Texas Department of Transportation
Regional ITS Architectures and Deployment Plans

San Antonio Region

Regional ITS Architecture Report

Prepared by:

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061190006

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AD	Archived Data
APTS	Advanced Public Transportation Systems
ART	Alamo Regional Transit
ASTM	American Society for Testing and Materials
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
BRT	Bus Rapid Transit
CAD	Computer Aided Dispatch
CCSWT	Community Council of Southwest Texas
CCTV	Closed-circuit Television
CDA	Comprehensive Development Agreement
COSA	City of San Antonio
CPT	Common Public Transportation
CTECC	Combined Transportation, Emergency and Communications Center
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DEM	Division of Emergency Management
DMS	Dynamic Message Sign
DOT	Department of Transportation
DPS	Department of Public Safety
DSRC	Dedicated Short Range Communication
EM	Emergency Management
EMS	Emergency Medical Services
EOC	Emergency Operations Center
ETMCC	External TMC Communication
FC	Fare Collection
FD	Fire Department
FHWA	Federal Highway Administration
FTA	Federal Transit Administration

LIST OF ACRONYMS

HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HCRS	Highway Conditions Reporting System
HRI	Highway Rail Intersection
IEEE	Institute of Electrical and Electronics Engineers
IM	Incident Management
IMMS	Incident Management Message Sets
ITE	Institute of Transportation Engineers
ITIS	International Traveler Information Systems
ITS	Intelligent Transportation System
ISD	Independent School District
KBC	Kerrville Bus Company
LCS	Lane Control Signals
LPTV	Low Power Television
LRMS	Location Referencing Message Specification
MAC	Medium Access Control
MC	Maintenance and Construction
MDT	Mobile Data Terminal
MPO	Metropolitan Planning Organization
MS	Message Sets
NOAA	National Oceanic and Atmospheric Administration
NTCIP	National Transportation Communications for ITS Protocol
OB	On-Board
PD	Police Department
PI	Passenger Information
PIO	Public Information Office
PSAP	Public Safety Answering Point
PTMS	Public Transportation Management System
PWD	Public Works Department
RDMT	Radio, Dispatch, Mobile Data, Transportation
RDS	Radio Data Systems

LIST OF ACRONYMS

RMA	Regional Mobility Authority
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users
SDO	Standards Development Organization
TCEQ	Texas Commission on Environmental Quality
TEA-21	Transportation Equity Act for the 21st Century
TMC	Transportation Management Center
TOC	Traffic Operations Center
TxDOT	Texas Department of Transportation
USDOT	United States Department of Transportation
VIVDS	Video Imaging Vehicle Detection System

1. INTRODUCTION

1.1 Project Overview

Development of a regional intelligent transportation system (ITS) architecture is one of the most important steps in planning for and implementing ITS in a region. ITS architectures provide a framework for implementing ITS projects, encourage interoperability and resource sharing among agencies, identify applicable standards to apply to projects, and allow for cohesive long-range planning among regional stakeholders. The ITS architecture allows stakeholders to plan for what they want their system to look like in the long-term and then break out the system into smaller pieces that can be implemented as funding permits.

ITS architectures satisfy the conformity requirements first established in the Transportation Equity Act for the 21st Century (TEA-21) highway bill and continued in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) bill passed in 2005. In response to Section 5206(e) of TEA-21, the Federal Highway Administration (FHWA) issued a final rule and the Federal Transit Administration (FTA) issued a final policy that required regions implementing any ITS project to have an ITS architecture in place by April 2005. After this date, any ITS projects must show conformance with their regional ITS architecture in order to be eligible for funding from FHWA or FTA. Regions that had not yet deployed ITS were given four years to develop an ITS architecture after their first ITS project proceeded to final design.

In an effort led by the Texas Department of Transportation (TxDOT) San Antonio District, the San Antonio Region completed an ITS architecture in June of 2003. The geographic boundaries of the original architecture for the Region included five counties: Bexar, Comal, Guadalupe, Kendall, and Wilson. Since that time the San Antonio Region has deployed a number of new ITS deployments, the regional boundaries have been expanded to the boundaries of the 12 county TxDOT San Antonio District, and the National ITS Architecture has been updated with new market packages and data flows.

In July of 2006, the TxDOT San Antonio District began a project to update the San Antonio Regional ITS Architecture using Version 5.1 of the National ITS Architecture. As part of this project, the geographic boundaries have been expanded to cover the entire TxDOT San Antonio District. The project focuses on a 20-year vision for ITS in the Region. A project website was developed which contains additional information that was not feasible to include in the report. This website was accessible at the time this report was developed at www.consystec.com by selecting the link to Texas Regional and then the link to San Antonio. In addition, a separate ITS Deployment Plan was developed to identify and prioritize specific ITS projects recommended for the Region in order to implement the ITS architecture. An executive summary brochure was also developed to provide a broad overview of the Regional ITS Architecture and Deployment Plan.

The ITS Architecture and the ITS Deployment Plan were both developed with significant input from local, state, and federal officials. Numerous interviews with stakeholders were held to solicit input in order to ensure that the plans reflected the unique needs of the Region. The project team also reported the project progress and solicited input from the San Antonio ITS Technical Committee, which meets on a quarterly basis at TransGuide. Copies of the draft reports were made available to all stakeholders, and the project website allowed stakeholders to submit comments directly to the project team. The Regional ITS Architecture and Deployment Plan developed reflects a current snapshot of existing ITS deployment and future ITS plans in the

Region. Needs and priorities of the Region will change over time, and, in order to remain effective, this plan should be periodically reviewed and updated.

1.2 Document Overview

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

Section 1 – Introduction

This section provides an overview of the National ITS Architecture requirements, an overview of the San Antonio Regional ITS Architecture, and the key features and stakeholders in the San Antonio Region.

Section 2 – Regional ITS Architecture Development Process

This section presents a synopsis of the key steps involved in developing the ITS architecture for the San Antonio Region. It includes a discussion of stakeholder involvement, architecture workshops, and the architecture development process.

Section 3 – Customization of the National ITS Architecture for the San Antonio Region

This section contains a summary of the regional needs and details the customization of the National ITS Architecture to meet the ITS vision for the Region. The market packages that were selected for the Region are included in this section and interconnects are presented. The "Sausage Diagram" showing the relationships of the key subsystems and elements in the Region, system interfaces, and the physical subsystem architecture flows is also included.

Section 4 – Application of the Regional ITS Architecture

Functional requirements and standards that apply to the Region, as indicated by the Regional ITS Architecture, are presented in Section 4. Operational concepts identifying stakeholder roles and responsibilities have been included, and potential agreements to support the sharing of data and resources have been identified. The section also includes information on how the Region anticipates deploying ITS to achieve their vision.

Section 5 – Maintaining the Regional ITS Architecture

A maintenance plan has been developed for the San Antonio Regional ITS Architecture, and is included in this section. The plan outlines the procedure for updating the ITS architecture over time.

The San Antonio Regional ITS Architecture also contains five appendices:

- Appendix A – Stakeholder Interviews;
- Appendix B – Market Package Definitions;
- Appendix C – Customized Market Packages;
- Appendix D – Element Functions; and
- Appendix E – Architecture Maintenance Documentation Form.

During the development of the San Antonio Regional ITS Architecture a website was established that contains the architecture documentation, element inventories, market packages, interconnects, interfaces, and functional requirements. This website was temporarily housed at www.consystec.com under the Texas Regional link and may be hosted at a later date by the Texas Department of Transportation. The website provides hyperlinks to more detailed information about the San Antonio Regional ITS Architecture than what could feasibly be included in the

printed document. In certain sections of the document, readers are referred to the website for additional information and details. All of the files contained on the website are also available on a project CD.

1.3 The San Antonio Region

1.3.1 San Antonio Region Scope of Regional ITS Architecture

The San Antonio Region is defined by the boundaries of the twelve county TxDOT San Antonio District as shown in **Figure 1**.

The Region encompasses 12,251 square miles in South-Central Texas. The Region includes Atascosa, Bandera, Bexar, Comal, Frio, Guadalupe, Kendall, Kerr, McMullen, Medina, Uvalde, and Wilson Counties. The largest city in the Region is San Antonio, with a population of 1.2 million according to the 2005 US Census estimate. The metropolitan area of San Antonio occupies much of Bexar County. The total San Antonio Region population is approximately 2 million.

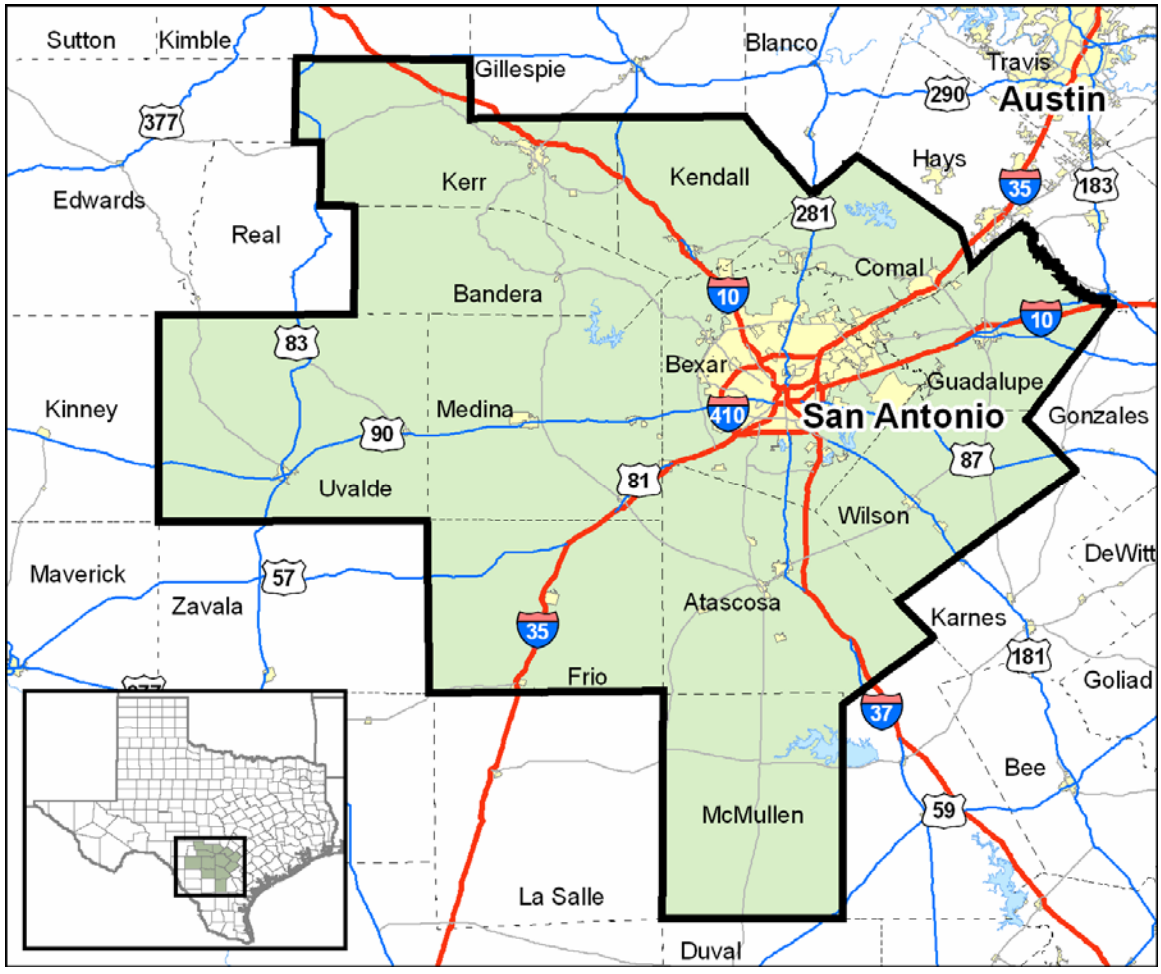

Figure 1 – San Antonio Regional Boundaries

The Region has many other communities within the geographic boundaries of the TxDOT San Antonio District. Stakeholders were solicited from throughout the Region, and have been documented both explicitly and generically in market package diagrams. **Table 1** in Section 1.3.4 identifies the stakeholders that participated in the architecture development process.

When developing the architecture, a 20-year vision for ITS in the Region was documented. In the ITS Deployment Plan, the 20-year time frame was broken down into smaller time periods to prioritize and sequence the projects. As in other regions in Texas, statewide commercial vehicle operations were not included in the Regional ITS Architecture because they are documented in the statewide Commercial Vehicle Information Systems and Networks (CVISN) plan.

1.3.2 Transportation Infrastructure

As illustrated in **Figure 1**, the Region is served by numerous State and Federal highways. The primary roadway facilities include the interstates (I-10, I-35, and I-37), the U.S. Highways (US 59, US 81, US 83, US 87, US 90, US 181, and US 281), and State Highways (SH 16, SH 151, and SH 1604). Several toll facilities are planned for the Region, while others are already under construction by the Alamo Regional Mobility Authority. Current and potential toll projects include Bandera Road, Wurzbach Parkway, I-35, and US 281/SH 1604.

I-35 is a north-south roadway stretching from Laredo, Texas to Duluth, Minnesota. Major trucking operates between Mexico and Canada on I-35. I-37 is an intrastate highway connecting Corpus Christi to San Antonio. I-37 terminates in San Antonio becoming US 281. I-10 is an east-west highway connecting the Pacific to the Atlantic.

TxDOT operates an interagency traffic, transit and emergency management center called TransGuide that is located in northwest San Antonio off of I-410. In addition to TxDOT operations, the facilities house VIA metropolitan demand-response dispatching, City of San Antonio Public Works, and representatives from City of San Antonio Police and Fire Departments. The City of San Antonio and Bexar County will be establishing an emergency operations center in the south-eastern part of San Antonio which will include a TransGuide workstation. The workstation will be activated during emergencies when the EOC is operational and will also serve as a backup for TransGuide should the TransGuide facility not be able to operate normally.

1.3.3 Stakeholders

Due to the fact that ITS often transcends traditional transportation infrastructure, it is important to involve a wide range of stakeholders to develop the Regional ITS Architecture. In addition to agencies responsible for surface transportation, other agencies and departments that are involved with emergency management, maintenance, transit, and traveler information were also asked for input.

Table 1 contains a listing of stakeholders in the San Antonio Region who have participated in the project meetings or provided input to the study team as to the needs and issues that should be considered as part of the San Antonio Regional ITS Architecture. In the San Antonio Region, members of the San Antonio ITS Technical Committee were invited to participate. Invitations were also extended to all 12 counties included in the San Antonio Region as well as a number of smaller municipalities. Letters were sent to the County Judges and the County Emergency Management Managers asking for their participation. In

addition, invitations were extended to the City Engineer or Public Works Director, the Police Chief, and the Fire Chief from the cities of Kerrville, New Braunfels, and Sequin.

Table 1 – San Antonio Stakeholder Agencies and Contacts

Stakeholder Agency/Function	Address	Contact
Alamo Area Council of Governments Homeland Security	8700 Tesoro Drive, Suite 700 San Antonio, Texas 78217	Don McFarland
Alamo Regional Mobility Authority	16500 San Pedro Ave., Ste.350 San Antonio, Texas 78232	Pat Irwin
Alamo Regional Transit	8700 Tesoro Drive, Suite 700 San Antonio, Texas 78217	Beverly Lutz
Bexar County Emergency Management Coordinator	203 West Nueva, Suite 302 San Antonio Texas 78207	Orlando Hernandez
Bexar County Infrastructure Services Department	233 N. Pecos, Suite 420 San Antonio, Texas 78207	Arnold Escobar
Bexar County Infrastructure Services Department	233 N. Pecos, Suite 420 San Antonio, Texas 78207	Ray Grana
Bexar County Infrastructure Services Department	233 N. Pecos, Suite 420 San Antonio, Texas 78207	Robert Pina
Bexar County Public Works	233 N. Pecos, Suite 420 San Antonio, Texas 78207	James Brannan
Bexar County Public Works	233 N. Pecos, Suite 420 San Antonio, Texas 78207	Mary Frances Teniente
Bexar County Public Works	233 N. Pecos, Suite 420 San Antonio, Texas 78207	Richard Higby
City of San Antonio Elderly and Disabled Services – Community Initiatives	1226 NW 18th St. San Antonio, Texas 78201	Fernando Medellin
City of San Antonio Public Works	114 W. Commerce, 6th Floor San Antonio, Texas 78205	Jason Cosby
City of San Antonio Public Works Parking Division	243 N. Center Street San Antonio, Texas 78202	Kenny Appedole
City of San Antonio Public Works Street Maintenance	3500 N.W. Loop 410, Suite 321 San Antonio, Texas 78229	Frank Ramirez
City of San Antonio Public Works Transportation Group	3500 N.W. Loop 410, Suite 321 San Antonio, Texas 78229	Elidia Banda
City of San Antonio Public Works Transportation Group	3500 N.W. Loop 410, Suite 321 San Antonio, Texas 78229	Marc Jacobson
Coach America - Kerrville Bus Company	1430 East Houston Street San Antonio, Texas 78202	Tofie Balagia

Table 1 – San Antonio Stakeholder Agencies and Contacts (continued)

Stakeholder Agency/Function	Address	Contact
Comal County Commissioner Precinct #2	199 Main Plaza New Braunfels, Texas 78130	Jay Millikin
Comal County Emergency Management Coordinator	199 Main Plaza New Braunfels, Texas 78130	Caroll Edgett
Comal County Engineer	195 David Jonas Drive New Braunfels, Texas 78132	Thomas Hornseth
Comal County Judge	199 Main Plaza New Braunfels, Texas 78130	Danny Scheel
Community Council of Southwest Texas	713 E. Main Street Uvalde, Texas 78801	Sarah Hidalgo-Cook
Department of Public Safety	5805 North Lamar Blvd. Austin, Texas 78752	Steven Tellez
Federal Highway Administration	300 East 8th Street, Room 826 Austin, Texas 78701	Mark Olson
Guadalupe County	415 East Donegan Seguin, Texas 78155	Daniel Kinsey
Presa Community Center	3721 S. Presa San Antonio, Texas 78210	Stephanie Smith
Texas Department of Transportation San Antonio District	3500 N.W. Loop 410 San Antonio, Texas 78229	Bill Jurczyn
Texas Department of Transportation San Antonio District	3500 N.W. Loop 410 San Antonio, Texas 78229	Brian Fariello
Texas Department of Transportation San Antonio District	4615 N.W. Loop 410 San Antonio, Texas 78229	Carolyn Goodall
Texas Department of Transportation Traffic Operations Division	ATTN: TRF – Cedar Park #51 Wing E 125 East 11th Street Austin, Texas 78701	Alex Power
VIA Metropolitan Transit	800 W. Myrtle San Antonio, Texas 78212	Tony Cade
Via Metropolitan Transit	800 W. Myrtle San Antonio, Texas 78212	Brian Wolfe
Warm Springs Resource Center	5101 Medical Drive San Antonio, Texas 78229	Ricardo Vasquez

2. REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

The development process followed for the San Antonio Region was designed to ensure that stakeholders could provide input and review for the development of the Region's ITS Architecture and Deployment Plan. **Figure 2** illustrates the stakeholder involvement process utilized. The text in italics indicates a group meeting or workshop.

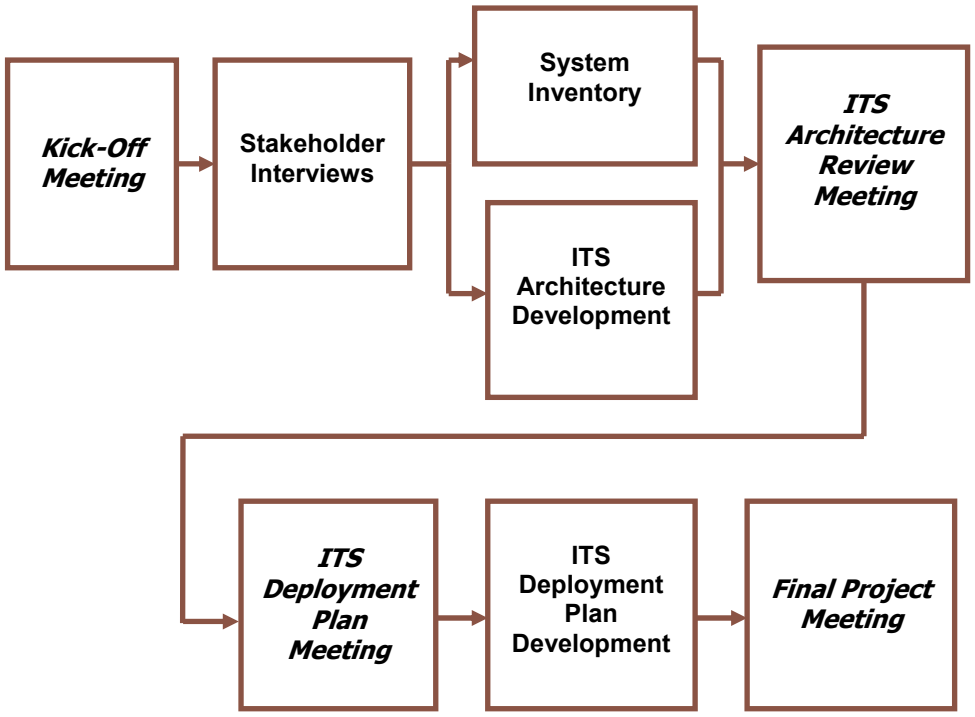

Figure 2 – San Antonio Regional ITS Architecture and Deployment Plan Development Process

A total of four meetings with the San Antonio ITS Technical Committee were held over a period of twelve months to update the Committee on the progress of the San Antonio Regional ITS Architecture and Deployment Plan and solicit input. The meetings were conducted as part of the regularly scheduled quarterly meetings of the ITS Technical Committee. These meetings included:

- Kick-Off which included selection of the ITS market package (services that ITS can provide) for inclusion in the Region;
- ITS Architecture Review which included prioritization of the selected ITS market packages and a demonstration of the project website;
- ITS Deployment Plan Review which included a discussion on the ITS projects to include in the Regional ITS Deployment Plan as well as maintenance of the Regional ITS Architecture and Deployment Plan; and
- Final Project Review which included a final review of the Regional ITS Architecture and Deployment Plan.

In addition to the meetings listed above, the project team met or communicated individually with stakeholders to document their ITS needs, identify their existing ITS inventory and future deployments,

review applicable ITS market packages, and identify potential projects for deployment. These discussions were documented in **Appendix A**.

3. CUSTOMIZATION OF THE NATIONAL ITS ARCHITECTURE FOR THE SAN ANTONIO REGION

3.1 Systems Inventory

An important initial step in the ITS architecture development process was to establish an inventory of existing ITS elements. Using the 2003 ITS Architecture document and holding discussions with stakeholders throughout the Region, the project team documented information about existing and planned systems that would play a role in the Regional ITS Architecture.

The National ITS Architecture has eight groups of ITS service areas, seven of which have been incorporated into the Regional ITS Architecture. The eighth area, which is Vehicle Safety, is primarily implemented by the private sector on vehicles and is generally not included in Regional ITS Architectures. Existing, planned, and future systems in the San Antonio Region were identified in the following service areas:

- ***Traffic Management*** – includes the TransGuide Operation Center as well as other existing and future traffic management centers (TMCs), detection systems, closed-circuit television (CCTV) cameras, fixed and portable dynamic message signs (DMS), electronic toll collection, and other related technologies.
- ***Emergency Management*** – includes emergency operations/management centers, improved information sharing among traffic and emergency services, automated vehicle location (AVL) on emergency vehicles, traffic signal preemption for emergency vehicles, and wide-area alerts.
- ***Maintenance and Construction Management*** – includes work zone management, roadway maintenance and construction information, and road weather detection systems.
- ***Public Transportation Management*** – includes transit and paratransit AVL, transit travel information systems, transit signal priority, electronic fare collection, and transit security.
- ***Commercial Vehicle Operations*** – includes HAZMAT material management.
- ***Traveler Information*** – includes the potential future 511 traveler information phone number, broadcast traveler information, and traveler information kiosks.
- ***Archived Data Management*** – includes electronic data management and archiving systems.

3.2 Regional Needs

Appendix A contains the stakeholder interview information sheets that document the discussions held at the individual meetings with stakeholders. The needs identified provided guidance for determining which market packages should be included in the architecture. Stakeholders identified ITS needs for the San Antonio Region in the following areas:

- Traffic management;
- Emergency management;
- Maintenance and construction management;
- Public transportation management;
- Commercial Vehicle Operations;
- Traveler information; and
- Archived data management.

Table 2 shows a summary of the needs stakeholders had identified for the Region. The needs are categorized by functional area.

Table 2 – Regional ITS Needs

ITS Needs
Traffic Management
Need to continue deployment of freeway management infrastructure in the Region
Need to integrate freeways and arterials to provide improved corridor management
Need for TMCs in developing municipalities for improved traffic management capabilities on major corridors
Need to share information between the TMCs in the Region
Need improved signal coordination on arterials and across city boundaries
Need improved traffic management systems, such as closed loop signal systems, throughout the Region
Need improved data collection systems, such as detectors, throughout the Region
Need improved monitoring capabilities, such as CCTV cameras, on major routes throughout the Region
Need for electronically managed parking facilities, especially when coordinating for special events
Need for toll authority and traffic management agency coordination in the future
Emergency Management
Need to improve capability to put AMBER Alerts quickly on DMS throughout the State
Need to increase disaster coordination capabilities for floods, hurricanes, homeland security, etc.
Need to improve incident management coordination capabilities between agencies and cities
Need to continue to add MDTs on emergency vehicles for dispatching
Need for continued deployment of traffic signal priority for emergency vehicles
Maintenance and Construction Management
Need to add flood detection and closure systems at low water crossings
Need to increase the number of portable DMS for use during extended closures and for traffic control
Need for maintenance tracking and location tracking of maintenance and construction vehicles
Public Transportation Management
Need to continue to develop mapping system for use with AVL technology
Need to consider adding on-board video surveillance on transit buses/vehicles
Need to consider adding real-time CAD for demand response transit buses/vehicles
Need to provide real-time bus location information to transit users at home and at bus stops
Need to improve overall traffic flow in the Region which will benefit all transit vehicles
Need for continued deployment of traffic signal preemption for transit vehicles
Need for coordination with toll and parking agencies in the Region, including payment and traveler card readers
Commercial Vehicle Operations
Need to provide updates on the Texas Commercial Vehicle Information Systems and Networks (CVISN) program
Traveler Information
Need to add roadside traveler information systems throughout the Region, including highway advisory radio and DMS on major routes
Need to continue to provide additional real time information on websites for travelers
Need to consider technologies that can provide updates and alerts directly to cell phones and PDAs
Need to link TMCs and the media to get real-time traffic information to the public

Table 2 – Regional ITS Needs (continued)

ITS Needs
Archived Data Management
Need for data archiving as ITS technologies are implemented and data becomes more available

During the development of the San Antonio Regional ITS Architecture a separate effort was also underway to develop the ITS Strategic Plan for San Antonio. The ITS Strategic Plan identified a number of recommendations for future deployments and use of ITS in the Region. These recommendations were considered in the development and prioritization of the ITS market packages for the Region.

3.3 Element Customization

The inventory and needs documented from stakeholder interviews were the starting point for developing the Regional ITS Architecture. These ITS systems and components were used to customize the National ITS Architecture and create the San Antonio Regional ITS Architecture.

3.3.1 Subsystems and Terminators

Each identified system or component in the San Antonio 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, Field, 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, or vehicles. **Figure 3** 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 San Antonio Region is shown later in **Figure 4**. Communication functions between the subsystems are represented in the ovals. It should be noted that fixed-point to fixed-point communications 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, information service providers, and government reporting systems.

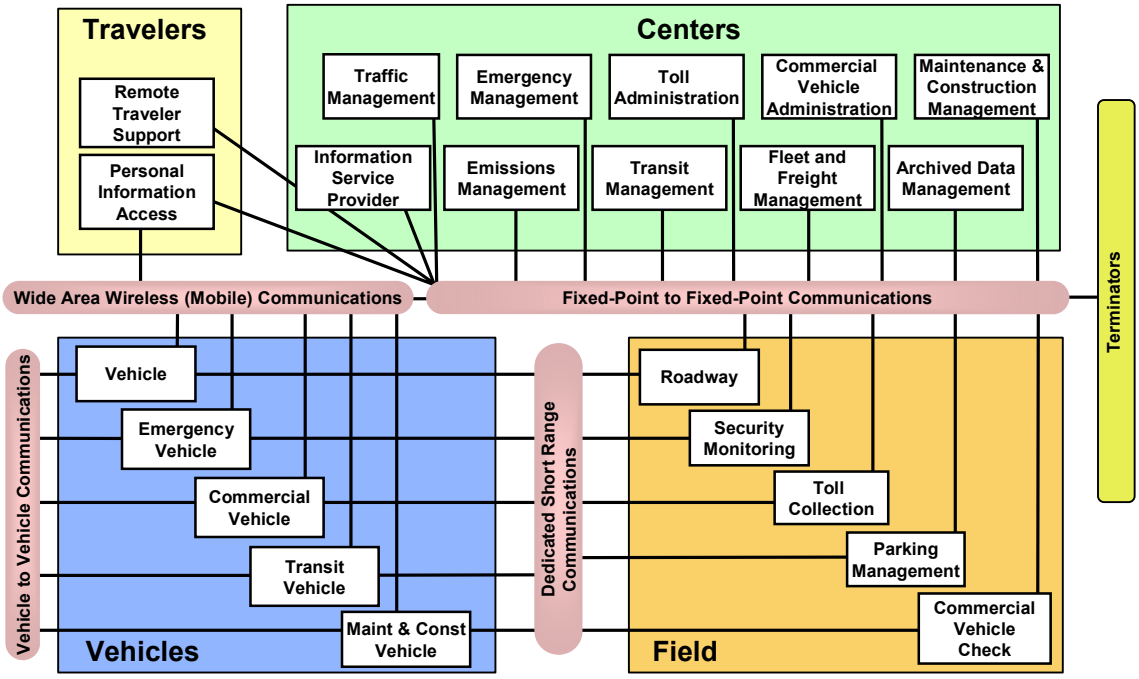

Figure 3 – National ITS Architecture Physical Subsystem Interconnect Diagram

3.3.2 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 San Antonio Region. A listing of stakeholders, as identified in the architecture, can be found in **Table 3** along with a description of the stakeholder. For example, rather than individually documenting each of the smaller municipalities and counties in the Region, a single stakeholder was created called County/Municipality to represent the counties and cities not specifically called out in the architecture. **Table 4** sorts the inventory by stakeholder so that each stakeholder can identify and review all of the architecture elements associated with their agency. The table includes the status of the element. In many cases an element classified as existing might still need to be enhanced to attain the service level desired by the Region.

The information in **Table 4** is included on the San Antonio ITS Architecture website, which was accessible at the time this report was developed at www.consystec.com by selecting the link to Texas Regional, then the link to the San Antonio, and then the "Inventory by Stakeholder" button which will open the stakeholder list. Each element in the list contains a hyperlink to more detailed information that includes element status, a description, the responsible stakeholder, and other elements within the inventory with which it interfaces.

Table 3 – San Antonio Stakeholder Descriptions

Stakeholder	Stakeholder Description
AACOG	The Alamo Area Council of Governments (AACOG) is a voluntary association of cities, counties, and special governmental districts. AACOG serves the Alamo Area/State Planning Region 18, which covers 12 counties and 11,354 square miles. AACOG also operates Alamo Regional Transit (ART).
Alamo RMA	The Alamo Regional Mobility Authority's purpose is to provide Bexar County with opportunities to accelerate needed transportation projects. The Alamo Regional Mobility Authority has the capability of implementing toll roads in the Region.
Archive Data Users	Users (and their systems) of general archive data within the Region.
Bexar County	Bexar County includes all Bexas Coungy agencies.
CCSWT	Community Council of Southwest Texas, Inc. (CCSWT) is a private nonprofit corporation chartered in 1965. The CCSWT transit service area covers Dimmit, Edwards, Kinney, La Salle, Real, Uvalde, and Zavala Counties.
COSA	The City of San Antonio (COSA) is the largest city in the TxDOT San Antonio District. As of the 2005 U.S. Census estimate, the City had a population of over 1.2 million.
COSA/Bexar County	Combination of the City of San Antonio and Bexar County. These stakeholders have been combined for the purpose of shared stakeholder elements in the Regional ITS Architecture.
County/Municipality	Stakeholder represents counties or municipalities that have not been explicitly called out in the Regional ITS Architecture. This stakeholder provides a general idea of how certain counties/municipalities work, although there are exceptions.
DPS	The Texas Department of Public Safety provides public safety services to people in the state of Texas by enforcing laws, administering regulatory programs, managing records, educating the public, and managing emergencies, both directly and through interaction with other agencies.
Enforcement Agency	Generic policing agency involved in the collection of fares and tolls for fee based transportation services.
Financial Institution	Generic banks involved in the transfer of funds for fare collection as well as for other fee based transportation services.
Kerrville Bus Company	Kerrville Bus Company, Inc. (KBC) specializes in a variety of services including scheduled route line transportation, motorcoach charters, and shuttles.
Local Media	Includes both print (newspaper) and broadcast (TV, radio) news media.
NOAA	National Oceanic and Atmospheric Administration (NOAA) included the National Weather Servi and collects and provides weather data.
Other Transit Management	This stakeholder encompasses all transit management systems in and outside of the Region that may impact other transit management or transportation services in the Region.
Private Rail Operations	Companies that operate freight rail within the San Antonio Region.
Private Sector	Private sector stakeholders that involve their industries with roadway and ITS technologies in the Region.

Table 3 – San Antonio Stakeholder Descriptions (continued)

Stakeholder	Stakeholder Description
Private Transportation Providers	Generic transportation providers that operate private systems in the Region such as taxis or bus companies (Greyhound).
Private Travelers	Roadway and transit users in the TxDOT San Antonio Region.
San Antonio CDA Concessionaire	Concessionaires operating under the Alamo RMA to operate and own toll roads for a period of time.
San Antonio International Airport	The San Antonio Airport System operated by the City of San Antonio Department of Aviation.
TCEQ	The Texas Commission on Environmental Quality (TCEQ) is the environmental agency for the state.
Traveler Card	Traveler cards that could function as bus fare payment cards, parking cards, or toll tags.
TxDOT	The Texas Department of Transportation (TxDOT), in cooperation with local and regional officials, is responsible for planning, designing, building, operating and maintaining the state's transportation system. The TxDOT San Antonio Dstrict encompasses 12 counties: Atascosa, Bandera, Bexar, Comal, Frio, Guadalupe, Kendall, Kerr, McMullen, Medina, Uvalde, and Wilson.
VIA	VIA Metropolitan Transit provides fixed route transit service to Bexar County. The service area is made up of the unincorporated parts of Bexar County and the following municipalities: Alamo Heights, Balcones Heights, Castle Hills, China Grove, Converse, Elmendorf, Kirby, Leon Valley, Olmos Park, San Antonio, Shavano Park, St. Hedwig, and Terrell Hills.

Table 4 – San Antonio Inventory of ITS Elements

Stakeholder	Element Name	Element Description	Status
AACOG	AACOG Website	The Alamo Area Council of Governments hosts a website that facilitates numerous services including transportation related information such as their ridesharing program and Alamo Regional Transit.	Existing
	ART CCTV Cameras	Surveillance equipment technologies owned and operated by Alamo Regional Transit that would be installed at bus stops, dispatch centers, or other Alamo Regional Transit facilities.	Planned
	ART Demand Response Vehicles	Alamo Regional Transit demand response vehicles provide rural transportation as well as medical and elderly transportation in 11 of the TxDOT San Antonio District boundaries. Vehicles may be equipped in the future with ITS security technologies such as cameras, incident detectors, and panic buttons.	Existing
	ART Deviated Fixed Route Vehicles	Alamo Regional Transit deviated fixed route vehicles operate along certain fixed routes deviating for disabled or elderly when necessary. Vehicles may be equipped in the future with ITS security technologies such as cameras, incident detectors, and panic buttons.	Existing
	ART Kerrville Dispatch Center	Alamo Regional Transit dispatch center located in Kerrville.	Existing
	ART Kiosks	Alamo Regional Transit kiosks that provide transit users information such as schedule and fare information.	Planned
	ART Origin/Destination Data Server	Bus routing and schedule information that can be used for reference in any future planning.	Planned
	ART San Antonio Dispatch Center	Alamo Regional Transit dispatch center located in San Antonio.	Existing
Alamo RMA	Alamo RMA Field Sensors	Includes all roadside control and information devices such as CCTV, VIVDS, loop detectors, and LCS that are owned and operated by Alamo RMA.	Planned
	Alamo RMA Operations Center	Alamo RMA may build an operations center in order to facilitate traffic management of Alamo RMA roadway infrastructure. The operations center would house monitoring equipment that would be connected to field sensors and may communicate with other operations centers in the Region.	Planned
	Alamo RMA Roadway Service Patrol Vehicles	Roadway service patrol vehicles operate on major roadway to provide assistance to vehicles involved with break-downs or incidents which result in congestion.	Planned

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Alamo RMA (continued)	Alamo RMA Toll Administration	Alamo RMA Toll Administration would be the sector of the RMA which would manage interagency communication and toll planning.	Existing
	Alamo RMA Toll Gantry	Alamo RMA toll gantries will be toll collection stations on the roadways. The toll gantries may have cash payment options, but would also have full speed lanes that use toll tags.	Planned
	Alamo RMA Website	Alamo RMA hosted website will provide realtime updates to travelers, as well as provide a method of online payment for toll tags.	Planned
Archive Data Users	Archived Data User Systems	Any user of archive data from any regional archive management system. This may include individual users, computer applications, or modeling systems utilizing the archived data.	Existing
Bexar County	Bexar County Sheriff's Office	Provides law enforcement services in Bexar County.	Existing
CCSWT	CCSWT CCTV Cameras	Surveillance equipment technologies owned and operated by the CCSWT that would be installed at bus stops, dispatch centers or other CCSWT facilities.	Planned
	CCSWT Demand Response Vehicles	CCSWT demand response vehicles offer services into Uvalde and San Antonio. Vehicles may be equipped in the future with ITS security technologies such as cameras, incident detectors, and panic buttons.	Existing
	CCSWT Deviated Fixed Route Vehicles	CCSWT deviated fixed route vehicles operate along certain fixed routes deviating for disabled or elderly when necessary. Vehicles may be equipped in the future with ITS security technologies such as cameras, incident detectors, and panic buttons.	Existing
	CCSWT Kiosks	CCSWT kiosks that provide transit users information such as schedule and fare information.	Planned
	CCSWT Main Office	Main dispatch center for Community Council of Southwest Texas (CCSWT). Communicates with CCSWT Maverick County Dispatch which dispatches for Maverick County.	Existing
	CCSWT Maverick County Dispatch	Dispatch Center for CCSWT operations in Maverick County.	Existing
	CCSWT Website	Community Council of Southwest Texas website that enables users to access information that CCSWT disseminates online.	Planned

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
COSA	COSA Barrier Gates	Automated barrier gates that operate when field sensors indicate it is necessary to close roads and relay closure information to City of San Antonio TMC.	Planned
	COSA CCTV Cameras	Closed circuit television cameras that provide realtime images for traffic management and security purposes.	Existing
	COSA DMS	City of San Antonio owned and operated dynamic message signs which allow messages to be disseminated to roadway users regarding travel conditions, maintenance or roadwork issues, major events, or evacuation procedures.	Existing
	COSA FD/EMS Dispatch	Jointly operated dispatch center for San Antonio Fire Department and Emergency Medical Services.	Existing
	COSA FD/EMS Vehicles	Emergency response vehicles including fire trucks and ambulances that are operated by the City of San Antonio.	Existing
	COSA Field Sensors	Field sensors including VIVDs, loop detectors, and microwave detection.	Existing
	COSA Lane Control Signals	City of San Antonio lane control signals used along major roads to show road closure or redirect traffic out of congested lanes.	Existing
	COSA Parking Division	COSA Parking Division operates and maintains parking infrastructure in the City of San Antonio.	Existing
	COSA Parking Division DMS	Dynamic message signs that will be operated by the parking division of COSA to guide people at large scale events to appropriate parking facilities.	Planned
	COSA PD Dispatch	San Antonio Police Department dispatch and PSAP function. Includes police department dispatch station located at TransGuide.	Existing
	COSA PD Vehicles	Police vehicles owned and operated by the City of San Antonio.	Existing
	COSA Public Works	Public works department for the City of San Antonio.	Existing
	COSA Public Works Vehicles	Vehicle fleet operated and maintained by City of San Antonio Public Works.	Existing
	COSA Street Maintenance Division	City of San Antonio maintenance division is responsible for city street maintenance and repair.	Existing
	COSA TMC	Traffic Management Center operated by City of San Antonio. The TMC is located in the TransGuide building.	Existing

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
COSA (continued)	COSA Traffic Operations	San Antonio traffic operations that coordinates and maintains signals and other field equipment owned by the City of San Antonio TMC.	Existing
	COSA Traffic Signals	City of San Antonio traffic signals that are maintained by City of San Antonio Traffic Operations.	Existing
	COSA Water Level and Rainfall Sensors	Field sensors that are operated by City of San Antonio to detect water levels and surface street run off in order to safely maintain the roadways in the area.	Planned
	COSA Website	City of San Antonio website for public information access.	Existing
COSA/Bexar County	San Antonio/Bexar County EOC	San Antonio/Bexar County Emergency Operations Center that coordinates for both the City of San Antonio and Bexar County.	Existing
County/Municipality	County/Municipal Barrier Gates	Automated barrier gates that operate when field sensors indicate it necessary to close roads and relay closure information to the county or municipal TOC.	Planned
	County/Municipal CCTV Cameras	Closed circuit television cameras that feed real-time images back to either the County or Municipal TMCs for traffic management and security purposes.	Existing
	County/Municipal DMS	County or municipal owned and operated dynamic message signs which allow messages to be disseminated to roadway users regarding travel conditions, maintenance or roadwork issues, major events or evacuation procedures.	Planned
	County/Municipal EOC	Emergency Operations Centers which could operate for either municipalities or counties in the future as the Region grows larger and the need for major incident and emergency management arises.	Planned
	County/Municipal Field Sensors	Field sensors including VIVDs, loop detectors, microwave detection, as well as flood detection and rainfall monitoring equipment.	Existing
	County/Municipal Maintenance Center	Maintenance operations for county or municipal vehicles, and other regularly maintained inventory.	Existing
	County/Municipal Public Safety Dispatch	Public safety answering points and dispatch centers for sheriff/police, fire, and EMS at the county or municipal level not explicitly called out in the San Antonio Regional ITS Architecture.	Existing

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
County/Municipality (continued)	County/Municipal Public Safety Vehicles	Emergency vehicles such as fire, police, and EMS that operate in either municipal or county jurisdictions. either municipal or county jurisdictions.	Existing
	County/Municipal Public Works	Public works department for counties or municipalities in the TxDOT San Antonio District Region.	Planned
	County/Municipal Public Works Vehicles	Vehicle fleet operated and maintained by county or municipal public works.	Planned
	County/Municipal TOC	County or municipal Traffic Operations Centers not explicitly called out in the San Antonio Regional ITS Architecture.	Existing
	County/Municipal Traffic Signals	County or municipal traffic signals that are maintained by a county or municipal TOC.	Existing
	County/Municipal Website	County or municipal website that enables users to access information that the county or municipality disseminates online.	Planned
	Shelter Provider	Shelter providers include any public or private infrastructure used in evacuations or other major emergencies to provide refugees shelter.	Planned
DPS	DPS Communications	Dispatches highway patrol vehicles using two way radio communications. Responsible for regional evacuation coordination.	Existing
	DPS Emergency Vehicles	Texas Department of Public Safety vehicles operating within the San Antonio Region.	Existing
	State Office of Emergency Management	State office that coordinates threat activities for the Texas Department of Public Safety (DPS).	Existing
	Texas DPS	Department of Public Safety for Texas.	Existing
Enforcement Agency	Enforcement Agency	Represents the different enforcement agencies that the regional transit agencies and tolling authorities will use in order to operate fare collection.	Existing
Financial Institution	Financial Institution	Represents the financial institutions the regional transit agencies will use as part of electronic fare payment systems. Includes Health Services through TxDOT.	Existing
Kerrville Bus Company	Coach America KBC Bus	Coach USA owned buses operating for Kerrville Bus Company. Buses are equipped with certain ITS security technologies such as drivecams, and may be further equipped with more advanced technologies in the future.	Existing

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Kerrville Bus Company (continued)	Coach America KBC CCTV Cameras	Surveillance equipment technologies owned and operated by Kerrville Bus Company that are used to monitor facilities such as bus stations or maintenance yard.	Existing
	Coach America KBC Home Office	Office of operations that manages the buses and coordinates with users.	Existing
	Coach America KBC Origin/Destination Data Server	Bus routing and schedule information that can be used for reference in any future planning.	Planned
	Coach America KBC Passenger Information Signs	Passenger information signs that can inform transit travelers of fare costs, schedules and other information requests.	Planned
	Coach America KBC Ticketing System	Kerrville Bus Company transit information exchange and ticketing system.	Existing
	Coach America KBC Website	Kerrville Bus Company Website that enables users to access information that Kerrville Bus Company disseminates online.	Existing
Local Media	Local Print and Broadcast Media	Local TV (including cable TV), radio, and newspapers.	Existing
NOAA	National Weather Service	Service for national, regional, and local weather information.	Existing
Other Transit Management	Other Regional Transit Providers	Includes Concho Valley COG, Brazos Transit District, City of Del Rio and regional paratransit agencies that have not been explicitly called out such as Warm Springs Resource Center.	Existing
	Other Transit Management	This includes all transit management systems in the Region. The agencies include both private and public transit management systems.	Existing
Private Rail Operations	Rail Operators	The dispatch centers for major railroads in the Region (e.g. Union Pacific in Omaha, NE).	Existing
	Rail Wayside Equipment	The rail operated equipment at highway rail intersections.	Existing
Private Sector	Commercial Vehicles	Privately owned commercial vehicles.	Existing
	Private Concierge Service Provider	Service provided that relays incidents to emergency management for Mayday support from private vehicles or commercial transportation systems.	Existing
	Private Fleet Management Systems	Private shipping and fleet management systems that are responsible for trucking administration and operations within the TxDOT San Antonio Region.	Planned
	Private Sector Traveler Information Services	General description of all private sector that run traveler information services.	Existing

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Private Sector (continued)	Watermark Hill Country Water Level Sensors	Rainfall water level sensors located along TxDOT maintained roadways in the Texas Hill Country. Watermark provides data to TxDOT.	Existing
	Watermark Safety Operations Center	Private sector firm contracted by TxDOT to monitor water levels on roadways in areas prone to flooding.	Existing
Private Transportation Providers	Private Transportation Providers	Providers will include taxi cab services, Greyhound, and any other transportation providers in the San Antonio Region.	Existing
Private Travelers	Private Traveler Vehicles	Vehicles operated by travelers in the San Antonio Region.	Existing
	Private Travelers Personal Computing Devices	Private travelers electronic applications which facilitate information access.	Existing
	Traveler	Travelers are people who make use of the transportation infrastructure in the Region.	Existing
San Antonio CDA Concessionaire	San Antonio CDA Concessionaire Field Sensors	This includes all roadside control devices such as CCTV, VIVDS, loop detectors, and LCS owned and used by the CDA.	Planned
	San Antonio CDA Concessionaire Operations Center	Traffic Operations Center owned and operated by the CDA.	Planned
	San Antonio CDA Concessionaire Toll Administration	San Antonio Comprehensive Development Agreement Concessionaire represents any agency that develops a CDA with the Alamo RMA for operation of a toll road in the Region.	Planned
	San Antonio CDA Concessionaire Toll Gantry	Toll gantry used for collection of tolls by the CDA.	Planned
San Antonio International Airport	San Antonio International Airport	International airport in San Antonio Region.	Existing
TCEQ	TCEQ Field Emissions Monitors	Emissions monitoring field equipment owned and operated by TCEQ.	Existing
	TCEQ Monitoring Operations Section	The Texas Commission on Environmental Quality local office that is responsible for regional field equipment monitoring and testing.	Existing
	TCEQ State Headquarters	State headquarters for TCEQ that collects all emissions data from around the state and prepares a report for the federal government.	Existing
Traveler Card	Traveler Card	A device by which travelers can pay a toll, traveler cards may also be used for bus ticketing or potentially coordinated in order to make any kind of payment such as tolling, parking or transit.	Planned

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TxDOT	Hazard Detection Equipment	Hazard detection equipment would include any security or environmental sensors that are used to provide early warning signs to emergency management representatives.	Planned
	Other TxDOT District DMS	Primarily involved with the dissemination of AMBER Alerts messages across the state, DMS are also used for traffic and emergency management.	Existing
	Other TxDOT District Maintenance Sections Dispatch	TxDOT maintenance sections in districts outside of the TxDOT San Antonio District.	Existing
	Other TxDOT District TMCs	Traffic Management Centers in other TxDOT Districts (i.e.TranStar, STRATIS, DalTrans, TransVision, TransVista, and PEGASIS).	Existing
	Public Sector Handheld Devices	Incident pager/advisory technology that public sector officials may carry in the event of an incident.	Existing
	TransGuide ATMS	TransGuide Advanced Traffic Management System.	Existing
	TransGuide Data Archive	TransGuide information data archive used for storing pertinent travel statistics, roadway incidents, events, and other traffic information.	Planned
	TransGuide Data Server	TransGuide operated data server which supports the dissemination of information to the TransGuide website and private sector users.	Existing
	TransGuide LPTV	Low power television broadcast from TransGuide that allows media to access video from TxDOT CCTV cameras.	Existing
	TransGuide Operations Center	Multiagency traffic operation center that includes TxDOT, COSA and VIA.	Existing
	TransGuide Website	Website owned and operated by TransGuide.	Existing
	Traveler Information Kiosks	Traveler information kiosks that relays information from TransGuide, the Highway Conditions Reporting System, and the future 511 System to travelers.	
	TxDOT 511 System	Planned statewide phone based traveler information system.	Planned
	TxDOT Austin District TMC (CTECC)	TxDOT Austin District Traffic Management Center located at the Combined Transportation, Emergency and Communications Center.	Existing

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TxDOT (continued)	TxDOT Barrier Gates	Automated barrier gates that operate when field sensors indicate it necessary to close roads and relay closure information to TxDOT at the TransGuide Operations Center.	Planned
	TxDOT CCTV Cameras	Closed circuit television cameras that provide realtime images back to TxDOT for traffic management and security purposes.	Existing
	TxDOT Corpus Christi District TMC	Traffic Management Center operated by the TxDOT Corpus Christi District that coordinates with one or more of the operations centers within the Region.	Existing
	TxDOT DMS	TxDOT owned and operated dynamic message signs.	Existing
	TxDOT Field Sensors	TxDOT owned and operated field sensors including VIVDs, loop detectors, and microwave detection.	Existing
	TxDOT Flood Detection	TxDOT owned and operated rainfall and weather monitoring sensors. This includes freeway water level monitors.sensors. This includes freeway water level monitors.	Existing
	TxDOT HAR	TxDOT operated highway advisory radio.	Existing
	TxDOT Highway Conditions Reporting System	System that provides detailed construction closures, detours, restrictions, permit and weather information. Compiled by District Public Information Office staff and area maintenance personnel. The system provides access to information by route, county, or roadway condition. Includes information on construction, closures, hazards, and detour information.	Existing
	TxDOT Lane Control Signals	Lane control signals owned and operated by the TxDOT San Antonio District.	Existing
	TxDOT Laredo District TMC (STRATIS)	Traffic Management Center operated by the TxDOT Laredo District that may coordinate with one or more of the operations centers within the Region.	Existing
	TxDOT Maintenance Vehicles	Vehicle fleet operated by the TxDOT San Antonio District.	Existing
	TxDOT Other District DMS	TransGuide will eventually control dynamic message signs of all TxDOT districts for AMBER Alerts.	Planned
	TxDOT Roadway Service Patrol Vehicles	Roadway service patrol vehicles operate on major roadway to provide assistance to vehicles involved with break-downs or incidents which result in congestion.	Existing
	TxDOT San Antonio District Maintenance	TxDOT San Antonio District Maintenance and Construction Management.	Existing

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TxDOT (continued)	TxDOT San Antonio District Public Information Office	TxDOT San Antonio District's Public Information Office.	Existing
	TxDOT Stormwater Pump Stations	Pumps operated by the TxDOT San Antonio District that are used to remove water from roadways prone to flooding.	Existing
	TxDOT Traffic Signal Shop	Traffic signal shop that coordinates signals and gathers information such as road network conditions for the TxDOT San Antonio District.	Existing
	TxDOT Traffic Signals	Traffic signals that are maintained by the TxDOT San Antonio District.	Existing
	TxDOT Work Zone Equipment	Work zone monitoring and alerting equipment owned by the TxDOT San Antonio District.San Antonio.	Existing
VIA	Personal Emergency Transportation Plan Website	This website will provide travelers with the ability to plan alternate routes for their most frequently used daily commutes.	Planned
	VIA Bus	VIA Metropolitan Transit owned bus. Vehicles may be equipped in the future with ITS security technologies such as cameras, incident detectors and panic buttons.	Existing
	VIA Data Mart	Archive data storage for VIA Metropolitan Transit.	Existing
	VIA Demand Response Vehicle	VIA transit vehicles used in responding to calls for paratransit operations and other demand response needs. Vehicles may be equipped in the future with ITS security technologies such as cameras, incident detectors and panic buttons.	Existing
	VIA Email Subscription Service	VIA user interface with transit scheduling and information.	Existing
	VIA Headquarters	VIA Headquarters handles administrative functions as well as coordinates with the updating of the VIA website.	Existing
	VIA Headquarters CCTV Cameras	Monitoring system put in place at the VIA headquarters to heighten security and increase safety.	Existing
	VIA Information Centers	Supermarkets or park and ride facilities that act as a ticket vendor for VIA transit users.	Existing
	VIA IVR Phone System	VIA operated interactive voice response phone system.	Existing
	VIA Kiosks	VIA Metropolitan Transit kiosks that enable users to acquire information that VIA disseminates through the kiosks.	Existing

Table 4 – San Antonio Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
VIA (continued)	VIA Pager/Telephone Service	VIA supported service to provide real time transit information to travelers.	Existing
	VIA Passenger Information Signs	VIA message signs that are located at transit centers and bus stops to provide realtime bus arrival information.	Existing
	VIA TransGuide Dispatch	VIA dispatch center operated from the TransGuide offices.	Existing
	VIA Transit Center/Bus Stops CCTV Cameras	VIA monitoring system for transit user safety.	Existing
	VIA Transit Police	VIA transit police officers are assigned to patrol VIA's service area and to oversee the security at VIA Headquarters.	Existing
	VIA Transit Police Vehicle	VIA Transit Police vehicles that are used to respond to VIA related traffic or traveler incidents.	Existing
	VIA Website	VIA Metropolitan transit website which provides open access to route and schedule information to the public.	Existing

3.3.3 High Level Regional System Interconnect Diagram

A system interconnect diagram, or "sausage diagram" (shown previously in **Figure 3**), shows the systems and primary interconnects in the Region. The National ITS Architecture interconnect diagram has been customized for the San Antonio Region based on the system inventory and information gathered from the stakeholders. **Figure 4** summarizes the existing, planned, and future ITS elements for the San Antonio Region in the context of a physical interconnect. Subsystems and elements specific to the Region are called out in the boxes surrounding the main interconnect diagram, and are color-coded to their associated subsystem.

3.4 Market Packages

Upon completion of the system inventory, the next step in the development of the Regional ITS Architecture was to identify the transportation services that are important to the San Antonio Region. In the National ITS Architecture, services are referred to as market packages. Market packages can 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 85 market packages identified in the National ITS Architecture Version 5.1.

The market packages are grouped together into 8 ITS service areas: Traffic Management, Emergency Management, Maintenance and Construction Management, Public Transportation Management, Commercial Vehicle Operations, Traveler Information, Archived Data Management, and Vehicle Safety. Vehicle Safety has not been included in the San Antonio Regional ITS Architecture because the deployment of these market packages in this service area would be primarily the responsibility of the private sector automobile manufacturers and would not be part of a regional deployment.

3.4.1 Selection and Prioritization of Market Packages

In the San Antonio 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. Fifty-one market packages were selected from the National ITS Architecture for implementation in the Region. They are identified in **Table 5**. Kimley-Horn prioritized the selected market packages and stakeholders reviewed the market package priorities during the Deployment Plan Review Meeting. The table organizes the market packages into service areas and priority groupings.

TxDOT is leading a separate effort to develop and implement the CVISN program. CVISN addresses commercial vehicle operations, including ITS, on a statewide level and includes such applications as electronic clearance, safety enforcement, and registration. Unless a specific need was identified in the San Antonio Region that could be addressed locally, the commercial vehicle operations market packages were not selected and instead will be covered in the CVISN effort to ensure consistency.

In several cases, there are multiple stakeholders in the Region that provide the same service at different levels. For example, Traffic Information Dissemination (ATMS06) is provided on interstates and controlled access state facilities by TxDOT using DMS. The City of San Antonio also deploys DMS on arterials. In the future Bexar County or other municipalities could also deploy DMS in their jurisdiction. The market package status is identified as existing, planned, or future for each of the primary stakeholders in the Region.

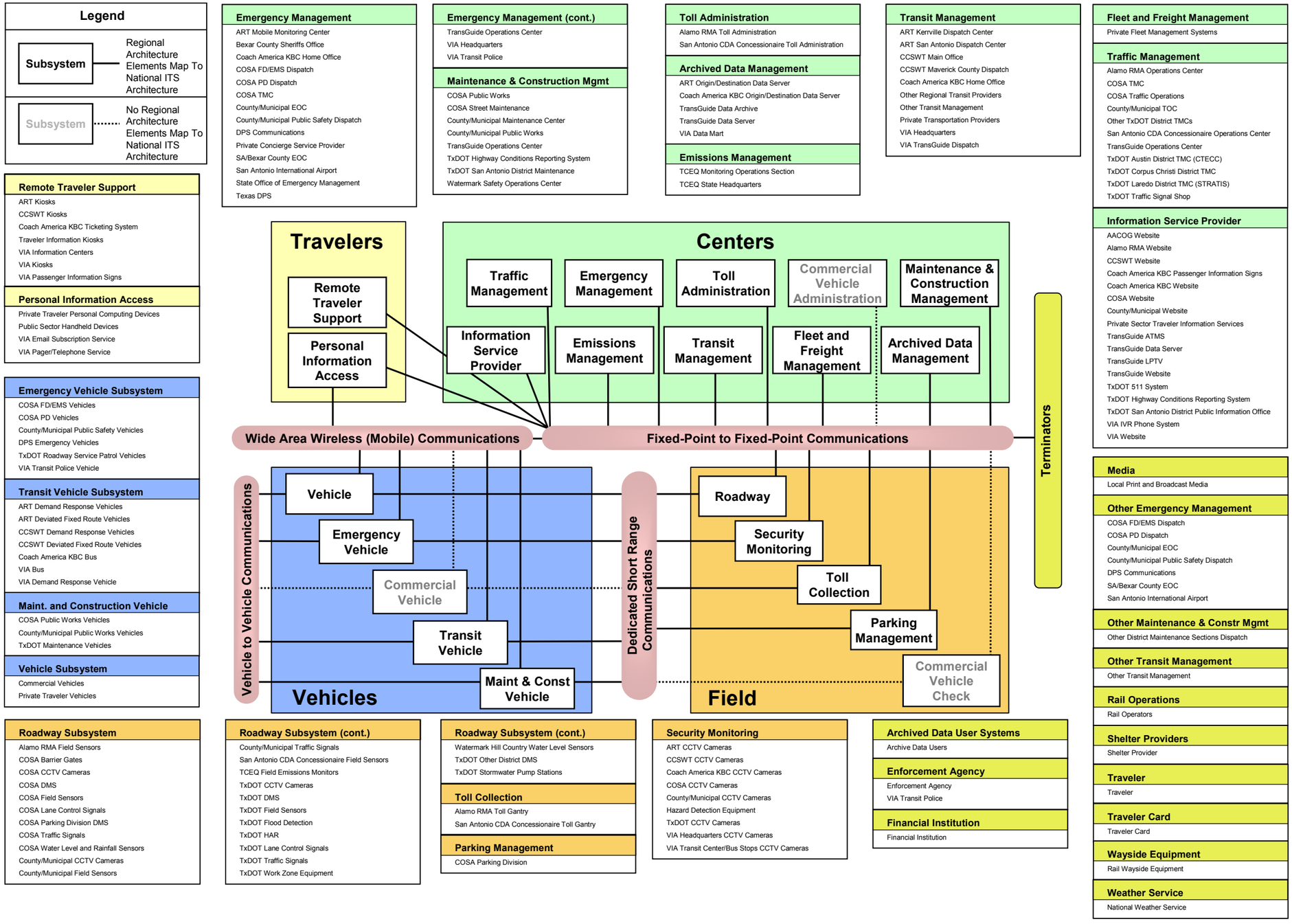

Figure 4 – San Antonio Regional System Interconnect Diagram

Table 5 – San Antonio Market Package Prioritization by Functional Area

High Priority Market Packages	Medium Priority Market Packages	Low Priority Market Packages
Traffic Management		
ATMS01 Network Surveillance ATMS02 Probe Surveillance ATMS03 Surface Street Control ATMS04 Freeway Control ATMS06 Traffic Information Dissemination ATMS07 Regional Traffic Control ATMS08 Traffic Incident Management System ATMS10 Electronic Toll Collection ATMS18 Reversible Lane Management	ATMS13 Standard Railroad Grade Crossing ATMS14 Advanced Railroad Grade Crossing ATMS15 Railroad Operations Coordination ATMS19 Speed Monitoring ATMS21 Roadway Closure Management	ATMS09 Traffic Forecast and Demand Management ATMS11 Emissions Monitoring and Management ATMS16 Parking Facility Management ATMS17 Regional Parking Management
Emergency Management		
EM01 Emergency Call Taking and Dispatch EM02 Emergency Routing EM06 Wide-Area Alert EM08 Disaster Response and Recovery EM09 Evacuation and Reentry Management EM10 Disaster Traveler Information	EM04 Roadway Service Patrols EM07 Early Warning System	EM03 Mayday Support EM05 Transportation Infrastructure Protection
Maintenance and Construction Management		
MC01 Maintenance and Construction Vehicle and Equipment Tracking MC03 Road Weather Data Collection MC04 Weather Information Processing and Distribution MC08 Work Zone Management MC10 Maintenance and Construction Activity Coordination	MC09 Work Zone Safety Monitoring	

Table 5 – San Antonio Market Package Prioritization by Functional Area (continued)

High Priority Market Packages	Medium Priority Market Packages	Low Priority Market Packages
Public Transportation Management		
APTS1 Transit Vehicle Tracking APTS2 Transit Fixed Route Operations APTS3 Demand Response Transit Operations APTS4 Transit Passenger and Fare Management APTS5 Transit Security APTS7 Multi-modal Coordination APTS8 Transit Traveler Information	APTS6 Transit Vehicle Maintenance	
Commercial Vehicle Operations		
	CVO10 HAZMAT Management CVO11 Roadside HAZMAT Security Detection and Mitigation	
Traveler Information		
ATIS1 Broadcast Traveler Information ATIS2 Interactive Traveler Information	ATIS5 ISP Based Route Guidance ATIS8 Dynamic Ridesharing	
Archived Data Management		
AD1 ITS Data Mart AD2 ITS Data Warehouse		AD3 Virtual ITS Data Warehouse

3.4.2 Customized Market Packages

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the San Antonio Region. Each market package is shown graphically, with the market package name, local agencies involved and desired data flows included.

Figure 5 is an example of an ATMS market package for Surface Street Control that has been customized for the Region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated entities (COSA TMC and COSA Traffic Operations, COSA Field Sensors, COSA Traffic Signals, and COSA Lane Control Signals) for surface street control in the City of San Antonio. Data flows between the subsystems indicate what information is being shared both currently and in the future.

Market packages that were customized for the San Antonio Region are shown in **Appendix C**. These market packages are also included on the San Antonio Regional ITS Architecture website by selecting the "Market Packages by Functional Area" button. On this section of the site, 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 number under each area heading. It is important to note that while the market package table on the website shows all

of the available market packages from the National ITS Architecture, only those selected for the San Antonio Region include diagrams. On the website these selected market packages are highlighted in the table.

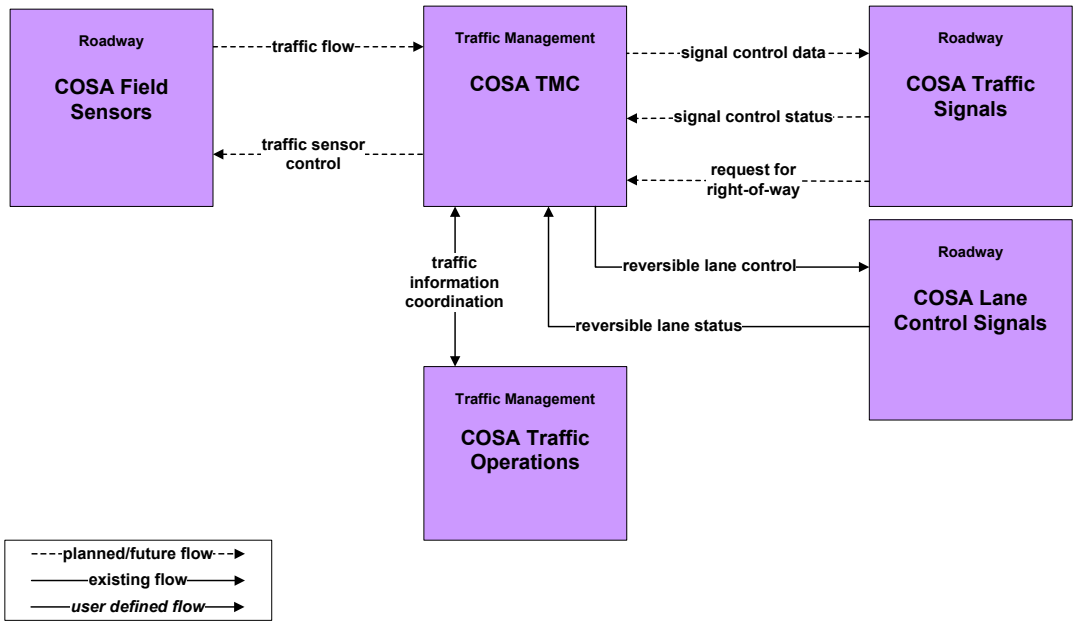

Figure 5 – Example Market Package Diagram: Surface Street Control

3.5 Architecture Interfaces

While it is important to identify the various systems and stakeholders as part of the Regional ITS Architecture, the primary purpose of the architecture is to identify the connectivity between transportation systems in the San Antonio Region. The interconnect diagram shown previously in **Figure 4** showed the high-level relationships of the subsystems and terminators in the San Antonio 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.

3.5.1 Element Connections

There are a large number of different elements identified as part of the San Antonio Regional ITS Architecture. These elements include traffic management centers, transit management centers and vehicles, dispatch systems, emergency management agencies, media outlets, and others – essentially, all of the existing and planned physical components that contribute to the Regional ITS. Element connections have been identified for each element in the San Antonio Regional ITS Architecture.

An example of one of the context diagrams is shown in **Figure 6**. This graphic shows the City of San Antonio Traffic Signals and all of the other elements in the Regional ITS

Architecture that interface with the COSA traffic signals. These interfaces are shown as existing or planned. The context diagrams are included on the Regional ITS Architecture website and can be accessed from either the "Inventory by Stakeholder" section or the "Inventory by Entity" section. When an element is selected from either of these areas you can choose to view the context diagram from the element description page that is displayed.

3.5.2 Data Flows Between Elements

Architecture flows define the specific information or 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 San Antonio Regional ITS Architecture.

An example of the architecture flows between two elements is shown in **Table 6**. In this summary, the flows between the COSA Traffic Signals and the COSA TMC show the information that could go between the elements. Flows include signal control status, request for right-of-way, and highway rail intersection (HRI) status. Similar to the interfaces, architecture flows are also defined as existing or planned.

Each of these individual element data flow summaries can be accessed on the project website at www.consystec.com by selecting the link to Texas Regional, then the link to the San Antonio Region, and then either the "ITS Inventory", "Inventory by Stakeholder", or "Inventory by Entity" button. Click on one of the inventory buttons and select any of the inventory elements in the table. Upon clicking the button, an element description page will be displayed. On this page the interface list contains each element in the architecture that the chosen element shares information with. Selecting the desired element will display a table of data flows similar to that in **Table 6**. Selecting the Context Diagram button will display a context diagram similar to **Figure 6**. The Context Diagram shows the selected element in the center and all other elements that it connects to in the Regional ITS Architecture.

Table 6 – Example Data Flow Table

Source	Architecture Flows	Destination
COSA Traffic Signals	signal control status (P)	COSA TMC
	request for right-of-way (P)	
	hri status (P)	
COSA TMC	signal control data (P)	COSA Traffic Signals
	hri request (P)	
	hri control data (P)	

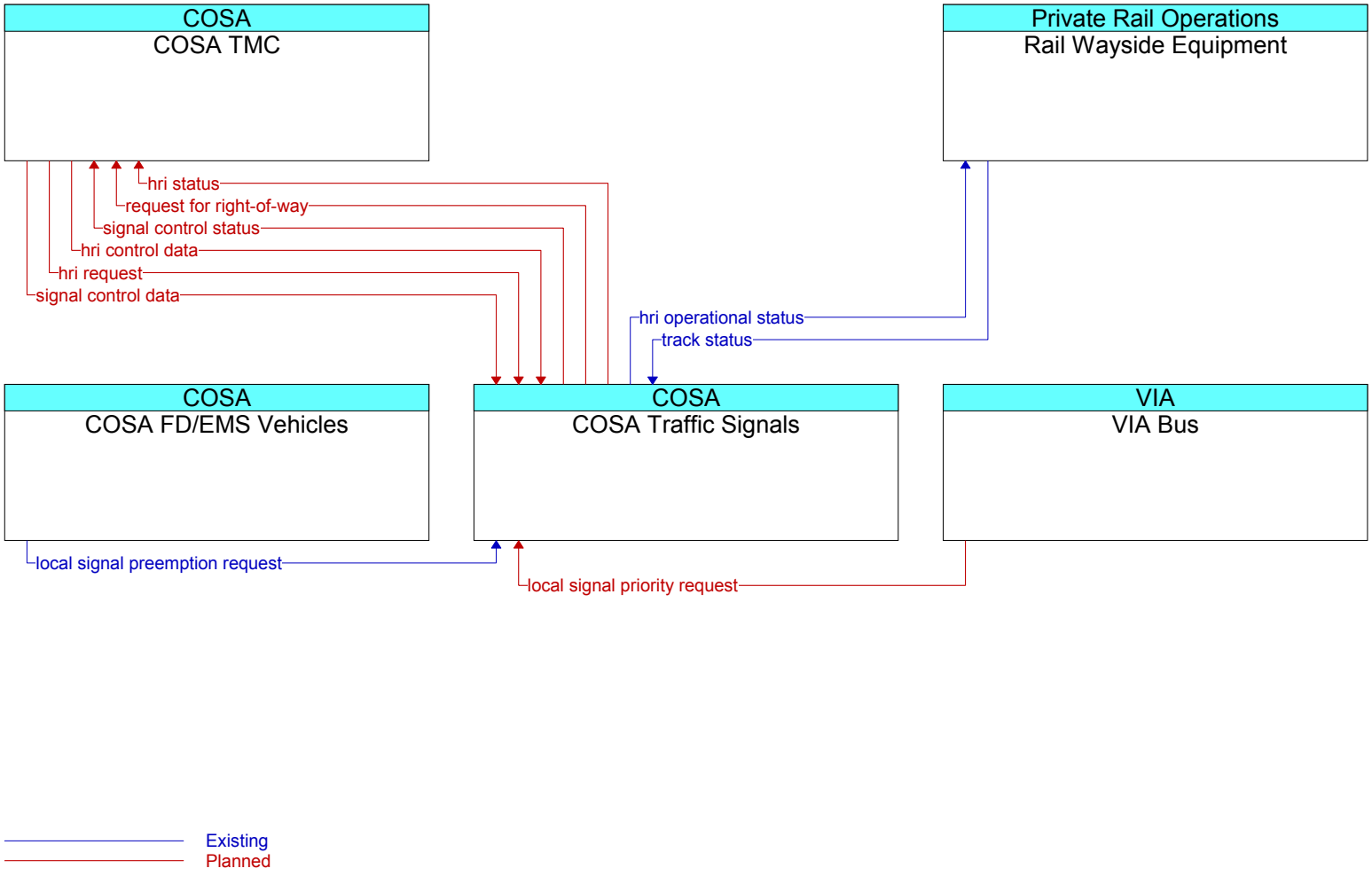

Figure 6 – Example Context Diagram: City of San Antonio Traffic Signals

4. APPLICATION OF THE REGIONAL ITS ARCHITECTURE

Once a region has identified the desired components of ITS for its area and established which agencies and systems need to be connected, the structure of the National ITS Architecture assists with the Region's planning and implementation. This section addresses the application of the Regional ITS Architecture in the San Antonio Region. The National ITS Architecture provides recommendations for standards and functional requirements that should be considered when implementing ITS elements. In addition, an operational concept has been developed for the Region and documents the roles and responsibilities of stakeholders in the operation of the Regional ITS. The implementation of ITS in the San Antonio Region will require interagency agreements. Potential agreements have been identified based on the desired data flows identified in the San Antonio Region. The ITS Architecture and ITS Deployment Plan developed as part of this process should be incorporated into the existing planning process for the Region to ensure that the maximum benefit is realized from the development effort.

4.1 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 its region. In the San Antonio 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 San Antonio Regional ITS Architecture, functional requirements have been identified at two levels. The customized market packages, discussed previously in Section 3.4.2, 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 the San Antonio Region has to do and the data that needs to be shared among elements. At a more detailed level, functional requirements for the San Antonio Region are described in terms of functions that each element in the architecture performs or will perform in the future. **Appendix D** contains a table that summarizes the functions by element.

4.2 Standards

Standards are an important tool that will allow efficient implementation of the elements in the San Antonio 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. Standards have been developed to support many of the physical subsystem architecture flows identified in the National ITS Architecture. **Table 7** identifies each of the ITS standards that could apply to the San Antonio Regional ITS Architecture. These standards are based on the physical subsystem architecture flows previously identified in Section 3.5.2. An additional standard that is not based on the National ITS Architecture physical subsystem architecture flows that should also be included is:

- TxDOT Center-to-Center: This standard has been developed by TxDOT to support center-to-center communications for traffic information.

Table 7 – San Antonio Applicable ITS Standards

SDO	Document ID	Title
AASHTO/ITE/NEMA	NTCIP 1101	Simple Transportation Management Framework (STMF)
	NTCIP 1102	Octet Encoding Rules (OER) Base Protocol
	NTCIP 1103	Transportation Management Protocols
	NTCIP 1104	Center-to-Center Naming Convention Specification
	NTCIP 1105	CORBA Security Service Specification
	NTCIP 1106	CORBA Near-Real Time Data Service Specification
	NTCIP 1201	Global Object Definitions
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units
	NTCIP 1203	Object Definitions for Dynamic Message Signs (DMS)
	NTCIP 1204	Environmental Sensor Station (ESS) Interface Standard
	NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control
	NTCIP 1206	Object Definitions for Data Collection and Monitoring (DCM) Devices
	NTCIP 1207	Object Definitions for Ramp Meter Control (RMC) Units
	NTCIP 1208	Object Definitions for Closed Circuit Television (CCTV) Switching
	NTCIP 1209	Data Element Definitions for Transportation Sensor Systems (TSS)
	NTCIP 1210	Field Management Stations – Part 1: Object Definitions for Signal System Masters
	NTCIP 1211	Object Definitions for Signal Control and Prioritization
	NTCIP 1401	TCIP Common Public Transportation (CPT) Objects
	NTCIP 1402	TCIP Incident Management (IM) Objects
	NTCIP 1403	TCIP Passenger Information (PI) Objects
	NTCIP 1404	TCIP Scheduling/Runcutting (SCH) Objects
	NTCIP 1405	TCIP Spatial Representation (SP) Objects
	NTCIP 1406	TCIP On-board (OB) Objects
	NTCIP 1407	TCIP Control Center (CC) Objects
	NTCIP 1408	TCIP Fare Collection (FC) Business Area Objects
	NTCIP 2101	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile
	NTCIP 2102	Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile
	NTCIP 2103	Point-to-Point Protocol Over RS-232 Subnetwork Profile
	NTCIP 2104	Ethernet Subnetwork Profile
	NTCIP 2201	Transportation Transport Profile
	NTCIP 2202	Internet (TCP/IP and UDP/IP) Transport Profile
	NTCIP 2301	STMF Application Profile
	NTCIP 2302	Trivial File Transfer Protocol Application Profile
	NTCIP 2303	File Transfer Protocol (FTP) Application Profile
	NTCIP 2304	Application Profile for DATEX-ASN (AP-DATEX)
	NTCIP 2305	Application Profile for CORBA (AP-CORBA)

Table 7 – San Antonio Applicable ITS Standards (continued)

SDO	Document ID	Title
AASHTO/ITE/NEMA (continued)	NTCIP 2306	Application Profile for XML Message Encoding and Transport in ITS C2C Communications
	NTCIP 2501	Information Profile for DATEX
	NTCIP 2502	Information Profile for CORBA
ASTM	ASTM E2158-01	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band
	ASTM E2259-xx	Standard Specification for Metadata to Support Archived Data Management Systems
	ASTM E2259-yy	Standard Specification for Archiving ITS Generated Travel Monitoring Data
	ASTM PS 105-99	Standard Provisional Specification for Dedicated Short Range Communication (DSRC) Data Link Layer
IEEE	IEEE 1512.1-2003	Standard for Traffic Incident Management Message Sets for Use by EMCs
	IEEE 1512.2-2004	Standard for Public Safety IMMS for use by EMCs
	IEEE 1512.3-2002	Standard for Hazardous Material IMMS
	IEEE 1570-2002	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection
	IEEE 1609.1	Resource Manager for DSRC 5.9 GHz
	IEEE 1609.2	Application Services (Layers 6,7) for DSRC 5.9 GHz
	IEEE 1609.3	Communications Services (Layers 4,5) for DSRC 5.9 GHz (Future Standard)
	IEEE 1609.4	Medium Access Control (MAC) Extension & the MAC Extension Management Entity for DSRC 5.9 GHz
	IEEE 802.11	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems – 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications
	IEEE 802.2	Logical Link (Layer 2) for DSRC 5.9 GHz
	IEEE P1512.4	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers
	IEEE Std 1455-1999	Standard for Message Sets for Vehicle/Roadside Communications
	IEEE 1512-2000	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs
ISO	ISO 21210	Networking Services (Layer 3) for DSRC 5.9 GHz
SAE	SAE J2266	Location Referencing Message Specification (LRMS)
	SAE J2313	On-Board Land Vehicle Mayday Reporting Interface
	SAE J2354	Message Set for Advanced Traveler Information System (ATIS)
	SAE J2369	Standard for ATIS Message Sets Delivered Over Reduced Bandwidth Media
	SAE J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards
	SAE J2540-1	RDS (Radio Data System) Phrase Lists

Table 7 – San Antonio Applicable ITS Standards (continued)

SDO	Document ID	Title
SAE (continued)	SAE J2540-2	ITIS (International Traveler Information Systems) Phrase Lists
	SAE J2540-3	National Names Phrase List

4.3 Operational Concepts

An Operational Concept documents each stakeholder's current and future roles and responsibilities in the operation of the Regional ITS. The Operational Concept documents these roles and responsibilities across a range of transportation services as grouped in the Operational Concepts section of Turbo Architecture. The services covered are:

- ***Arterial Management*** – The development of signal systems that react to changing traffic conditions and provide coordinated intersection timing over a corridor, an area, or multiple jurisdictions.
- ***Highway Management*** – The development of systems to monitor freeway (or tollway) traffic flow and roadway conditions, and provide strategies such as lane access control to improve the flow of traffic on the freeway. Includes systems to provide information to travelers on the roadway.
- ***Incident Management*** – The development of systems to provide rapid and effective response to incidents. Includes systems to detect and verify incidents, along with coordinated agency response to the incidents.
- ***Emergency Management*** – The development of systems to provide emergency call taking, public safety dispatch, and emergency operations center operations.
- ***Maintenance and Construction Management*** – The development of systems to manage the maintenance of roadways in the Region, including winter snow and ice clearance. Includes the managing of construction operations.
- ***Transit Management*** – The development of systems to more efficiently manage fleets of transit vehicles or transit rail. Includes systems to provide transit traveler information both pre-trip and during the trip.
- ***Electronic Payment*** – The development of electronic fare payment systems for use by transit and other agencies (e.g., parking).
- ***Commercial Vehicle Operations*** – The development of systems to facilitate the management of commercial vehicles (e.g,, electronic clearance).
- ***Traveler Information*** – The development of systems to provide static and real time transportation information to travelers.
- ***Archive Data Management*** – The development of systems to collect transportation data for use in non-operational purposes (e.g., planning and research).

Table 8 identifies the roles and responsibilities of key stakeholders for a range of transportation services.

Table 8 – San Antonio Stakeholder Roles and Responsibilities

Transportation Service	Stakeholder	Roles/Responsibilities
Traffic Signal Control	TxDOT	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on state owned arterials.
		Provide traffic images and video surveillance control to private sector traveler information systems.
		Operate traffic signal systems on state owned arterials, including traffic signals, sensor systems, and pedestrian crossing signals.
		Provide traffic information reports to regional and private information service providers as well as the TxDOT 511 System (through HCRS).
		Provide traffic information to regional agencies including transit, emergency management, maintenance and construction, and the media. Provide traffic information to travelers through state owned DMS.
		Coordinate traffic information with the state's other Regional TMCs and the local city and municipality TMCs/TOCs.
		Coordinate HRI signal adjustments with regional and private rail operators.
		Operate and control reversible lanes on state arterials or toll roads.
		Provide speed monitoring on state owned arterials or toll roads.
		Provide automated flood detection and road closures (as well as alerting the traveling public through DMS) on state owned arterials.
		Provide security monitoring of critical infrastructure for the State, and relay threat information to regional emergency management providers as well as other regional and municipal/local TMCs/TOCs.
		Provide emergency signal preemption for the City and County public safety vehicles as well as DPS vehicles.
	City of San Antonio	Provide traffic images to private sector traveler information systems.
		Operate traffic signal systems on city owned streets, including traffic signals, sensor systems, and video image vehicle detection (VIVDS).
		Operate programmable flasher systems for city schools.
		Provide traffic information reports to regional information service providers, private information service providers, and the TxDOT 511 System.
		Provide traffic information to regional agencies including transit, emergency management, maintenance and construction, and the media (through the City's PIO). Provide traffic information to travelers through the City's DMS.
		Coordinate HRI railroad preemption.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Traffic Signal Control (continued)	City of San Antonio (continued)	Operate and control reversible lanes on city owned streets.
		Provide speed monitoring on city owned streets.
		Provide automated flood detection and road closures on city owned streets.
		Provide transit signal priority for regional fixed route transit vehicles.
		Provide emergency signal preemption for the City's Fire and EMS vehicles.
	Municipal	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on municipal streets.
		Operate traffic signal systems on city owned streets, including traffic signals, sensor systems, and pedestrian crossing systems.
		Operate programmable flasher systems for city schools.
		Provide traffic information reports to regional information service providers, private information service providers, and the TxDOT 511 System.
		Provide traffic information to regional agencies including transit, emergency management, maintenance and construction, and the media. Provide traffic information to travelers through the City's DMS.
		Coordinate traffic information with the TransGuide TMC and the local city and municipal TMCs/TOCs.
		Coordinate HRI signal adjustments with regional and private rail operators.
		Provide emergency signal preemption for the municipality's Fire and EMS vehicles.
Highway Management	TxDOT	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on state owned highways.
		Operate lane controls on state owned highways.
		Provide traffic information to regional transportation agencies and the general public through traffic information devices (DMS, Highway Advisory Radio, HCRS, TxDOT 511, etc.).
		Provide HOV lane management for state owned highways. Provide travelers with real-time pricing information for HOV lanes via agency DMS.
		Provide security monitoring of critical infrastructure for the State.
		Coordinate traffic information and traffic control with other regional TMCs.
Incident Management (Traffic)	Texas Department of Public Safety (DPS)	Dispatch DPS vehicles for incidents on highways.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management (Traffic) (continued)	Texas Department of Public Safety (DPS) (continued)	Coordinate incident response with other public safety agencies (police, fire, EMS, sheriff, etc.) as well as with TxDOT.
		Perform incident detection and verification for the highways within the Region, and provide this information to traffic and other public safety agencies.
		Coordinate maintenance resources in response to incidents on state highways with regional maintenance providers.
		Coordinate an incident response with regional rail operations for incidents involving rail.
	City of San Antonio Police and Fire/EMS Dispatch	Receive emergency calls for incidents within the City or the County.
		Coordinate public safety resources for incident response with the City's TMC.
		Coordinate incident response with other public safety agencies (Fire and EMS).
		Dispatch the City's police vehicles, fire vehicles and EMS vehicles and dispatch county public safety vehicles, as well as coordinate with all other public safety agencies within the Region.
		Perform incident detection and verification for the streets within the City and County, and provide this information to the City's TMC.
		Coordinate an incident response with regional rail operations for incidents involving rail.
		Coordinate maintenance resources in response to incidents within the City and County.
	County Public Safety Dispatch	Receive emergency calls for incidents within the counties.
		Dispatch the County's public safety vehicles and track their location.
		Perform incident detection and verification for the streets within the County, and provide this information to TransGuide.
		Coordinate an incident response with regional rail operations for incidents involving rail.
		Coordinate maintenance resources in response to incidents within the County of an adjacent municipality.
	Municipal Public Safety Dispatch	Receive emergency calls for incidents within the municipalities.
		Coordinate public safety resources for incident response with the municipality's TOC/TMC.
		Dispatch the municipality's police vehicles, fire vehicles and EMS vehicles as well as coordinate with all other public safety agencies within the Region.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management (Traffic) (continued)	Municipal Public Safety Dispatch (continued)	Perform incident detection and verification for the streets within the municipalities, and provide this information to the municipality's TOC/TMC.
		Coordinate an incident response with regional rail operations for incidents involving rail.
		Coordinate with ambulance services in response to incidents within the municipality.
		Coordinate maintenance resources in response to incident with the municipality.
Transit Management	VIA Metropolitan Transit	Track vehicle location on all agency fixed route transit vehicles and demand response vehicles.
		Provide transit schedule and fare information to the agency's website, the TxDOT 511 System, regional traveler information providers, and private sector traveler information service providers.
		Provide fixed route bus service for the agency defined service area.
		Provide demand response bus service for the agency defined service area, with the ability to provide a demand response transit plan from the agency website.
		Provide transit passenger electronic fare payment on all agency fixed route and demand response.
		Provide transit security on all agency transit vehicles through silent alarms, sensors, AVL, and surveillance systems.
		Provide automated transit maintenance scheduling through automated vehicle condition reports on all agency fixed route and demand response.
		Obtain traffic signal priority from the municipalities in the agency's service area through the municipality's field equipment for all fixed route transit vehicles.
		Coordinate transit service with all other agency transit vehicles.
		Coordinate transit service with other regional transit providers, as well as regional intermodal terminals, AMTRAK stations, and regional airports.
		Provide transit traveler information to the agency website (thus accessible from the WWW) as well as making it available on all transit information kiosks and transit vehicles.
		Coordinate emergency plans with Municipal, County, and Statewide EOCs and provide emergency transit services for evacuations, fires, and disasters (including re-entry).
	Other Transit Management	Track vehicle location and evaluate schedule performance on all agency fixed route transit vehicles and demand response transit vehicles.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Transit Management (continued)	Other Transit Management (continued)	Provide transit schedule and fare information to the agency's website, the TxDOT 511 System, regional traveler information providers, and private sector traveler information service providers.
		Provide fixed route bus service for the agency defined service area.
		Provide demand response bus service for the agency defined service area, with the ability to provide a demand response transit plan from the agency website.
		Provide transit passenger electronic fare payment on all agency fixed route and demand response transit vehicles.
		Provide transit security on all agency transit vehicles through silent alarms and surveillance systems.
		Provide automated transit maintenance scheduling through automated vehicle condition reports on all agency fixed route and demand response transit vehicles.
		Coordinate transit service with other regional transit providers, as well as regional intermodal terminals, AMTRAK stations, and regional airports.
		Provide transit traveler information to the agency website (thus accessible from the WWW) as well as making it available on all transit information kiosks and transit vehicles.
		Coordinate emergency plans with Municipal, County, and Statewide EOCs and provide emergency transit services for evacuations, fires, and disasters (including re-entry).
Traveler Information	TxDOT	Operate the TxDOT 511 System.
		Collect traffic, incident, transit schedule, road maintenance and weather information and provide it to the media and private travelers.
		Provide broadcast information to travelers.
		Coordinate and share traveler information with all other traveler information providers within the Region.
		Provide traveler information to private travelers (in vehicle, personal computing device, or kiosk) upon request.
		Provide traveler information to the media.
		Provide a route guidance system for private commercial fleets based on information gathered from HCRS.
Emergency Management	Department of Public Safety	Dispatch State Police vehicles (and track their location) as well as coordinate with all other public safety agencies within the Region.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Department of Public Safety (continued)	Participates in the incident response, coordination, and reporting of the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).
		Operates a PSAP for statewide services, but has the ability to dispatch regional and statewide emergency services.
		Coordinates with regional medical centers regarding the status of the care facility as well as the patient status en route to the medical center.
		Receive signal preemption from regional traffic signals.
		Receive and respond to threat information from the City's TMC regarding critical infrastructure.
		Receive AMBER Alerts and other Wide-Area Alert information from the State Office of Emergency Management.
		Generate AMBER Alerts and distribute them to regional emergency management agencies, transit agencies, traffic agencies, and the media.
		Aid in the coordination of region-wide emergency plans, evacuation and reentry plans, and disaster management plans.
		Receive Wide-Area Alert information from the Regional EOCs.
	City of San Antonio Police Department	Participates in the incident response, coordination, and reporting of the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).
		Dispatch the City's police vehicles (and track their location) as well as coordinate with all other public safety agencies within the City and Region.
		Perform incident detection and verification for streets within the City.
		Receive AMBER Alerts and other Wide-Area Alert information from the Department of Public Safety (DPS).
		Receive Wide-Area Alert information from the Regional EOCs.
		Aid in the coordination of region-wide emergency plans, evacuation and reentry plans, and disaster management plans.
	City of San Antonio Fire Department	Participates in the incident response, coordination, and reporting of the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	City of San Antonio Fire Department (continued)	Dispatch the City's police vehicles (and track their location) as well as coordinate with all other public safety agencies within the City and Region.
		Perform incident detection and verification for streets within the City.
		Receive AMBER Alerts and other Wide-Area Alert information from DPS.
		Receive Wide-Area Alert information from the Regional EOCs.
		Aid in the coordination of region-wide emergency plans, evacuation and reentry plans, and disaster management plans.
	Municipal	Participates in the incident response, coordination, and reporting of the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).
		Operates PSAP for the municipalities, with the ability to dispatch regional and statewide emergency services.
		Dispatch the municipality's public safety vehicles (and track their location) as well as coordinate with all other public safety agencies within the municipality and the Region.
		Coordinates with regional medical centers regarding the status of the care facility as well as the patient status en route to the medical center.
		Receive signal preemption from municipality and city traffic signals, as well as regional traffic signals.
		Perform incident detection and verification for streets within the municipalities of the Region.
		Receive AMBER Alerts and other Wide-Area Alert information from DPS.
		Receive Wide-Area Alert information from the Regional EOCs.
		Aid in the coordination of region-wide emergency plans, evacuation and reentry plans, and disaster management plans.
		Participates in the incident response, coordination, and reporting of the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).
	County Sheriff	Operate 9-1-1 center for the County, with the ability to dispatch regional and statewide emergency services.
		Dispatch county sheriff's vehicles (and track their location) and county public safety vehicles and coordinate with all other public safety agencies within the County and Region.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	County Sheriff (continued)	Receive signal preemption for county public safety vehicles from regional traffic signals.
		Perform incident detection and verification for streets within the counties of the state as well as on county roads.
		Receive AMBER Alerts and other Wide-Area Alert information from DPS.
		Receive Wide-Area Alert information from the Regional EOCs.
		Aid in the coordination of region-wide emergency plans, evacuation and reentry plans, and disaster management plans.
		Participates in the incident response, coordination, and reporting of the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).
	County Emergency Management Agencies	Responsible for the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).
		Coordinates with regional medical centers regarding the status of the care facility as well as the patient status en route to the medical center.
		Receive AMBER Alerts and other Wide-Area Alert information from DPS.
		Generate and coordinate wide-area alerts and distribute them to regional emergency management agencies, transit agencies, traffic agencies, regional information service providers, and the media.
		Plan and coordinate region wide emergency plans, evacuation and reentry plans, and disaster management plans dealing with HAZMAT incidents.
		Provide regional traffic, transit, emergency management, and maintenance operations with disaster information to disseminate to the traveling public.
	San Antonio/Bexar County Office of Emergency Management (EOC)	Participates in the incident response, coordination, and reporting of the Statewide Mutual Aid and Incident Management Network in a coordination effort only (no dispatch function).
		Operates PSAP for the City and the County, with the ability to dispatch regional and statewide emergency services.
		Receive AMBER Alerts and other Wide-Area Alert information from DPS.
		Generate and coordinate wide-area alerts and distribute them to regional emergency management agencies, transit agencies, traffic agencies, regional information service providers, and the media.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	San Antonio/Bexar County Office of Emergency Management (EOC) (continued)	Plan and coordinate region-wide emergency plans, evacuation and reentry plans, and disaster management plans dealing with HAZMAT incidents.
		Provide regional traffic, transit, emergency management, and maintenance operations with disaster information to disseminate to the traveling public.
	TxDOT	Receive flood monitoring information from own field equipment.
		Provide flood warning information to regional TMCs/TOCs, regional transit agencies, regional maintenance agencies, and the media.
		Provide flood warning information to the traveling public through DMS and with flood gates.
		Provide disaster traveler information to regional emergency management agencies, regional traffic agencies, and regional transit agencies.
	City of San Antonio	Receive flood monitoring information from its own field equipment (water level monitors and CCTV cameras).
		Provide flood warning information to regional TMCs/TOCs, regional transit agencies, regional maintenance agencies, and the media.
		Provide flood warning information to the traveling public through DMS and with flood gates.
		Provide disaster traveler information to regional emergency management agencies, regional traffic agencies, and regional transit agencies.
Maintenance and Construction Management	TxDOT	Receive a request for maintenance resources for incident response from regional emergency management agencies.
		Coordinate maintenance resources for incidents with other regional maintenance providers.
		Receive vehicle location information from agency maintenance and construction vehicles.
		Receive vehicle maintenance conditions from agency maintenance and construction vehicles and coordinate with fleet maintenance mechanic shop.
		Collect road weather information with agency field equipment and distribute it to regional traffic, maintenance and transit agencies as well as the national weather service and the media.
		Provide maintenance of state highways within the Region, including pavement maintenance and all construction activities.
		Dispatch agency maintenance vehicles and get operations status from theses vehicles.
		Provide maintenance to all field equipment owned and operated by the agency.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	TxDOT	Manage work zones on all agency maintenance and construction activities, as well as monitors work zone safety with agency field devices and vehicles.
		Provide maintenance status and notification information to the traveling public through agency owned DMS.
		Monitor the safety of maintenance and construction activities through early warning systems and sensors on maintenance and construction field equipment.
		Coordinates maintenance and construction activities with other regional maintenance and construction agencies.
		Distributes maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, transit providers, rail operations, and the media.
	City of San Antonio	Receive a request for maintenance resources for incident response from regional emergency management agencies.
		Coordinate maintenance resources for incidents with other regional maintenance providers.
		Receive vehicle location information from agency maintenance and construction vehicles.
		Receive vehicle maintenance conditions from agency maintenance and construction vehicles and coordinate fleet maintenance with agency's fleet services.
		Provide maintenance of streets within the City, including pavement maintenance and all construction activities.
		Coordinate maintenance activities with the agency's TMC and with the agency's asset management system.
		Dispatch agency maintenance vehicles and get operations status from theses vehicles.
		Provide maintenance to all field equipment owned and operated by the City.
		Manage work zones on city streets, and monitors the safety of work zones status with city owned vehicles and field equipment.
	Municipal	Receive a request for maintenance resources for incident response from regional emergency management agencies.
		Coordinate maintenance resources for incidents with other regional maintenance providers.
		Receive vehicle location information from agency maintenance and construction vehicles.
		Receive vehicle maintenance conditions from agency maintenance and construction vehicles and coordinate fleet maintenance with agency's equipment repair garage.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	Municipal (continued)	Provide maintenance of streets within the municipalities, including pavement maintenance and all construction activities.
		Coordinate maintenance activities with the municipal TMC/TOC and with the agency's asset management system.
		Dispatch agency maintenance vehicles and get operations status from theses vehicles.
		Provide maintenance to all field equipment owned and operated by the municipality.
		Manage work zones on municipal streets.
		Coordinates maintenance and construction activities with other regional maintenance and construction agencies.
		Distributes maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.
	County Departments	Receive a request for maintenance resources for incident response from regional emergency management agencies.
		Coordinate maintenance resources for incidents with other regional maintenance providers.
		Receive vehicle location information from agency maintenance and construction vehicles.
		Receive vehicle maintenance conditions from agency maintenance and construction vehicles and coordinate fleet maintenance with agency's equipment repair garage.
		Provide maintenance of streets within the County, including pavement maintenance and all construction activities.
		Coordinate maintenance activities with regional traffic operations and with the agency's asset management system.
		Dispatch agency maintenance vehicles and get operations status from theses vehicles.
		Provide maintenance to all field equipment owned and operated by the County.
		Manage work zones on county streets.
		Coordinates maintenance and construction activities with other regional maintenance and construction agencies.
		Distributes maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.

Table 8 – San Antonio Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Archived Data Management	TxDOT	Collect and archive pavement management/maintenance information from regional maintenance sections and provide the information to the statewide system.
		Collect and archive emergency and crash information from regional archives.
		Collect and archive traffic information from the agency's regional TMC and traffic signal system.
	City of San Antonio	Collect and archive pavement management/maintenance information from its own field equipment and maintenance section and provide the information to regional and statewide systems.
		Collect and archive emergency and crash information from regional emergency management agencies and regional public safety agencies and provide this information to the statewide system.
		Collect and archive traffic information from the agency's maintenance section.
	Municipal	Collect and archive pavement management/maintenance information from its own field equipment and maintenance section and provide the information to regional and statewide systems.
		Collect and archive emergency and crash information from regional emergency management agencies and regional public safety agencies and provide this information to the statewide system.

4.4 Potential Agreements

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

With the implementation of ITS technologies, integrating systems from one or more agencies, and the anticipated level of information exchange identified in the ITS Architecture, it is likely that formal agreements between agencies will be needed in the future. These agreements, while perhaps not requiring a financial commitment from agencies in the Region, should outline specific roles, responsibilities, data exchanges, levels of authority, and other facets of regional operations. Some agreements will also outline specific funding responsibilities, where appropriate and applicable.

Table 9 provides a list of existing and potential agreements for the San Antonio Region based on the interfaces identified in the Regional ITS 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 9 – San Antonio Existing and Potential Agreements

Status	Agreement and Agencies	Agreement Description
Existing	**Data/Video Sharing and Usage** TxDOT San Antonio District, and Local Media	License agreements to access and broadcast TxDOT CCTV camera video feeds.
Existing	**Electronic Toll Interoperability Agreements** TxDOT TTA, Alamo RMA and Other Texas Regional Tolling Authorities	Agreements define electronic toll collection interoperability between TxDOT TTA, Alamo Regional Mobility Authority, and other Texas regional tolling authorities such as the North Texas Tollway Authority and Harris County Toll Road Authority.
Existing	**Data Sharing and Usage** TxDOT San Antonio District and Private Information Service Provider	Agreements define the parameters, guidelines, and policies for private sector (such as the media or other information service providers) use of ITS data. This type of agreement is recommended 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 providing agencies logo on all video images broadcast).
Future	**Fiber Sharing Agreements** TxDOT San Antonio District, City of San Antonio, and Local Municipalities	Agreements would define the responsibilities of each agency, including maintenance responsibilities and hierarchies, for sharing fiber communications along corridors throughout the Region.
Future	**Incident Data Sharing and Usage** TxDOT San Antonio District and Emergency Management Agencies	Agreements would define the parameters, guidelines, and policies for inter-agency sharing of incident data between TxDOT and emergency management agencies in the Region. Incident information could be sent directly to CAD systems and include information on lane closures, travel delays, and weather. Certain data sharing and usage is already operational between TxDOT and COSA traffic operations and COSA Police and Fire Departments
Future	**Joint Operations/Shared Control Agreement** TxDOT San Antonio District and San Antonio/Bexar County EOC	Provides for the development of a unified public safety communication system that could include 911 operations, CAD, mobile data information transfer, public safety and public service radio communications, and ITS management. The communications would be shared between TransGuide and the future San Antonio/Bexar County EOC.
Future	**Joint Operations/Shared Control Agreement** TxDOT San Antonio District and Alamo RMA	Provides for the development of a unified road network communication system that could include toll operations, incident management on road networks, coordinated maintenance and construction management, and ITS management.

4.5 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 San Antonio 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 foundation systems in the San Antonio Region are listed below. Projects associated with these and other market packages identified for the Region have been included in the San Antonio Regional ITS Deployment Plan.

- Network Surveillance;
- Surface Street Control;
- Freeway Control;
- Traffic Information Dissemination;
- Regional Traffic Control;
- Traffic Incident Management System;
- Wide-Area Alerts;
- Emergency Routing;
- Roadway Data Collection;
- Transit Vehicle Tracking;
- Transit Fixed Route Operations;
- Transit Demand Response Operations;
- Transit Traveler Information; and
- ITS Data Mart and Data Warehouse.

5. USE AND MAINTENANCE OF THE REGIONAL ITS ARCHITECTURE

The ITS Architecture developed for the San Antonio Region addresses the Region's vision for ITS implementation at the time the plan was developed. Stakeholders invested a considerable amount of effort in the development of the Regional ITS Architecture and Regional ITS Deployment Plan. The plan needs to be incorporated into the Regional planning process so that the ITS vision for the Region is considered when implementing ITS projects and to ensure that the Region remains eligible for federal funding for implementation of the projects.

As the Region grows, needs will change, and, as technology progresses, new ITS opportunities will arise. Shifts in the Regional needs and focus as well as changes in the National ITS Architecture will necessitate that the San Antonio Regional ITS Architecture be updated to remain a useful resource for the Region.

5.1 Maintenance Process

Stakeholders agreed to maintain the ITS Architecture and Deployment Plan by conducting a full update once every four years, beginning in 2012. It was recommended that the update be scheduled to occur the year before the Long Range Transportation Plan update so as to better incorporate ITS technologies and ITS plans into the overall transportation planning process. The ITS Deployment Plan is more susceptible to change as old projects are completed and new projects are realized. While not scheduled for a full update every year, the ITS Deployment Plan will be tracked and reviewed annually by the San Antonio ITS Technical Committee with the TxDOT San Antonio District serving as the lead agency. Any architecture changes resulting from the ITS Deployment Plan Review will be documented and retained by TxDOT for inclusion into the next complete update of the Regional ITS Architecture. A maintenance form is available in **Appendix E** of the architecture which can be filled in and submitted to TxDOT San Antonio District for the purposes of tracking and updating the architecture.

5.2 Process for Determining Architecture Conformity

The San Antonio Regional ITS Architecture documents the customized market packages that were developed as part of the ITS architecture process. To satisfy federal requirements and remain eligible to use federal funds, a project must conform to the Regional ITS Architecture.

The following steps are recommended to show conformance:

- Identify the ITS components in the project;
- Identify the corresponding ITS market packages(s) from the Regional ITS Architecture;
- Locate the ITS components that are being implemented as part of the project within the market package;
- Compare the connections to other agencies or elements documented in the ITS Architecture as well as the information flows between them to the connections that will be part of the project; and
- Document any changes necessary to the ITS Architecture or the project to ensure there is conformance.

Identifying the ITS Components

ITS components can be fairly apparent in an ITS focused project such as CCTV or DMS deployments, but could also be included in other types of projects. For example, an arterial widening project could include the installation of signal system interconnect, signal upgrades, and

the incorporation of the signals in the project limits into the City's closed loop signal system. These are all ITS deployments and should be included in the ITS architecture.

Identifying the Corresponding Market Packages and ITS Components

If a project was included in the ITS Deployment Plan, then the applicable market package(s) for that project are identified in a column. However, ITS projects are not required to be included in the ITS Deployment Plan in order to be eligible for federal funding; therefore, market packages might need to be identified without the assistance of an ITS Deployment Plan. In that case, the market packages selected and prioritized for the San Antonio Region are identified in **Table 5** of this document, detailed market package definitions are located in **Appendix B**, and customized market packages for the Region are included in **Appendix C**. Once the appropriate market packages are identified, the ITS components that are being implemented in the project should be identified within the market packages.

Evaluating the Connections and Flows

The element connections and architecture flows documented in the market package diagrams were selected based on the information available at the time the plan was developed. As the projects are designed, decisions will be made on the system layout that might differ from what is shown in the market package. These changes in the project should be documented in the ITS market packages. If the project design conforms to the ITS architecture market packages then no change is required.

Documenting Required Changes

If any changes are needed to accommodate the project under review, Section 5.3 describes how those changes should be documented. Any changes will be incorporated during the next architecture update. Conformance will be accomplished by documenting how the market package(s) should be modified so that the connections and data flows are consistent with the project.

5.3 Procedure for Submitting ITS Architecture Changes Between Scheduled Updates

Updates to the San Antonio Regional ITS Architecture should occur on a regular basis to maintain the architecture as a useful planning tool. Between complete plan updates smaller modifications will likely be required to accommodate ITS projects in the Region. Section 5.2 contains guidance for determining whether or not a project requires architecture modifications.

For situations where a change is required, an ITS Architecture Maintenance Documentation Form was developed and is included in **Appendix E**. This form should be completed and submitted to the TxDOT San Antonio District whenever a change to the Regional ITS Architecture is proposed.

The Maintenance Documentation form identifies three levels of modifications. They include:

Level 1 – Basic changes that do not affect the structure of the architecture

Examples include: Changes to stakeholder or element name, element status, or data flow status

Level 2 – Structural changes that impact only one agency

Examples include: Addition of a new market package or modifications to an existing market package that affects only one agency

Level 3 – Structural changes that have the potential to impact multiple agencies.

Examples include: Addition of a new market package or modifications to an existing market package that involves multiple agencies or incorporation of a new stakeholder into the architecture.

In the process of documenting the change, the stakeholder proposing the change should contact any other agency that will be impacted by the modification to obtain feedback. This communication between agencies will simplify the process of performing a complete plan update. When a complete update is performed, all of the documented changes will be incorporated into the architecture. However, changes could be documented at other times as agencies are planning for future projects using the same form.