Archive Data Users Systems	TxDOT	Existing
Asset Management	City of Lubbock Pavement Management System	City of Lubbock	Existing
	TxDOT BRINSAP	TxDOT	Existing
	TxDOT Lubbock District Pavement Management System	TxDOT	Existing
	TxDOT Lubbock District Roadway Asset Inventory	TxDOT	Future
Care Facility	Regional Medical Centers	Regional Medical Center	Existing
Commercial Vehicle Subsystem	Commercial Vehicles	Commercial Vehicle Operators	Existing
	Rail Operators Rail Cars	Rail Operators	Existing
Driver	Driver	Private Travelers	Existing
Emergency Management Subsystem	Cannon AFB EOC	Cannon AFB	Existing
	City and County of Lubbock EOC	City of Lubbock	Existing
	City of Lubbock Fire Dispatch	City of Lubbock Public Safety Departments	Existing
	City of Lubbock Police/911 Dispatch	City of Lubbock Public Safety Departments	Existing
	City of Plainview EOC	City of Plainview	Existing
	City of Plainview Police/Fire/EMS Dispatch	City of Plainview	Existing
	County EOC	County Emergency Management Agencies	Existing

Entity	Element	Stakeholder	Status
Emergency Management Subsystem (continued)	County Volunteer Fire Departments Dispatch	County Volunteer Fire Departments	Existing
	DPS Administration	DPS	Existing
	DPS Communications Service	DPS	Existing
	DPS/District Disaster Committee EOC	DPS	Existing
	Municipal or County Public Safety Dispatch and PSAP	Municipal or County Public Safety	Existing
	New Mexico State Police Dispatch	New Mexico State Police	Existing
	Private Ambulance Dispatch	Private Ambulance	Existing
	Private Tow/Wrecker Dispatch	Private Tow/Wrecker Providers	Existing
	Regional Medical Centers	Regional Medical Center	Existing
	State Operations Center	DPS	Existing
	TDCJ-ID Regional Dispatch	Texas Department of Criminal Justice Institutional Division	Existing
	TTU Police Department Dispatch	Texas Tech University	Existing
	UMC EMS Dispatch	DPS	Existing
Emergency Vehicle Subsystem	City of Lubbock Emergency Vehicles	City of Lubbock Public Safety Departments	Existing
	City of Plainview Emergency Vehicles	City of Plainview	Existing
	DPS Emergency Vehicles	DPS	Existing
	Municipal or County Emergency Vehicles	Municipal or County Public Safety	Existing
	Private Ambulance Vehicle	Private Ambulance	Existing
	TTU Police Vehicles	Texas Tech University	Existing
	UMC Emergency Vehicles	DPS	Existing
Equipment Repair Facility	City of Lubbock Central Services Garage	City of Lubbock	Existing
	County Road and Bridge Equipment Repair	County Road and Bridge	Existing
	Municipal PWD Garage	Municipal Public Works Department	Existing
	TxDOT Lubbock District Equipment Repair Garage	TxDOT	Existing

Entity	Element	Stakeholder	Status
Event Promoters	Municipal Convention and Visitors Bureau	Municipal Convention and Visitors Bureau	Future
	TTU Event Planning Office	Texas Tech University	Future
Financial Institution	Financial Institution	Financial Institution	Existing
Fleet and Freight Management Subsystem	Private Fleet Management Systems	Commercial Vehicle Operators	Future
	Rail Operations Centers	Rail Operators	Existing
Information Service Provider Subsystem	CapTrans Website	CapTrans	Existing
	Citibus Website	Citibus	Existing
	City of Lubbock Website	City of Lubbock	Existing
	Municipal Websites	Municipal Government	Existing
	Private Sector Traveler Information Services	Private Information Service Providers	Future
	SPARTAN Website	SPARTAN	Future
	TxDOT 511 System	TxDOT	Future
	TxDOT Highway Conditions Reporting System	TxDOT	Existing
	TxDOT Lubbock District TMC	TxDOT	Existing
	TxDOT Lubbock District Website	TxDOT	Future
	TxDOT Motor Carrier Routing Information	TxDOT	Existing
Maintenance and Construction Administrative Systems	TxDOT Lubbock District Area Engineers Office	TxDOT	Existing
Maintenance and Construction Management Subsystem	City of Lubbock Transportation Division and Public Works Department	City of Lubbock	Existing
	County Road and Bridge	County Road and Bridge	Existing
	Municipal PWD	Municipal Public Works Department	Existing
	New Mexico Maintenance Sections	New Mexico DOT	Existing
	Other TxDOT District Area Engineers Office	TxDOT	Existing
	Other TxDOT District Maintenance Sections	TxDOT	Existing
	TTU Facilities and Maintenance Department	Texas Tech University	Existing

Entity	Element	Stakeholder	Status
Maintenance and Construction Management Subsystem (continued)	TxDOT Highway Conditions Reporting System	TxDOT	Existing
	TxDOT Lubbock District Area Engineers Office	TxDOT	Existing
	TxDOT Lubbock District Maintenance Management Office	TxDOT	Existing
	TxDOT Lubbock District Maintenance Sections	TxDOT	Existing
Maintenance and Construction Vehicle Subsystem	City of Lubbock Vehicles	City of Lubbock	Existing
	County Road and Bridge Vehicles	County Road and Bridge	Existing
	Lubbock Automated Roadway Information System	TxDOT	Future
	Municipal PWD Vehicles	Municipal Public Works Department	Existing
	TxDOT Lubbock District Maintenance and Construction Vehicles	TxDOT	Existing
Media	Local Print and Broadcast Media	Local Media	Existing
Other EM	Lubbock Region Incident and Mutual Aid Network	Regional Emergency and Public Safety Agencies	Future
Parking Management Subsystem	TTU Parking System	Texas Tech University	Future
Personal Information Access Subsystem	Private Travelers Personal Computing Devices	Private Travelers	Existing
Rail Operations	Rail Operations Centers	Rail Operators	Existing
Remote Traveler Support Subsystem	Citibus Information Display / Point of Sale	Citibus	Future
	TxDOT Rest Area/Visitor Center/Service Plaza/Truck Stop Kiosks	TxDOT	Future
Roadway Subsystem	City of Lubbock Field Equipment	City of Lubbock	Existing
	City of Plainview Field Equipment	City of Plainview	Existing
	County Road and Bridge Field Equipment	County Road and Bridge	Future
	Municipal Field Equipment	Municipal Public Works Department	Future
	TTU Field Equipment	Texas Tech University	Existing
	TTU Parking System DMS	Texas Tech University	Future
	TxDOT Lubbock District Anti-Icing Equipment	TxDOT	Future

Entity	Element	Stakeholder	Status
Roadway Subsystem (continued)	TxDOT Lubbock District CCTV	TxDOT	Future
	TxDOT Lubbock District DMS	TxDOT	Existing
	TxDOT Lubbock District Field Sensors	TxDOT	Existing
	TxDOT Lubbock District Flood Detection	TxDOT	Future
	TxDOT Lubbock District HAR	TxDOT	Future
	TxDOT Lubbock District Lane Use Control Signals	TxDOT	Future
	TxDOT Lubbock District Ramp Metering	TxDOT	Future
	TxDOT Lubbock District RWIS Sensors	TxDOT	Future
	TxDOT Lubbock District School Flashers	TxDOT	Existing
	TxDOT Lubbock District Speed Monitoring	TxDOT	Existing
	TxDOT Lubbock District Traffic Signals	TxDOT	Existing
	TxDOT Lubbock District Work Zone Equipment	TxDOT	Future
Traffic Management Subsystem	City of Lubbock Traffic Management Center	City of Lubbock Traffic Engineering Department	Existing
	City of Plainview Traffic Operations Center	City of Plainview	Future
	Municipal TOCs	Municipal Government	Future
	New Mexico DOT TMC	New Mexico DOT	Existing
	Other TxDOT District TMCs	TxDOT	Existing
	TTU Traffic Operations Center	Texas Tech University	Future
	TxDOT Fort Worth TMC (TransVision)	TxDOT	Existing
	TxDOT Lubbock District TMC	TxDOT	Existing
Transit Management Subsystem	CapTrans Transit Dispatch	CapTrans	Existing
	Citibus Transit Dispatch	Citibus	Existing
	Independent School District Dispatch	Independent School Districts	Existing
	Lubbock Region Transit Reconciliation Network	Lubbock Region Reconciliation Network Owners	Future

Entity	Element	Stakeholder	Status
Transit Management Subsystem (continued)	Private Taxi Provider Dispatch	Private Taxi Providers	Existing
	SPARTAN Transit Dispatch	SPARTAN	Existing
Transit Vehicle Subsystem	CapTrans Transit Vehicles	CapTrans	Existing
	Citibus Demand Response Vehicles	Citibus	Existing
	Citibus Transit Vehicles	Citibus	Existing
	Independent School District Buses	Independent School Districts	Existing
	SPARTAN Vehicles	SPARTAN	Existing
Traveler Card	Lubbock Regional Smart Card	Citibus	Future
Vehicle Subsystem	Commercial Vehicles	Commercial Vehicle Operators	Existing
Wayside Equipment	Rail Operators Wayside Equipment	Rail Operators	Existing
Weather Service	National Weather Service	NOAA	Existing

4.2 Regional Market Packages

Upon completion of the system inventory, the next step in the development of the architecture was to identify the transportation services that are important to the Lubbock Region. In the National ITS Architecture, services are referred to as market packages. Market packages could include several stakeholders and elements that work together to provide a service in the Region. Examples of market packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are a total of 75 market packages identified in the National ITS Architecture Version 4.0.

In the Lubbock Region, the National ITS Architecture market packages were reviewed by the stakeholders and selected based on the relevance of the service that the market package could provide to the Region. All of the market packages that stakeholders in the Lubbock Region selected for implementation in the Region are identified in **Table 5**, as well as the elements in the Region that serve a role in providing the market package service and the primary stakeholders responsible for implementing the market packages.

In several cases, there are multiple stakeholders in the Region that provide the same service at different levels. For example, Surface Street Control (ATMS03) could be provided on arterials by the City of Lubbock and by TxDOT on highways throughout the Lubbock District. The market packages status is identified as existing, planned, or future for each of the primary stakeholders in the Region. In many cases market packages classified as existing might still need to be enhanced to increase the service that the market package provides and establish all of the elements associated with it.

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

Table 5 – Lubbock Region Selected Market Packages

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS01	Network Surveillance	City of Lubbock Field Equipment	City of Lubbock	Existing
		City of Lubbock Website	City of Plainview	Existing
		City of Lubbock Traffic Management Center	Municipalities	Future
		City of Plainview Field Equipment	TxDOT Lubbock	Future
		City of Plainview Traffic Operations Center		
		Municipal TOCs		
		Municipal Websites		
		Municipal Field Equipment		
		Private Sector Traveler Information Services		
		TTU Field Equipment		
		TTU Traffic Operations Center		
		TxDOT Lubbock District CCTV		
		TxDOT Lubbock District Field Sensors		
		TxDOT Lubbock District TMC		
		TxDOT Lubbock District Website		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS03	Surface Street Control	City of Lubbock Field Equipment	City of Lubbock	Existing
		City of Lubbock Traffic Management Center	City of Plainview	Existing
		City of Plainview Field Equipment	Municipalities	Future
		City of Plainview Traffic Operations Center	Texas Tech University	Future
		Municipal TOCs	TxDOT Lubbock	Future
		Municipal Field Equipment		
		TTU Traffic Operations Center		
		TTU Field Equipment		
		TxDOT Lubbock District Field Sensors		
		TxDOT Lubbock District TMC		
		TxDOT Lubbock District Traffic Signals		
ATMS04	Freeway Control	City of Lubbock Traffic Management Center	TxDOT Lubbock	Future
		TxDOT Lubbock District CCTV		
		TxDOT Lubbock District Field Sensors		
		TxDOT Lubbock District Lane Use Control Signals		
		TxDOT Lubbock District Ramp Metering		
		TxDOT Lubbock District TMC		
ATMS06	Traffic Information Dissemination	CapTrans Transit Dispatch	City of Lubbock	Future
		Citibus Transit Dispatch	City of Plainview	Future
		City of Lubbock Field Equipment	Municipalities	Future
		City of Lubbock Transportation Division and Public Works Department	TxDOT Lubbock	Future
		City of Lubbock Website		
		City of Lubbock Fire Dispatch		
		City of Lubbock Police/911 Dispatch		
		City of Lubbock Traffic Management Center		
		City of Plainview Field Equipment		
		City of Plainview Police/Fire/EMS Dispatch		
		City of Plainview Traffic Operations Center		
		County Road and Bridge		
		DPS Communications Service		
		Independent School District Dispatch		
		Local Print and Broadcast Media		
		Municipal TOCs		
		Municipal Websites		
		Municipal or County Public Safety Dispatch and PSAP		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS06 (continued)	Traffic Information Dissemination (continued)	Municipal Field Equipment Municipal PWD Private Sector Traveler Information Services SPARTAN Transit Dispatch TTU Police Department Dispatch TxDOT 511 System TxDOT Lubbock District DMS TxDOT Lubbock District HAR TxDOT Lubbock District Maintenance Sections TxDOT Lubbock District TMC TxDOT Lubbock District Website		
ATMS07	Regional Traffic Control	City of Lubbock Traffic Management Center City of Plainview Traffic Operations Center Municipal TOCs New Mexico DOT TMC Other TxDOT District TMCs TxDOT Fort Worth TMC (TransVision) TxDOT Lubbock District TMC	TxDOT Lubbock	Future
ATMS08	Incident Management System	City and County of Lubbock EOC City of Lubbock Field Equipment City of Lubbock Transportation Division and Public Works Department City of Lubbock Emergency Vehicles City of Lubbock Fire Dispatch City of Lubbock Police/911 Dispatch City of Lubbock Traffic Management Center City of Plainview Emergency Vehicles City of Plainview EOC City of Plainview Police/Fire/EMS Dispatch City of Plainview Traffic Operations Center County EOC County Road and Bridge County Volunteer Fire Departments Dispatch DPS Communications Service DPS Emergency Vehicles DPS/District Disaster Committee EOC Municipal Convention and Visitors Bureau	Transportation and Emergency Management Agencies	Future

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS08 (continued)	Incident Management System (continued)	Municipal TOCs Municipal or County Emergency Vehicles Municipal or County Public Safety Dispatch and PSAP Municipal PWD New Mexico DOT TMC New Mexico Maintenance Sections New Mexico State Police Dispatch Private Ambulance Dispatch Private Ambulance Vehicle Rail Operations Centers TTU Event Planning Office TTU Police Department Dispatch TTU Police Vehicles Other TxDOT District Maintenance Sections TxDOT Highway Conditions Reporting System TxDOT Lubbock District Area Engineers Office TxDOT Lubbock District DMS TxDOT Lubbock District Flood Detection TxDOT Lubbock District Maintenance Sections TxDOT Lubbock District TMC UMC EMS Dispatch UMC Emergency Vehicles		
ATMS13	Standard Railroad Grade Crossing	City of Lubbock Field Equipment City of Lubbock Traffic Management Center City of Plainview Field Equipment City of Plainview Traffic Operations Center Rail Operations Centers Rail Operators Wayside Equipment TxDOT Lubbock District TMC TxDOT Lubbock District Traffic Signals	City of Lubbock City of Plainview TxDOT Lubbock	Future Future Future
ATMS15	Railroad Operations Coordination	City of Lubbock Traffic Management Center City of Plainview Traffic Operations Center Rail Operations Centers TxDOT Lubbock District TMC	City of Lubbock City of Plainview TxDOT Lubbock	Future Future Future

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS16	Parking Facility Management	Driver TTU Field Equipment TTU Parking System TTU Parking System DMS TTU Traffic Operations Center	Texas Tech University	Future
ATMS19	Speed Monitoring	City of Lubbock Field Equipment	City of Lubbock	Future
		City of Lubbock Traffic Management Center	TxDOT Lubbock	Future
		Driver TxDOT Lubbock District School Flashers TxDOT Lubbock District Speed Monitoring TxDOT Lubbock District TMC		
ATMS21	Roadway Closure Management	DPS Communications Service TxDOT Lubbock District Flood Detection TxDOT Lubbock District Lane Use Control Signals TxDOT Lubbock District TMC TxDOT Lubbock District Web Site TxDOT Lubbock District Maintenance Sections	TxDOT Lubbock	Future
EM01	Emergency Response	Cannon AFB EOC City and County of Lubbock EOC City of Lubbock Fire Dispatch City of Lubbock Police/911 Dispatch City of Plainview EOC City of Plainview Police/Fire/EMS Dispatch County EOC County Volunteer Fire Departments Dispatch DPS Communications Service DPS/District Disaster Committee EOC Lubbock Region Incident and Mutual Aid Network Municipal or County Public Safety Dispatch and PSAP New Mexico State Police Dispatch Private Ambulance Dispatch Private Tow/Wrecker Dispatch Regional Medical Centers State Operations Center TDCJ-ID Regional Dispatch	Emergency Management Agencies	Future

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
EM01 (continued)	Emergency Response (continued)	TTU Police Department Dispatch UMC EMS Dispatch		
EM02	Emergency Routing	City of Lubbock Field Equipment	City of Lubbock	Existing
		City of Lubbock Emergency Vehicles	City of Plainview	Future
		City of Lubbock Fire Dispatch	TxDOT Lubbock	Future
		City of Lubbock Police/911 Dispatch		
		City of Lubbock Traffic Management Center		
		City of Plainview Emergency Vehicles		
		City of Plainview Field Equipment		
		City of Plainview Police/Fire/EMS Dispatch		
		City of Plainview Traffic Operations Center		
		DPS Communications Service		
		DPS Emergency Vehicles		
		Municipal or County Emergency Vehicles		
		Municipal or County Public Safety Dispatch and PSAP		
		Private Ambulance Dispatch		
		Private Ambulance Vehicle		
		Regional Medical Centers		
		TxDOT Lubbock District TMC		
		TxDOT Lubbock District Traffic Signals		
MC01	Maintenance and Construction Vehicle Tracking	City of Lubbock Transportation Division and Public Works Department	City of Lubbock	Future
		City of Lubbock Vehicles	County Road and Bridge	Future
		County Road and Bridge	Municipalities	Future
		County Road and Bridge Vehicles	TxDOT Lubbock	Future
		Municipal PWD		
		Municipal PWD Vehicles		
		TxDOT Lubbock District Maintenance and Construction Vehicles		
		TxDOT Lubbock District Maintenance Sections		
MC02	Maintenance and Construction Vehicle Maintenance	City of Lubbock Central Services Garage	City of Lubbock	Future
		City of Lubbock Transportation Division and Public Works Department	County Road and Bridge	Future
		City of Lubbock Vehicles	Municipalities	Future
		County Road and Bridge	TxDOT Lubbock	Future
		County Road and Bridge Equipment Repair		
		County Road and Bridge Vehicles		
		Municipal PWD		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC02 (continued)	Maintenance and Construction Vehicle Maintenance (continued)	Municipal PWD Garage		
		Municipal PWD Vehicles		
		TxDOT Lubbock District Equipment Repair Garage		
		TxDOT Lubbock District Maintenance and Construction Vehicles		
		TxDOT Lubbock District Maintenance Sections		
MC03	Road Weather Data Collection	TxDOT Lubbock District DMS	TxDOT Lubbock	Future
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District RWIS Sensors		
		TxDOT Lubbock District TMC		
MC04	Weather Information Processing and Distribution	CapTrans Transit Dispatch	City of Lubbock	Future
		Citibus Transit Dispatch	City of Plainview	Future
		City and County of Lubbock EOC	TxDOT Lubbock	Future
		City of Lubbock Fire Dispatch		
		City of Lubbock Police/911 Dispatch		
		City of Lubbock Traffic Management Center		
		City of Plainview EOC		
		City of Plainview Police/Fire/EMS Dispatch		
		City of Plainview Traffic Operations Center		
		County EOC		
		County Volunteer Fire Departments Dispatch		
		DPS Communications Service		
		DPS/District Disaster Committee EOC		
		Independent School District Dispatch		
		Local Print and Broadcast Media		
		Municipal or County Public Safety Dispatch and PSAP		
		Municipal TOCs		
		National Weather Service		
		New Mexico DOT TMC		
		New Mexico State Police Dispatch		
		Other TxDOT District TMCs		
		Private Ambulance Dispatch		
		Private Travelers Personal Computing Devices		
		SPARTAN Transit Dispatch		
		TDCJ-ID Regional Dispatch		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC04 (continued)	Weather Information Processing and Distribution (continued)	TxDOT Lubbock District Maintenance Sections TxDOT Lubbock District Website		
MC05	Roadway Automated Treatment	TxDOT Lubbock District Anti-Icing Equipment TxDOT Lubbock District Maintenance Sections	TxDOT Lubbock	Future
MC06	Winter Maintenance	CapTrans Transit Dispatch Citibus Transit Dispatch City of Lubbock Transportation Division and Public Works Department City of Lubbock Vehicles City of Lubbock Website City of Lubbock Fire Dispatch City of Lubbock Police/911 Dispatch City of Lubbock Traffic Management Center City of Plainview Police/Fire/EMS Dispatch City of Plainview Traffic Operations Center County EOC County Road and Bridge County Road and Bridge Vehicles DPS Communications Service Independent School District Dispatch Local Print and Broadcast Media Municipal TOCs Municipal or County Public Safety Dispatch and PSAP Municipal PWD Municipal PWD Vehicles National Weather Service SPARTAN Transit Dispatch TxDOT Lubbock District Maintenance and Construction Vehicles TxDOT Lubbock District Maintenance Sections TxDOT Lubbock District TMC TxDOT Lubbock District Website	City of Lubbock County Road and Bridge Municipalities TxDOT Lubbock	Future Future Future Future

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC07	Roadway Maintenance and Construction	City of Lubbock Pavement Management System	City of Lubbock	Future
		City of Lubbock Transportation Division and Public Works Department	County Road and Bridge	Future
			Municipalities	Future
		City of Lubbock Vehicles	TxDOT Lubbock	Future
		City of Lubbock Traffic Management Center		
		County Road and Bridge		
		County Road and Bridge Vehicles		
		Municipal PWD		
		Municipal PWD Vehicles		
		National Weather Service		
		Lubbock Automated Roadway Information System		
		TxDOT BRINSAP		
		TxDOT Lubbock District Area Engineers Office		
		TxDOT Lubbock District Maintenance and Construction Vehicles		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District Pavement Management System		
		TxDOT Lubbock District Roadway Asset Inventory		
		TxDOT Lubbock District TMC		
MC08	Work Zone Management	CapTrans Transit Dispatch	City of Lubbock	Future
		Citibus Transit Dispatch	Municipalities	Future
		City of Lubbock Field Equipment	TxDOT Lubbock	Future
		City of Lubbock Fire Dispatch		
		City of Lubbock Police/911 Dispatch		
		City of Lubbock Traffic Management Center		
		City of Lubbock Transportation Division and Public Works Department		
		City of Lubbock Vehicles		
		City of Plainview Police/Fire/EMS Dispatch		
		City of Plainview Traffic Operations Center		
		County EOC		
		County Road and Bridge		
		DPS Communications Service		
		Independent School District Dispatch		
		Municipal Field Equipment		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC08 (continued)	Work Zone Management (continued)	Municipal or County Public Safety Dispatch and PSAP		
		Municipal PWD		
		Municipal TOCs		
		Municipal PWD Vehicles		
		Other TxDOT District Area Engineers Office		
		Other TxDOT District Maintenance Sections		
		Private Tow/Wrecker Dispatch		
		SPARTAN Transit Dispatch		
		State Operations Center		
		TxDOT Highway Conditions Reporting System		
		TxDOT Lubbock District Area Engineers Office		
		TxDOT Lubbock District Maintenance and Construction Vehicles		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District TMC		
		TxDOT Lubbock District Website		
		TxDOT Lubbock District Work Zone Equipment		
MC09	Work Zone Safety Monitoring	City of Lubbock Field Equipment	City of Lubbock	Future
		City of Lubbock Transportation Division and Public Works Department	County Road and Bridge	Future
		City of Lubbock Vehicles	Municipalities	Future
		County Road and Bridge	TxDOT Lubbock	Future
		County Road and Bridge Field Equipment		
		County Road and Bridge Vehicles		
		Municipal Field Equipment		
		Municipal PWD		
		Municipal PWD Vehicles		
		TxDOT Lubbock District Maintenance and Construction Vehicles		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District Work Zone Equipment		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC10	Maintenance and Construction Activity Coordination	CapTrans Transit Dispatch	City of Lubbock	Future
		Citibus Transit Dispatch	County Road and Bridge	Future
		City and County of Lubbock EOC	Municipalities	Future
		City of Lubbock Transportation Division and Public Works Department	TxDOT Lubbock	Future
		City of Lubbock Fire Dispatch		
		City of Lubbock Police/911 Dispatch		
		City of Lubbock Traffic Management Center		
		City of Plainview Police/Fire/EMS Dispatch		
		City of Plainview Traffic Operations Center		
		County Road and Bridge		
		DPS Communications Service		
		Independent School District Dispatch		
		Local Print and Broadcast Media		
		Municipal TOCs		
		Municipal or County Public Safety Dispatch and PSAP		
		Municipal PWD		
		New Mexico DOT TMC		
		New Mexico Maintenance Sections		
		Rail Operations Centers		
		SPARTAN Transit Dispatch		
		Other TxDOT District Area Engineers Office		
		Other TxDOT District Maintenance Sections		
		Other TxDOT District TMCs		
		TxDOT Highway Conditions Reporting System		
		TxDOT Lubbock District Area Engineers Office		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District TMC		
		TxDOT Lubbock District Website		
APTS1	Transit Vehicle Tracking	CapTrans Transit Dispatch	CapTrans	Future
		CapTrans Transit Vehicles	Citibus	Future
		Citibus Demand Response Vehicles	Independent School District	Future
		Citibus Transit Dispatch	SPARTAN	Future
		Citibus Transit Vehicles		
		Independent School District Buses		
		Independent School District Dispatch		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
APTS1 (continued)	Transit Vehicle Tracking (continued)	SPARTAN Transit Dispatch SPARTAN Vehicles		
APTS2	Transit Fixed-Route Operations	Citibus Transit Dispatch	Citibus	Future
		Citibus Transit Vehicles	Independent School District	Future
		Citibus Website		
		City of Lubbock Transportation Division and Public Works Department		
		City of Lubbock Traffic Management Center		
		City of Plainview Traffic Operations Center		
		Independent School District Buses		
		Independent School District Dispatch		
		Municipal TOCs		
		Private Sector Traveler Information Services		
		TTU Facilities and Maintenance Department		
		TTU Traffic Operations Center		
		TxDOT 511 System		
		TxDOT Lubbock District Area Engineers Office		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District TMC		
APTS3	Demand Response Transit Operations	CapTrans Transit Dispatch	CapTrans	Future
		CapTrans Transit Vehicles	Citibus	Future
		CapTrans Website	SPARTAN	Future
		Citibus Demand Response Vehicles		
		Citibus Transit Dispatch		
		Citibus Website		
		City of Lubbock Transportation Division and Public Works Department		
		City of Lubbock Traffic Management Center		
		City of Plainview Traffic Operations Center		
		County Road and Bridge		
		Municipal TOCs		
		Municipal PWD		
		Private Sector Traveler Information Services		
		SPARTAN Transit Dispatch		
		SPARTAN Vehicles		
		SPARTAN Website		
		TTU Facilities and Maintenance Department		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
APTS3 (continued)	Demand Response Transit Operations (continued)	TTU Traffic Operations Center		
		TxDOT 511 System		
		TxDOT Lubbock District Area Engineers Office		
		TxDOT Lubbock District Maintenance Management Office		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District TMC		
APTS4	Transit Passenger and Fare Management	CapTrans Transit Dispatch	CapTrans	Future
		CapTrans Transit Vehicles	Citibus	Future
		Citibus Information Display/Point of Sale	SPARTAN	Future
		Citibus Transit Dispatch		
		Citibus Transit Vehicles		
		Financial Institution		
		Lubbock Region Transit Reconciliation Network		
		Lubbock Regional Smart Card		
		SPARTAN Transit Dispatch		
		SPARTAN Vehicles		
APTS5	Transit Security	CapTrans Transit Dispatch	CapTrans	Future
		CapTrans Transit Vehicles	Citibus	Future
		Citibus Demand Response Vehicles	SPARTAN	Future
		Citibus Information Display/Point of Sale		
		Citibus Transit Dispatch		
		Citibus Transit Vehicles		
		City of Lubbock Fire Dispatch		
		City of Lubbock Police/911 Dispatch		
		City of Plainview Police/Fire/EMS Dispatch		
		DPS Communications Service		
		Municipal or County Public Safety Dispatch and PSAP		
		SPARTAN Transit Dispatch		
		SPARTAN Vehicles		
		TTU Police Department Dispatch		
APTS7	Multi-modal Coordination	CapTrans Transit Dispatch	CapTrans	Future
		CapTrans Transit Vehicles	Citibus	Future
		Citibus Transit Dispatch	SPARTAN	Future
		Citibus Transit Vehicles		
		City of Lubbock Field Equipment		
		City of Lubbock Traffic Management Center		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
APTS7 (continued)	Multi-modal Coordination (continued)	Private Taxi Provider Dispatch SPARTAN Transit Dispatch SPARTAN Vehicles TTU Field Equipment TTU Traffic Operations Center		
APTS8	Transit Traveler Information	CapTrans Transit Dispatch CapTrans Website Citibus Information Display/Point of Sale Citibus Transit Dispatch Citibus Website Private Travelers Personal Computing Devices SPARTAN Transit Dispatch SPARTAN Website TxDOT Rest Areas/Visitor Centers/Service Plaza/Truck Stop Kiosks	CapTrans — Future Citibus — Future SPARTAN — Future	
CVO10	HAZMAT Management	City of Lubbock Fire Dispatch City of Lubbock Police/911 Dispatch City of Plainview Police/Fire/EMS Dispatch Commercial Vehicles Private Fleet Management Systems DPS Communications Service Municipal or County Public Safety Dispatch and PSAP Rail Operations Centers Rail Operators Rail Cars	Private Fleet Management — Future Rail Operators — Future	
ATIS1	Broadcast Traveler Information	City of Lubbock Traffic Management Center Local Print and Broadcast Media Private Travelers Personal Computing Devices Other TxDOT District Maintenance Sections TxDOT 511 System TxDOT Highway Conditions Reporting System TxDOT Lubbock District Area Engineers Office TxDOT Lubbock District Maintenance Sections TxDOT Lubbock District TMC TxDOT Lubbock District Website TxDOT Rest Areas/Visitor Centers/Service Plaza/Truck Stop Kiosks	TxDOT Lubbock — Future	

Note: In the APTS8, CVO10, and ATIS1 rows above, the "Primary Stakeholders Responsible for Implementation" and "Market Package Status" values are paired as follows:

APTS8:

Primary Stakeholders Responsible for Implementation	Market Package Status
CapTrans	Future
Citibus	Future
SPARTAN	Future

CVO10:

Primary Stakeholders Responsible for Implementation	Market Package Status
Private Fleet Management	Future
Rail Operators	Future

ATIS1:

Primary Stakeholders Responsible for Implementation	Market Package Status
TxDOT Lubbock	Future

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATIS2	Interactive Traveler Information	Citibus Information Display/Point of Sale	TxDOT Lubbock	Future
		Private Travelers Personal Computing Devices		
		TxDOT 511 System		
		TxDOT Lubbock District Website		
		TxDOT Rest Areas/Visitor Centers/Service Plaza/Truck Stop Kiosks		
ATIS5	ISP Based Route Guidance	City of Lubbock Traffic Management Center	TxDOT Lubbock	Future
		Private Fleet Management Systems		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District TMC		
		TxDOT Motor Carrier Routing Information		
		TxDOT Rest Areas/Visitor Centers/Service Plaza/Truck Stop Kiosks		
AD1	ITS Data Mart	CapTrans Transit Dispatch	Department of Public Safety	Future
		Citibus Transit Dispatch	TxDOT Lubbock	Future
		DPS Administration		
		Statewide Crash Records Information System		
		Statewide Crash Records Information System Users		
		SPARTAN Transit Dispatch		
		TxDOT Lubbock District Maintenance Sections		
		TxDOT Lubbock District Pavement Management System		
		TxDOT Lubbock District Pavement Management System Users		
		TxDOT Lubbock District Public Transportation Management System (PTMS)		
		TxDOT PTMS Archive Data Users Systems		
		TxDOT Statewide Pavement Management System		
AD2	ITS Data Warehouse	CapTrans Transit Dispatch	Lubbock MPO	Future
		Citibus Transit Dispatch		
		City of Lubbock Traffic Management Center		
		City of Plainview Traffic Operations Center		
		Lubbock MPO Archive		
		Lubbock MPO Archive Data User Systems		
		Municipal TOCs		
		Rail Operations Centers		

Table 5 – Lubbock Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
AD2 (continued)	ITS Data Warehouse (continued)	SPARTAN Transit Dispatch TxDOT Lubbock District TMC		

4.3 Interconnections

4.3.1 Top Level Regional System Interconnect Diagram

A system interconnect diagram, or sausage diagram (shown previously in **Figure 4**), shows the systems and primary interconnects in the Region. The National ITS Architecture interconnect diagram has been customized for the Lubbock Region based on the information gathered from the stakeholders and system inventory. **Figure 5** summarizes the existing, planned, and future ITS elements for the Lubbock Region in the context of a physical interconnect. Subsystems and elements specific to Lubbock are called out in the boxes surrounding the main interconnect diagram, and these are color-coded to the subsystem to which they are associated.

4.3.2 Customized Market Packages

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Lubbock Region. Each market package is shown graphically, with the market package name, Lubbock-specific element, and with the unique agency and system identifiers within the subsystems and terminators. Market packages represent a service that will be deployed as an integrated capability. Market packages often are comprised of one or more equipment packages, which are functional capabilities that could be deployed at a specific time. Equipment packages are the most basic functions that will be developed or bought by implementers.

Figure 6 is an example of an ATMS market package for Surface Street Control that has been customized for the Lubbock Region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated entities (TxDOT Lubbock District Traffic Signals, TxDOT Lubbock District Field Sensors, etc.) for the TxDOT Lubbock District signal system. Data flows between the subsystems indicate what information is being shared.

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

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

Remote Traveler Support Subsystem
- Citibus Information Display / Point of Sale*
- TxDOT Rest Area/Visitor Center/Service Plaza/Truck Stop Kiosks*

Personal Information Access Subsystem
- Private Travelers Personal Computing Devices

Transit Vehicle Subsystem
- CapTrans Transit Vehicles
- Citibus Demand Response Vehicles
- Citibus Transit Vehicles
- Independent School District Buses
- SPARTAN Vehicles

Vehicle Subsystem
- Commercial Vehicles

Commercial Vehicle Subsystem
- Commercial Vehicles
- Rail Operators Rail Cars

Maintenance and Const Vehicle Subsystem
- City of Lubbock Vehicles
- County Road and Bridge Vehicles
- Lubbock Automated Roadway Information System*
- Municipal PWD Vehicles
- TxDOT Lubbock District Maintenance and Construction Vehicles

Emergency Vehicle Subsystem
- City of Lubbock Emergency Vehicles
- City of Plainview Emergency Vehicles
- DPS Emergency Vehicles
- Municipal or County Emergency Vehicles
- Private Ambulance Vehicles
- TTU Police Vehicles
- UMC Emergency Vehicles

Maintenance & Construction Management
- City of Lubbock Transportation Division and Public Works Department
- County Road and Bridge
- Municipal PWD
- New Mexico Maintenance Sections
- Other TxDOT District Area Engineers Office
- Other TxDOT District Maintenance Sections
- TTU Facilities and Maintenance Department
- TxDOT Highway Conditions Reporting System
- TxDOT Lubbock District Area Engineers Office
- TxDOT Lubbock District Maintenance Management Office
- TxDOT Lubbock District Maintenance Sections

Emergency Management Subsystem
- Cannon AFB EOC
- City of County of Lubbock EOC
- City of Lubbock Fire Dispatch
- City of Lubbock Police/911 Dispatch
- City of Plainview EOC
- City of Plainview Police/Fire/EMS Dispatch
- County EOC

Emergency Management Subsystem (Cont.)
- County Volunteer Fire Departments Dispatch
- DPS Administration
- DPS Communications Service
- DPS/District Disaster Committee EOC
- Municipal or County Public Safety Dispatch and PSAP
- New Mexico State Police Dispatch
- Private Ambulance Dispatch
- Private Tow/Wrecker Dispatch
- Regional Medical Centers
- State Operations Center
- TDCJ-ID Regional Dispatch
- TTU Police Department Dispatch
- UMC EMS Dispatch

Fleet and Freight Management Subsystem
- Private Fleet Management Systems*
- Rail Operations Centers

Information Service Provider Subsystem
- CapTrans Website
- Citibus Website
- City of Lubbock Website
- Municipal Websites
- Private Sector Traveler Information Services*
- SPARTAN Website*
- TxDOT 511 System*
- TxDOT Highway Conditions Reporting System
- TxDOT Lubbock District TMC
- TxDOT Lubbock District Website*
- TxDOT Motor Carrier Routing Information

Archived Data Management Subsystem
- Lubbock MPO Archive*
- Statewide Crash Records Information System
- TxDOT Lubbock District Pavement Management System
- TxDOT Odessa District Public Transportation Management System (PTMS)
- TxDOT Statewide Pavement Management System

Transit Management Subsystem
- CapTrans Transit Dispatch
- Citibus District Dispatch
- Independent School District Dispatch
- Lubbock Region Transit Reconciliation Network*
- Private Taxi Provider Dispatch
- SPARTAN Transit Dispatch

Traffic Management Subsystem
- City of Lubbock Traffic Management Center
- City of Plainview Traffic Operations Center*
- Municipal TOCs*
- New Mexico DOT TMC
- Other TxDOT District TMCs
- TTU Traffic Operations Center*
- TxDOT Fort Worth TMC (TransVision)
- TxDOT Lubbock District TMC

Archived Data User Systems
- Lubbock MPO Archive Data User Systems*
- Statewide Crash Records Information System Users
- TxDOT Lubbock District Pavement Management System Users
- TxDOT PTMS Archive Data Users Systems

Asset Management
- City of Lubbock Pavement Management System
- TxDOT BRINSAP
- TxDOT Lubbock District Pavement Management System
- TxDOT Lubbock District Roadway Asset Inventory*

Care Facility
- Regional Medical Centers

Driver
- Driver

Equipment Repair Facility
- City of Lubbock Central Services Garage
- County Road and Bridge Equipment Repair
- Municipal PWD Garage
- TxDOT Lubbock District Equipment Repair Garage

Event Promoters
- Municipal Convention and Visitors Bureau*
- TTU Event Planning Office*

Financial Institution
- Financial Institution

Maintenance & Construction Admin
- TxDOT Lubbock District Area Engineers Office

Media
- Local Print and Broadcast Media

Other EM
- Lubbock Regional Incident and Mutual Aid Network*

Rail Operations
- Rail Operations Centers

Traveler Card
- Lubbock Regional Smart Card*

Wayside Equipment
- Rail Operators Wayside Equipment

Weather Service
- National Weather Service

Parking Management
- TTU Parking System*

Roadway Subsystem
- City of Lubbock Field Equipment
- City of Plainview Field Equipment
- County Road and Bridge Field Equipment*
- Municipal ITS Field Equipment*
- TTU Field Equipment
- TTU Parking System DMS*
- TxDOT Lubbock District Anti-Icing Equipment*
- TxDOT Lubbock District CCTV*
- TxDOT Lubbock District DMS
- TxDOT Lubbock District Field Sensors

Roadway Subsystem
- TxDOT Lubbock District Flood Detection*
- TxDOT Lubbock District HAR*
- TxDOT Lubbock District Lane Use Control Signals*
- TxDOT Lubbock District Ramp Metering*
- TxDOT Lubbock District RWIS Sensors*
- TxDOT Lubbock District School Flashers*
- TxDOT Lubbock District Speed Monitoring
- TxDOT Lubbock District Traffic Signals
- TxDOT Lubbock District Work Zone Equipment*

Elements are planned or future, not existing.

Last Updated: February 15, 2005

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

Vehicles
- Vehicle
- Transit Vehicle
- Commercial Vehicle
- Emergency Vehicle
- Maintenance & Construction Vehicle

Vehicle to Vehicle Communications

Dedicated Short Range Communications

Roadside
- Roadway
- Toll Collection
- Parking Management
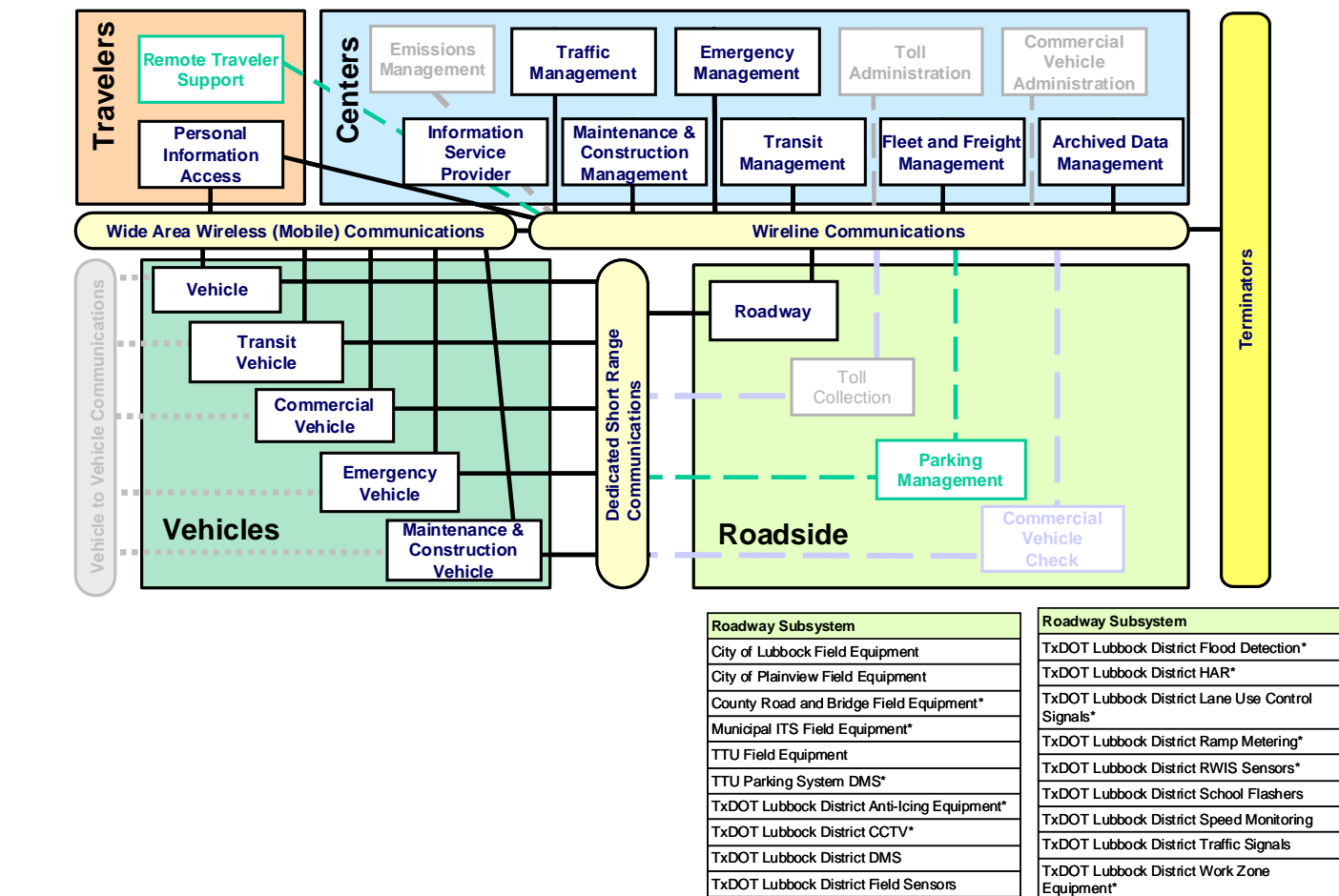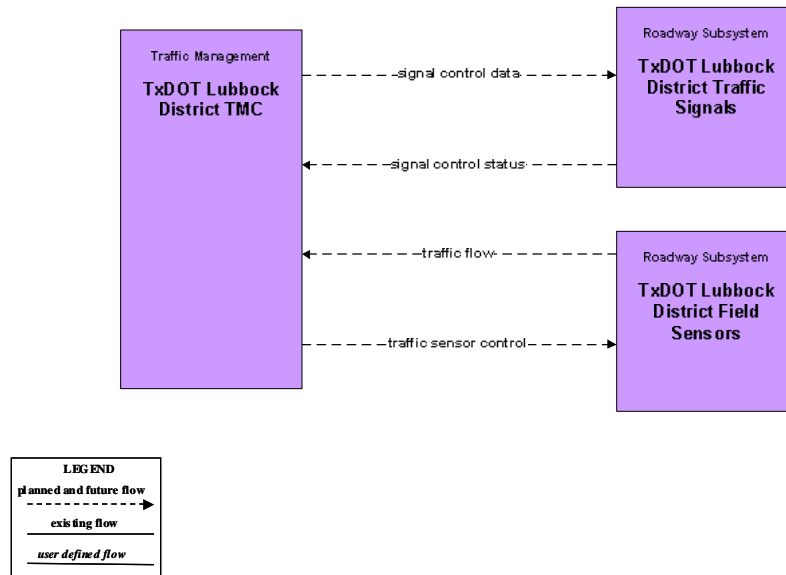- Commercial Vehicle Check

**Figure 5 – Lubbock Regional System Interconnect Diagram**

Figure 6 – Custom Market Package for Surface Street Control

4.3.3   Lubbock Architecture Interfaces

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

There are 123 different elements identified as part of the Lubbock Regional ITS Architecture. These elements include traffic management centers, transit vehicles, dispatch systems, emergency management agencies, media outlets, and others – essentially, all of the existing and planned physical components that contribute to the regional intelligent transportation system. Interfaces have been identified for each element in the Lubbock Regional ITS Architecture, and each element has been mapped to those other elements with which it must interface. For example, the TxDOT Lubbock District TMC has existing or planned interfaces with 43 other elements in the Lubbock Region, ranging from field equipment and dispatch centers, to other TxDOT District TMCs. Other interfaces are far less complex, such as the interface between the DPS vehicles and the DPS Communications Dispatch.

An example of one of the system interfaces is shown in **Figure 7**. This graphic shows the TxDOT Lubbock 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.
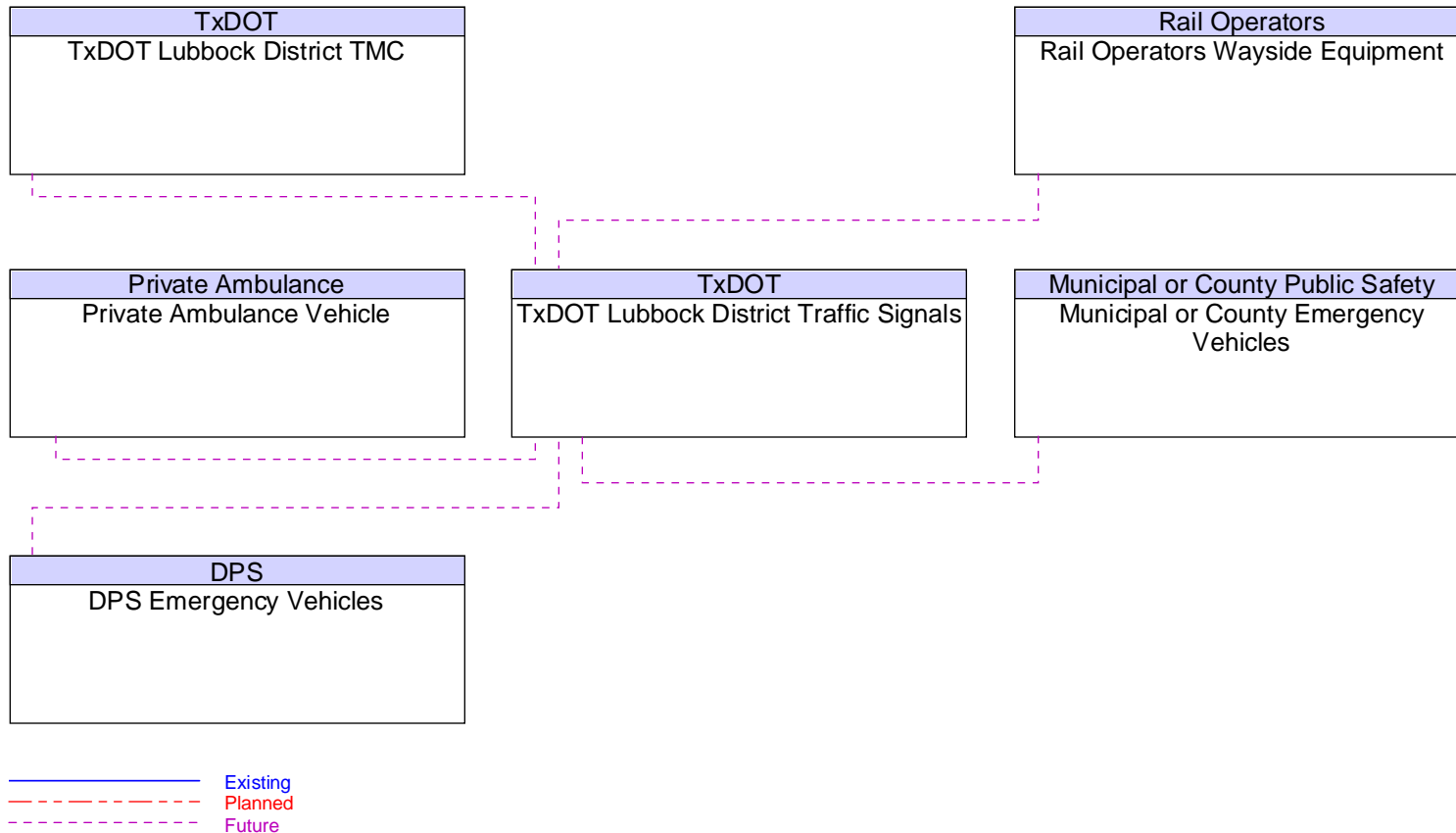
Figure 7 – TxDOT Lubbock District Traffic Signals Interfaces

Legend:
- Existing
- Planned
- Future

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

4.3.4 Physical Subsystem Architecture Flows

Architecture flows between the subsystems and terminators define the specific information (data) that is exchanged between subsystems and terminators. Each architecture flow has one or more data flows that specify what information is exchanged and the direction of the exchange. These data flows could be requests for information, alerts and messages, status requests, broadcast advisories, event messages, confirmations, electronic credentials, and other key information requirements. These architecture flows define the interface requirements between the various elements in the Lubbock Regional ITS Architecture.

An example of the architecture flows between two elements is shown in **Figure 8**. In this interface, the flows between the TxDOT Lubbock District TMC and Other Texas District TMCs show information that must go from the Lubbock District TMC to other TxDOT TMCs, as well as information that the TMC needs from devices. Similar to the interfaces, architecture flows also are defined as existing, planned, or future.

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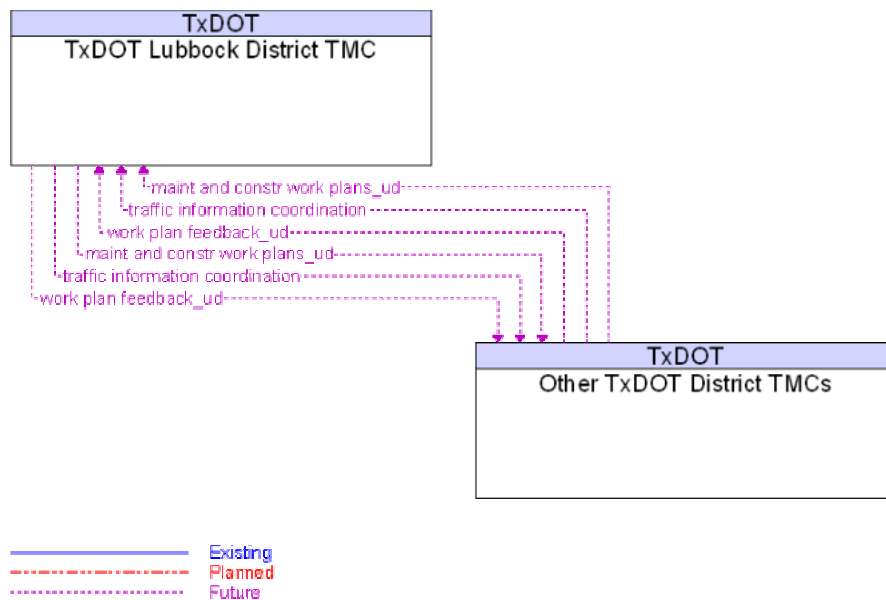
Figure 8 – TxDOT Lubbock District TMC to Other Texas District TMCs Architecture Flows

4.4 Functional Requirements

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

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

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

Table 6 – Lubbock Region Equipment Packages

Subsystem	Equipment Package
Archived Data Management Subsystem	Government Reporting Systems Support
	ITS Data Repository
	On-Line Analysis and Mining
	Traffic and Roadside Data Archival
Commercial Vehicle Administration Subsystem	CV Data Collection
Commercial Vehicle Subsystem	On-board Cargo Monitoring
Emergency Management Subsystem	Emergency Call-Taking
	Emergency Data Collection
	Emergency Dispatch
	Emergency Environmental Monitoring
	Emergency Response Management
	Mayday Support
Emergency Vehicle Subsystem	On-board EV En Route Support
	On-board EV Environmental Monitoring
	On-board EV Incident Management Communication

Table 6 – Lubbock Region Equipment Packages (continued)

Subsystem	Equipment Package
Emissions Management Subsystem	Emissions Data Collection
Fleet and Freight Management Subsystem	Fleet HAZMAT Management
Information Service Provider Subsystem	Basic Information Broadcast
	Infrastructure Provided Route Selection
	Interactive Infrastructure Information
	ISP Data Collection
	ISP Probe Information Collection
Maintenance and Construction Management Subsystem	MCM Automated Treatment System Control
	MCM Data Collection
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Maintenance Decision Support
	MCM Roadway Maintenance and Construction
	MCM Speed Monitoring
	MCM Vehicle and Equipment Maintenance Management
	MCM Vehicle Tracking
	MCM Winter Maintenance Management
	MCM Work Activity Coordination
	MCM Work Zone Management
	MCM Work Zone Safety Management
Maintenance and Construction Vehicle Subsystem	MCV Environmental Monitoring
	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Winter Maintenance
	MCV Work Zone Support
Parking Management Subsystem	Parking Data Collection
	Parking Electronic Payment
	Parking Management
	Parking Surveillance
Personal Information Access Subsystem	Personal Basic Information Reception
	Personal Interactive Information Reception
	Personal Location Determination
	Personal Provider-Based Route Guidance
Remote Traveler Support Subsystem	Remote Basic Information Reception
	Remote Interactive Information Reception

Table 6 – Lubbock Region Equipment Packages (continued)

Subsystem	Equipment Package
Remote Traveler Support Subsystem (continued)	Remote Mayday I/F
	Remote Transit Fare Management
	Remote Transit Information Services
	Secure Area Monitoring
Roadway Subsystem	Roadside Data Collection
	Roadside Signal Priority
	Roadway Automated Treatment
	Roadway Basic Surveillance
	Roadway Environmental Monitoring
	Roadway Equipment Coordination
	Roadway Freeway Control
	Roadway Incident Detection
	Roadway Infrastructure Monitoring
	Roadway Probe Beacons
	Roadway Signal Controls
	Roadway Speed Monitoring
	Roadway Traffic Information Dissemination
	Roadway Work Zone Safety
	Roadway Work Zone Traffic Control
	Standard Rail Crossing
Toll Administration Subsystem	Toll Data Collection
Traffic Management Subsystem	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Freeway Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Signal Control
	TMC Speed Monitoring
	TMC Traffic Information Dissemination
	TMC Work Zone Traffic Management
	Traffic Data Collection
	Traffic Maintenance
Transit Management Subsystem	Transit Center Fare and Load Management
	Transit Center Fixed-Route Operations

Table 6 – Lubbock Region Equipment Packages (continued)

Subsystem	Equipment Package
Transit Management Subsystem (continued)	Transit Center Information Services
	Transit Center Multi-Modal Coordination
	Transit Center Paratransit Operations
	Transit Center Security
	Transit Center Tracking and Dispatch
	Transit Data Collection
	Transit Environmental Monitoring
	Transit Garage Operations
Transit Vehicle Subsystem	On-board Environmental Monitoring
	On-board Fixed Route Schedule Management
	On-board Paratransit Operations
	On-board Transit Fare and Load Management
	On-board Transit Information Services
	On-board Transit Security
	On-board Transit Signal Priority
	On-board Transit Trip Monitoring
Vehicle Subsystem	Basic Vehicle Reception
	Interactive Vehicle Reception
	Smart Probe
	Vehicle Location Determination
	Vehicle Mayday I/F
	Vehicle Provider-Based Route Guidance
	Vehicle Safety Monitoring System
	Vehicle Toll/Parking Interface

4.5 Standards

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

Table 7 – Applicable ITS Standards for the Lubbock Region

SDO	Document ID	Title	Type
AASHTO/ITE/NEMA	NTCIP 1201	Global Object Definitions	Message
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units	Message
	NTCIP 1203	Object Definitions for Dynamic Message Signs	Message
	NTCIP 1204	Object Definitions for Environmental Sensor Stations and Roadside Weather Information System	Message
	NTCIP 1205	Data Dictionary for Closed Circuit Television (CCTV)	Message
	NTCIP 1207	Ramp Meter Controller Objects	Message
	NTCIP 1208	Object Definitions for Video Switches	Message
	NTCIP 1209	Transportation System Sensor Objects	Message
	NTCIP 1210	Objects for Signal Systems Master	Message
	NTCIP 1211	Objects for Signal Control Priority	Message
	NTCIP 1301	Message Set for Weather Reports	Message
	NTCIP 1401	TCIP – Common Public Transportation (CPT) Business Area Standard	Message
	NTCIP 1402	TCIP – Incident Management (IM) Business Area Standard	Message
	NTCIP 1403	TCIP – Passenger Information (PI) Business Area Standard	Message
	NTCIP 1404	TCIP – Scheduling/Runcutting (SCH) Business Area Standard	Message
	NTCIP 1405	TCIP – Spatial Representation (SP) Business Area Standard	Message
	NTCIP 1406	TCIP – Onboard (OB) Business Area Standard	Message
	NTCIP 1407	TCIP – Control Center (CC) Business Area Standard	Message
	NTCIP 1408	TCIP – Fare Collection (FC) Business Area Standard	Message
	View List	NTCIP Center-to-Center Standards Group	Communication
	View List	NTCIP Center-to-Field Standards Group	Communication
ASTM	ASTM 5 GHz Data Link	Standard Specification for 5.9 GHz Data Link Layer	Communication
	ASTM 5 GHz Phys	Standard Specification for 5.9 GHz Physical Layer	Communication
	ASTM DD 17.54.00.2	ADMS Data Dictionary Specifications	Data
	ASTM PS 105-99	Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	Communication
	ASTM PS 111-98	Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz	Communication
EIA/CEA	CEA/EIA-794	Data Radio Channel (DARC) System	Communication
	CEA/EIA-795	Subcarrier Traffic Information Channel (STIC) System	Communication

Table 7 – Applicable ITS Standards for the Lubbock Region (continued)

SDO	Document ID	Title	Type
IEEE	IEEE P1512.1	Standard for Traffic Incident Management Message Sets for Use by EMCs	Message
	IEEE P1512.2	Standard for Public Safety IMMS for use by EMCs	Message
	IEEE P1512.3	Standard for Hazardous Material IMMS for use by EMCs	Message
	IEEE P1512.a	Standard for Emergency Management Data Dictionary	Data
	IEEE P1512-2000	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	Message
	IEEE P1556	Security/Privacy of Vehicle/RS Communications including Smart Card Communications	Communication
	IEEE P1570	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	Message
ITE	ITE TM 1.03	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	Data
	ITE TM 2.01	Message Sets for External TMC Communication (MS/ETMCC)	Message
	ITE TS 3.TM	TCIP – Traffic Management (TM) Business Area Standard	Message
SAE	SAE J1746	ISP-Vehicle Location Referencing Standard	Data
	SAE J2313	On-board Land Vehicle Mayday Reporting Interface	Message
	SAE J2353	Data Dictionary for Advanced Traveler Information System (ATIS)	Data
	SAE J2354	Message Set for ATIS	Message
	SAE J2369	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	Message
	SAE J2529	Rules for Standardizing Street Names and Route IDs	Message
	SAE J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards	Message

4.6   Phases of Implementation

The Lubbock Regional ITS Architecture will be implemented through a series of projects led by primarily public sector agencies, but participation from the private sector will be needed for some components. Key foundation systems will need to be implemented in order to support other systems that have been identified in the Regional ITS Architecture. The deployment of all of the systems required to achieve the final Regional ITS Architecture build out will be incremental and will occur over the next several years.

A sequence of projects and recommended time frames has been identified in the Lubbock Regional ITS Deployment Plan. These projects have been sequenced over a 20-year period, with projects identified for deployment in a 5-, 10-, and 20-year timeframe. These timeframes correspond with priorities and needs identified by stakeholders in the Lubbock Region.

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

- Network Surveillance;
- Surface Street Control;
- Regional Traffic Control;
- Road Weather Data Collection;
- Weather Information Processing and Distribution;
- Traffic Information Dissemination;
- Incident Management System;
- Fixed Route Transit Operations; and
- Demand Response Transit Operations.

In addition to the above market packages, the implementation of an appropriate communications system in the Lubbock Region to support ITS—including operation of devices as well as information sharing among agencies—is critical for continued deployment and integration of systems. The City of Lubbock and TxDOT have already identified a strong need for a communications link to facilitate information sharing and system operations between these two agencies, and they are seeking funding to implement this link in the near term.

5. OPERATIONAL CONCEPT

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

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

With the information sharing needs, operational requirements, and in some cases shared or joint operations of systems, agreements may be required to better define roles and responsibilities. A list of potential agreements has been included in Section 5.3. As projects are implemented and agencies move toward integration on a regional level, these potential agreements should be reviewed for their applicability.

5.1 Operational Scenarios

Scenario 1

A storm with the potential for heavy rains is sweeping through the Texas Panhandle and approaching the Lubbock Region. The EOC is watching the storm and has alerted the City of Lubbock, TxDOT, the City of Plainview, and sheriffs in the Region's northern and central counties about the potential for heavy rainfall.

The rains begin, and after the long, dry summer in the Panhandle, runoff from the storm is causing severe flooding along roadways. As the waters rise, flood detection stations report back to the TxDOT Lubbock TMC and maintenance offices that several roadways have become impassable, including portions of I-27. As part of the flood detection system, in particularly dangerous areas where the flood conditions can be underestimated, lane closure, and restriction systems are also in place. These are activated after the flood system algorithm reaches a specified threshold, warning drivers that certain lanes on the highway are closed. TxDOT Lubbock maintenance staff enters the emergency conditions, closures, and warnings into HCRS, which updates the statewide database. An automated notification system sends a warning to SPARTAN and CapTrans, which provide demand-response transportation services, about the closures and hazardous conditions, and warns of affected roadways that might be on their routes.

The TxDOT Lubbock TMC also sends a message to DPS, the City of Plainview, and Hale County so that when emergency vehicles are dispatched the drivers are cognizant of the closures and can take the appropriate detours. Because the flooding is particularly concentrated near Plainview, the Hale County EOC is activated and begins coordinating with local agencies; it is anticipated that there will be several motorists seeking refuge from the storm, as well as emergency call-outs for stranded vehicles. TxDOT maintenance offices in Plainview, Tulia, Floydada, and Dimmit continue to monitor data coming in from flood detection stations in their areas; these maintenance

offices are coordinating with county and city officials about flooding on county roads. Through a regional maintenance coordination system, information about road closures due to flooding on roadways throughout the Region is continuously updated.

Messages are placed on DMS in the Lubbock Region to warn of the flood conditions that exist on I-27 and other major routes, and urge motorists to avoid the areas affected by the flood. Beacons on highway advisory radio signs along I-27 are activated, and an emergency message is broadcast through the HAR system. Through center-to-center communications, TxDOT Lubbock's warning message also is sent to the TxDOT TMC in the Amarillo District warning them of the conditions on I-27. The Amarillo District posts messages on DMS near I-40 and I-27 warning southbound motorists of the hazardous conditions and closures.

Flooding in the Lubbock Region will continue to be a threat, but as demonstrated in this scenario, ITS applications can aid in detection, agency coordination and motorist information, which results in increased safety for travelers and safety personnel in the Lubbock Region.

Scenario 2

It's a crisp, October Saturday, and Red Raider fans from throughout west Texas and beyond are making their way to the Jones SBC Stadium at Texas Tech for a football game. More than 50,000 fans are expected at the game. The City of Lubbock, Texas Tech University and TxDOT have implemented a game-day event management plan that will help traffic move safely into and out of the stadium parking lots, as well as improve safety of the streets near campus during event ingress and egress.

Systems that have been deployed in the Lubbock Region by various agencies in the Lubbock metro area are utilized in a coordinated 'game-day' traffic management and traveler information system plan. TxDOT posts messages on dynamic message signs on the Marsha Sharp Freeway in central Lubbock, Loop 289 and on I-27 advising event traffic of the appropriate exits to use to get to the event. The City of Lubbock has instrumented key corridors near the Texas Tech campus as 'smart corridors', and they are able to view CCTV images of traffic and receive volume and speed data from detectors along the roadways. Traffic signal timing plans along 19th Street, 4th Street, and University Avenue are automatically adjusted based on real-time data coming in to the City of Lubbock's TMC and Texas Tech's Traffic Operations Center (TOC). Portable dynamic message signs along 19th Street, University Avenue, and 4th Street guide patrons to the parking areas for the game.

The Texas Tech parking management system automatically counts each car as it enters the parking garage at the stadium; when the garage reaches capacity, a 'lot full' sign is automatically illuminated. A garage status message is sent to the Texas Tech TOC, and through a communications link, is also sent to the City of Lubbock TMC. Using wireless communications, operators at the City of Lubbock then change the message on portable dynamic message signs on streets near the stadium warning travelers that the stadium garage is full and to use other parking facilities. CCTV cameras in the parking lot monitor parking circulation and capacity.

Citibus offers a game-day shuttle service from the other campus lots off of Indiana Avenue to the stadium. Using AVL technology, Citibus can monitor where each of its shuttles is on the streets leading to the stadium. Automatic passenger counters keep a total of the number of patrons using the free shuttle service.

Although major events like a Texas Tech football game will put substantial demand on the area's roadway network, systems that have been implemented in the field greatly help to guide patrons

safely to and from the stadium and parking lots. These systems, combined with interagency communications to share real-time data, provide a valuable tool for traffic and law enforcement agencies to safely manage event traffic ingress and egress.

5.2   Roles and Responsibilities

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

Travel and Traffic Management

- City of Lubbock (Traffic and Police)
- County Road/Public Works
- Texas Tech University
- Texas Department of Public Safety
- Texas Department of Transportation (Lubbock and Other Districts)

Public Transportation Management

- Citibus Fixed Route and Demand-Response Transit
- SPARTAN
- CapTrans
- Independent School Districts

Electronic Payment

- Not Applicable (transit electronic payment is address in Public Transportation Operations)

Commercial Vehicle Operations

- Texas Department of Public Safety
- Texas Department of Transportation

Emergency Management

- City of Lubbock (Traffic, Police, and Fire)
- Local City/County EOCs
- Local County Sheriffs
- Local Law Enforcement (including Texas Tech Police)
- Texas Department of Public Safety
- Texas Department of Transportation

Information Management

- Texas Department of Transportation
- Lubbock Metropolitan Planning Organization

Maintenance and Construction Management

- City of Lubbock
- County Road and Bridge
- Texas Department of Transportation

5.3 Lubbock Agreements

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

Currently, there are some agreements in place in the Region, primarily for mutual aid (these are more common practice and informal) as well as more formal agreements for traffic signal operations and maintenance. With the implementation of ITS technologies, integration of systems from one or more agencies, and the anticipated level of information exchange identified in the architecture, it is likely that additional formal agreements will be needed in the future.

These agreements, while perhaps not requiring a financial commitment from agencies in the Region, should outline specific roles, responsibilities, data exchanges, levels of authority, and other facets of regional operations. Some agreements also will outline specific funding responsibilities, where appropriate and applicable.

Table 8 provides a list of potential agreements for the Lubbock Region based on the interfaces identified in the Regional Architecture. It is important to note that as ITS services and systems are implemented in the Region, part of the planning and review process for those projects should include a review of potential agreements that would be needed for implementation or operations.

Table 8 – Potential Agreements for the Lubbock Region

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

Table 8 – Potential Agreements for the Lubbock Region (continued)

Agreement and Agencies	Status	Agreement Description	Considerations
Shared Video Monitoring (Public) TxDOT, City of Lubbock, DPS, Local Sheriff and Police	Future	This agreement would enable shared video monitoring of TxDOT and City CCTV cameras by public safety and emergency services agencies in the Lubbock Region for incident management purposes. This agreement would define the parameters and policies for public safety agencies to access video images via the TxDOT video switch. It is recommended that the agreement include any TxDOT policies relating to video images (including archiving, privacy, disclaimers, use of video and redistribution) as well as processes for agency requests for specific views. Shared video monitoring does not address shared use or shared control of video equipment functions (see *Joint Operations/Shared Control Agreements among Public Agencies* below).	These agreements are typically zero-dollar agreements, in that there is no charge among agencies for the actual data, although there might be some cost incurred for infrastructure, systems or fiber to enable communications between agencies, particularly with the high bandwidth required for transmitting live video images.
Joint Operations/Shared Control Agreements (Public) TxDOT, City of Lubbock, Texas Tech	Future	These agreements are formal arrangements to allow joint operations or control of certain systems and equipment. TxDOT Lubbock and the City of Lubbock have already discussed the likelihood that there will be shared control of some devices that are implemented, and perhaps shared operations of system elements. The agreement would need to define the terms of this arrangement, such as hours of operation and time of day/time of week where shared control would take effect, circumstances or incidents where shared control would take effect, notification procedures between the agencies agreeing to shared control arrangements, etc.	Joint operations/shared control will require that agencies agree on parameters of system operations, and that consistent policies and procedures are in place at the operations centers. Standardized equipment and device interfaces will help facilitate consistent operations by operators at the various centers.
Mutual Aid Agreements (Public) DPS, Fire, Police, Sheriff, EOCs, TxDOT	Existing (Informal)	Mutual aid agreements currently exist as informal arrangements in the Lubbock Region, although they are a routine practice among public safety and emergency services agencies. Formal mutual aid agreements will become more important as agencies integrate systems and capabilities, particularly automated dispatch and notification.	These agreements are typically zero-dollar agreements, although there might be some funding required to support regional incident management activities. The agreement also would outline resource commitments that would be part of any mutual aid arrangement (personnel, equipment, facilities, etc.).