State of Texas
Regional ITS Architectures and Deployment Plans

Brazos Valley Region

Regional ITS Architecture Report

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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
BCSCVB	Bryan/College Station Convention and Visitors Bureau
BCSMPO	Bryan/College Station Metropolitan Planning Organization
BRINSAP	Bridge Inventory Inspection System
BVCOG	Brazos Valley Council of Governments
CC	Control Center
CCTV	Closed-Circuit Television
CDD	Computer-Aided Dispatch
CEA	Consumer Electronics Association
CPT	Common Public Transportation
CVISN	Commercial Vehicle Information Systems and Networks
DARC	Data Radio Channel
DMS	Dynamic Message Sign
DPS	Department of Public Safety
DSRC	Dedicated Short Range Communications
EIA	Electronic Industries Association
EMS	Emergency Medical Services
EOC	Emergency Operations Center
ETMCC	External TMC Communication
EV	Emergency Vehicle
FC	Fare Collection
FHWA	Federal Highway Administration
GIS	Geographic Information System
HAR	Highway Advisory Radio

LIST OF ACRONYMS

HAZMAT	Hazardous Materials
HCRS	Highway Condition Reporting System
HRI	Highway-Rail Intersections
I/F	Interface
IEEE	Institute of Electrical and Electronics Engineers
IM	Incident Management
IMMS	Incident Management Message Sets
ISD	Independent School District
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	Onboard
PI	Passenger Information
PTMS	Public Transportation Management System
RWIS	Road Weather Information System
SAE	Society of Automotive Engineers
SDO	Standards Development Organization
SP	Spatial Representation
STIC	Subcarrier Traffic Information Channel
TAMU	Texas A&M University

LIST OF ACRONYMS

TCIP	Transit Communication Interface Protocol
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
TTI	Texas Transportation Institution
TxDOT	Texas Department of Transportation
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 Brazos Valley Region was the eleventh in the series of Regional ITS Architectures to be prepared as part of this initiative.

The Brazos Valley Region is located in central Texas. The Brazos Valley Region is bordered by the TxDOT Waco and Dallas Districts to the north, the TxDOT Austin District to the west, the TxDOT Tyler and Lufkin Districts to the east, and the TxDOT Yoakum and Houston Districts to the south.

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

Stakeholders from throughout the Region participated in the development of the Regional ITS Architecture, including representatives from TxDOT, the Texas Department of Public Safety (DPS), City of College Station, City of Bryan, Brazos County, Metropolitan Planning Organization (MPO), Council of Governments (COG), and the Bryan and College Station Police Departments. 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 information dissemination, and incident management. Emergency vehicle signal preemption was also identified as a priority.

Market packages were selected that corresponded to the desired services and functions identified for the Region, and were customized for Brazos Valley 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 emergency response. 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 Brazos Valley Region.

An interconnect, or "Sausage Diagram" was developed for the Brazos Valley 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 Brazos Valley 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 Brazos Valley 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 Brazos Valley Region also were identified as part of the architecture development process.

An Operational Concept for the Brazos Valley 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 Brazos Valley 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 Brazos Valley 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, the Texas DPS, Bryan/College Station MPO, Texas Transportation Institute, Easterwood Airport, cities, transit agencies, and local universities. A series of five meetings were held with the ITS stakeholders to discuss the development and gather input into the Brazos Valley Regional ITS Architecture and Deployment Plan. In addition, a project web site was developed which contains all of the information on the Brazos Valley 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 Brazos Valley 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 Brazos Valley Region have been identified. An operational concept has been developed that focuses on the roles and responsibilities of the various agencies involved in the Brazos Valley Region. A separate ITS Deployment Plan was developed that identifies projects in the Brazos Valley Region that are required to implement the architecture.

1.2 Document Overview

The Brazos Valley 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 Brazos Valley Region, as well as an overview of some of the key features and stakeholders in the Brazos Valley Region.

Section 2 – Integration Strategy

This section discusses Brazos Valley 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 are also included.

Section 3 – Regional ITS Architecture Development Process

An overview of the key steps involved in developing the ITS architecture for the Brazos Valley 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 Brazos Valley Regional ITS Architecture. The inventory of existing and planned systems is presented in Section 4, and is sorted by both stakeholder as well as by entity for easy reference. The market packages that were selected for the Brazos Valley Region are also included in this section, as are the system functional requirements. The Brazos Valley 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 Brazos Valley 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 Brazos Valley 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 Brazos Valley Regional ITS Architecture also contains three appendices:

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

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 Brazos Valley Region. The web site provides hyperlinks to more detailed information about the Brazos Valley Regional ITS Architecture than what could feasibly be included in the printed document. In certain sections of the document, readers are referred to the web site for additional information and details. At the time this report was published, the Brazos Valley Regional ITS Architecture web site was being hosted at www.consystec.com. TxDOT plans to permanently host the site in the future at www.dot.state.tx.us/trf/its.

1.3 The Brazos Valley Region

1.3.1 Geographic Overview

The Brazos Valley Region is bordered by the TxDOT Waco and Dallas Districts to the north, the TxDOT Austin District to the west, the TxDOT Tyler and Lufkin Districts to the east, and the TxDOT Yoakum and Houston Districts to the south. For the Brazos Valley Regional ITS Architecture and Deployment Plan, the study area included all ten counties that comprise the TxDOT Bryan District. The geographic boundaries of the Brazos Valley Region are highlighted in **Figure 1**. The TxDOT Bryan District was used as a basis for the project Region.

The counties included in the Brazos Valley Region area:

- Brazos;
- Burleson;
- Freestone;
- Grimes;
- Leon;
- Madison;
- Milam;
- Robertson;
- Walker; and
- Washington.

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 Cities of Bryan and College Station are the only cities in the project Region with populations that exceed the 50,000 threshold.

1.3.2 Transportation Infrastructure

As illustrated in **Figure 1**, the Brazos Valley Region has an extensive transportation infrastructure. The primary roadway facilities include I-45, US-77, US-79, US-190, US-290, SH-6, and SH-105.

I-45 is a north-south, divided interstate highway. The effective operation of this highway is critical to the movement of goods and people through the State of Texas. I-45 extends from Galveston on the Texas Gulf Coast, to Dallas. Blockages along I-45 can have serious implications for drive-time for commercial vehicles and motorists alike due to the lack of obvious alternate routes. Knowing the road and travel conditions within this transportation corridor and having the ability to disseminate this information to motorists are important elements for this project. For example, if I-45 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.

In addition to roadway infrastructure, the Easterwood Airport serves as the commercial airport for the Brazos Valley Region.

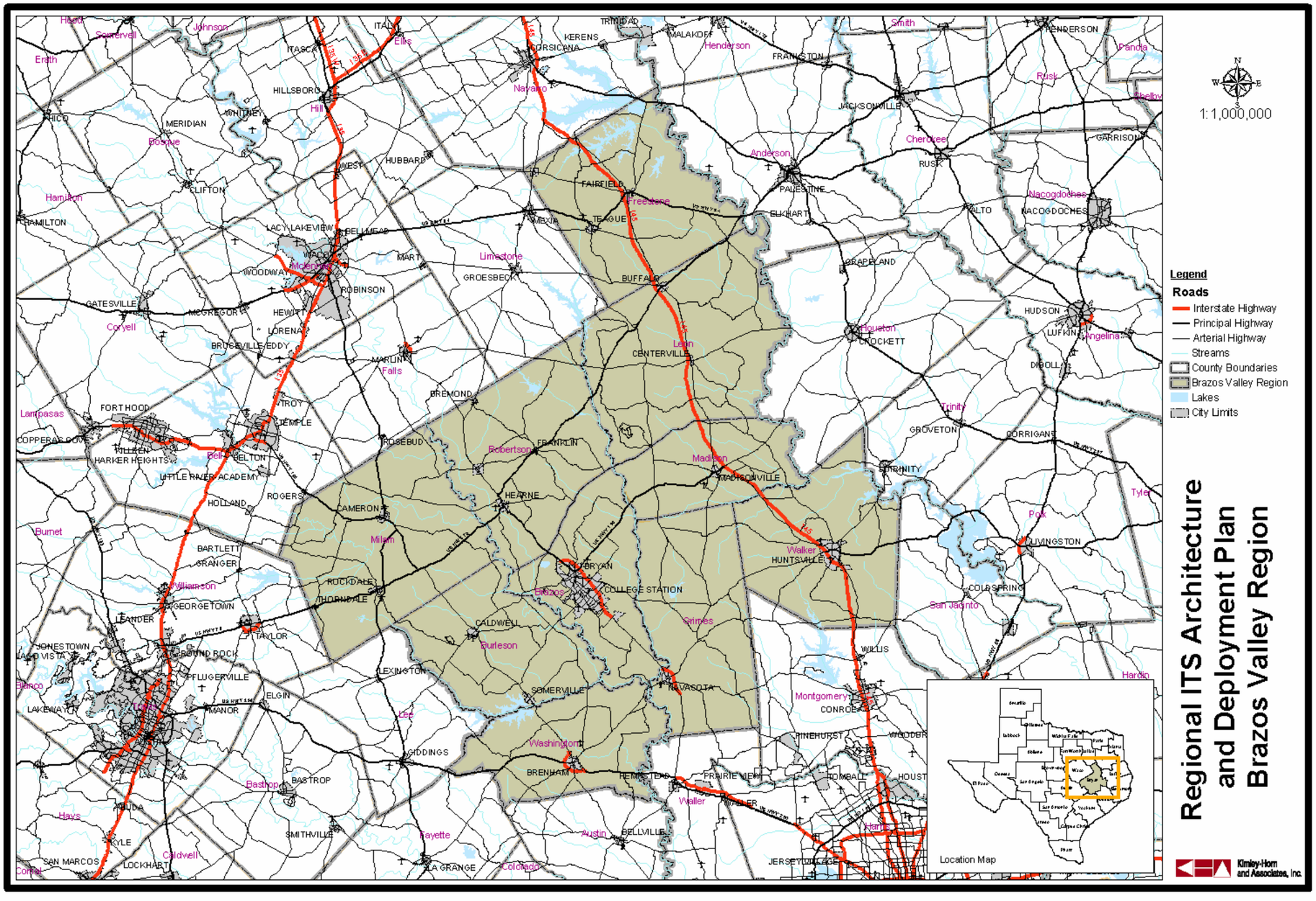


Figure 1 – Brazos Valley Region Map

1.3.3 Brazos Valley Region ITS Plans

There are several agencies in the Brazos Valley Region that have already deployed ITS components. It is important to recognize the initial deployment of ITS infrastructure in a Region because federal requirements mandate that a Region, in order to secure future funding for ITS projects, must have an ITS architecture in place within four years of the initial deployment of ITS strategies and components. As the Brazos Valley 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.

Currently, the Brazos Valley Region has several ITS components deployed in the field including closed loop signal systems with video image vehicle detection systems (VIVDS), signal preemption for emergency vehicles, computer aided dispatch (CAD) and portable dynamic message signs (DMS). The following sections discuss these deployments.

Video Detection

TxDOT is 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. The City of Bryan and City of College Station also have limited deployments of VIVDS.

Signal Preemption for Emergency Vehicles

Currently, the City of College Station has signal preemption installed at intersections within the city limits for fire vehicles. 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.

Computer Aided Dispatch

Several emergency management and transit agencies in the Region have implemented CAD systems. 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.

Portable Dynamic Message Signs

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

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 Brazos Valley Region.

The following is a list of stakeholders in the Brazos Valley 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 Brazos Valley Regional ITS Architecture.

- Blinn College Police Department;
- Brazos County;
- Brazos Transit;
- Brazos Valley Council of Governments;
- Bryan/College Station Chamber of Commerce;
- Bryan/College Station Metropolitan Planning Organization (MPO);
- Brazos County Emergency Management;
- City of Bryan;
- City of College Station;
- City of Huntsville;
- College Station Independent School District (ISD);
- Easterwood Airport;
- Sam Houston State University;
- Texas A&M University;
- Texas Transportation Institute;
- TxDOT Bryan 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 Brazos Valley 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 Brazos County 911 dispatch is to dispatch emergency personnel to the appropriate locations when a call for help is placed within the county. The integration of the 911 dispatch with any of the other stakeholders will not change this primary function of the dispatch or disrupt typical business practices. The integration of 911 dispatch with another agency, such as the TxDOT Bryan 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 Brazos Valley Region and the primary areas of concern that were uncovered in the preparation of the Brazos Valley Regional ITS Architecture. Additionally, this section will discuss the need for interregional integration with agencies external to the Brazos Valley 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 Brazos Valley 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 – Brazos Valley Stakeholder Agencies and Contacts

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
Blinn College Police Dept.	Grizelda Martinez	PO Box 6030 Bryan, Texas	979-209-7418	gmartinez@blinn.edu
Brazos County	Randy Sims	300 East 26th Street, Ste 114 Bryan, Texas 77803	979-361-4102	N/A
Brazos County	Tom Golson	202 E 27th St, Ste 102 Bryan, Texas 77803	979-361-4468	tgolson@co.brazos.tx.us
Brazos County	Ray Crow	2617 Hwy 21 W Bryan, Texas 77803	979-822-2127	rcrow@co.brazos.tx.us
Brazos County Emergency Management	DeMerle Giordano	101 Regent Avenue, Ste 320 Bryan, Texas 77803	979-361-4140	demerle@co.brazos.tx.us
Brazos Transit	Kristine Box	1759 N. Earl Rudder Freeway Bryan, Texas 77803	979-778-4495	transit2@tca.net

Table 1 – Brazos Valley Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
Brazos Transit	Jennifer Montgomery	1759 N. Earl Rudder Freeway Bryan, Texas 77803	979-778-4489	jennifer_transit@tca.net
Brazos Valley Council of Governments	Michael Parks	1706 E 29th Bryan, Texas 77802	979-775-4244	mparks@bvcog.org
Brazos Valley Council of Governments	Tom Wilkinson	P.O. Drawer 4128 Bryan, Texas 77802	979-775-4244	twilkinson@bvcog.org
Bryan/College Station Chamber of Commerce	Dena Gaskin	PO Box 3579 Bryan, Texas 77805	979-260-5200	dena@bcschamber.org
Bryan/College Station Chamber of Commerce	Royce Hickman	P.O. Box 3579 Bryan, Texas 77805	979-260-5200	royce@bcschamber.org
Bryan/College Station Chamber of Commerce	Al Jones	P.O. Box 3579 Bryan, Texas 77805	979-690-6060	annjones@txcyber.com
Bryan/College Station MPO	Jennifer Bearden	3608 E 29th St, Ste 113 Bryan, Texas 77802	979-260-5298	jbeard@bcsmpo.org
Bryan/College Station MPO	Linda LaSut	3608 E 29th St, Ste 113 Bryan, Texas 77802	979-260-5298	llasut@bcsmpo.org
City of Bryan	Alex Canstansio	P.O. Box 1000 Bryan, Texas 77803	979-209-5937	N/A
City of Bryan	Norman Maurer	1111 Waco Bryan, Texas 77808	979-209-5933	N/A
City of Bryan	George Mitchell	P.O. Box 1000 Bryan, Texas 77803	979-209-5935	N/A
City of Bryan	Paul Kaspar	P.O. Box 1000 Bryan, TX 77805	979-209-5040	pkaspar@bryantx.gov
City of Bryan Police Department	Freddie Komar	301 S Texas Ave Bryan, Texas 77803	979-209-5387	komarf@ci.bryan.tx.us
City of Bryan Police Department	Wayland Rawls	301 S Texas Ave Bryan, Texas 77803	979-209-5456	rawlsw@ci.bryan.tx.us
City of College Station	Olivia Burnside	P.O. Box 9960 College Station, Texas 77842	979-764-3560	oburnside@cstx.gov
City of College Station	Ken Fogle	P.O. Box 9960 College Station, Texas 77842	979-764-3556	kfogle@cstx.gov
City of College Station	Brian Hilton	P.O. Box 9960 College Station, Texas 77842	979-764-6210	bhilton@cstx.gov
City of College Station	Lee Robinson	P.O. Box 9960 College Station, Texas 77842	979-764-3695	N/A
City of College Station	Troy Rother	2613 Texas Ave College Station, Texas 77842	979-764-3838	trother@cstx.gov
City of College Station	Pat Walker	PO Box 9960 College Station, Texas 77842	979-764-3450	N/A

Table 1 – Brazos Valley Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
City of College Station Police Department	Mike Mathews	2611 A Texas Avenue S College Station, Texas 77840	979-764-3611	mmathews@cstx.gov
City of College Station Police Department	Zeta Fail	2611 A. Texas Avenue S College Station, Texas 77840	979-764-6311	zfail@cstx.gov
City of Huntsville	City Planner	448 SH 75 N Huntsville, Texas 77320	936-294-5793	N/A
College Station ISD	Bill Conaway	2000 Welsh College Station, Texas 77840	979-764-5440	bconaway@csisd.org
Easterwood Airport	John Happ	1 McKenzie Terminal Blvd, Suite 112 College Station, Texas 77845	979-845-8511	N/A
Federal Highway Administration	Mark Olson	300 East 8th Street, Room 826 Austin, Texas 78701	512-536-5972	mark.olson@fhwa.dot.gov
Sam Houston State University Police	Charles Tacket	2424 Sam Houston Ave Huntsville, Texas 77340	936-294-1794	N/A
St. Joseph Regional Health Center	Tim Ottinger	2201 Franciscan Drive Bryan, Texas 77802	979-776-2458	tottinger@mail.st-joseph.org
Texas A&M University	Kathie Mathis	1250 TAMU College Station, Texas 77843-1250	979-862-3441	kmathis@tamu.edu
Texas A&M University	Doug Williams	1250 TAMU College Station, Texas 77843-1250	979-845-9700	dg-williams@tamu.edu
Texas Transportation Institute	Kevin Balke	3135 TAMU College Station, Texas 77843-3135	979-845-9899	k-balke@tamu.edu
Texas Transportation Institute	Bob Brydia	3135 TAMU College Station, Texas 77843-3135	979-845-8140	r-brydia@tamu.edu
Texas Transportation Institute	Dennis Christiansen	3135 TAMU College Station, Texas 77843-3135	979-845-1713	dennis-c@tamu.edu
Texas Transportation Institute	Curtis Herrick	2740 SW Marzin Downs Blvd Suite 227 Palm City, Florida 34990	772-781-1685	gcherrick@earthlink.net
Texas Transportation Institute	Srinivasa Sunkari	3135 TAMU College Station, Texas 77843-3135	979 845-7472	s-sunkari@tamu.edu
Texas Transportation Institute	Leonard Ruback	3135 TAMU College Station, Texas 77843	979-862-4343	l-ruback@ttimail.tamu.edu
TxDOT – Bryan District	Bob Appleton	1300 North Texas Avenue Bryan, Texas 77803	979-778-9707	bapplet@dot.state.tx.us

Table 1 – Brazos Valley Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Contact	Address	Phone Number	E-Mail
TxDOT – Bryan District	Kirk Barnes	1300 North Texas Avenue Bryan, Texas 77803	979-778-9756	kbarnes@dot.state.tx.us
TxDOT – Bryan District	Chad Bohne	1300 North Texas Avenue Bryan, Texas 77803	979-778-9710	N/A
TxDOT – Bryan District	Joe Brewer	1300 North Texas Avenue Bryan, Texas 77803	979-778-9732	jbrewe1@dot.state.tx.us
TxDOT – Bryan District	Lonny Traweek	1300 North Texas Avenue Bryan, Texas 77803	979-778-9714	N/A
TxDOT – Bryan District	Darla Walton	1300 North Texas Avenue Bryan, Texas 77803	979-778-9668	dwalton@dot.state.tx.us
TxDOT Austin Traffic Operations	Fabian Kalapach	125 East 11th Street Austin, Texas 78701-2483	(512) 506-5112	fkalapa@dot.state.tx.us
TxDOT Austin Traffic Operations	Alex Power	Attn: TRF-TM 125 East 11th Street Austin, Texas 78701-2483	(512) 416-3444	apower@dot.state.tx.us
TxDOT Public Transportation Division	Ben Herr	125 E. 11th Street Austin, Texas 78701-2483	(512) 416-2812	lherr@dot.state.tx.us

2.2 Regional Needs

Needs from the Region were identified in the project kick-off meeting held on April 15, 2003. Stakeholders participating in that meeting identified the needs in the Region according to the eight user service areas defined in the National ITS Architecture. The needs identified in the project kick-off meeting are documented in **Table 2**.

Table 2 – Brazos Valley Region: Summary of ITS Needs

Brazos Valley Region

Summary of ITS Needs
Brazos Valley Regional ITS Architecture and Deployment Plan Kick-Off Meeting
April 15, 2003

Institutional Issues/Needs

- Need access to test bed locations within the Region for research purposes

Traffic Management Needs

- Need improved safety at rural intersections
- Need flood detection/monitoring
- Need to integrate Bryan/College Station/TxDOT signal systems to help traffic flow across jurisdictional boundaries
- Need to improve management of student traffic and commuter traffic in Huntsville
- Need improved special event management and information distribution
- Need traffic monitoring capabilities in City of College Station
- Need dynamic lane assignment capability in the City of College Station
- Need signal system communications upgrade in City of Bryan
- Need VIVDS in City of Bryan (loops fail frequently due to expansive soils)

Traveler Information Needs

- Need improved traffic information dissemination

Public Transportation Management Needs

- Need real-time train location data and notification of trains blocking the roadway
- Need Automated vehicle Location (AVL) on Texas A&M buses
- Need security cameras on Texas A&M buses
- Need connections to emergency management responders for improved coordination in situations such as evacuations
- Need to improve reliability of Brazos Valley Transit
- Need AVL on Brazos Valley Transit vehicles
- Need Mobile Data Terminals (MDTs) on Brazos Valley Transit vehicles
- Need signal priority for Brazos Valley Transit vehicles
- Need public transportation service in Huntsville
- Need AVL and a Mayday system on College Station ISD buses
- Need additional security cameras on College Station ISD buses
- Need improved coordination between Brazos Valley Transit and Texas A&M Transit to facilitate cross ridership
- Need real-time campus transit info kiosks for Texas A&M Transit
- Need common fare payment system for Brazos Valley Transit and Texas A&M Transit to facilitate cross ridership

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

Commercial Vehicle Operations Needs

- Need improved truck routing in Huntsville

Emergency Management Needs

- Need inter-regional communications connections to improve coordination when receiving evacuees from other regions
- Need common radio frequency for Bryan Police, College Station Police, DPS and the Sheriff's Department
- Need CAD system integration
- Need automated call-out system with coverage in College Station
- Need AVL on police, fire, emergency medical services (EMS), and large equipment for the City of College Station and the City of Bryan

Archived Data Management Needs

- Need improved data collection from rural areas for COG analysis (traffic counts, roadway hazards)
- Need traffic count information for off-system roadways in College Station

Maintenance and Construction Management Needs

- Need ice detection and notification for improved maintenance response
- Need improved construction information available to local businesses

2.3 Regional Integration and Interoperability

The Brazos Valley Region is bordered by seven other TxDOT Districts. The Brazos Valley Region needs improved coordination with these surrounding areas for incident management and roadway closings.

A vision for the Brazos Valley Region is to integrate systems both on an intra-regional and an inter-regional basis. Within the Brazos Valley Region, nearly every stakeholder identified is involved in emergency management. Incidents that occur on major roadways either in the Brazos Valley Region or on roadways that could impact the movement of people and goods in the Brazos Valley Region should be shared. The integration of the State Emergency Operations Center (EOC) and the local EOC can facilitate the clearing of such an incident more efficiently. As an example, a chemical spill along SH-6 between Bryan and College Station would require a major clean-up in addition to other emergency personnel on site. Coordination between the two 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.

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. The Texas A&M University Transportation Services and Brazos Transit can improve

performance and schedule adherence by integrating closure information from operators of the transportation network.

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 Brazos Valley 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 the development of 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 Brazos Valley 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 Brazos Valley Process

The process followed for the Brazos Valley 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.

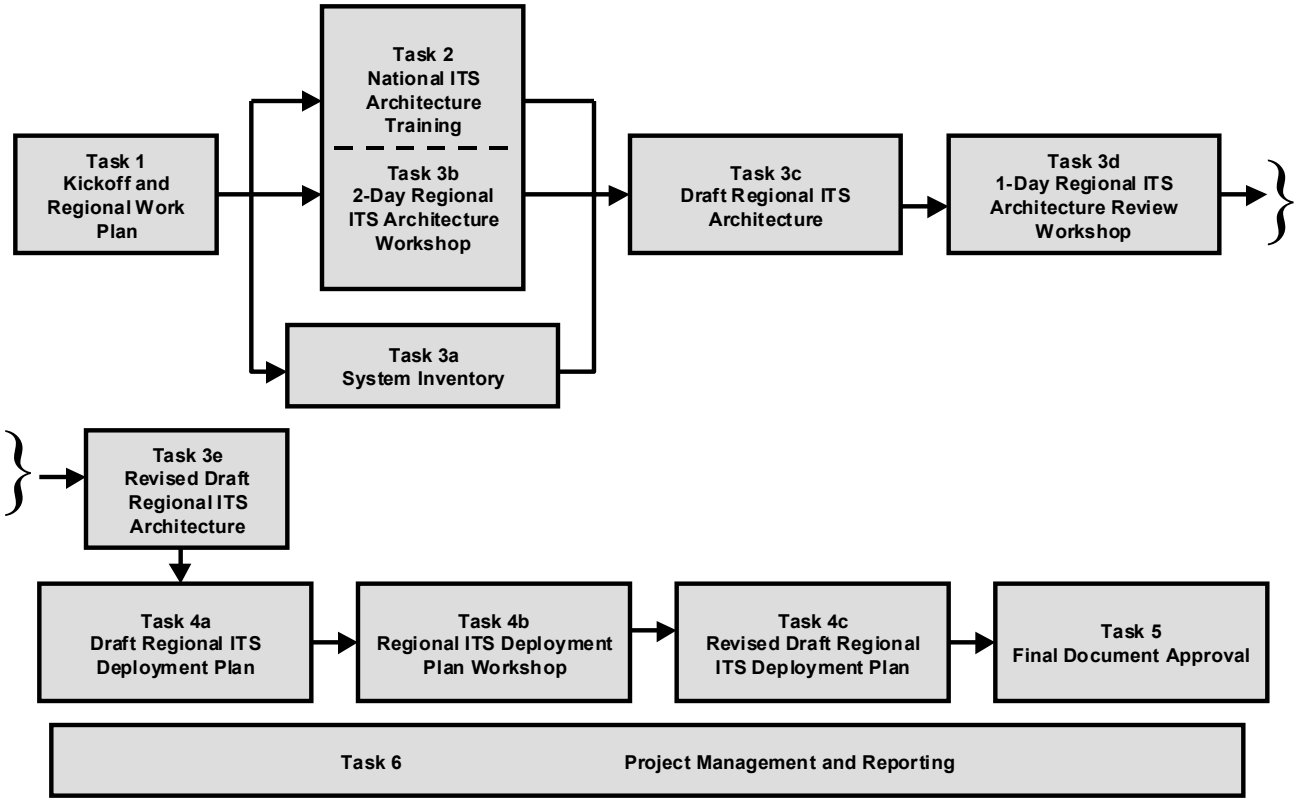


Figure 2 – Brazos Valley Regional ITS Architecture and Deployment Plan Development Process

A total of five meetings and workshops with stakeholders over a period of eleven months were used to develop the Brazos Valley 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 Workshop;
- 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 Brazos Valley 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 Brazos Valley 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 Brazos Valley, 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 Brazos Valley 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 Brazos Valley Regional ITS Architecture.

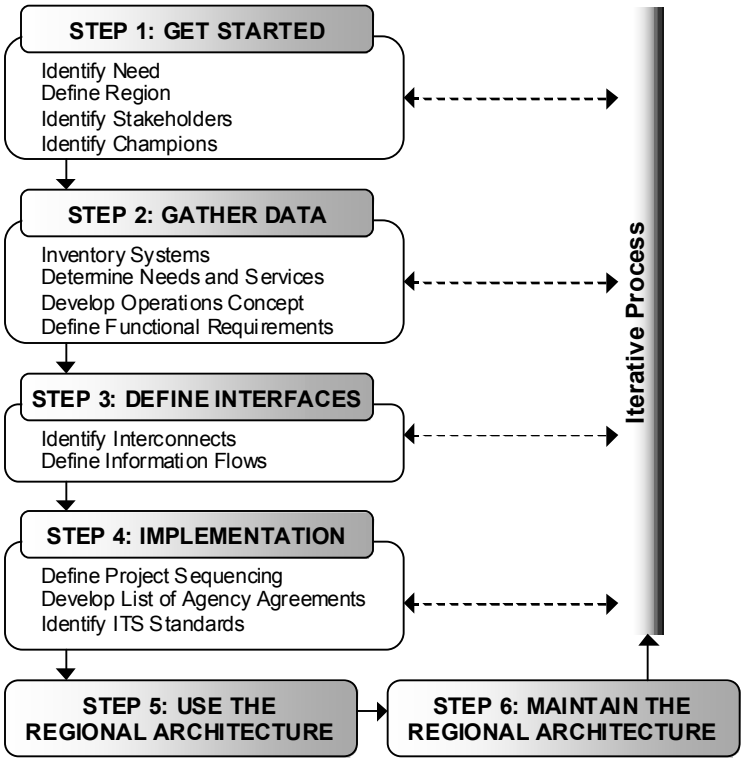
Task 4B – Regional ITS Deployment Plan Workshop: The Draft Regional ITS Deployment Plan was presented to stakeholders at the Regional ITS Deployment Plan Workshop. Stakeholders were asked to provide input on the recommended projects, priority, and deployment timeframe.

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



(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 Brazos Valley 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 Brazos Valley 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 Brazos Valley 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, Brazos Valley 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 Brazos Valley Region were identified in the following categories:

- ***Travel and Traffic Management*** – includes the TxDOT Bryan Traffic Management Center (TMC), center-to-center links, detection systems, closed-circuit television (CCTV), fixed and portable dynamic message signs, broadcast traveler information, railroad operations coordination, and other related technologies.
- ***Public Transportation Management*** – includes transit and paratransit automated vehicle location, and transit travel information systems.
- ***Commercial Vehicle Operations*** – Hazardous Materials (HAZMAT) permitting and coordination with TexView (CVISN) efforts.
- ***Emergency Management*** – includes emergency operations/management centers, improved information sharing among traffic and emergency services, and enhanced HAZMAT evacuation.
- ***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 management.

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 Brazos Valley Regional ITS inventory was mapped to a subsystem or terminator in the National ITS Architecture. Subsystems and terminators are the 'entities' that represent systems in ITS. Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, Roadside, Vehicles, and Travelers. Each of these major classes includes various subsystems that represent a set of transportation functions (or processes) that are likely to be collected together under one agency, jurisdiction, or location, and correspond to physical elements, such as traffic operations centers, traffic signals,

vehicles, and so on. **Figure 4** shows the National ITS Architecture subsystems. This figure, also known as the "sausage diagram" is a standard interconnect diagram, showing the relationships of the various subsystems within the architecture; a customized interconnect diagram for the Brazos Valley Region is included in Section 4.3.1 of this report. Communication functions between the subystems 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.

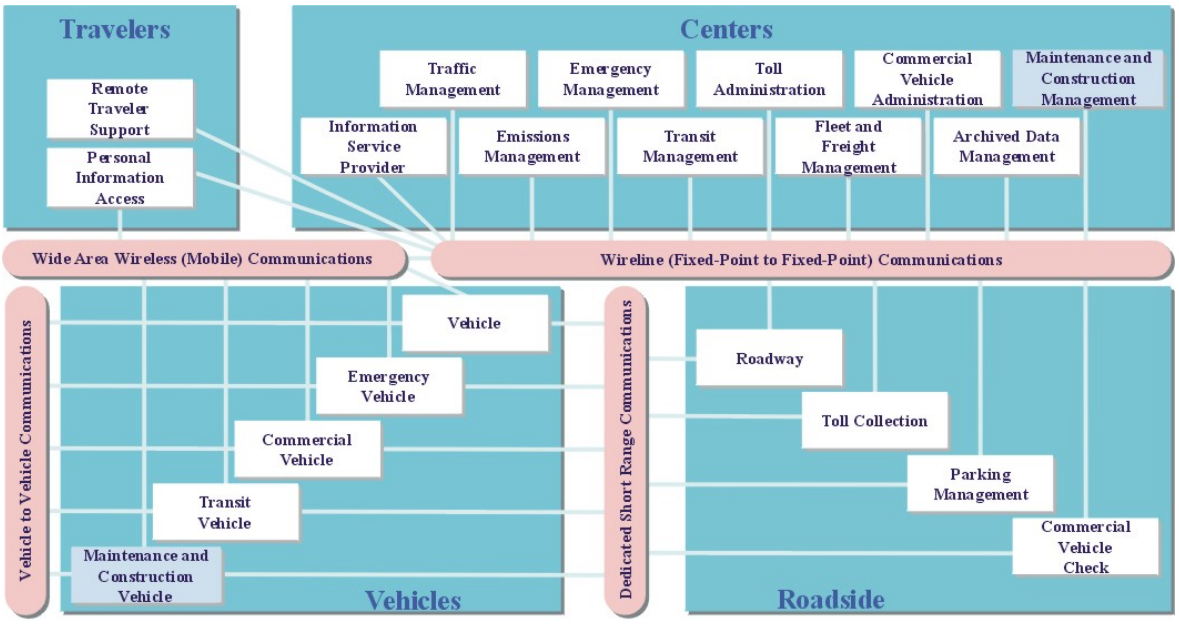


Figure 4 – Physical Subsystem Interconnect Diagram

4.1.2 Brazos Valley ITS Inventory by Stakeholder

Each stakeholder is associated with one or more systems or elements (subsystems and terminators) that make up the transportation system in the Brazos Valley 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 Brazos Valley Regional ITS Architecture.

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

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

4.1.3 Brazos Valley ITS Inventory by Entity

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

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

Stakeholder	Element	Entity	Status
Bryan/College Station MPO	BCSMPO Traffic Counts and Accident Location Database	Archived Data Management Subsystem	Planned
	BCSMPO Traffic Counts and Accident Location Database	Traffic Management Subsystem	Planned
	BCSMPO Website	Information Service Provider Subsystem	Existing
	Brazos County Traffic Count Archive	Archived Data Management Subsystem	Planned
	MPO Transit Ridership Database	Archived Data Management Subsystem	Existing
	Regional Kiosks	Remote Traveler Support Subsystem	Future
Blinn College Police Department	Blinn College Police and Dispatch	Emergency Management Subsystem	Existing
	Blinn College Police Vehicles	Emergency Vehicle Subsystem	Existing
Brazos County 911	Automated Call Out System	Emergency Management Subsystem	Existing
	Automated Call Out System	Information Service Provider Subsystem	Existing
	Brazos County 911 Dispatch	Emergency Management Subsystem	Existing
Brazos Transit	Brazos Transit Operations Center	Archived Data User Systems	Existing
	Brazos Transit Operations Center	Transit Management Subsystem	Existing
	Brazos Transit Paratransit Vehicles	Transit Vehicle Subsystem	Existing
	Brazos Transit Vehicles	Transit Vehicle Subsystem	Existing
	Brazos Transit Website	Information Service Provider Subsystem	Existing
Brazos Valley COG	Brazos Valley COG GIS	Map Update Provider	Planned
	Brazos Valley COG Regional Probe Information Server	Traffic Management Subsystem	Future
	BVCOG Traffic Accident Archive	Archived Data Management Subsystem	Planned
Bryan/College Station Convention and Visitors Bureau (BCSCVB)	BCSCVB Convention and Visitors Bureau	Event Promoters	Existing
	BCSCVB Website	Information Service Provider Subsystem	Planned
City of Bryan	City of Bryan EOC	Emergency Management Subsystem	Existing
	City of Bryan Maintenance Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
City of Bryan Fire Department	City of Bryan Fire Rescue Vehicles	Emergency Vehicle Subsystem	Existing

Table 3 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
City of Bryan Police Department	City of Bryan Police Department	Emergency Management Subsystem	Existing
	City of Bryan Police Vehicles	Emergency Vehicle Subsystem	Existing
	City of Bryan Speed DMS	Roadway Subsystem	Existing
City of Bryan Public Services Department	City of Bryan Field Equipment	Roadway Subsystem	Existing
	City of Bryan Maintenance Facility	Equipment Repair Facility	Existing
	City of Bryan Road Maintenance Department	Maintenance and Construction Management Subsystem	Existing
	City of Bryan Signal Shop	Maintenance and Construction Management Subsystem	Existing
	City of Bryan Traffic Operations Center	Traffic Management Subsystem	Existing
City of College Station	City of College Station Garage Parking	Parking Management Subsystem	Existing
	City of College Station Police and Dispatch	Emergency Management Subsystem	Existing
City of College Station Fire Department	City of College Station Fire Dispatch	Emergency Management Subsystem	Existing
	City of College Station Fire Rescue Vehicles	Emergency Vehicle Subsystem	Existing
	CS Fire 4	Emergency Management Subsystem	Existing
City of College Station Police Department	City of College Station Police Vehicles	Emergency Vehicle Subsystem	Existing
	City of College Station Speed DMS	Roadway Subsystem	Existing
City of College Station Public Works	City of College Station Field Equipment	Roadway Subsystem	Existing
	City of College Station Maintenance Facility	Equipment Repair Facility	Existing
	City of College Station Public Works – Streets Division	Maintenance and Construction Management Subsystem	Existing
	City of College Station Public Works Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
	City of College Station Signal Shop	Maintenance and Construction Management Subsystem	Existing
	City of College Station Traffic Operations Center	Traffic Management Subsystem	Existing

Table 3 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
College Station Office of Emergency Management	City of College Station EOC	Emergency Management Subsystem	Existing
Commercial Vehicle Operators	Commercial Vehicles	Commercial Vehicle Subsystem	Existing
	Commercial Vehicles	Vehicle Subsystem	Existing
	Private Fleet Management Systems	Fleet and Freight Management Subsystem	Future
Correctional Facilities	Correctional Facilities Operations	Emergency Management Subsystem	Existing
County Department of Emergency Management	County EOC	Emergency Management Subsystem	Existing
County Road and Bridge Department	County Road and Bridge Equipment Repair	Equipment Repair Facility	Existing
	County Road and Bridge Field Equipment	Roadway Subsystem	Future
	County Road and Bridge Maintenance Office	Maintenance and Construction Management Subsystem	Existing
	County Road and Bridge Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
DPS	DPS Communications Service	Emergency Management Subsystem	Existing
	DPS Emergency Vehicles	Emergency Vehicle Subsystem	Existing
	Statewide Crash Records Information System	Archived Data Management Subsystem	Existing
	Statewide Crash Records Information System Users	Archived Data User Systems	Existing
DPS Division of Emergency Management	State EOC	Emergency Management Subsystem	Existing
Driver	Driver	Driver	Existing
Easterwood Airport	Easterwood Airport	Multimodal Transportation Service Provider	Existing
Financial Institution	Financial Institution	Financial Institution	Future
Independent School Districts	Independent School District Buses	Transit Vehicle Subsystem	Existing
	Independent School District Dispatch	Transit Management Subsystem	Existing
	ISD Website	Information Service Provider Subsystem	Existing
Intercity Bus Operators	Bryan Intercity Bus Depot	Multimodal Transportation Service Provider	Existing
Local Media	Local Print and Broadcast Media	Media	Existing

Table 3 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
MPO Archive Users	MPO Archive User	Archived Data User Systems	Planned
Municipal or County Government	County Sheriff Police Vehicles	Emergency Vehicle Subsystem	Existing
	County Volunteer Fire Rescue Vehicles	Emergency Vehicle Subsystem	Existing
	Municipal Fire Rescue Vehicles	Emergency Vehicle Subsystem	Existing
	Municipal or County Permitting System	Commercial Vehicle Administration Subsystem	Existing
	Municipal or County Public Safety Dispatch	Emergency Management Subsystem	Existing
	Municipal Police Vehicles	Emergency Vehicle Subsystem	Existing
	Municipal Traffic Operations Center	Traffic Management Subsystem	Future
Municipal or County Public Safety	Municipal Field Equipment	Roadway Subsystem	Future
	Municipal or County Local Accident Database	Archived Data Management Subsystem	Existing
	Municipal or County Police Department	Emergency Management Subsystem	Existing
Municipal Public Works Department	Municipal Maintenance Facility	Equipment Repair Facility	Existing
	Municipal Public Works Department	Maintenance and Construction Management Subsystem	Existing
	Municipal PWD Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
NOAA	National Weather Service	Surface Transportation Weather Service	Existing
	National Weather Service	Weather Service	Existing
Passenger Rail	Passenger Rail	Multimodal Transportation Service Provider	Future
Private Ambulance	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
	Private Tow/Wrecker Vehicles	Emergency Vehicle Subsystem	Existing

Table 3 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
Private Travelers	Private Travelers Personal Computing Devices	Personal Information Access Subsystem	Future
	Private Vehicles	Vehicle Subsystem	Existing
	Private Vehicles	Vehicle Characteristics	Existing
Rail Operators	Rail Operations Centers	Emergency Management Subsystem	Existing
	Rail Operations Centers	Fleet and Freight Management Subsystem	Existing
	Rail Operations Centers	Rail Operations	Existing
	Rail Operators Rail Cars	Commercial Vehicle Subsystem	Future
	Rail Operators Wayside Equipment	Wayside Equipment	Existing
Regional Medical Center	Regional Medical Center	Care Facility	Existing
	Regional Medical Center	Emergency Management Subsystem	Existing
Regional Mobility Toll Road Authority	Regional Mobility Authority Toll Plazas	Toll Collection Subsystem	Future
	Regional Mobility Authority Toll Road Customer Service Center	Toll Administration Subsystem	Future
Regional Parking Operators	Regional Parking Garages	Parking Management Subsystem	Future
	Regional Parking, Public Transit and Taxi Payment Instrument	Traveler Card	Future
Sam Houston State University	Sam Houston State University Parking Garage	Parking Management Subsystem	Planned
Sam Houston State University Police	Sam Houston State University Police and Dispatch	Emergency Management Subsystem	Existing
	Sam Houston State University Police Vehicles	Emergency Vehicle Subsystem	Existing
State of Texas	Service Agencies	Information Service Provider Subsystem	Existing
Texas A&M University	TAMU EMS Vehicles	Emergency Vehicle Subsystem	Existing
	TAMU EOC	Emergency Management Subsystem	Existing
	TAMU Field Equipment	Roadway Subsystem	Existing
	TAMU Parking Garage	Parking Management Subsystem	Existing
	TAMU Police and Public Safety Dispatch	Emergency Management Subsystem	Existing
	TAMU Police Vehicles	Emergency Vehicle Subsystem	Existing

Table 3 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
Texas A&M University (continued)	TAMU Special Event Promoters	Event Promoters	Existing
	TAMU Traffic Management Center	Traffic Management Subsystem	Future
	TAMU Website	Information Service Provider Subsystem	Planned
Texas A&M University Transportation Services	TAMU Paratransit Vehicles	Transit Vehicle Subsystem	Existing
	TAMU Transit Info Line	Information Service Provider Subsystem	Existing
	TAMU Transit Kiosks	Remote Traveler Support Subsystem	Planned
	TAMU Transit Operations Center	Transit Management Subsystem	Existing
	TAMU Transit Vehicles	Transit Vehicle Subsystem	Existing
	TAMU Transit Web Site	Information Service Provider Subsystem	Existing
Texas Education Agency	Texas Education Association Ridership Office	Archived Data Management Subsystem	Existing
Texas Transportation Institute	TTI Field Equipment	Roadway Subsystem	Existing
	TTI TransLink	Archived Data Management Subsystem	Existing
	TTI TransLink	Information Service Provider Subsystem	Existing
	TTI TransLink	Traffic Management Subsystem	Existing
TxDOT	Other TxDOT District Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
	TranStar and Other Texas Region TMCs	Traffic Management Subsystem	Existing
	TxDOT 511 System	Information Service Provider Subsystem	Planned
	TxDOT Bridge Inventory Inspection System (BRINSAP)	Asset Management	Existing
	TxDOT Bryan District Area Engineers Office	Maintenance and Construction Administrative Systems	Existing
	TxDOT Bryan District Area Engineers Office	Maintenance and Construction Management Subsystem	Existing
	TxDOT Bryan District CCTV	Roadway Subsystem	Planned
	TxDOT Bryan District College Station Traffic Recorders	Roadway Subsystem	Existing
	TxDOT Bryan District DMS	Roadway Subsystem	Planned

Table 3 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
TxDOT (continued)	TxDOT Bryan District Field Sensors	Roadway Subsystem	Existing
	TxDOT Bryan District Flood Detection	Roadway Subsystem	Planned
	TxDOT Bryan District Highway Advisory Radio (HAR)	Roadway Subsystem	Planned
	TxDOT Bryan District Maintenance Sections	Maintenance and Construction Management Subsystem	Existing
	TxDOT Bryan District Maintenance Vehicles	Maintenance and Construction Vehicle Subsystem	Existing
	TxDOT Bryan District Office	Traffic Management Subsystem	Existing
	TxDOT Bryan District Pavement Management System	Archived Data Management Subsystem	Existing
	TxDOT Bryan District Pavement Management System	Asset Management	Existing
	TxDOT Bryan District Pavement Management System Users	Archived Data User Systems	Planned
	TxDOT Bryan District Public Information Office	Information Service Provider Subsystem	Planned
	TxDOT Bryan District Public Transportation Management System (PTMS)	Archived Data Management Subsystem	Existing
	TxDOT Bryan District Road Weather Information System (RWIS)	Roadway Subsystem	Planned
	TxDOT Bryan District Shop	Equipment Repair Facility	Existing
	TxDOT Bryan District Signal Shop	Maintenance and Construction Management Subsystem	Existing
	TxDOT Bryan District Traffic Signals	Roadway Subsystem	Existing
	TxDOT Bryan District Web Page	Information Service Provider Subsystem	Existing
	TxDOT Bryan District Work Zone Equipment	Roadway Subsystem	Future
	TxDOT Fort Worth TMC (TransVision)	Traffic Management Subsystem	Existing
	TxDOT Highway Condition Reporting System (HCRS)	Information Service Provider Subsystem	Existing
	TxDOT Highway Condition Reporting System (HCRS)	Maintenance and Construction Management Subsystem	Existing

Table 3 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Stakeholder) (continued)

Stakeholder	Element	Entity	Status
TxDOT (continued)	TxDOT Motor Carrier Routing Information	Information Service Provider Subsystem	Existing
	TxDOT Rest Areas/Visitor Centers/Service/Truck Stops/ Plaza Kiosks	Remote Traveler Support Subsystem	Future
	TxDOT Statewide Pavement Management System	Archived Data Management Subsystem	Existing

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

Entity	Element	Stakeholder	Status
Archived Data Management Subsystem	BCSMPO Traffic Counts and Accident Location Database	BCSMPO	Planned
	Brazos County Traffic Count Archive	BCSMPO	Planned
	BVCOG Traffic Accident Archive	Brazos Valley COG	Planned
	MPO Transit Ridership Database	BCSMPO	Existing
	Municipal or County Local Accident Database	Municipal or County Public Safety	Existing
	Statewide Crash Records Information System	DPS	Existing
	Texas Education Association Ridership Office	Texas Education Agency	Existing
	TTI TransLink	Texas Transportation Institute	Existing
	TxDOT Bryan District Pavement Management System	TxDOT	Existing
	TxDOT Bryan District Public Transportation Management System (PTMS)	TxDOT	Existing
	TxDOT Statewide Pavement Management System	TxDOT	Existing
Archived Data User Systems	Brazos Transit Operations Center	Brazos Transit	Existing
	MPO Archive User	MPO Archive Users	Planned
	Statewide Crash Records Information System Users	DPS	Existing
	TxDOT Bryan District Pavement Management System Users	TxDOT	Planned
Asset Management	TxDOT BRINSAP	TxDOT	Existing
	TxDOT Bryan District Pavement Management System	TxDOT	Existing
Care Facility	Regional Medical Center	Regional Medical Center	Existing
Commercial Vehicle Administration Subsystem	Municipal or County Permitting System	Municipal or County Government	Existing
Commercial Vehicle Subsystem	Commercial Vehicles	Commercial Vehicle Operators	Existing
	Rail Operators Rail Cars	Rail Operators	Future
Driver	Driver	Driver	Existing

Table 4 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Emergency Management Subsystem	Automated Call Out System	Brazos County 911	Existing
	Blinn College Police and Dispatch	Blinn College Police Department	Existing
	Brazos County 911 Dispatch	Brazos County 911	Existing
	City of Bryan EOC	City of Bryan	Existing
	City of Bryan Police Department	City of Bryan Police Department	Existing
	City of College Station EOC	College Station Office of Emergency Management	Existing
	City of College Station Fire Dispatch	City of College Station Fire Department	Existing
	City of College Station Police and Dispatch	City of College Station	Existing
	Correctional Facilities Operations	Correctional Facilities	Existing
	County EOC	County Department of Emergency Management	Existing
	CS Fire 4	City of College Station Fire Department	Existing
	DPS Communications Service	DPS	Existing
	Municipal or County Police Department	Municipal or County Public Safety	Existing
	Municipal or County Public Safety Dispatch	Municipal or County Government	Existing
	Private Tow/Wrecker Dispatch	Private Tow/Wrecker Providers	Existing
	Rail Operations Centers	Rail Operators	Existing
	Regional Medical Center	Regional Medical Center	Existing
	Sam Houston State University Police and Dispatch	Sam Houston State University Police	Existing
	State EOC	DPS Division of Emergency Management	Existing
	TAMU EOC	Texas A&M University	Existing
	TAMU Police and Public Safety Dispatch	Texas A&M University	Existing
Emergency Vehicle Subsystem	Blinn College Police Vehicles	Blinn College Police Department	Existing
	City of Bryan Fire Rescue Vehicles	City of Bryan Fire Department	Existing
	City of Bryan Police Vehicles	City of Bryan Police Department	Existing

Table 4 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Emergency Vehicle Subsystem (continued)	City of College Station Fire Rescue Vehicles	City of College Station Fire Department	Existing
	City of College Station Police Vehicles	City of College Station Police Department	Existing
	County Sheriff Police Vehicles	Municipal or County Government	Existing
	County Volunteer Fire Rescue Vehicles	Municipal or County Government	Existing
	DPS Emergency Vehicles	DPS	Existing
	Municipal Fire Rescue Vehicles	Municipal or County Government	Existing
	Municipal Police Vehicles	Municipal or County Government	Existing
	Private Ambulance Vehicle	Private Ambulance	Existing
	Private Tow/Wrecker Vehicles	Private Tow/Wrecker Providers	Existing
	Sam Houston State University Police Vehicles	Sam Houston State University Police	Existing
	TAMU EMS Vehicles	Texas A&M University	Existing
	TAMU Police Vehicles	Texas A&M University	Existing
Equipment Repair Facility	City of Bryan Maintenance Facility	City of Bryan Public Services Department	Existing
	City of College Station Maintenance Facility	City of College Station Public Works	Existing
	County Road and Bridge Equipment Repair	County Road and Bridge Department	Existing
	Municipal Maintenance Facility	Municipal Public Works Department	Existing
	TxDOT Bryan District Shop	TxDOT	Existing
Event Promoters	BCSCVB Convention and Visitors Bureau	Brazos Valley Convention and Visitors Bureau	Existing
	TAMU Special Event Promoters	Texas A&M University	Existing
Financial Institution	Financial Institution	Financial Institution	Future
Fleet and Freight Management Subsystem	Private Fleet Management Systems	Commercial Vehicle Operators	Future
	Rail Operations Centers	Rail Operators	Existing
Information Service Provider Subsystem	Automated Call Out System	Brazos County 911	Existing
	BCSMPO Website	BCSMPO	Existing
	Brazos Transit Website	Brazos Transit	Existing

Table 4 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Information Service Provider Subsystem (continued)	BCSCVB Website	Brazos Valley Convention and Visitors Bureau	Planned
	ISD Website	Independent School Districts	Existing
	Private Sector Traveler Information Services	Private Information Service Providers	Future
	Service Agencies	State of Texas	Existing
	TAMU Transit Info Line	Texas A&M University Transportation Services	Existing
	TAMU Transit Web Site	Texas A&M University Transportation Services	Existing
	TAMU Website	Texas A&M University	Planned
	TTI TransLink	Texas Transportation Institute	Existing
	TxDOT 511 System	TxDOT	Planned
	TxDOT Bryan District Public Information Office	TxDOT	Planned
	TxDOT Bryan District Web Page	TxDOT	Existing
	TxDOT Highway Condition Reporting System (HCRS)	TxDOT	Existing
	TxDOT Motor Carrier Routing Information	TxDOT	Existing
Maintenance and Construction Administrative Systems	TxDOT Bryan District Area Engineers Office	TxDOT	Existing
Maintenance and Construction Management Subsystem	City of Bryan Road Maintenance Department	City of Bryan Public Services Department	Existing
	City of Bryan Signal Shop	City of Bryan Public Services Department	Existing
	City of College Station Public Works – Streets Division	City of College Station Public Works	Existing
	City of College Station Signal Shop	City of College Station Public Works	Existing
	County Road and Bridge Maintenance Office	County Road and Bridge Department	Existing
	Municipal Public Works Department	Municipal Public Works Department	Existing
	Other TxDOT District Maintenance Sections	TxDOT	Existing
	TxDOT Bryan District Area Engineers Office	TxDOT	Existing
	TxDOT Bryan District Maintenance Sections	TxDOT	Existing

Table 4 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Maintenance and Construction Management Subsystem (continued)	TxDOT Bryan District Signal Shop	TxDOT	Existing
	TxDOT Highway Condition Reporting System (HCRS)	TxDOT	Existing
Maintenance and Construction Vehicle Subsystem	City of Bryan Maintenance Vehicles	City of Bryan	Existing
	City of College Station Public Works Vehicles	City of College Station Public Works	Existing
	County Road and Bridge Vehicles	County Road and Bridge Department	Existing
	Municipal PWD Vehicles	Municipal Public Works Department	Existing
	TxDOT Bryan District Maintenance Vehicles	TxDOT	Existing
Map Update Provider	Brazos Valley COG GIS	Brazos Valley COG	Planned
Media	Local Print and Broadcast Media	Local Media	Existing
Multimodal Transportation Service Provider	Bryan Intercity Bus Depot	Intercity Bus Operators	Existing
	Easterwood Airport	Easterwood Airport	Existing
	Passenger Rail	Passenger Rail	Future
Parking Management Subsystem	City of College Station Garage Parking	City of College Station	Existing
	Regional Parking Garages	Regional Parking Operators	Future
	Sam Houston State University Parking Garage	Sam Houston State University	Planned
	TAMU Parking Garage	Texas A&M University	Existing
Personal Information Access Subsystem	Private Travelers Personal Computing Devices	Private Travelers	Future
Rail Operations	Rail Operations Centers	Rail Operators	Existing
Remote Traveler Support Subsystem	Regional Kiosks	BCSMPO	Future
	TAMU Transit Kiosks	Texas A&M University Transportation Services	Planned
	TxDOT Rest Areas/Visitor Centers/Service/Truck Stops/ Plaza Kiosks	TxDOT	Future
Roadway Subsystem	City of Bryan Field Equipment	City of Bryan Public Services Department	Existing
	City of Bryan Speed DMS	City of Bryan Police Department	Existing
	City of College Station Field Equipment	City of College Station Public Works	Existing

Table 4 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Roadway Subsystem (continued)	City of College Station Speed DMS	City of College Station Police Department	Existing
	County Road and Bridge Field Equipment	County Road and Bridge Department	Future
	Municipal Field Equipment	Municipal or County Public Safety	Future
	TAMU Field Equipment	Texas A&M University	Existing
	TTI Field Equipment	Texas Transportation Institute	Existing
	TxDOT Bryan District CCTV	TxDOT	Planned
	TxDOT Bryan District College Station Traffic Recorders	TxDOT	Existing
	TxDOT Bryan District DMS	TxDOT	Planned
	TxDOT Bryan District Field Sensors	TxDOT	Existing
	TxDOT Bryan District Flood Detection	TxDOT	Planned
	TxDOT Bryan District HAR	TxDOT	Planned
	TxDOT Bryan District RWIS	TxDOT	Planned
	TxDOT Bryan District Traffic Signals	TxDOT	Existing
	TxDOT Bryan District Work Zone Equipment	TxDOT	Future
Surface Transportation Weather Service	National Weather Service	NOAA	Existing
Toll Administration Subsystem	Regional Mobility Authority Toll Road Customer Service Center	Regional Mobility Toll Road Authority	Future
Toll Collection Subsystem	Regional Mobility Authority Toll Plazas	Regional Mobility Toll Road Authority	Future
Traffic Management Subsystem	BCSMPO Traffic Counts and Accident Location Database	BCSMPO	Planned
	Brazos Valley COG Regional Probe Information Server	Brazos Valley COG	Future
	City of Bryan Traffic Operations Center	City of Bryan Public Services Department	Existing
	City of College Station Traffic Operations Center	City of College Station Public Works	Existing
	Municipal Traffic Operations Center	Municipal or County Government	Future
	TAMU Traffic Management Center	Texas A&M University	Future
	TranStar and Other Texas Region TMCs	TxDOT	Existing

Table 4 – Brazos Valley Inventory of Regional Subsystems/Terminators (sorted by Entity) (continued)

Entity	Element	Stakeholder	Status
Traffic Management Subsystem (continued)	TTI TransLink	Texas Transportation Institute	Existing
	TxDOT Bryan District Office	TxDOT	Existing
	TxDOT Fort Worth TMC (TransVision)	TxDOT	Existing
Transit Management Subsystem	Brazos Transit Operations Center	Brazos Transit	Existing
	Independent School District Dispatch	Independent School Districts	Existing
	Private Taxi Provider Dispatch	Private Taxi Providers	Existing
	TAMU Transit Operations Center	Texas A&M University Transportation Services	Existing
Transit Vehicle Subsystem	Brazos Transit Paratransit Vehicles	Brazos Transit	Existing
	Brazos Transit Vehicles	Brazos Transit	Existing
	Independent School District Buses	Independent School Districts	Existing
	TAMU Paratransit Vehicles	Texas A&M University Transportation Services	Existing
	TAMU Transit Vehicles	Texas A&M University Transportation Services	Existing
Traveler Card	Regional Parking, Public Transit and Taxi Payment Instrument	Regional Parking Operators	Future
Vehicle Subsystem	Commercial Vehicles	Commercial Vehicle Operators	Existing
	Private Vehicles	Private Travelers	Existing
Vehicle Characteristics	Private Vehicles	Private Travelers	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 Brazos Valley Region. In the National ITS Architecture, services are referred to as market packages. Market packages could include several stakeholders and elements that work together to provide a service in the Region. Examples of market packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 75 market packages identified in the National ITS Architecture Version 4.0.

In the Brazos Valley 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 Brazos Valley 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 Bryan and on highways through the TxDOT Bryan 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 – Brazos Valley 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	BCSCVB Website	City of Bryan	Existing
		City of Bryan Field Equipment	City of College Station	Existing
		City of Bryan Traffic Operations Center	TxDOT Bryan District	Existing
		City of College Station Field Equipment	Municipalities	Future
		City of College Station Traffic Operations Center	TTI	Existing
		Municipal Field Equipment	TAMU	Future
		Municipal Traffic Operations Center		
		Private Sector Traveler Information Services		
		TAMU Field Equipment		
		TAMU Traffic Management Center		
		TAMU Website		
		TTI Field Equipment		
		TTI TransLink		

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS01 (continued)	Network Surveillance (continued)	TxDOT 511 System TxDOT Bryan District CCTV TxDOT Bryan District College Station Traffic Recorders TxDOT Bryan District Field Sensors TxDOT Bryan District Office TxDOT Bryan District Public Information Office TxDOT Bryan District Web Page		
ATMS02	Probe Surveillance	Brazos Transit Operations Center Brazos Valley COG Regional Probe Information Server BCSCVB Website City of Bryan Field Equipment City of Bryan Maintenance Vehicles City of Bryan Traffic Operations Center City of College Station Field Equipment City of College Station Public Works Vehicles City of College Station Traffic Operations Center Commercial Vehicles County Road and Bridge Field Equipment County Road and Bridge Vehicles Independent School District Dispatch Municipal Field Equipment Municipal PWD Vehicles Municipal Traffic Operations Center Private Sector Traveler Information Services Private Vehicles TAMU Field Equipment TAMU Traffic Management Center TAMU Transit Operations Center TAMU Website TTI Field Equipment TTI TransLink TxDOT 511 System TxDOT Bryan District Field Sensors TxDOT Bryan District Maintenance Vehicles	Brazos Valley COG	Future

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATMS02 (continued)	Probe Surveillance (continued)	TxDOT Bryan District Office TxDOT Bryan District Web Page		
ATMS03	Surface Street Control	City of Bryan Field Equipment City of Bryan Traffic Operations Center City of College Station Field Equipment City of College Station Traffic Operations Center Municipal Field Equipment Municipal Traffic Operations Center TxDOT Bryan District Field Sensors TxDOT Bryan District Office TxDOT Bryan District Traffic Signals	City of Bryan City of College Station Municipalities TxDOT Bryan District	Existing Existing Future Existing
ATMS06	Traffic Information Dissemination	BCSMPO Traffic Counts and Accident Location Database BCSMPO Website Brazos County 911 Dispatch Brazos Transit Operations Center BCSCVB Website City of Bryan Field Equipment City of Bryan Road Maintenance Department City of Bryan Traffic Operations Center City of College Station Field Equipment City of College Station Police and Dispatch City of College Station Fire Dispatch City of College Station Public Works – Streets Division City of College Station Traffic Operations Center Correctional Facilities Operations County Road and Bridge Maintenance Office DPS Communications Service Independent School District Dispatch Local Print and Broadcast Media Municipal Field Equipment Municipal or County Public Safety Dispatch Municipal Public Works Department Municipal Traffic Operations Center Other TxDOT District Maintenance Sections	City of Bryan City of College Station TxDOT Bryan District Municipalities	Future Future Future Future

Table 5 – Brazos Valley 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)	Private Sector Traveler Information Services Private Tow/Wrecker Dispatch Regional Medical Center TAMU Police and Public Safety Dispatch TAMU Transit Operations Center TAMU Website TTI TransLink TxDOT 511 System TxDOT Bryan District DMS TxDOT Bryan District HAR TxDOT Bryan District Maintenance Sections TxDOT Bryan District Office TxDOT Bryan District Public Information Office TxDOT Bryan District Web Page		
ATMS07	Regional Traffic Control	City of Bryan Traffic Operations Center City of College Station Traffic Operations Center Municipal Traffic Operations Center TAMU Traffic Management Center TranStar and Other Texas Region TMCs TTI Translink TxDOT Bryan District Office TxDOT Fort Worth TMC (TransVision)	TxDOT Bryan District	Future
ATMS08	Incident Management System	Automated Call Out System Blinn College Police and Dispatch Blinn College Police Vehicles Brazos County 911 Dispatch Brazos Transit Operations Center BCSCVB Convention and Visitors Bureau City of Bryan EOC City of Bryan Fire Rescue Vehicles City of Bryan Police Vehicles City of Bryan Road Maintenance Department City of Bryan Signal Shop City of Bryan Traffic Operations Center City of College Station EOC City of College Station Fire Dispatch	City of Bryan City of College Station TxDOT Bryan District Counties and Municipalities	Future Future Future Future

Table 5 – Brazos Valley 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)	City of College Station Fire Rescue Vehicles City of College Station Police Vehicles City of College Station Police and Dispatch City of College Station Public Works – Streets Division City of College Station Signal Shop City of College Station Traffic Operations Center Correctional Facilities Operations County EOC County Volunteer Fire Rescue Vehicles County Road and Bridge Maintenance Office County Sheriff Police Vehicles DPS Communications Service DPS Emergency Vehicles Independent School District Dispatch Municipal Fire Rescue Vehicles Municipal or County Public Safety Dispatch Municipal Police Vehicles Municipal Public Works Department Municipal Traffic Operations Center Other TxDOT District Maintenance Sections Private Ambulance Vehicle Private Tow/Wrecker Dispatch Private Tow/Wrecker Vehicles Rail Operations Centers Regional Medical Center Sam Houston State University Police and Dispatch Sam Houston State University Police Vehicles State EOC TAMU EMS Vehicles TAMU Police Vehicles TAMU Police and Public Safety Dispatch TAMU Special Event Promoters TAMU Transit Operations Center TTI TransLink TxDOT Bryan District Area Engineers Office		

Table 5 – Brazos Valley 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)	TxDOT Bryan District Flood Detection TxDOT Bryan District Maintenance Sections TxDOT Bryan District Office TxDOT Bryan District Signal Shop		
ATMS10	Electronic Toll Collection	Commercial Vehicles Financial Institution Private Fleet Management Systems Private Sector Traveler Information Services Private Vehicles Regional Mobility Authority Toll Customer Service Center Regional Mobility Authority Toll Plazas TxDOT 511 System	Regional Mobility Authority	Future
ATMS13	Standard Railroad Grade Crossing	Brazos County 911 Dispatch City of Bryan Field Equipment City of Bryan Traffic Operations Center City of College Station Field Equipment City of College Station Fire Dispatch City of College Station Traffic Operations Center CS Fire 4 Rail Operations Centers Rail Operators Wayside Equipment TAMU Police and Public Safety Dispatch TAMU Transit Operations Center TTI Field Equipment TTI TransLink TxDOT Bryan District Office TxDOT Bryan District Traffic Signals	City of Bryan City of College Station TxDOT Bryan District TTI	Future Future Future Future
ATMS15	Railroad Operations Coordination	City of Bryan Traffic Operations Center City of College Station Traffic Operations Center Municipal Traffic Operations Center Rail Operations Centers TTI TransLink TxDOT Bryan District Office	City of Bryan City of College Station Municipalities TTI TxDOT Bryan District	Future Future Future Future Future

Table 5 – Brazos Valley 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	City of College Station Garage Parking	City of College Station	Future
		Financial Institution	TAMU	Future
		Private Sector Traveler Information Services	Sam Houston State University	Future
		Regional Parking Garages		
		Regional Parking, Public Transit and Taxi Payment Instrument		
		Regional Parking Reconciliation Network		
		Sam Houston State University Parking Garage		
		TAMU Parking Garage		
		TAMU Website		
ATMS18	Reversible Lane Management	City of College Station Field Equipment	TxDOT Bryan	Future
		City of College Station Traffic Operations Center	City of College Station	Future
		TAMU Field Equipment	TAMU	Future
		TTI Field Equipment		
		TTI Translink		
		TxDOT Bryan District Field Equipment		
		TxDOT Bryan District Office		
		TxDOT Bryan District Traffic Signals		
ATMS19	Speed Monitoring	City of Bryan Speed DMS	City of Bryan	Future
		City of College Station Speed DMS	City of College Station	Future
		Driver		
		Private Vehicles		
EM01	Emergency Response	Automated Call Out System	Regional Medical Center	Future
		Blinn College Police and Dispatch	City of College Station	Future
		Brazos County 911 Dispatch	Brazos County	Future
		Brazos Valley Region Incident and Mutual Aid Network	Corrections Facilities	Future
		City of Bryan EOC	TAMU	Future
		City of College Station EOC	City of Bryan	Future
		City of College Station Fire Dispatch		
		City of College Station Police and Dispatch		
		Correctional Facilities Operations		
		County EOC		
		DPS Communications Service		
		Municipal or County Public Safety Dispatch		
		Private Ambulance Vehicle		
		Private Tow/Wrecker Dispatch		
		Rail Operations Centers		

Table 5 – Brazos Valley 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)	Regional Medical Center Sam Houston State University Police and Dispatch State EOC TAMU EOC TAMU Police and Public Safety Dispatch		
EM02	Emergency Routing	Brazos County 911 Dispatch City of Bryan Field Equipment City of Bryan Fire Rescue Vehicles City of Bryan Police Vehicles City of Bryan Traffic Operations Center City of College Station Field Equipment City of College Station Fire Rescue Vehicles City of College Station Police Vehicles City of College Station Fire Dispatch City of College Station Police and Dispatch City of College Station Traffic Operations Center County Volunteer Fire Rescue Vehicles County Sheriff Police Vehicles Municipal Fire Rescue Vehicles Municipal or County Public Safety Dispatch Municipal Police Vehicles Private Ambulance Vehicle Regional Medical Center TxDOT Bryan District Office TxDOT Bryan District Traffic Signals	City of Bryan City of College Station TxDOT Bryan District	Existing Existing Future
EMEX1	Emergency Evacuation by Transit	Brazos Transit Operations Center City of Bryan EOC City of College Station EOC Correctional Facilities Operations County EOC Independent School District Dispatch Private Taxi Provider Dispatch State EOC TAMU EOC TAMU Transit Operations Center	Emergency Management Agencies Transit Agencies	Future Future

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC01	Maintenance and Construction Vehicle Tracking	City of Bryan Maintenance Vehicles	TxDOT Bryan District	Future
		City of Bryan Road Maintenance Department	Counties and Municipalities	Future
		City of College Station Public Works – Streets Division	City of Bryan	Future
		City of College Station Public Works Vehicles	City of College Station	Future
		County Road and Bridge Maintenance Office		
		County Road and Bridge Vehicles		
		Municipal Public Works Department		
		Municipal PWD Vehicles		
		TxDOT Bryan District Maintenance Sections		
		TxDOT Bryan District Maintenance Vehicles		
MC02	Maintenance and Construction Vehicle Maintenance	City of Bryan Maintenance Facility	TxDOT Bryan District	Future
		City of Bryan Maintenance Vehicles	Counties and Municipalities	Future
		City of Bryan Road Maintenance Department	City of Bryan	Future
		City of College Station Maintenance Facility	City of College Station	Future
		City of College Station Public Works – Streets Division		
		City of College Station Public Works Vehicles		
		County Road and Bridge Equipment Repair		
		County Road and Bridge Maintenance Office		
		County Road and Bridge Vehicles		
		Municipal Maintenance Facility		
		Municipal Public Works Department		
		Municipal PWD Vehicles		
		TxDOT Bryan District Maintenance Sections		
		TxDOT Bryan District Maintenance Vehicles		
		TxDOT Bryan District Shop		

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC03	Road Weather Data Collection	National Weather Service	TxDOT Bryan District	Future
		TTI Field Equipment	TTI	Future
		TTI TransLink		
		TxDOT Bryan District Office		
		TxDOT Bryan District RWIS		
MC04	Weather Information Processing and Distribution	BCSCVB Website	Information Service Providers	Future
		Brazos County 911 Dispatch		
		Brazos Transit Operations Center		
		City of College Station Fire Dispatch		
		City of College Station Police and Dispatch		
		Independent School District Dispatch		
		National Weather Service		
		Private Travelers Personal Computing Devices		
		TAMU Transit Operations Center		
		TTI TransLink		
		TxDOT Bryan District Web Page		
MC07	Roadway Maintenance and Construction	City of Bryan Maintenance Vehicles	TxDOT Bryan District	Future
		City of Bryan Road Maintenance Department	Counties and Municipalities	Future
		City of Bryan Traffic Operations Center	City of Bryan	Future
		City of College Station Public Works – Streets Division	City of College Station	Future
		City of College Station Public Works Vehicles		
		City of College Station Traffic Operations Center		
		County Road and Bridge Maintenance Office		
		County Road and Bridge Vehicles		
		Municipal Public Works Department		
		Municipal PWD Vehicles		
		Municipal Traffic Operations Center		
		National Weather Service		
		TxDOT BRINSAP		
		TxDOT Bryan District Area Engineers Office		
		TxDOT Bryan District Maintenance Sections		
		TxDOT Bryan District Maintenance Vehicles		
		TxDOT Bryan District Office		
		TxDOT Bryan District Pavement Management System		

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC08	Work Zone Management	Brazos County 911 Dispatch	TxDOT Bryan District	Future
		Brazos Transit Operations Center	Counties and Municipalities	Future
		City of Bryan Field Equipment	City of Bryan	Future
		City of Bryan Maintenance Vehicles	City of College Station	Future
		City of Bryan Road Maintenance Department		
		City of Bryan Traffic Operations Center		
		City of College Station Field Equipment		
		City of College Station Fire Dispatch		
		City of College Station Police and Dispatch		
		City of College Station Public Works – Streets Division		
		City of College Station Public Works Vehicles		
		City of College Station Traffic Operations Center		
		Correctional Facilities Operations		
		County Road and Bridge Field Equipment		
		County Road and Bridge Maintenance Office		
		County Road and Bridge Vehicles		
		DPS Communications Service		
		Independent School District Dispatch		
		Municipal or County Public Safety Dispatch		
		Municipal Field Equipment		
		Municipal Public Works Department		
		Municipal PWD Vehicles		
		Municipal Traffic Operations Center		
		Other TxDOT District Maintenance Sections		
		Private Tow/Wrecker Dispatch		
		Regional Medical Center		
		TAMU Transit Operations Center		
		TTI TransLink		
		TxDOT Bryan District Area Engineers Office		
		TxDOT Bryan District Maintenance Sections		
		TxDOT Bryan District Maintenance Vehicles		
		TxDOT Bryan District Office		
		TxDOT Bryan District Web Page		
		TxDOT Bryan District Work Zone Equipment		
		TxDOT Highway Condition Reporting System (HCRS)		

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC09	Work Zone Safety Monitoring	City of Bryan Field Equipment	TxDOT Bryan District	Future
		City of Bryan Maintenance Vehicles	City of Bryan	Future
		City of Bryan Road Maintenance Department	City of College Station	Future
		City of College Station Field Equipment	Counties and Municipalities	Future
		City of College Station Public Works – Streets Division		
		City of College Station Public Works Vehicles		
		County Road and Bridge Field Equipment		
		County Road and Bridge Maintenance Office		
		County Road and Bridge Vehicles		
		Municipal Field Equipment		
		Municipal Public Works Department		
		Municipal PWD Vehicles		
		TxDOT Bryan District Maintenance Sections		
		TxDOT Bryan District Maintenance Vehicles		
		TxDOT Bryan District Work Zone Equipment		
MC10	Maintenance and Construction Activity Coordination	Brazos County 911 Dispatch	TxDOT Bryan District	Future
		Brazos Transit Operations Center	Counties and Municipalities	Future
		City of Bryan Road Maintenance Department	City of Bryan	Future
		City of Bryan Traffic Operations Center	City of College Station	Future
		City of College Station Fire Dispatch		
		City of College Station Police and Dispatch		
		City of College Station Public Works – Streets Division		
		City of College Station Traffic Operations Center		
		Correctional Facilities Operations		
		County Road and Bridge Maintenance Office		
		DPS Communications Service		
		Independent School District Dispatch		
		Municipal or County Public Safety Dispatch		
		Municipal Public Works Department		
		Municipal Traffic Operations Center		
		Other TxDOT District Maintenance Sections		
		Private Taxi Provider Dispatch		
		Private Tow/Wrecker Dispatch		

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
MC10 (continued)	Maintenance and Construction Activity Coordination (continued)	Rail Operations Centers Regional Medical Center TAMU Police and Public Safety Dispatch TAMU Transit Operations Center TxDOT Bryan District Maintenance Sections TxDOT Bryan District Office TxDOT Bryan District Public Information Office TxDOT Bryan District Web Page TxDOT Highway Condition Reporting System (HCRS)		
APTS1	Transit Vehicle Tracking	Brazos Transit Operations Center Brazos Transit Paratransit Vehicles Brazos Transit Vehicles Independent School District Buses Independent School District Dispatch TAMU Paratransit Vehicles TAMU Transit Operations Center TAMU Transit Vehicles	Brazos Transit TAMU Transit Independent School Districts	Future Future Future
APTS2	Transit Fixed-Route Operations	Brazos Transit Operations Center Brazos Transit Vehicles Brazos Transit Website City of Bryan Traffic Operations Center City of College Station Traffic Operations Center Independent School District Buses Independent School District Dispatch Municipal Traffic Operations Center Private Sector Traveler Information Services TAMU Traffic Management Center TAMU Transit Info Line TAMU Transit Operations Center TAMU Transit Vehicles TAMU Transit Web Site TAMU Website TTI TransLink TxDOT 511 System TxDOT Bryan District Office	Brazos Transit TAMU Transit Independent School Districts	Future Future Future

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
APTS3	Demand Response Transit Operations	Brazos Transit Operations Center	Brazos Transit	Future
		Brazos Transit Paratransit Vehicles	TAMU Transit	Future
		Brazos Transit Website		
		City of Bryan Traffic Operations Center		
		City of College Station Traffic Operations Center		
		Municipal Traffic Operations Center		
		Private Sector Traveler Information Services		
		TAMU Paratransit Vehicles		
		TAMU Traffic Management Center		
		TAMU Transit Info Line		
		TAMU Transit Operations Center		
		TAMU Transit Web Site		
		TAMU Website		
		TTI TransLink		
		TxDOT Bryan District Office		
APTS4	Transit Passenger and Fare Management	Brazos Transit Operations Center	Brazos Transit	Future
		Brazos Transit Paratransit Vehicles		
		Brazos Transit Vehicles		
		Financial Institution		
		Regional Kiosks		
		Regional Parking, Public Transit and Taxi Payment Instrument		
		Service Agencies		
		TAMU Transit Kiosks		
APTS5	Transit Security	Brazos County 911 Dispatch	Brazos Transit	Future
		Brazos Transit Operations Center	TAMU Transit	Future
		Brazos Transit Paratransit Vehicles	Independent School Districts	Future
		Brazos Transit Vehicles		
		City of College Station Fire Dispatch		
		City of College Station Police and Dispatch		
		DPS Communications Service		
		Independent School District Buses		
		Independent School District Dispatch		
		Municipal or County Public Safety Dispatch		
		Sam Houston State University Police and Dispatch		
		TAMU Paratransit Vehicles		

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
APTS5 (continued)	Transit Security (continued)	TAMU Police and Public Safety Dispatch TAMU Transit Operations Center TAMU Transit Vehicles		
APTS7	Multi-modal Coordination	Brazos Transit Operations Center Brazos Transit Paratransit Vehicles Brazos Transit Vehicles Bryan Intercity Bus Depot Easterwood Airport Passenger Rail Private Taxi Provider Dispatch TAMU Paratransit Vehicles TAMU Transit Operations Center TAMU Transit Vehicles	Brazos Transit TAMU Transit	Future Future
APTS8	Transit Traveler Information	Brazos Transit Operations Center Brazos Transit Website Private Travelers Personal Computing Devices Regional Kiosks TAMU Transit Info Line TAMU Transit Kiosks TAMU Transit Operations Center TAMU Transit Web Site TxDOT 511 System	Brazos Transit TAMU Transit	Future Future
CVO04	CV Administrative Processes	DPS Communications Service Municipal or County Permitting System Private Fleet Management Systems TxDOT Bryan District Office	Counties and Municipalities	Future
CVO10	HAZMAT Management	Brazos County 911 Dispatch City of College Station Fire Dispatch City of College Station Police and Dispatch Commercial Vehicles Municipal or County Public Safety Dispatch Private Fleet Management Systems Rail Operations Centers Rail Operators Rail Cars	Counties and Municipalities City of College Station	Future Future

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
ATIS1	Broadcast Traveler Information	Independent School District Dispatch ISD Website Local Print and Broadcast Media Private Travelers Personal Computing Devices TxDOT 511 System TxDOT Bryan District Maintenance Sections TxDOT Bryan District Office TxDOT Bryan District Public Information Office TxDOT Bryan District Web Page TxDOT Highway Conditions Reporting System	TxDOT Bryan District	Future
ATIS5	Information Service Provider (ISP) Based Route Guidance	City of Bryan Traffic Operations Center City of College Station Traffic Operations Center Municipal Traffic Operations Center Private Fleet Management Systems TTI TransLink TxDOT Bryan District Maintenance Sections TxDOT Bryan District Office TxDOT Motor Carrier Routing Information TxDOT Rest Areas/Visitor Centers/Service/Truck Stops/Plaza Kiosks	TxDOT Statewide	Future
AD1	ITS Data Mart	BCSMPO Traffic Counts and Accident Location Database Blinn College Police and Dispatch Brazos County 911 Dispatch Brazos Valley COG GIS Brazos Transit Operations Center City of Bryan Police Department City of College Station Police and Dispatch Independent School District Dispatch MPO Transit Ridership Database Municipal or County Local Accident Database Municipal or County Police Department Municipal or County Public Safety Dispatch Sam Houston State University Police and Dispatch	TxDOT Bryan District Bryan/College Station MPO TxDOT Statewide DPS Communications Service	Future Future Future Future

Table 5 – Brazos Valley Region Selected Market Packages (continued)

Market Package	Market Package Name	Elements Associated with Market Package	Primary Stakeholders Responsible for Implementation	Market Package Status
AD1 (continued)	ITS Data Mart (continued)	Statewide Crash Records Information System Statewide Crash Records Information System Users TAMU Police and Public Safety Dispatch Texas Education Association Ridership Office TxDOT Bryan District Maintenance Sections TxDOT Bryan District Pavement Management System TxDOT Bryan District Pavement Management System Users TxDOT Bryan District Public Transportation Management System (PTMS) TxDOT Statewide Pavement Management System		
AD2	ITS Data Warehouse	BCSMPO Traffic Counts and Accident Location Database Brazos County 911 Dispatch Brazos County Traffic Count Archive Brazos Transit Operations Center BVCOG Traffic Accident Archive City of Bryan Police Department City of Bryan Road Maintenance Department City of Bryan Traffic Operations Center City of College Station Police/Fire Dispatch City of College Station Public Works – Streets Division City of College Station Traffic Operations Center County Road and Bridge Maintenance Office Easterwood Airport Independent School District Buses Independent School District Dispatch MPO Archive User Municipal or County Police Department Municipal or County Public Safety Dispatch Municipal Public Works Department Municipal Traffic Operations Center Rail Operations Centers	Bryan/College Station MPO Brazos Valley COG TransLink	Future Future Future

Table 5 – Brazos Valley 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)	Statewide Crash Records Information System TAMU Police and Public Safety Dispatch TAMU Traffic Management Center TAMU Transit Operations Center TTI TransLink TxDOT Bryan District Maintenance Sections TxDOT Bryan District Office TxDOT Bryan District Pavement Management System		

4.3 Interconnections

4.3.1 Top Level Regional System Interconnect Diagram

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

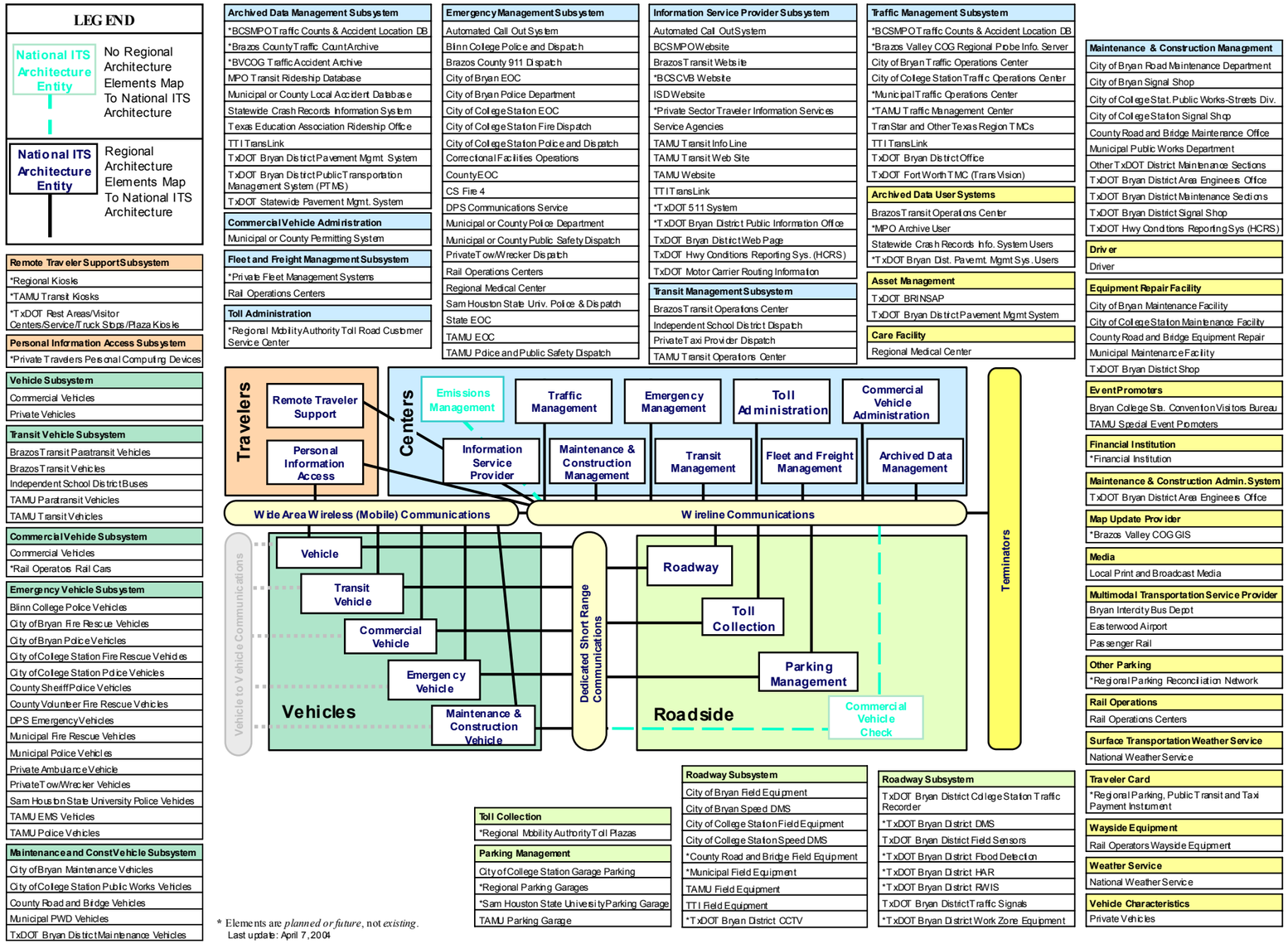


Figure 5 – Brazos Valley Regional System Interconnect Diagram

4.3.2 Customized Market Packages

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Brazos Valley Region. Each market package is shown graphically, with the market package name, Brazos Valley-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 Advanced Traffic Management System (ATMS) market package for Surface Street Control that has been customized for the Brazos Valley Region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated entities (TxDOT Bryan District Traffic Signals, TxDOT Bryan District Field Sensors, etc.) for both the TxDOT Bryan District signal system and other municipal traffic signal systems in the Region. Data flows between the subsystems indicate what information is being shared.

Market packages that were customized for the Brazos Valley Region are shown in **Appendix A**. These market packages also are included on the Brazos Valley 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 Brazos Valley 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.

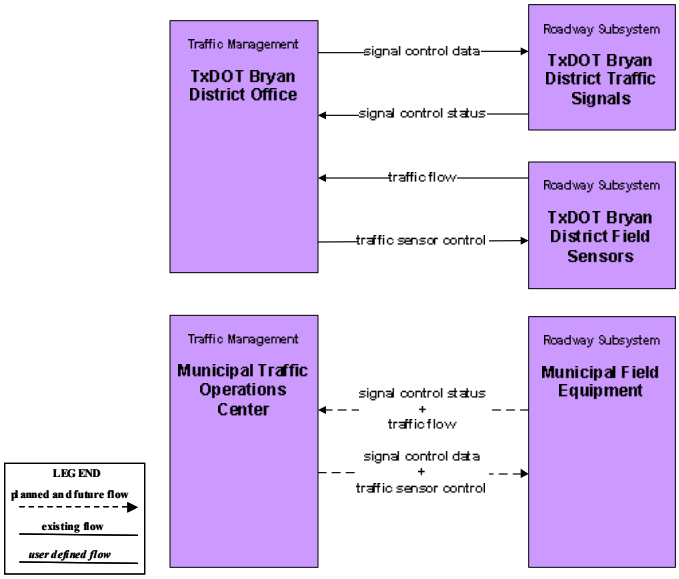


Figure 6 – Custom Market Package for Surface Street Control

4.3.3 Brazos Valley Architecture Interfaces

While it is important to identify the various systems and stakeholders as part of a regional ITS, a primary purpose of the architecture is to identify the *connectivity* between transportation systems in the Brazos Valley Region. The interconnect diagram shown previously in **Figure 5** showed the high-level relationships of the subsystems and terminators in the Brazos Valley 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 148 different elements identified as part of the Brazos Valley 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 Brazos Valley Regional ITS Architecture, and each element has been mapped to those other elements with which it must interface. For example, the TxDOT Bryan District Office has existing or planned interfaces with 52 other elements in the Brazos Valley 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 Bryan District traffic signals and the existing and planned interfaces with other elements throughout the Region. These interfaces are shown as existing, planned, or future. Interfaces defined as planned have funding identified, while future interfaces are desired by stakeholders but funding has not yet been identified.

Each element and its defined interfaces are listed in **Appendix B**. Elements and their interfaces also are accessible via the Brazos Valley 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.

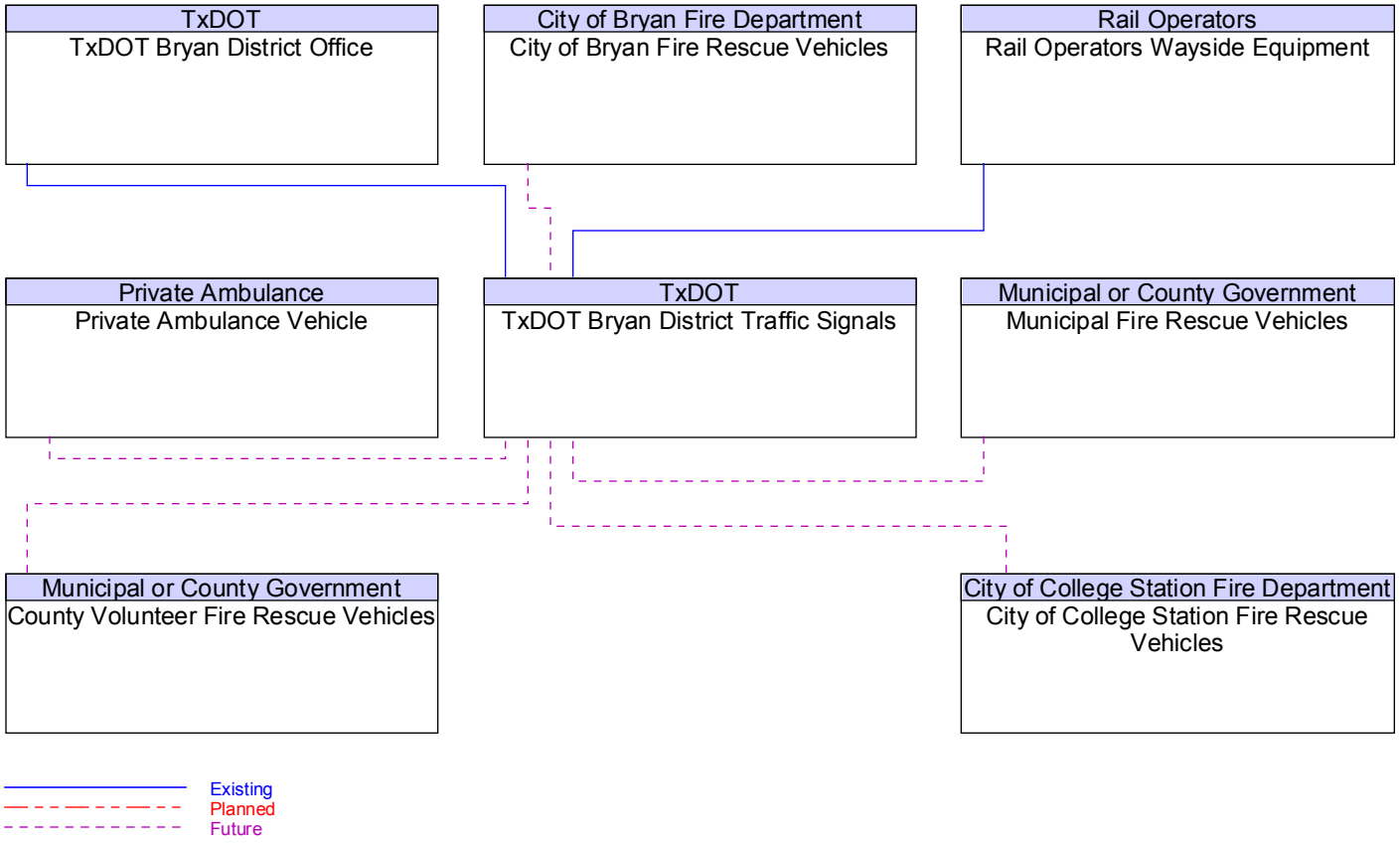


Figure 7 – TxDOT Bryan District Traffic Signals Interfaces

4.3.4 Physical Subsystem Architecture Flows

Architecture flows between the subsystems and terminators define the specific information (data) that is exchanged between subsystems and terminators. Each architecture flow has one or more data flows that specify what information is exchanged and the direction of the exchange. These data flows could be requests for information, alerts and messages, status requests, broadcast advisories, event messages, confirmations, electronic credentials, and other key information requirements. These architecture flows define the interface requirements between the various elements in the Brazos Valley 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 Bryan District Office and TranStar and Other Texas Region TMCs show information that must go from the Bryan District Office to other Texas TMCs, as well as information that the District Office 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 Brazos Valley 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 Brazos Valley Region are discussed in more detail in Section 4.5.

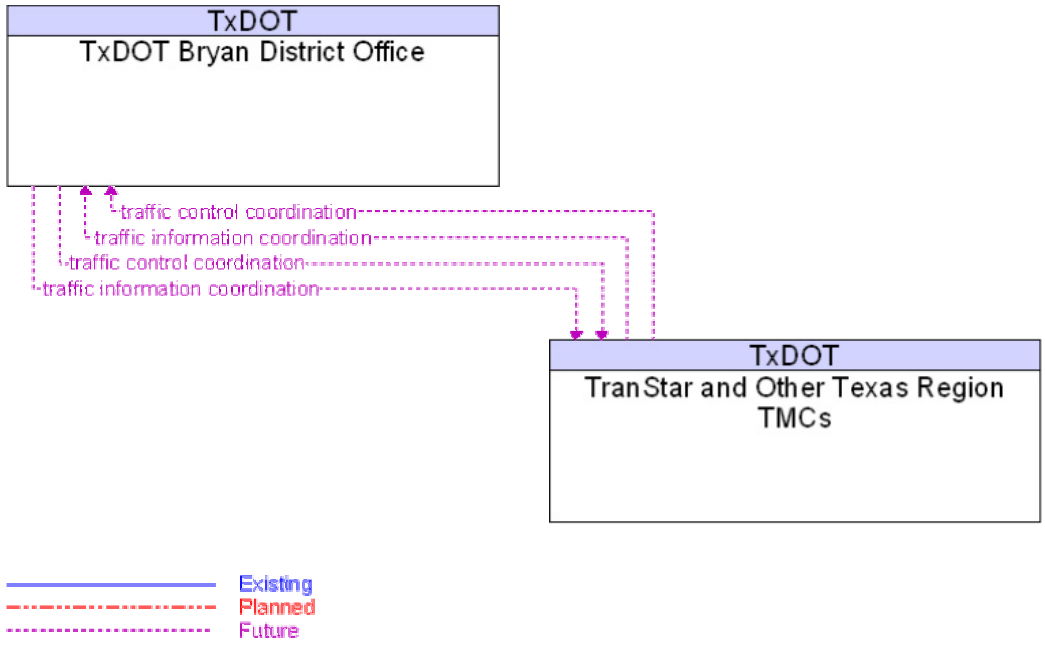


Figure 8 – TxDOT Bryan District Office to TranStar and Other Texas Region TMCs Architecture Flows

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 Brazos Valley 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 Brazos Valley 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 Brazos Valley has to do and the data that needs to be shared among elements.

At a more detailed level, functional requirements for the Brazos Valley Region also are described in terms of equipment packages that are associated with one or more subsystems in the Brazos Valley 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 Brazos Valley Regional ITS Architecture web site by clicking on the "Functions" button.

Table 6 – Brazos Valley 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	Credentials and Taxes Administration
	CV Data Collection
	CV Information Exchange
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

Table 6 – Brazos Valley Region Equipment Packages (continued)

Subsystem	Equipment Package
Emergency Vehicle Subsystem	On-board EV En Route Support
	On-Board EV Environmental Monitoring
	On-board EV Incident Management Communication
Emissions Management Subsystem	Emissions Data Collection
Fleet and Freight Management Subsystem	Fleet Administration
	Fleet Credentials and Taxes Management and Reporting
	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 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 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 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

Table 6 – Brazos Valley Region Equipment Packages (continued)

Subsystem	Equipment Package
Remote Traveler Support Subsystem	Remote Basic Information Reception
	Remote Interactive Information Reception
	Remote Mayday I/F
	Remote Transit Fare Management
	Remote Transit Information Services
	Secure Area Monitoring
Roadway Subsystem	Roadside Data Collection
	Roadside Signal Priority
	Roadway Basic Surveillance
	Roadway Environmental Monitoring
	Roadway Equipment Coordination
	Roadway Incident Detection
	Roadway Infrastructure Monitoring
	Roadway Probe Beacons
	Roadway Reversible Lanes
	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 Administration
	Toll Data Collection
Toll Collection Subsystem	Toll Plaza Toll Collection
Traffic Management Subsystem	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Multimodal Coordination
	TMC Probe Information Collection
	TMC Regional Traffic Control
	TMC Reversible Lane Management
	TMC Signal Control
	TMC Speed Monitoring
	TMC Traffic Information Dissemination
	TMC Work Zone Traffic Management

Table 6 – Brazos Valley Region Equipment Packages (continued)

Subsystem	Equipment Package
Traffic Management Subsystem (continued)	Traffic Data Collection
	Traffic Maintenance
Transit Management Subsystem	Transit Center Fare and Load Management
	Transit Center Fixed-Route Operations
	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
	Smart Probe
	Vehicle Location Determination
	Vehicle Mayday I/F
	Vehicle Probe Support
	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 Brazos Valley 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 Brazos Valley 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 Brazos Valley Regional ITS Architecture web site by clicking on the "Interfaces" or "Standards" buttons.

Table 7 – Applicable ITS Standards for the Brazos Valley Region

SDO	Document ID	Title	Type
AASHTO/ITE/NEMA	NTCIP 1201	Global Object Definitions	Message
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units	Message
	NTCIP 1203	Object Definitions for Dynamic Message Signs	Message
	NTCIP 1204	Object Definitions for Environmental Sensor Stations and Roadside Weather Information System	Message
	NTCIP 1205	Data Dictionary for Closed Circuit Television (CCTV)	Message
	NTCIP 1206	Data Collection and Monitoring Devices	Message
	NTCIP 1208	Object Definitions for Video Switches	Message
	NTCIP 1209	Transportation System Sensor Objects	Message
	NTCIP 1210	Objects for Signal Systems Master	Message
	NTCIP 1211	Objects for Signal Control Priority	Message
	NTCIP 1301	Message Set for Weather Reports	Message
	NTCIP 1401	TCIP – Common Public Transportation (CPT) Business Area Standard	Message
	NTCIP 1402	TCIP – Incident Management (IM) Business Area Standard	Message
	NTCIP 1403	TCIP – Passenger Information (PI) Business Area Standard	Message
	NTCIP 1404	TCIP – Scheduling/Runcutting (SCH) Business Area Standard	Message
	NTCIP 1405	TCIP – Spatial Representation (SP) Business Area Standard	Message
	NTCIP 1406	TCIP – Onboard (OB) Business Area Standard	Message
	NTCIP 1407	TCIP – Control Center (CC) Business Area Standard	Message
	NTCIP 1408	TCIP – Fare Collection (FC) Business Area Standard	Message
	Various	NTCIP Center-to-Center Standards Group	Communication
	Various	NTCIP Center-to-Field Standards Group	Communication

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

SDO	Document ID	Title	Type
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
IEEE	IEEE P1512.1	Standard for Traffic Incident Management Message Sets for Use by EMCs	Message
	IEEE P1512.2	Standard for Public Safety Incident Management Message Sets (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 IMMS for use by EMCs	Message
	IEEE P1556	Security/Privacy of Vehicle/RS Communications including Smart Card Communications	Communication
	IEEE P1570	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	Message
	IEEE Std 1455-1999	Standard for Message Sets for Vehicle/Roadside Communications	Message
ITE	ITE TM 1.03	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	Data
	ITE TM 2.01	Message Sets for External TMC Communication (MS/ETMCC)	Message
SAE	SAE J1746	ISP-Vehicle Location Referencing Standard	Data
	SAE J2313	On-Board Land Vehicle Mayday Reporting Interface	Message
	SAE J2353	Data Dictionary for Advanced Travel Information System (ATIS)	Data
	SAE J2354	Message Set for 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 Regional ITS Architecture will be implemented through a series of projects led by both public sector and private sector agencies. Key foundation systems will need to be implemented in order to support other systems that have been identified in the Regional ITS Architecture. The deployment of all of the systems required to achieve the final Regional ITS Architecture build out will occur over many years.

A sequence of projects and their respective time frames have been identified in the Brazos Valley Regional ITS Deployment Plan. These projects have been sequenced over a 20-year period, with projects identified for deployment in 5-, 10- and 20-year timeframes.

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

- Network Surveillance;
- Surface Street Control;
- Traffic Information Dissemination;
- Transit Vehicle Tracking; and
- Broadcast Traveler Information.

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

5. OPERATIONAL CONCEPT

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

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

With the integration, information sharing, and in some cases joint operations of systems, there will likely be a requirement for agency agreements. Descriptions of potential agreements that may be needed in the Brazos Valley Region are included in Section 5.3.

5.1 Operational Scenarios

Scenario 1

The first operational scenario describes how the integrated elements of the Brazos Valley Region's ITS program will function together in the event of a HAZMAT spill near the Bryan and College Station city limits. In this operational scenario, some local arterials are instrumented with permanent DMS and major intersections in the both cities have CCTV cameras for monitoring. These systems are controlled from their respective TOCs. The TxDOT Bryan District TMC also facilitates information sharing with motorists on state routes approaching the two cities.

A motorist's cellular phone 911 call is received and the City of College Station police dispatch is notified of a crash at a busy intersection. The dispatcher logs the incident details and dispatches an officer as well as electronically notifies the City of College Station TOC to find out if video coverage exists at that intersection. The City of College Station TOC locates the incident on a camera and while sharing the image with the police dispatcher they see that a HAZMAT vehicle is involved and that there is a potential spill. The officer on scene is notified to proceed with caution while TOC operators read the license plate from the truck and determine the contents. A message is automatically routed to the City of College Station Streets Department, TxDOT Bryan District Office, and the Regional EOC requesting HAZMAT crews to assist with incident clearance. The truck is carrying an extremely dangerous substance and since the extent of damage to the vehicle indicates that a leak is likely, emergency officials decide to evacuate the immediate area to limit exposure during the clean up process.

The City of College Station TOC contacts the City of Bryan TOC because of the close proximity of the spill to the city limits to advise them of the situation and request signal timing modifications on a parallel route in the City of Bryan to facilitate moving traffic through the area and away from the spill. The City of Bryan complies with the request and modifies their timing plans.

Messages are immediately placed on DMS throughout the Region to notify motorists of the incident and consequent road closures. The City of College Station and City of Bryan crews close down streets in a one mile radius of the incident, and place portable DMS on approaches to divert motorists. Local media are informed of the incident and closure, and they broadcast via radio and TV reports that many streets will be closed for several hours. TxDOT updates the HCRS web page, HAR, and 511 traveler information phone number with the information. The center-to-center communications links allow for instantaneous dissemination of the same message to multiple agencies.

Scenario 2

An ice storm is approaching the Brazos Valley Region. Temperatures begin to drop below freezing as the roadside weather data collection centers monitor the deteriorating weather conditions and send reports to the TxDOT Bryan District TMC. Ice formation is detected on an overpass along I-45 and a message is sent from the ice-detection system to the TxDOT Bryan TMC and sand trucks are deployed to the scene.

The ice storm is severe and the Regional EOC is activated. Video images captured along the interstate using TxDOT's CCTV cameras are fed to the EOC where officials monitor the situation as well as to emergency personnel watching for incidents along the roadways. As the storm continues, several bridges and inclines become impassable. This information is passed along to the local TMCs, emergency dispatch centers, TxDOT HCRS webpage, HAR and 511 by the TxDOT Bryan District TMC. Closure information regarding I-45 is sent to the TxDOT Houston District and TxDOT Dallas District TMCs so they can place messages on DMS in their districts regarding the closures to alert travelers coming from Houston and Dallas of the icy conditions. Notice is given to the media to alert the public of the dangers of trying to travel during current winter weather conditions. Once roadways are cleared, the public is once again notified that traveling conditions are safe and they can resume their normal activities.

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 Brazos Valley 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 Bryan
- City of College Station
- County Road and Bridge
- Texas Department of Transportation Bryan District
- Other Texas Department of Transportation Districts
- Texas Department of Public Safety

Public Transportation Management

- Independent School Districts
- Brazos Valley Transit

Electronic Payment

- City of Bryan
- City of College Station

Commercial Vehicle Operations

- Texas Department of Public Safety
- Texas Department of Transportation

Emergency Management

- City of Bryan (Police, Fire, Emergency Operations Center, Traffic)
- City of College Station (Police, Fire, Emergency Operations Center, Traffic)
- Bryan County Public Safety (Sheriff's Office, Emergency Operations Center)
- Regional Hospitals
- Texas Department of Public Safety
- Texas Department of Transportation

Advanced Vehicle Safety System Needs

- Not Applicable

Information Management

- Texas Department of Transportation
- City of Bryan
- City of College Station
- Bryan/College Station MPO
- Brazos Valley COG

Maintenance and Construction Management

- City of Bryan
- City of College Station
- County Road and Bridge
- Texas Department of Transportation

5.3 Brazos Valley Agreements

The Regional ITS Architecture for the Brazos Valley 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 Brazos Valley 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.

There are several existing agreements in place in the Brazos Valley Region for signal control, communications resource sharing, and ITS integration. The City of College Station and the City of Bryan each have signal maintenance agreements with the TxDOT Bryan District. The City of College Station also has an agreement with Texas A&M University for the interconnect of City of College Station and Texas A&M fiber optic cable for the purpose of data sharing. There are several additional agreements between local agencies to work together in the implementation of ITS technologies in the Region as well as an agreement that provided the support for this ITS architecture planning project. These agreements have been included in Appendix C of the Brazos Valley Regional ITS Architecture document. 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.

Table 8 provides a list of potential agreements for the Brazos Valley 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 Brazos Valley Region

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

Table 8 – Potential Agreements for the Brazos Valley Region (continued)

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