



Austin Regional ITS Architecture Update

Regional ITS Architecture Report

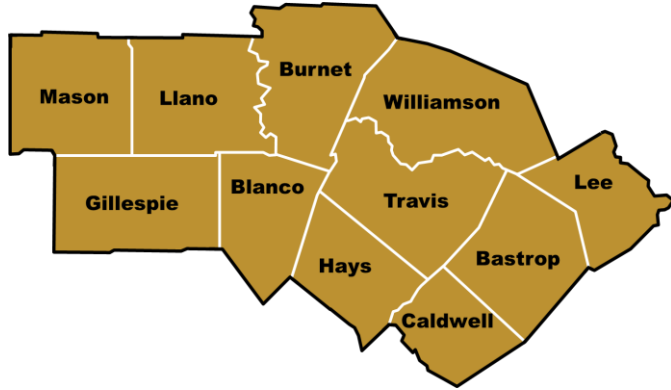
June 2015



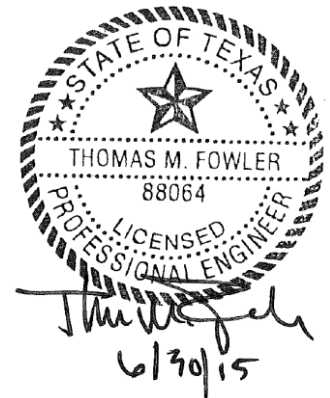
Austin

REGIONAL ITS ARCHITECTURE

2015 UPDATE



Final Regional ITS Architecture Report



Prepared by the **Texas Department of Transportation** in coordination with stakeholder agencies throughout the TxDOT Austin District

June 2015

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LIST OF ACRONYMS

AUSTIN REGIONAL ITS ARCHITECTURE

AASHTO	American Association of State Highway and Transportation Officials
ABIA	Austin Bergstrom International Airport
AIMHigh	Austin-area Incident Management for Highways
AMBER	America's Missing: Broadcast Emergency Response
APCO	Association of Public Safety Communications Officials
ASTM	American Society for Testing and Materials
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
CAD	Computer Aided Dispatch
CAMPO	Capital Area Metropolitan Planning Organization
CARTS	Capital Area Rural Transportation System
CCTV	Closed-Circuit Television
CTECC	Combined Transportation and Emergency Communications Center
CTRMA	Central Texas Regional Mobility Authority
CVISN	Commercial Vehicle Information Systems and Networks
CVRIA	Connected Vehicle Reference Implementation Architecture
DEM	Department of Emergency Management
DMS	Dynamic Message Sign
DOT	Department of Transportation
DPS	Department of Public Safety
DSRC	Dedicated Short Range Communication
EMC	Emergency Management Center
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTP	File Transfer Protocol
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
HCRS	Highway Conditions Reporting System

LIST OF ACRONYMS

AUSTIN REGIONAL ITS ARCHITECTURE

HRI	Highway Rail Intersection
IEEE	Institute of Electrical and Electronics Engineers
IMMS	Incident Management Message Sets
ITE	Institute of Transportation Engineers
ITIS	International Traveler Information Systems
ITS	Intelligent Transportation System
ISD	Independent School District
ISO	International Standards Organization
LCRA	Lower Colorado River Authority
LED	Light Emitting Diode
LRMS	Location Referencing Message Specification
L RTP	Long Range Transportation Plan
MAC	Medium Access Control
MDT	Mobile Data Terminal
MPO	Metropolitan Planning Organization
NEMA	National Electrical Manufacturers Association
NOAA	National Oceanic and Atmospheric Administration
NTCIP	National Transportation Communications for ITS Protocol
OER	Octet Encoding Rules
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
RTP	Regional Transportation Plan
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible and Efficient Transportation Equity Act – A Legacy for Users
SDO	Standards Development Organization
STMF	Simple Transportation Management Framework
STS	Special Transit Service

LIST OF ACRONYMS

AUSTIN REGIONAL ITS ARCHITECTURE

TCEQ	Texas Commission on Environmental Quality
TEA-21	Transportation Equity Act for the 21st Century
TIP	Transportation Involvement Plan
TMC	Traffic Management Center
TMDD	Traffic Management Data Directory
TOC	Traffic Operations Center
TOD	Toll Operations Division
TxDOT	Texas Department of Transportation
USDOT	United States Department of Transportation
USGS	United States Geological Survey
UT	University of Texas
VIVDS	Video Imaging Vehicle Detection System

1. INTRODUCTION

1.1 Project Overview

The Regional Intelligent Transportation System (ITS) Architecture provides a long-range plan for the deployment, integration, and operation of ITS in the Austin Region. The Regional ITS Architecture allows stakeholders to plan for what they want their system to look like in the long term and then break the system into smaller pieces that can be implemented over time as funding permits. Development of a Regional ITS Architecture encourages interoperability and resource sharing among agencies and allows for cohesive long-range planning among regional stakeholders. Completion and update of the plan is also required by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) in order to use federal transportation funds for ITS projects in the Region.

In the Austin Region, the first regional plan developed for ITS was the Austin Area-Wide Intelligent Vehicle Highway System (IVHS) Plan and IH-35 Corridor Deployment Plan, which was developed in 1996. This plan served as the predecessor to the first Austin Regional ITS Architecture which was developed in 2002. Since that time a number of new ITS projects have been implemented and the National ITS Architecture, which served as the basis for the Austin Regional ITS Architecture, has been updated. In order to reflect these changes, the Texas Department of Transportation (TxDOT) Austin District, working closely with stakeholders throughout the Region, completed an update of the Regional ITS Architecture in 2007 and again in 2015.

The Regional ITS Architecture consists of several key components:

ITS Needs – The needs describe the transportation related needs in the Region that could possibly be addressed by ITS.

ITS Inventory – The inventory describes all of the ITS related elements that either exist or are planned for the Region.

ITS Service Packages – The ITS service packages describe the services that stakeholders in the region want ITS to provide. ITS service package diagrams have been developed to illustrate how each service will be deployed and operated by each agency in the Region that expressed interest in a particular service. In previous versions of the Austin Regional ITS Architecture, ITS service packages were referred to as ITS market packages. The name change has been made to be consistent with the terminology that is now used in Version 7.0 of the National ITS Architecture.

ITS Deployment Plan – The Deployment Plan documents planned and potential ITS projects that could be implemented in the region to provide the ITS services that stakeholders identified as important to the Region.

Use and Maintenance Plan – The use and maintenance plan describes how to use the Regional ITS Architecture for ITS planning and design efforts, such as the development of a Systems Engineering Analysis. It also describes how the Regional ITS Architecture should be maintained in the future.

Regional ITS architectures are necessary to satisfy the ITS conformity requirements first established in the Transportation Equity Act for the 21st Century (TEA-21) highway bill and continued in the Safe, Accountable, Flexible and Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU) bill passed in 2005. In response to Section 5206(e) of TEA-21, the FHWA issued a final rule and the 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. In order to demonstrate this conformance, it is important that regions deploying ITS have an updated regional ITS architecture in place.

The geographic boundaries of the original architecture for the Region were those of the Capital Area Metropolitan Planning Organization (CAMPO) area and included Travis, Williamson, and Hays

Counties. However, the boundaries were expanded in the 2007 update to include the boundaries of the eleven county TxDOT Austin District. The stakeholders developed the Regional ITS Architecture based on a vision of how they wanted to implement and operate ITS through the year 2040 in the Austin Region. In addition, an ITS Deployment Plan was developed to complement the Regional ITS Architecture. The ITS Deployment Plan identifies projects that have been recommended by the stakeholders as priority projects for their agency that will help achieve the vision of the Regional ITS Architecture. Additionally, a project website was developed which contain all of the project documents as well as an interactive version of the Regional ITS Architecture. The website is located at: www.AustinITSArchitecture.com

The Austin Regional ITS Architecture and the Austin Regional ITS Deployment Plan were both developed with significant input from local, state, and federal officials. A series of workshops were held with all stakeholders and individual interviews were conducted with many of stakeholders outside of the workshop to request input and ensure that the plans reflected the unique needs of the Region. Copies of the draft reports were made available to all stakeholders through the project website. The Regional ITS Architecture and Deployment Plan strives to present an accurate snapshot of existing ITS deployment and future ITS plans in the Region. However, 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 Austin Region

1.2.1 GEOGRAPHIC BOUNDARIES

The Austin Region is comprised of Bastrop, Blanco, Burnet, Caldwell, Gillespie, Hays, Lee, Llano, Mason, Travis, and Williamson Counties. These boundaries correspond with the boundaries of the TxDOT Austin District, which is shown in **Figure 1**. The Region encompasses approximately 9,489 square miles in central Texas and has a population of approximately 2.06 million according to the 2014 U.S. Census population estimates.

When developing the stakeholder group, the project team coordinated with the TxDOT Austin District to invite the appropriate city, county, regional, state and federal agencies. Stakeholders included representatives from traffic, transit, public safety, emergency management, toll, and rail agencies in the Austin Region.

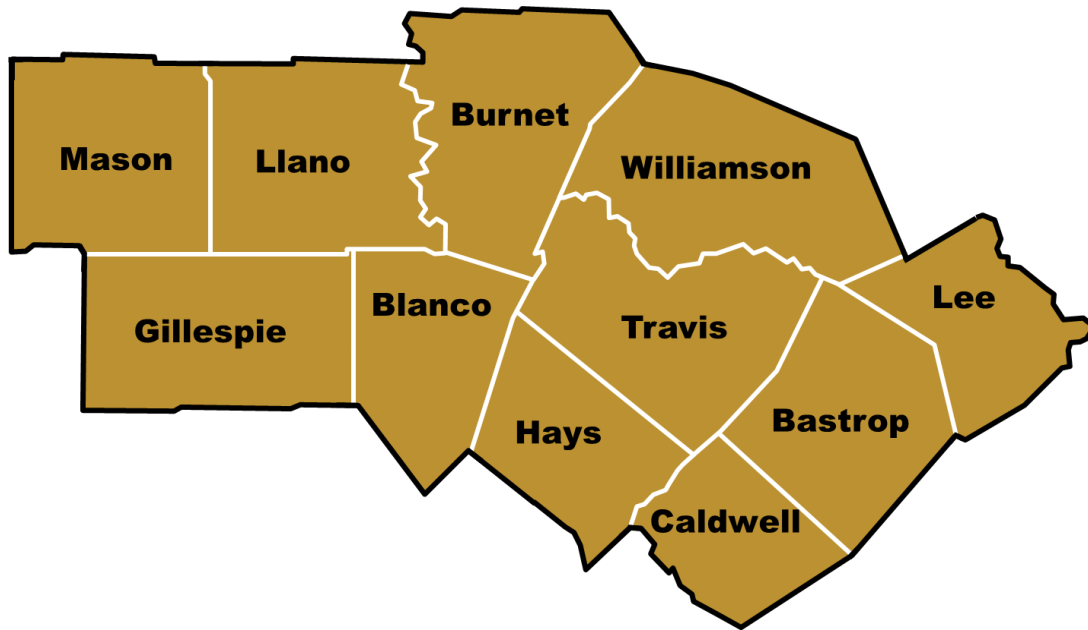


Figure 1 – Austin Regional Boundaries

1.2.2 TRANSPORTATION INFRASTRUCTURE

The Austin Region is served by a significant number of State and Federal highways. The primary access controlled facilities include I-35, US 183, US 290, SH45, SH 71, SH130, SH Loop 1 (MoPac), Toll Road 183A and Toll Road 290 (Manor Expressway). Several of those facilities are either tolled for their entire length (Toll Road 183A) or have sections that are tolled (Toll Road 290, SH45, SH 130 and SH Loop 1). Toll roads in the Region are either controlled by the Central Texas Regional Mobility Authority (CTRMA) or the TxDOT Toll Operations Division (TOD).

I-35 is the primary highway in the Region; I-35, US 183, and SH130 run north-south and SH 71 and US 290 run east-west. The effective operation of I-35 is critical to the movement of goods and people through the State of Texas as well as the United States. I-35 extends from Laredo, Texas on the U.S.-Mexico border to Duluth, Minnesota. Construction and incidents along I-35 can have a severe impact on commercial vehicle traffic and motorists traveling through the Region on this significant cross-country facility.

US 183, US 290, SH 71, and SH183A serve several rapidly growing communities north and east of the City of Austin. Most of the traffic along the roadways is daily commuter traffic and this travel pattern is anticipated to continue growing in coming years.

Fixed-route and paratransit services are provided in Travis County and portions of Williamson County by the Capital Metropolitan Transportation Authority (CapMetro). The Capital Area Rural Transportation System (CARTS) also provides fixed-route and paratransit services in several counties including Bastrop, Caldwell, Hays, Lee, Travis, and Williamson. Demand response service in the Austin Region is provided primarily by CapMetro and CARTS in the same areas in which they provide fixed-route service. Additionally Texas State University operates a fixed-route bus service for students in the City of San Marcos, and Cap Metro operates the UT Shuttle in the City of Austin near the University of Texas Campus. Commuter rail is provided by CapMetro and serves the City of Austin, the City of Cedar Park and the City of Leander.

The Austin Region has undertaken several deployments of ITS programs throughout the Region. These programs have come from multiple agencies and cover a range of transportation modes as well. Some multi-agency participation has been present on some of these ITS initiatives. The following are some of the larger ITS initiatives underway or existing within the Austin Region.

AIMHigh – The Austin-area Incident Management for Highways (AIMHigh) coalition is made up of representatives from transportation and public safety agencies in the Austin Region. The group meets on a regular basis to review the response to recent incidents as well as to discuss incident management initiative or other projects that could impact incident management.

Combined Transportation, Emergency and Communications Center (CTECC) – CTECC is a partnership between the City of Austin, Travis County, TxDOT, and Capital Metro. The building includes the TxDOT Traffic Management Center (TMC) for the Austin District, City of Austin 911 and 311 answering and dispatch, Capital Metro dispatch, and the region's Emergency Operations Center. Agencies located in CTECC include the following:

- City of Austin – Austin-Travis County Emergency Medical Services, Austin Fire Department, Austin Police Department, Office of Homeland Security and Emergency Management
- Travis County – Travis County Sheriff's Office, Travis County Constable, Office of Emergency Management
- Texas Department of Transportation – Traffic Management Center
- Capital Metro – Transit Dispatch

TxDOT Toll Operations Division – Formally known as the Texas Turnpike Authority (TTA), the TxDOT Toll Operations Division (TOD) operates multiple toll roads in the Austin Region including the northern section of SH Loop 1 (MoPac), SH 45 both north and south of Austin, and SH 130. All facilitates utilized automated tolling which eliminates the need for toll plazas and allows vehicles to maintain highway speeds. The TxDOT TOD also manages the TxTag program, which is a transponder that allows the electronic readers to identify individual vehicles. TxTags are compatible with CTRMA facilities and others toll agencies throughout the State of Texas.

Capital Metropolitan Transportation Authority (CapMetro) ITS – CapMetro has developed an extensive ITS program that includes automated vehicle location (AVL), automated passenger counters, security cameras both on buses and multimodal stations, transit signal priority for bus rapid transit routes, automated transit fleet monitoring for fixed-route and paratransit vehicles. Additionally, CapMetro has developed a mobile phone application that allows riders to purchase tickets and use their phone as their bus pass. The mobile application also provides trip planning, general information, and real-time bus location tracking. CapMetro would like to develop a regional fare card or mobile phone application that allows riders to purchase passes for other regional transit management agencies providers in Houston Dallas/Fort Worth and San Antonio.

City of Austin Traffic Management – The City of Austin has updated their advanced traffic management system software that is used to monitor and operate traffic signals, dynamic message signs (DMS), field sensors, and closed circuit television (CCTV) cameras. The City has also installed a number of Bluetooth devices to obtain vehicle speeds along certain corridors. The City would like to place CCTV images and a map with speed information on their website. Additional projects include adaptive traffic signals along Lamar, expansion of traffic signal preemption, and the addition of DMS or installation of graphic route information panels (GRIPs) for dynamic route assignment.

City of Round Rock ITS – The City of Round Rock is currently implementing several ITS projects including the installation of pan-tilt-zoom CCTV cameras at various locations throughout the City for network surveillance by the end of 2015 and railroad preemption notification by the end of 2014. Additionally, the City of Round Rock Police Department is exploring the possibility of connecting to CTECC through fiber optic cable to obtain images from TxDOT CCTV cameras.

City of Cedar Park – The City of Cedar Park has implemented a City TOC that includes signal control and monitoring capabilities, pan-tilt-zoom CCTV cameras, and Blue Tooth readers for arterial travel times. They are exploring options that could be used to provide travel information to the public including enhanced traveler information features on the City'

City of San Marcos – The City of San Marcos has implemented a traffic signal system that includes signal monitoring and control capabilities as well as pan-tilt-zoom CCTV cameras. Trains stopped at

railroad crossings remains a challenge in the City of San Marcos and they are reviewing technologies that would allow them to monitor crossings more closely and provide advanced information to travelers.

CARTS – CARTS provides fixed-route and demand response transit service over a nine county area in the Austin Region. CARTS buses include (AVL), automated passenger counters, and security systems. Real-time information on bus location is available and CARTS is working to bring this information to the public. A strong need exists to create a regional fare payment system that would allow users to ride CARTS and Capital Metro buses using the same payment system.

CTRMA Toll Facilities – CTRMA now operates two tolled controlled access highways in the northern section of the Austin Region. The first section of the Toll Road 183A opened in March 2007 and was extended in April 2012. The current termini are just north of SH45 to just south of San Gabriel Parkway. Toll Road 290 (Manor Expressway) was opened in December 2012 and an extension was opened in May 2014. The current limits of the Toll Road 290 are from I-35 to Parmer Lane near the City of Manor. Both facilities utilized automated tolling. CTRMA is also constructing express lanes along MoPac for Cesar Chaves Street to Parmer Lane. The express lanes will be barrier separated from the general purpose lanes and motorists will pay a variable toll rate that is dependent upon the level of congestion; however, public transit buses, registered van pools, and emergency vehicles will not be required to pay a toll. The project is expected to be completed in late 2015.

CTRMA Highway Emergency Response Operator (HERO) Program – CTRMA operates the HERO Program which is a roadway service patrol that provides roadside assistance for motorists along I-35 from the City of Kyle to the City of Georgetown and on SH 183 from I-25 to Lakeline Boulevard. There is interest in the Region to extend this program to additional corridors.

1.2.3 STAKEHOLDERS

Due to the fact that ITS often transcends traditional transportation infrastructure, it is important to involve a wide range of local, state, and federal stakeholders in the ITS architecture development and visioning process. Input from these stakeholders is a critical part of defining the interfaces, integration needs, and overall vision for ITS in a region. In the Austin Region, stakeholders that participated included not just representatives from transportation and public transit agencies, but also stakeholders that represented public safety, health, and aviation.

Table 1 contains a listing of stakeholders for the Austin Region who participated in the project workshops or provided input to the study team as to the needs and issues that should be considered as part of the Regional ITS Architecture. Other stakeholders that were invited to participate but were not able to attend were provided minutes of workshops and notified when copies of reports were available for review on the project website to encourage their participation as much as possible. A complete listing of stakeholders invited to participate in the project and workshop attendance records is included in the stakeholder database in **Appendix D**.

Table 1 – Austin Stakeholder Agencies and Contacts

Stakeholder Agency	Address	Contact
CAMPO	505 Barton Springs Road, Suite 700 Austin, TX 78704	Katheryn Cromwell
CAMPO	505 Barton Springs Road, Suite 700 Austin, TX 78704	Dan Dargevics
CAMPO	505 Barton Springs Road, Suite 700 Austin, TX 78704	Ashby Johnson
CAMPO	505 Barton Springs Road, Suite 700 Austin, TX 78704	Alex Kone
CARTS	2010 E 6th Street Austin, TX 78702	Rachid Breir
CARTS	2010 E 6th Street Austin, TX 78702	Adrian Elliott
CARTS	2010 E 6th Street Austin, TX 78702	René Guajardo
CARTS	2010 E 6th Street Austin, TX 78702	Dave Marsh
CARTS	2010 E 6th Street Austin, TX 78702	Lyle Nelson
CapMetro	2910 E. 5th Street Austin, TX 78702	Joe Iannello
CapMetro	2910 E. 5th Street Austin, TX 78702	Jane Schroter
CapMetro	2910 E. 5th Street Austin, TX 78702	Daryl Weinberg
City of Austin	4201 Ed Bluestein Boulevard Austin TX 78721	William Brooks
City of Austin	P.O. Box 1088 Austin, TX 78767	Jasper Brown
City of Austin	1501 Toomey Road Austin, TX 78704	David Carey
City of Austin	1501 Toomey Road Austin, TX 78704	Brian Craig
City of Austin	1501 Toomey Road Austin, TX 78704	Jim Dale
City of Austin	4201 Ed Bluestein Boulevard Austin TX 78721	Thayer Smith
City of Austin	PO Box 689001 Austin, Texas 78768-9001	Tim Prueh
City of Austin	P.O. Box 1088 Austin TX 78767	Scott Swearengin
City of Austin	P.O. Box 1088 Austin TX 78767	Chris Swenson

Table 1 – Austin Stakeholder Agencies and Contacts (Continued)

Stakeholder Agency	Address	Contact
City of Austin	5010 Old Manor Road Austin, TX 78723	Robert Turner
City of Cedar Park	2401 Brushy Creek Loop Cedar Park, TX 78613	Stephen Hanuscin
City of Cedar Park	2401 Brushy Creek Loop Cedar Park, TX 78613	Ali Mozdbar*
City of Pflugerville	P.O. Box 589 Pflugerville, TX 78691	Dan Franz
City of Pflugerville	P.O. Box 679 Pflugerville, TX 78691	Daryl Wilkes
City of Round Rock	221 E. Main Street Round Rock, TX 78664	Vinnie Cherrone
City of Round Rock	203 Commerce Boulevard Round Rock, TX 78664	Shane Glasier
City of Round Rock	212 Commerce Boulevard Round Rock, TX 78664	David Walther
City of Round Rock	221 E. Main Street Round Rock, TX 78664	Chad Wood*
City of Round Rock	203 Commerce Boulevard Round Rock TX 78664	Billy Wusterhausen
City of San Marcos	630 East Hopkins Street San Marcos, Texas 78666	Sabas Avila
City of San Marcos	2300 S Interstate 35 San Marcos, Texas 78666	Bob Klett
City of San Marcos	630 East Hopkins Street San Marcos, Texas 78666	Ning Zou
CTRMA	3300 N IH-35, Suite 300 Austin, TX 78705	Wes Burford
CTRMA	3300 N IH-35, Suite 300 Austin, TX 78705	Greg Mack
CTRMA	3300 N IH-35, Suite 300 Austin, TX 78705	Tim Reilly
DPS	P.O. Box 4087 Austin, TX 78773	Charles Booker
DPS	P.O. Box 4087 Austin, TX 78773	Jack Doebbler
DPS	5805 N. Lamar Boulevard Box 4087 Austin, TX 78773	Paul Schulze
FHWA - Texas Division	300 East 8th Street, RM 826 Austin, Texas 78701	Mark Olson*
FHWA – Texas Division	300 East 8 th Street, RM 826 Austin, Texas 78701	Stephen Ratke

Table 1 – Austin Stakeholder Agencies and Contacts (Continued)

Stakeholder Agency	Address	Contact
Texas A&M Transportation Institute	701 N. Post Oak Rd., Suite 430 Houston, TX 77024-3827	Curtis Beaty
Travis County	5010 Old Manor Road Austin, Texas 78723	Pete Baldwin
Travis County	700 Lavaca Street, 5 th Floor Austin, TX 78767	David Greear
Travis County	700 Lavaca Street, 5 th Floor Austin, TX 78767	Chris Wallace
TxDMV – Motor Carrier Division	4000 Jackson Ave Austin, TX 78731	Grady Meyer
TxDOT Austin District	118 E. Riverside Drive Austin, TX 78704	Imelda Barrett
TxDOT Austin District	5010 Old Manor Road Austin, TX 78723	Brian Burke
TxDOT Austin District	P.O. Box 15426 Austin, TX 78761	Bruce Byron
TxDOT Austin District	P.O. Box 15426 Austin, TX 78761	Ed Collins
TxDOT Austin District	P.O. Box 15426 Austin, TX 78761	Marisabel Ramthun
TxDOT Rail Division	118 E. Riverside Drive Austin, TX 78704	Orlando Jamandre
TxDOT Toll Operations Division	12719 Burnet Road Austin, TX 78727	Erica Ramirez
TxDOT Toll Operations Division	12719 Burnet Road Austin, TX 78727	Linda Sexton
TxDOT Traffic Operations Division	118 E. Riverside Drive Austin, TX 78704	Alesia Gamboa
TxDOT Traffic Operations Division	118 E. Riverside Drive Austin, TX 78704	Jianming Ma
TxDOT Traffic Operations Division	118 E. Riverside Drive Austin, TX 78704	Alex Power
TxDOT Traffic Operations Division	118 E. Riverside Drive Austin, TX 78704	Robert Travis
TxDOT Transportation Planning and Programming Division	118 E. Riverside Drive Austin, TX 78704	Catherine Wolff
Williamson County	3151 Southeast Inner Loop, Ste B Georgetown, TX 78626	Joey Briggs
Williamson County	3151 Southeast Inner Loop, Ste B Georgetown, TX 78626	Joe England
Williamson County	3151 Southeast Inner Loop, Ste B Georgetown, TX 78626	Scott Mount

*Indicates stakeholder was no longer with listed agency at the conclusion of the Regional ITS Architecture Update.

1.3 Document Overview

The Austin Regional ITS Architecture report is organized into seven key sections:

Section 1 – Introduction

This section provides an overview of the Austin Regional ITS Architecture, including a description of the Region and list of participating stakeholders.

Section 2 – Regional ITS Architecture Development Process

This section provides an overview of the key steps involved in developing the ITS architecture for the Austin Region as well as an overview of the Turbo Architecture database and reports.

Section 3 – Regional ITS Needs

This section contains a summary of regional needs for the Austin Region that are related to ITS.

Section 4 – Regional ITS Inventory

This section provides a description of the stakeholders and ITS elements in the Region. Elements are grouped based on the owner, such as the City of Austin or CapMetro, and their current status is listed as either existing or planned.

Section 5 – Regional ITS Architecture

This section describes how the National ITS Architecture was customized to meet the ITS needs, plans, and visions for the Austin Region. The ITS service packages that are included in this section and interconnects are presented, including the “sausage diagram” showing the relationships of the key subsystems and elements in the Region. Functional requirements and standards that apply to the Region, as indicated by the Regional ITS Architecture, are also presented. Operational concepts identifying stakeholder roles and responsibilities have been prepared and potential agreements to support the sharing of data and resources have been identified.

Section 6 – Use and Maintenance of the Regional ITS Architecture

This section describes how the Regional ITS Architecture can be used to show architectural conformance of ITS projects in the planning or design phase. A process for maintaining the Regional ITS Architecture and submitting requested changes to the Regional ITS Architecture is also presented.

The Austin Regional ITS Architecture also contains six appendices:

Appendix A – Service Package Definitions

Appendix B – Customized Service Packages

Appendix C – Element Functions

Appendix D – Stakeholder Database

Appendix E – Agreements

Appendix F – Architecture Maintenance Documentation Form

A corresponding website was also developed for the Austin Regional ITS Architecture which contains electronic versions of all documents, meeting minutes, and an interactive version of the Turbo Architecture database. The website is located at the following address:

www.AustinITSArchitecture.com

2. REGIONAL ITS ARCHITECTURE DEVELOPMENT PROCESS

The update of the Regional ITS Architecture and Deployment Plan for the Austin Region relied heavily on stakeholder input to ensure that the architecture reflected regional needs. Four workshops were held with stakeholders to gather input and conduct training, interviews were conducted with representatives from many of the regional stakeholder agencies, and a website was developed with the draft and final documents for the Regional ITS Architecture. The website also had an interactive version of the Regional ITS Architecture generated from Turbo Architecture and additional guidance on the use and maintenance of the Regional ITS Architecture.

The process followed for the Austin 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 process followed.

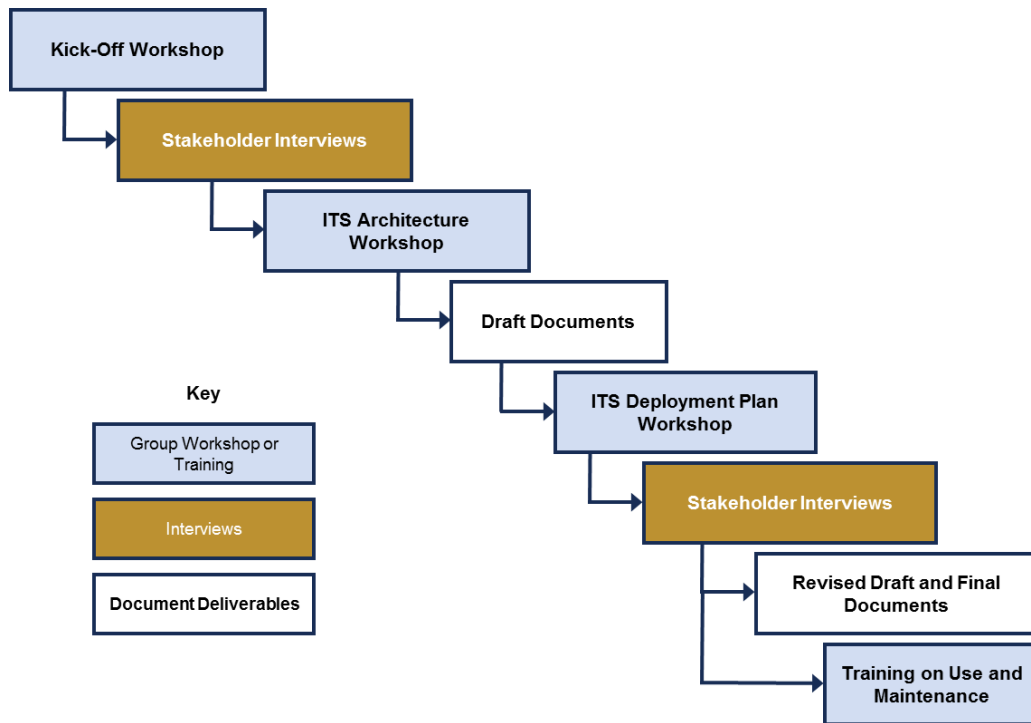


Figure 2 – Austin Regional ITS Architecture and Deployment Plan Development Process

2.1 Stakeholder Workshops

Four workshops with stakeholders were held to update the Austin Regional ITS Architecture and Deployment Plan. These workshops included:

- Kick-Off Workshop
- Stakeholder ITS Architecture Workshop
- ITS Deployment Plan Workshop
- ITS Architecture Training Workshop

In addition, interviews were conducted with many of the key stakeholder agencies outside of the workshops to gather additional information for developing the Regional ITS Architecture. Key components of the process are described below:

Kick-Off Workshop: A stakeholder group was identified that included representatives from regional transportation, transit, public safety, emergency management, and rail agencies. The group was invited to the project Kick-Off Workshop where an overview of the project was provided, the regional boundaries were defined, existing and planned ITS deployments in the Region were discussed, and ITS needs for the Region were identified.

Stakeholder Input: Stakeholder input was gathered through a series of interviews that were conducted with stakeholder agencies as well as through an ITS Architecture Workshop. The interviews were used to complete the system inventory for the region, define how ITS services are currently being operated, define how ITS services could be operated in the future, and identify potential ITS projects for the Region. The ITS Architecture Workshop was used to discuss regional priorities for ITS service packages and begin discussing ITS projects.

Develop Draft Regional ITS Architecture and Deployment Plan Update: Following the stakeholder input, a draft Regional ITS Architecture report was developed. Additionally, a website was created to allow stakeholders access to an interactive version of the Regional ITS Architecture and documents such as reports, meeting minutes, presentations, and the Turbo Architecture database.

ITS Deployment Plan Workshop: Additional stakeholder input was gathered through an ITS Deployment Plan Workshop. Stakeholders were asked to provide additional input on the recommended projects, responsible agencies, and deployment timeframe. Following the workshop, additional follow-up was conducted with agencies to discuss regional projects.

Final Report: The final Regional ITS Architecture and Deployment Plan was developed, which included an executive summary, project report, Turbo Architecture database, and project website with an interactive version of the Regional ITS Architecture.

ITS Architecture Training Workshop: A training session was conducted for all the stakeholders that included information on the maintenance of the Austin Regional ITS Architecture, including how to establish project conformity so that ITS projects are eligible for federal funding and how to use the plan to develop a project level systems engineering analysis. Additionally, the workshop also incorporated training on how to use the Turbo Architecture database.

Turbo Architecture Database: Turbo Architecture Version 7.0 was used to develop the Austin Regional ITS Architecture. Turbo Architecture is a software application that was developed by the United States Department of Transportation (USDOT) to be used as a tool for documenting and maintaining ITS architectures. Version 7.0 of Turbo Architecture was released in February 2012 and was developed to support Version 7.0 of the National ITS Architecture. Use of the Turbo Architecture software in development of the regional ITS architectures is recommended by both the FHWA and FTA.

2.2 Turbo Architecture

In the Austin Region, the Turbo Architecture database that was developed was based on the ITS service packages which are provided in Appendix B of this report. The ITS service packages provide a graphical representation of the services stakeholders in the Region would like ITS to provide. In each service package, the elements, such as TMC or a CCTV camera, and the data that is shared between them are shown. Turbo Architecture allows the Region to document all of the elements and data flows that exist or are planned in the Region. Turbo Architecture also allows the user to quickly access any standards that are associated with the data flows as well as generate reports and diagrams to assist in reviewing the data. Some examples of the useful reports and diagrams that may be generated using the Turbo Architecture software are included in Table 2.

Turbo Architecture saves data in Microsoft Access compatible data files. Turbo Architecture files can be accessed using Microsoft Access, although use of Access will not provide nearly the same amount of capabilities as accessing the files using the Turbo Architecture software. With the release of Version 4.1 of Turbo Architecture, the USDOT began offering the Turbo Architecture software free of charge and provides a link for downloading the software on the National ITS Architecture website. At the time this

report was written, that site was located at www.iteris.com/itsarch/ and Version 7.0 was the most recent version available. A link to download Turbo Architecture is also provided on the Austin Regional ITS Architecture website located at www.AustinITSArchitecture.com.

Table 2 – Turbo Architecture Report and Diagrams

Report or Diagram Name	Functions
Stakeholder Report	Provides a description of the stakeholder and the associated elements for each stakeholder in the Regional ITS Architecture.
Inventory Report	Provides a description and status for each element in the Regional ITS Architecture.
Service Packages Report	Identifies each of the service packages selected for the Region and the elements associated with each service package.
Functional Requirements Report	Identifies the functions that each element provides.
Interconnect Report	Identifies for each element all of the other elements that are connected and the status of each connection.
Standards Activities Report	Identifies relevant standards associated with each of the data flows used in the Regional ITS Architecture.
Subsystem Diagram	Identifies the subsystems from the National ITS Architecture that are included in the Regional ITS Architecture.
Interconnect Diagrams	Identifies for each element all of the other elements that are connected and the status of each connection. The Interconnect Diagrams can be customized to show all elements in the Regional ITS Architecture or a single element can be selected so that only the connections it has with other elements are shown. Interconnect Diagrams can also be viewed by individual service packages to view all of the elements and connections in each service package.
Flow Diagrams	Flow Diagrams are similar to Interconnect Diagrams; however, the actual data flows that are part of each connection between elements are also shown.

3. REGIONAL ITS NEEDS

Regional needs that could be addressed by ITS were identified by stakeholders in both the Kick-off Workshop held in March 2014 and the Stakeholder ITS Architecture workshop held in July 2014. Additionally, interviews with individual stakeholders were conducted between the Kick-off and Stakeholder ITS Architecture Workshops. The Capital Area Metropolitan Planning Organization's (CAMPO) 2035 Regional Transportation Plan (RTP) was also reviewed to determine other regional needs that could possibly be addressed in some way through ITS. CAMPO is currently updating their RTP, and the new plan will be referred to as the 2040 Regional Transportation Plan.

CAMPO 2035 Regional Transportation Plan

The CAMPO 2035 RTP outlines twelve (12) goals that correspond with the guidelines that were established under SAFETEA-LU, the federal transportation Bill passed in 2005. Of the twelve goals, ITS can address five (5) of them directly as described below:

Safety – Network surveillance utilizing CCTV cameras and vehicle field sensors can provide a real-time view of conditions to improve incident detection times. Once detected, agencies are able to provide advanced warning of incidents or other potential safety issues that might impact travelers. Road service patrols such as the CTRMA Highway Emergency Response Operator (HERO) Program aid in making highways safer by assisting emergency responders, removing disabled vehicles from the roadway and shoulder, clearing debris from the roadway, and offering assistance to motorists.

Mobility and Access – ITS can support the movement and the regulation of commercial vehicles that carry essential goods to consumers in addition to hazardous materials. ITS can also benefit the vulnerable road users such as pedestrians and bicyclists by alerting motor vehicles of their presence.

Connectivity – ITS in transit operations can improve the multimodal connections between transit vehicles and transit agencies. ITS can also assist transit users by providing accurate information for trip planning across multiple modes of transportation and provide travelers with real-time information about the status of each mode of their trip.

Efficiency – ITS provides freeway, arterial, and transit managers with the tools to better operate their systems and coordinate with other agencies, such as public safety, that play a critical role in operations.

Air Quality, Climate Protection, and Energy – ITS can be used to reduce the idle time of vehicles through coordinated signals including adaptive signal timing that helps to reduce energy consumption and air pollution.

Security – ITS can be used to monitor infrastructure, especially key components such as bridges and tunnels and monitor operations and riders on public transit vehicles and transit centers. Emergency alerts including missing children and elderly or suspected criminals can be broadcast to the public.

The needs identified through the Regional ITS Architecture development process as well as the 2035 LRTP provided guidance for determining which ITS service packages should be included in the Regional ITS Architecture.

TxDOT Regional Survey of ITS Service Areas

During the development of the Regional ITS Architecture a study was conducted by TxDOT and the University of Texas Center for Transportation Research (CTR) to determine the need for various ITS capabilities in the TxDOT Austin District. This study was used by TxDOT to consider when prioritizing ITS deployments and operational capabilities. Agencies that participated included TxDOT, CTRMA, City of Austin, City of Cedar Park, Capital Metro, and CARTS. Agencies were asked to rate the eight ITS service areas from the National ITS Architecture on a scale from 0 to 5, with 5 indicating the most interest by the agency in seeing that service deployed and 0 indicating no interest. The results of the survey are included below, presented in order of the most highly rated to the lowest rated.

- Advanced Traffic Management Systems (ATMS) – Rating 4.8
- Emergency Management (EM) – Rating 4.3
- Advanced Traveler Information Systems (ATIS) – Rating 4.2
- Advanced Vehicle Safety Systems (AVSS) – Rating 3.8
- Advanced Public Transportation Systems (APTS) – Rating 3.7
- Archived Data Management (AD) – Rating 3.4
- Maintenance and Construction Management (MC) – Rating 3.4
- Commercial Vehicle Operations (CVO) – Rating 2.0

The results of the TxDOT survey corresponded very closely with the priorities that stakeholders involved in the Austin Regional ITS Architecture gave to the ITS services packages chosen for the Austin Region from the National ITS Architecture. In general, service packages related to Traffic Management, Emergency Management, and Traveler Information tended to rate the highest in priority. Public transit also rated very highly among the transit providers in the Austin Region, who were for the most part actively engaged in deploying a majority of the ITS service packages related to transit.

Austin Regional ITS Needs

The Austin regional ITS needs were defined based on input from the regional stakeholders gathered through the Regional ITS Architecture workshops, interviews of the regional stakeholders, and review of existing studies and reports in the Region such as the CAMPO 2035 RTP and the TxDOT Survey of ITS Service Areas discussed earlier in this section.

The Austin regional ITS needs are presented in **Table 3**. Also shown in **Table 3** are the ITS service packages that correspond to the needs, and the priorities that were assigned to each ITS service packages by the regional stakeholders. The ITS service packages are discussed in more detail in Section 5.1 of this report.

As would be expected, the ITS service packages that address the needs of the Austin Region are generally assigned a high priority. In some cases, medium and low priority ITS service packages were also identified to address needs. These service packages were usually seen as not being critical to meeting the ITS need.

The last three needs that are identified generally cannot be addressed through ITS service packages in the Region, however stakeholders felt it was important to document these needs for the Regional ITS Architecture.

Table 3 – Regional ITS Needs

ITS Need	Corresponding ITS Service Packages and ITS Service Package Priority	
Improve communication and coordination between agencies (State-Local, Local-Local) for traffic operations and incident management	ATMS06 – Traffic Information Dissemination	High
	ATMS07 – Regional Traffic Management	High
	ATMS08 – Traffic Incident Management System	High
	EM04 – Roadway Service Patrols	High
Improve the accuracy, timeliness, and availability of regional travel information	ATMS01 – Network Surveillance	High
	ATMS06 – Traffic Information Dissemination	High
	ATMS07 – Regional Traffic Management	High
	ATIS01 – Broadcast Traveler Information	High
	ATIS02 – Interactive Traveler Information	High
	APTS08 – Transit Traveler Information	High
	ATMS17 – Regional Parking Management	Medium
Collect and make available additional travel time information along controlled access facilities and arterials	ATMS01 – Network Surveillance	High
	ATMS06 – Traffic Information Dissemination	High
	ATIS01 – Broadcast Traveler Information	High
	ATIS02 – Interactive Traveler Information	High
Implement Integrated Corridor Management (ICM) strategies	ATMS01 – Network Surveillance	High
	ATMS03 – Traffic Signal Control	High
	ATMS06 – Traffic Information Dissemination	High
	ATMS07 – Regional Traffic Management	High
	ATIS01 – Broadcast Traveler Information	High
	ATIS02 – Interactive Traveler Information	High
	APTS01 – Transit Vehicle Tracking	High
	APTS07 – Multi-modal Coordination	High
	APTS08 – Transit Traveler Information	High
Implement additional strategies for active traffic management	ATMS01 – Network Surveillance	High
	ATMS03 – Traffic Signal Control	High
	ATMS22 – Variable Speed Limits	High
	ATMS18 – Reversible Lane Management	Medium
	ATMS23 – Dynamic Lane Management and Shoulder Use	Medium Low
	ATMS04 – Traffic Metering	Low
	ATMS05 – HOV Lane Management	
Monitor roadway weather conditions to minimize the effects of adverse conditions on traffic	ATMS06 – Traffic Information Dissemination	High
	MC03 – Road Weather Data Collection	High
	MC04 – Weather Information Processing and Distribution	High
	ATMS24 – Dynamic Roadway Warning	Medium
	EM07 – Early Warning System	Medium

Table 3 – Regional ITS Needs (Continued)

ITS Need	Corresponding ITS Service Packages and ITS Service Package Priority	
Improve emergency vehicle movements with traffic signal preemption	ATMS03 – Traffic Signal Control	High
	EM01 – Emergency Call-Taking and Dispatch	High
	EM02 – Emergency Routing	High
Improve data sharing among agencies for both operational and planning initiatives	ATMS06 – Traffic Information Dissemination	High
	ATMS07 – Regional Traffic Management	High
	AD1 – ITS Data Mart	High
	AD2 – ITS Data Warehouse	High
	AD3 – Virtual Data Warehouse	High
Implement a regional or statewide transit fare payment system that could accommodate the transfer of passengers between modes and agencies	APTS04 – Transit Fare Collection Management System	High
	APTS07 – Multi-modal Coordination	High
Optimize transit passenger travel times and establish coordination among transit agencies	APTS01 – Transit Vehicle Tracking	High
	APTS02 – Transit Fixed-Route Operations	High
	APTS03 – Demand Response Transit Operations	High
	APTS07 – Multi-modal Coordination	High
	APTS11 – Multi-modal Connection Protection	High
Expand traffic signal priority for transit vehicles	APTS09 – Transit Signal Priority	High
	ATMS03 – Traffic Signal Control	High
Ensure that the Austin Region remains at the forefront of new technological advancements in transportation	There were no specific ITS service packages identified to meet this need.	
Provide additional training to operators to ensure that deployments of ITS are fully utilized	There were no specific ITS service packages identified to meet this need.	
Plan for and adapt to changes in vehicle safety technologies such as connected vehicles	Although the National ITS Architecture does include ITS service packages for connected vehicles, stakeholders did not want to select and define these service packages as they felt more research is needed before they can define how such an ITS service package would be implemented.	

4. REGIONAL ITS INVENTORY

The inventory and needs documented at the Kick-Off Workshop in addition to the individual interviews were the starting point for developing an ITS architecture for the Region. These ITS systems and components were used to customize the National ITS Architecture and create the Regional ITS Architecture for the Austin Region.

When developing customized elements in the 2007 update, the Austin stakeholder group agreed to create individual traffic, maintenance, and emergency management elements for the following municipalities: City of Austin, City of Cedar Park, City of Georgetown, City of Round Rock, and City of San Marcos. It was determined that no significant changes have occurred that would require customized elements for additional municipalities; therefore, the 2015 update includes those same customized elements. The other smaller communities in the Region were documented as part of the municipal elements. This documentation allows the communities to be included in the Regional ITS Architecture, and therefore eligible to use federal funds for future ITS deployments, even if there are no specific plans for ITS implementation at this time. Similarly, of the eleven counties in the Austin Region only Hays, Travis, and Williamson Counties are identified with individual elements in the Regional ITS Architecture.

Individual customized elements were created for many of the other stakeholder agencies in the Region, including TxDOT, CTRMA, Capital Metro, CARTS, CAMPO, and LCRA.

4.1 Stakeholders

Each element included in the Austin Regional ITS Architecture is associated with a stakeholder agency. A listing of stakeholders as identified in the Austin Regional ITS Architecture can be found in **Table 4** along with a description of the stakeholder. Rather than individually documenting each of the smaller municipalities in the Region, a single stakeholder, which represents the cities and towns, and in some instances counties, not specifically called out in the architecture, was created for municipal agencies.

Table 4 – Austin Stakeholder Descriptions

Stakeholder	Stakeholder Description
Amtrak	Passenger rail services provider with stations in San Marcos, Austin, and Taylor.
Archive Data Users	Users (and their systems) of general archive data within the Region.
Army Corps of Engineers	The US Army Corps of Engineers is the regulatory agency responsible for reservoirs and waterways including Lake Georgetown and Lake Granger.
Austin/Travis County Office of Emergency Management	City of Austin/Travis County joint department that coordinates the citywide and countywide response to large-scale emergencies and disasters. This includes planning and activities for preparedness, response, and recovery phases of a disaster. The Austin/Travis County Emergency Operations Center (EOC) is part of the Office of Emergency Management.
Capital Area MPO	Metropolitan planning organization (MPO) for the Austin metropolitan area that currently includes Travis, Williamson, Hays, Bastrop, Burnet, and Caldwell Counties.
CapMetro	Capital Metropolitan Transportation Authority provides fixed-route and paratransit service in the City of Austin and several surrounding jurisdictions.
CARTS	Capital Area Rural Transportation System provides fixed-route, commuter route, and demand response transit in portions of Bastrop, Blanco, Burnet, Caldwell, Fayette, Hays, Lee, Travis, and Williamson Counties.
Cellular Providers	Represents cellular service providers in the Austin Region.
City of Austin	Municipal government for the City of Austin. Includes both traffic and maintenance sections for the City as well as the Watershed department.
City of Austin and Travis County	Emergency medical services provider for Travis County, including the City of Austin.
City of Austin Aviation Department	City of Austin department responsible for the operation of Austin-Bergstrom International Airport.
City of Austin Fire Department	City of Austin department responsible for fire dispatch and response. Dispatched out of CTECC.
City of Austin Police Department	City of Austin department responsible for police dispatch. Dispatched out of CTECC.
City of Cedar Park	Municipal government for the City of Cedar Park. Includes both traffic and maintenance sections for the City.
City of Georgetown	Municipal government for the City of Georgetown. Includes both traffic and maintenance sections for the City.
City of Round Rock	Municipal government for the City of Round Rock. Includes both traffic and maintenance sections for the City.
City of Round Rock Public Safety	City of Round Rock department responsible for police and fire dispatch as well as operating the Round Rock EOC.
City of San Marcos	Municipal government for the City of San Marcos. Includes both traffic and maintenance sections for the City.
Commercial Information Provider	Private provider of regional transportation information, usually on a subscription basis.
Commercial Vehicle Fleet Operations	Private commercial vehicle operations that operate within the Region.
County Departments	County government departments such as road and bridge.

Table 4 – Austin Stakeholder Descriptions (Continued)

Stakeholder	Stakeholder Description
County Emergency Management Agencies	Agencies that coordinate their county's response to large-scale emergencies and disasters. This includes planning and activities for preparedness, response, and recovery phases of a disaster.
County Public Safety	County public safety dispatch and emergency response. Dispatch includes County Sheriff and any other county public safety services such as emergency medical services (EMS). In many counties responsibilities also include dispatch of Department of Public Safety troopers.
CTRMA	The Central Texas Regional Mobility Authority is responsible for the construction, maintenance and operation of several toll roads in the Region (i.e. US 183A).
Department of Public Safety	State public safety agency whose responsibilities include issuing AMBER Alerts.
Financial Institution	Banks involved in the transfer of funds for fare collection as well as for other fee based transportation services.
Hays County	Represents the county offices and stakeholders of Hays County.
Independent School Districts	Public school districts within the Region. The districts have been included primarily for their role in emergency evacuations where school buses are utilized.
Intercity Carriers	Private bus carriers that carry passengers to/from intercity terminals (e.g. Greyhound).
Local Media	Includes both print (newspaper) and broadcast (TV, radio) news media.
Lower Colorado River Authority	Manages the water supply of the lower Colorado River basin. LCRA generates electricity, operates the Mansfield Dam, the dam on Lake Buchanan as well as several smaller dams in the Region.
Municipalities	Municipalities located within the Region that are not specifically called out by the ITS architecture (i.e. Leander, Marble Falls, and Burnet). In some instances, this also includes counties not specifically called out.
NOAA	National Oceanic and Atmospheric Administration (includes the National Weather Service).
Other Regional Communications Providers	Intended to be a placeholder for other regional communications providers that operate on either 800 MHz or 900 MHz.
Other Transit Management Agencies	Includes regional transit agencies in the State of Texas including Corpus Christi, Dallas, Fort Worth, Houston, and San Antonio.
Private Concierge Service Provider	Private company who provides mayday support to vehicles through a subscription service.
Private Rail Operations	Companies that operate freight rail within the Region.
Private Tow/Wrecker Providers	Private companies that provide tow or wrecker services for the Region.
Private Transportation Providers	Private transportation service providers such as taxis, shuttle services, and the Texas State University bus system that operates within the Region.
Private Travelers	Traveling public accessing various modes of transportation, including surface streets, air, rail/transit, and non-motorized.
Public/Private Ambulance Providers	EMS providers located within the Region.

Table 4 – Austin Stakeholder Descriptions (Continued)

Stakeholder	Stakeholder Description
Radio Network Users	All current and future users of the radio network. This includes TMCs, maintenance dispatch and vehicles, emergency dispatches and vehicles, transit management/dispatch and vehicles, toll facilities, and multi-modal transportation service providers. The vision for the radio system is that in the future all members of these service groups will have interoperable voice and data radio systems to facilitate a coordinated response during an incident.
Regional Event Promoter	Group that promotes events within the Region, such as a Chamber of Commerce or Visitor's Bureau.
Regional Medical Centers	Hospital/trauma centers in the Region.
Regional Utility Companies	Utility companies that operate in the Region.
Rural Fire Departments	Rural fire departments that operate using paid, volunteer, or a combination of paid and volunteer staff. These departments are usually dispatched by the County Sheriff or other area public safety answering point (PSAP).
Service Agencies	State and Federal agencies who subsidize the funding of paratransit and other demand response transit providers.
Statewide Toll Authorities	Own and operate the statewide HUB system for toll collection and reconciliation.
TCEQ – Texas Commission on Environmental Quality	The Texas Commission on Environmental Quality that is responsible for measuring and evaluating the emissions data for cities within the state of Texas.
Texas DEM	The Texas Department of Emergency Management is a division of the Texas Department of Public Safety responsible for the response to large-scale emergencies and disasters.
Travis County Public Safety	Public safety and emergency response agencies for Travis County. Includes the Travis County Sheriff and Austin/Travis County EMS.
Travis County Transportation and Natural Resources Department	Department responsible for the construction and maintenance of county roads in Travis County.
TxDMV	Texas Department of Motor Vehicles. Responsible for the titling, registration, and licensing of all vehicles in the state and issuing permits for commercial vehicles to operate.
TxDOT	Texas Department of Transportation. Responsible for the maintenance and construction of interstates, state routes, and other state roadway facilities in Texas. This general TxDOT stakeholder includes all elements not part of the TxDOT Austin District.
TxDOT Austin District	Austin District of TxDOT. Includes traffic, maintenance, and planning and programming. The District includes Mason, Gillespie, Llano, Burnet, Blanco, Hays, Travis, Williamson, Caldwell, Bastrop, and Lee Counties.
TxDOT TOD	The TxDOT Toll Operations Division that is responsible for the construction, maintenance and operations of toll facilities in the region not managed by CTRMA.
TxDOT Travel Division	Represents the Travel Division for TxDOT.
University of Texas	The University of Texas (UT) at Austin. Includes all departments of the University, including the UT events department and the UT Police Department.
USGS	The US Geological Survey collects and analyzes environmental data in the region including water level data.

Table 4 – Austin Stakeholder Descriptions (Continued)

Stakeholder	Stakeholder Description
Williamson County Public Safety	Public safety and emergency response agencies for Williamson County. Includes the Williamson County Sheriff and Williamson County EMS.
Williamson County Road Department	Department responsible for the construction and maintenance of county roads in Williamson County.

4.2 ITS Elements

The ITS inventory is documented in the Regional ITS Architecture as elements. **Table 5** sorts the inventory by stakeholder so that each stakeholder can easily identify and review all of the architecture elements associated with their agency. The table includes a description of the element and the status of the element, which is indicated as either existing or planned. In many cases, an element classified as existing might still need to be enhanced to attain the service level desired by the Region.

Table 5 – Austin Inventory of ITS Elements

Stakeholder	Element Name	Element Description	Status
Amtrak	Amtrak Dispatch	The dispatch function for Amtrak.	Existing
Archive Data Users	Archive Data Users	Any user of archive data products from any Regional archive management system. This may include individual users, computer applications, or modeling systems utilizing the archived data.	Existing
Army Corps of Engineers	Army Corps of Engineers Flood Detectors	Flood monitoring equipment owned and operated by the Army Corps of Engineers. Used to determine water elevations of rivers, causeways, etc. and report it back to local agencies (traffic, transit, emergency management, maintenance, etc.).	Existing
	Army Corps of Engineers Flood Monitoring Center	Represents the control center for the Army Corps of Engineers where flood monitoring equipment sends data to.	Existing
Austin/Travis County Office of Emergency Management	Austin/Travis County EOC (CTECC)	The emergency operations center (EOC) for the City of Austin and Travis County that is located in the CTECC building in Austin.	Existing
Capital Area MPO	Capital Area MPO Archive	Archive management system for the Metropolitan Planning Organization for the City of Austin and surrounding areas.	Planned
CapMetro	CapMetro Barrier System	Barrier system used to close parking lots when at capacity, as well as at exit points for payment collection.	Planned
	CapMetro DMS	Dynamic message signs (DMS) owned and operated by CapMetro. Located at MetroRail stations and MetroRapid BRT stations.	Existing
	CapMetro Fixed-Route Operations Center	Dispatches all fixed-route transit vehicles for CapMetro. Includes fixed-route service to the University of Texas.	Existing
	CapMetro Fixed-Route Vehicles	Fixed-route vehicles owned and operated by CapMetro including MetroBus, MetroExpress, MetroFlyer, and UT Shuttles.	Existing
	CapMetro Freight and Passenger Rail Operations Center	The operations center for freight and passenger rail track owned and managed by CapMetro.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
CapMetro (continued)	CapMetro Lessee Freight Cars	Freight rail vehicles operating on CapMetro’s track.	Existing
	CapMetro Maintenance Garages	The maintenance and equipment repair facilities for CapMetro.	Existing
	CapMetro MetroAccess Paratransit Operations Center	Dispatches all MetroAccess vehicles for CapMetro.	Existing
	CapMetro MetroAccess Paratransit Vehicles	Demand response vehicles owned and operated by CapMetro.	Existing
	CapMetro MetroRail Passenger Rail Vehicles	Passenger rail vehicles owned and operated by CapMetro.	Existing
	CapMetro MetroRapid BRT Operations Center	Dispatches all MetroRapid Bus Rapid Transit (BRT) vehicles for CapMetro.	Existing
	CapMetro MetroRapid BRT Vehicles	Bus Rapid Transit (BRT) vehicles owned and operated by CapMetro.	Existing
	CapMetro Mobile App	Mobile phone ticketing application used for transit fares and also provides trip planning and real-time arrival information.	Existing
	CapMetro Multimodal Stations	Multimodal stations for CapMetro that may include any combination of park and ride lots, bike shelters and service from any of the following: MetroAccess, MetroBus, MetroExpress, MetroFlyer, MetroRail, and MetroRapid.	Existing
	CapMetro Parking Facility Equipment	Parking equipment owned by CapMetro that monitors parking lots, determines the availability of parking spaces, closes a barrier system when the lot is full, and opens a barrier system after a customer has paid for their parking fee.	Planned
	CapMetro Passes	Fare cards used for transit service on CapMetro vehicles.	Existing
	CapMetro Security Monitoring Field Equipment	Secure area monitoring devices owned and operated by CapMetro. Includes monitoring systems on buses, park and ride lots, or at transit terminals (including commuter rail).	Existing
	CapMetro Ticket Vending Machine	Transit fare kiosks owned and operated by CapMetro located at MetroRail stations that sell CapMetro Passes.	Existing
CapMetro Wayside Equipment	Wayside equipment owned and operated by CapMetro to support their freight and passenger rail operations.	Existing	

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
CapMetro (continued)	CapMetro Website	The website for CapMetro where fare and schedule information may be found and CapMetro Passes can be purchased.	Existing
	Regional Fare Card	A single electronic card that would be used primarily for transit fares throughout the state. Additional uses could include payment for parking and tolls.	Planned
	Transit Operations Personnel	CapMetro personnel that are responsible for various roles including passenger counting.	Existing
CARTS	CARTS Barrier System	Barrier system used to close parking lots when at capacity, as well as at exit points for payment collection.	Existing
	CARTS Demand Response Vehicles	Demand response vehicles owned and operated by the Capital Area Rural Transportation System (CARTS).	Existing
	CARTS DMS	Dynamic message signs (DMS) owned and operated by CARTS.	Existing
	CARTS Fare Card	A pre-paid rechargeable card that can be purchased online and used on certain CART routes.	Existing
	CARTS Fixed-Route Vehicles	Fixed-route vehicles owned and operated by CARTS.	Existing
	CARTS Maintenance Garage	The equipment maintenance garage for CARTS that performs the maintenance of all CART vehicles.	Existing
	CARTS Parking Facility Equipment	Parking equipment owned by CARTS that monitors parking lots, determines the availability of parking spaces, and closes a barrier system when the lot is full (and prior to paying for an exit).	Planned
	CARTS Security Monitoring Field Equipment	Secure area monitoring devices owned and operated by CARTS. Includes monitoring systems on buses, at bus stops, and at bus terminals.	Existing
	CARTS Transit Kiosks	Transit kiosks owned and operated by CARTS.	Existing
	CARTS Transit Operations Center	The transit dispatch function for CARTS. Dispatches all fixed-route vehicles and demand response vehicles.	Existing
	CARTS Website	The website for CARTS where fare and schedule information may be found. In the future you may be able to request and pay for a demand response transit trip. Includes interactive voice response services.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Cellular Providers	Cellular Communications Device Systems	The radio or voice communications network that is owned and operated by Cellular companies. Radio and voice networks used to transfer voice and data communications between agencies.	Existing
City of Austin	City of Austin Air Quality Division	The emissions management division for the City of Austin.	Existing
	City of Austin Asset Management System	This element represents a place-holder element for an asset management system for the City of Austin (e.g. bridge restrictions, pavement management, etc.).	Planned
	City of Austin Bicycle Detection App	Mobile phone application that allows cyclists to be detected by a traffic signal as they approach it.	Existing
	City of Austin CCTV Cameras	Closed circuit television (CCTV) cameras owned and operated by the City of Austin.	Existing
	City of Austin Convention and Visitors Bureau	The City of Austin department of tourism responsible for attracting various travelers, conventions, etc. to the City of Austin.	Existing
	City of Austin DMS	Dynamic message signs (DMS) owned and operated by the City of Austin.	Existing
	City of Austin Dynamic Lane Assignment Signals	Dynamic signals used to change lane configuration.	Existing
	City of Austin Emissions Monitoring Field Equipment	Emissions monitoring field equipment owned and operated by the City of Austin.	Existing
	City of Austin Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems, remote traffic microwave sensors, or traditional loops.	Existing
	City of Austin Fleet Services	The maintenance shop for all roadside equipment owned and operated by the City of Austin. Also provides maintenance to City of Austin vehicles.	Existing
	City of Austin Flood Closure Gates	Modified railroad closure gates operated by the City of Austin that are intended to keep traffic from flooded areas/roadways.	Existing
City of Austin Flood Detectors	Flood warning systems for the City of Austin that detect flood events at low water crossings (dips) throughout the city. System includes monitoring and alerting functions and may be interconnected with other roadway equipment such as DMS to alert motorists.	Existing	

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
City of Austin (continued)	City of Austin Flood Warning Beacons	Flashing beacons that are activated to warn motorists that water may be on a section of the roadway.	Existing
	City of Austin In-vehicle Parking Meters	Portable device that allows for the payment of on-street parking through the City of Austin Website without the use of on-street parking meters.	Existing
	City of Austin Parking Enterprise	City of Austin office that manages on-street parking and regulates private transportation service providers.	Existing
	City of Austin Parking Meters	On-street parking meters in the City of Austin that are managed by the City of Austin Parking Enterprise.	Existing
	City of Austin Pavement Management System	The City of Austin's Pavement Management System that assists in storing, retrieving, analyzing and reporting information to help with pavement-related decision-making processes.	Existing
	City of Austin Pedestrian Hybrid Beacons	A beacon that grants right of way to crossing pedestrians at a marked crosswalk.	Existing
	City of Austin Permit Issuing Department	Issues permits for parades, demonstrations, marathons, etc.	Planned
	City of Austin Permitting System	The City of Austin's commercial vehicle permitting system for hazardous materials (HAZMAT) and oversize/overweight permits.	Existing
	City of Austin Public Information Office	The office provides the official interface between the City of Austin traffic and maintenance departments and interests outside the departments such as the media.	Existing
	City of Austin Public Works Dispatch	The maintenance and construction division for the City of Austin. Operates as the dispatch function for the City of Austin maintenance and construction vehicles.	Existing
	City of Austin Public Works Vehicles	Maintenance and construction vehicles for the City of Austin.	Existing
	City of Austin Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Existing
	City of Austin RWIS	Road weather information systems (RWIS) that are owned and operated by the City of Austin.	Planned
City of Austin School Programmable Flasher System	School zone warning system installed in the City of Austin school zones to warn drivers. System includes pagers, flashers and DMS installed at flasher locations. Pagers are used to download/upload messages to the DMS and to activate/deactivate the flashers.	Existing	

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
City of Austin (continued)	City of Austin TMC	The traffic management center (TMC) located in Austin that controls the traffic signal systems and other field equipment owned by the City of Austin.	Existing
	City of Austin Traffic Database	The archive data management system for traffic operations and traffic information for the City of Austin.	Planned
	City of Austin Traffic Signals	Traffic signal systems owned and operated by the City of Austin.	Existing
	City of Austin Watershed Protection	Department within the City of Austin that is responsible for monitoring floods within the City and getting the information out to other agencies as well as the traveling public.	Existing
	City of Austin Website	Transportation information web page for the City of Austin. Currently offers information on on-street parking availability. In the future will include real-time construction, work zone, special event, incident, and traffic information.	Existing
City of Austin and Travis County	City of Austin/Travis County 911 Dispatch Center (CTECC)	The 911 public safety answering point (PSAP) for the City of Austin. Also dispatches emergency medical services (EMS) and County Sheriff for all of Travis County. Collocated with the TxDOT Austin District TMC – Combined Transportation and Emergency Communications Center (CTECC).	Existing
	City of Austin/Travis County Radio Systems	The radio communications network that is owned and operated by Travis County. Radio networks used to transfer voice and data communications between agencies.	Existing
City of Austin Aviation Department	ABIA (Airport) Police Dispatch	Police dispatch for the airport grounds at Austin Bergstrom International Airport (ABIA).	Existing
	ABIA (Airport) Police Vehicles	Police vehicles owned and operated by ABIA. Includes MDTs in police cruisers.	Existing
	Austin Bergstrom International Airport	The international airport that serves the Austin area.	Existing
City of Austin Fire Department	City of Austin Fire Vehicles	Fire vehicles owned and operated by the City of Austin. ITS technologies on-board fire vehicles include MDTs, AVL, signal pre-emption devices, etc. Also includes HAZMAT vehicles dispatched within the City limits.	Existing
City of Austin Police Department	City of Austin Crash Records Database	Crash or incident records database collected by the City of Austin.	Existing
	City of Austin Police Vehicles	Police vehicles owned and operated by the City of Austin. ITS technologies on-board cruisers include MDTs, AVL, etc.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
City of Cedar Park	City of Cedar Park CCTV Cameras	Closed circuit television (CCTV) cameras owned and operated by the City of Cedar Park.	Existing
	City of Cedar Park DMS	Dynamic message signs (DMS) owned and operated by the City of Cedar Park.	Planned
	City of Cedar Park Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems, remote traffic microwave sensors, or traditional loops.	Existing
	City of Cedar Park Flood Closure Gates	Gates operated by the City of Cedar Park that are intended to keep traffic from flooded areas/roadways.	Planned
	City of Cedar Park Flood Detectors	Flood warning systems for the City of Cedar Park that detect flood events at low water crossings (dips) throughout the city. System includes monitoring and alerting functions and may be interconnected with other roadway equipment such as warning beacons to alert motorists.	Planned
	City of Cedar Park Flood Warning Beacons	Flashing beacons that are activated to warn motorists that water may be on a section of the roadway.	Planned
	City of Cedar Park Public Information Office	The office provides the official interface between the City of Cedar Park traffic and maintenance departments and interests outside the departments such as the media.	Existing
	City of Cedar Park Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Existing
	City of Cedar Park School Programmable Flasher Systems	School zone warning system installed in the City of Cedar Park school zones to warn drivers. System includes pagers, flashers and DMS installed at flasher locations. Pagers are used to download/upload messages to the DMS and to activate/deactivate the flashers	Existing
	City of Cedar Park TMC	The Traffic Management Center (TMC) located in Cedar Park that controls the traffic signal systems and other field equipment owned by the City of Cedar Park.	Existing
City of Cedar Park Traffic Signals	Traffic signal systems owned and operated by the City of Cedar Park.	Existing	

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
City of Georgetown	City of Georgetown CCTV Cameras	Closed circuit television (CCTV) cameras owned and operated by the City of Georgetown.	Planned
	City of Georgetown DMS	Dynamic message signs (DMS) owned and operated by the City of Georgetown.	Planned
	City of Georgetown Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems, remote traffic microwave sensors, or traditional loops.	Existing
	City of Georgetown Flood Closure Gates	Gates operated by the City of Georgetown that are intended to keep traffic from flooded areas/roadways.	Planned
	City of Georgetown Flood Detectors	Flood warning systems for the City of Georgetown that detect flood events at low water crossings (dips) throughout the city. System includes monitoring and alerting functions, and may be interconnected with other roadway equipment such as beacons to alert motorists that the roadway is flooded ahead.	Existing
	City of Georgetown Flood Warning Beacons	Flashing beacons that are activated to warn motorists that water may be on a section of the roadway.	Planned
	City of Georgetown Public Information Office	The office provides the official interface between the City of Georgetown traffic and maintenance departments and interests outside the departments such as the media.	Existing
	City of Georgetown Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Planned
	City of Georgetown School Programmable Flasher Systems	School Zone warning system installed in the City of Georgetown school zones to warn drivers. System includes pagers, flashers and DMS installed at flasher locations. Pagers are used to download/upload messages to the DMS and to activate/deactivate the flashers.	Existing
	City of Georgetown TOC	The TOC located in Georgetown that controls the traffic signal systems and other field equipment owned by the City of Georgetown.	Planned
City of Georgetown Traffic Signals	Traffic signal systems owned and operated by the City of Georgetown.	Existing	

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
City of Round Rock	City of Round Rock CCTV Cameras	Closed circuit television (CCTV) cameras that are owned and operated by the City of Round Rock.	Existing
	City of Round Rock Communications Division	The office provides the official interface between the City of Round Rock traffic and maintenance departments and interests outside the departments such as the media.	Existing
	City of Round Rock Convention and Visitors Bureau	The City of Round Rock department of tourism responsible for attracting various travelers, conventions, etc. to the City of Round Rock.	Existing
	City of Round Rock Demand Response Vehicles	Demand Response Vehicles owned and operated by the City of Round Rock	Existing
	City of Round Rock DMS	Dynamic message signs (DMS) owned and operated by the City of Round Rock.	Planned
	City of Round Rock Equipment Repair Facility	The maintenance shop for all roadside equipment owned and operated by the City of Round Rock. Also provides maintenance to City of Round Rock vehicles.	Existing
	City of Round Rock Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems, remote traffic microwave sensors, or traditional loops.	Existing
	City of Round Rock Flood Closure Gates	Gates operated by the City of Round Rock that are intended to keep traffic from flooded areas/roadways.	Existing
	City of Round Rock Flood Detectors	Flood warning systems for the City of Round Rock that detect flood events at low water crossings (dips) throughout the city. System includes monitoring and alerting functions, and may be interconnected with other roadway equipment such as beacons to alert motorists that the roadway is flooded ahead.	Existing
	City of Round Rock Flood Warning Beacons	Flashing beacons that are activated to warn motorists that water may be on a section of the roadway.	Planned
	City of Round Rock Office of Emergency Management	Office responsible for emergency preparedness and coordination. Also monitors low water crossings in the City of Round Rock.	Existing
	City of Round Rock Pavement Management System	The City of Round Rock's Pavement Management System that assists in storing, retrieving, analyzing and reporting information to help with pavement-related decision-making processes.	Existing
City of Round Rock Permitting System	The City of Round Rock's commercial vehicle permitting system for HAZMAT and oversize/overweight permits.	Existing	

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
City of Round Rock (continued)	City of Round Rock Portable DMS	Portable dynamic message signs (DMS) owned and operated by the City of Round Rock.	Planned
	City of Round Rock Public Works Dispatch	The maintenance and construction division for the City of Round Rock. Operates as the dispatch function for the City of Round Rock's maintenance and construction vehicles.	Existing
	City of Round Rock Public Works Vehicles	Maintenance and construction vehicles for the City of Round Rock.	Existing
	City of Round Rock Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Planned
	City of Round Rock Rectangular Rapid Flash Beacons	High intensity LEDs that enhance a warning sign to alert motorist of potential conflicts within the roadway, particularly cyclist and pedestrians.	Existing
	City of Round Rock School Programmable Flasher Systems	School Zone warning system installed in the City of Round Rock school zones to warn drivers. System includes pagers, flashers and DMS installed at flasher locations. Pagers are used to download/upload messages to the DMS and to activate/deactivate the flashers.	Planned
	City of Round Rock TMC	The TMC located in Round Rock that controls the traffic signal systems and other field equipment owned by the City of Round Rock.	Existing
	City of Round Rock Traffic Signals	Traffic signal systems owned and operated by the City of Round Rock.	Existing
	City of Round Rock Website	Transportation information website for the City of Round Rock. In the future will include real-time construction, work zone, special event, incident, and traffic information.	Existing
City of Round Rock Public Safety	City of Round Rock Communications Center	Local PSAP for the City of Round Rock.	Existing
	City of Round Rock Crash Records Database	Crash or incident records database collected by the City of Round Rock.	Existing
	City of Round Rock EOC	The emergency operations center for the City of Round Rock that is activated in the event of a natural or man-made disaster, or anytime a major threat is determined to exist.	Existing
	City of Round Rock Fire Vehicles	Fire vehicles owned and operated by the City of Round Rock. ITS technologies on-board fire vehicles include MDTs, AVL, signal preemption devices, etc.	Existing
	City of Round Rock Police Vehicles	Police vehicles owned and operated by the City of Round Rock. ITS technologies on-board cruisers include MDTs, AVL, etc.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
City of San Marcos	City of San Marcos CCTV Cameras	CCTV cameras owned and operated by the City of San Marcos.	Existing
	City of San Marcos Communications Office	The office provides the official interface between the City of San Marcos traffic and maintenance departments and interests outside the departments such as the media.	Existing
	City of San Marcos DMS	Dynamic message signs (DMS) owned and operated by the City of San Marcos.	Planned
	City of San Marcos Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems, remote traffic microwave sensors, or traditional loops.	Existing
	City of San Marcos Flood Closure Gates	Gates operated by the City of San Marcos that are intended to keep traffic from flooded areas/roadways.	Planned
	City of San Marcos Flood Detectors	Flood warning systems for the City of San Marcos that detect flood events at low water crossings (dips) throughout the city. System includes monitoring and alerting functions, and may be interconnected with other roadway equipment such as beacons to alert motorists.	Planned
	City of San Marcos Flood Warning Beacons	Flashing beacons that are activated to warn motorists that water may be on a section of the roadway.	Planned
	City of San Marcos Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Planned
	City of San Marcos Rectangular Rapid Flash Beacons	High intensity LEDs that enhance a warning sign to alert motorist of potential conflicts within the roadway, particularly cyclist and pedestrians.	Existing
	City of San Marcos School Programmable Flasher Systems	School Zone warning system installed in the City of San Marcos school zones to warn drivers. System includes pagers, flashers and DMS installed at flasher locations. Pagers are used to download/upload messages to the DMS and to activate/deactivate the flashers.	Existing
	City of San Marcos TOC	A virtual traffic management center that controls the traffic signal systems and other field equipment owned by the City of San Marcos.	Existing
	City of San Marcos Traffic Signals	Traffic signal systems owned and operated by the City of San Marcos.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Commercial Vehicle Fleet Operations	Commercial Vehicles	Privately owned commercial vehicles that travel throughout the Region. Included in the architecture to cover HAZMAT incident reporting.	Existing
Commercial Vehicle Fleet Operations	Private Fleet Management Systems	Includes private commercial fleet management operations in the Region.	Existing
County Departments	County Asset Management System	This element represents a place-holder element for an asset management system for the counties within the Region (e.g. bridge restrictions, pavement management, etc.).	Planned
	County Equipment Repair Garage	The maintenance shop for all roadside equipment owned and operated by the counties within the Region.	Existing
	County ITS Field Equipment	Represents ITS field equipment owned and operated by the counties not expressly called out in this Architecture, but that are within the Region. Includes CCTV cameras, portable DMS traffic sensors, traffic signals, etc.	Existing
	County Maintenance and Construction Operations Dispatch	The maintenance and construction division for the unnamed Counties within the Region. Operates as the dispatch function for and County's maintenance and construction vehicles.	Existing
	County Maintenance and Construction Vehicles	Maintenance and construction vehicles for the unnamed Counties within the Region.	Planned
County Emergency Management Agencies	Austin Region Incident and Mutual Aid Network	The regional incident and mutual aid network where all emergency management providers can share or gather information regarding an incident.	Planned
	County EOC	County EOCs, which represents the EOCs in each of the counties in the Region.	Planned
County Public Safety	County Public Safety Dispatch and PSAP	Dispatch center for sheriff, fire and EMS at the county level in the TxDOT Austin Region.	Existing
	County Public Safety Vehicles	County emergency vehicles including sheriff and EMS. Some preemption for EMS vehicles.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
CTRMA	CTRMA CCTV Cameras	Closed circuit television (CCTV) cameras owned and operated by the Central Texas Regional Mobility Authority (CTRMA).	Existing
	CTRMA DMS	Dynamic message signs (DMS) owned and operated by CTRMA.	Existing
	CTRMA Field Sensors	Field sensors owned and operated by CTRMA.	Existing
	CTRMA HERO Vehicles	Roadway service patrol vehicles operated by CTRMA.	Existing
	CTRMA Operations Center	The customer service center for the CTRMA. This represents the backend systems of the Toll Authority.	Existing
	CTRMA Toll Collection SmartHUB	A HUB device owned and operated by CTRMA that relays toll collection information to toll authorities throughout the Region.	Existing
	CTRMA Toll Plazas	Toll plazas owned and operated by CTRMA.	Existing
	CTRMA Toll Reconciliation Office	The CTRMA office that reconciles toll payments with the TxDOT Toll Operations Division (TOD). It is intended that TOD does the toll collection for the CTRMA. This office coordinates that collection through CTRMA toll plazas.	Existing
	CTRMA Website	Website owned and operated by CTRMA. Contains toll information and vehicle tag information posted in the website.	Existing
Department of Public Safety	DPS and Other Public Safety Spectrum Systems	The radio communications network that is owned and operated by the Department of Public Safety (DPS) and other public safety providers. Spectrum system is used to transfer voice and data communications between agencies.	Existing
	DPS Communications	Dispatches Highway Patrol Vehicles using two-way radio communication. Responsible for regional evacuation coordination.	Existing
	DPS Emergency Vehicles	Highway Patrol vehicles that provide public safety services on state owned roads and highways.	Existing
	State Office of Emergency Management	State office that coordinates threat activities for the Texas Department of Public Safety (DPS).	Existing
	Statewide EOC	The statewide emergency operations center (EOC).	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

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Hays County	Hays County Flood Closure Gates	Gates operated by the City of Austin that are intended to keep traffic from flooded areas/roadways.	Planned
	Hays County Flood Detectors	Flood warning systems for Hays County that detect flood events at low water crossings (dips) throughout the county. System includes monitoring and alerting functions, and may be interconnected with other roadway equipment such as DMS to alert motorists that the roadway is flooded ahead.	Existing
	Hays County Flood Warning Beacons	Flashing beacons that are activated to warn motorists that water may be on a section of the roadway.	Existing
	Hays County Office of Emergency Management	The Hays County agency that is responsible for communications and coordination of local resources during a disaster or large scale incident or other hazards.	Existing
	Hays County Radio Systems	The radio communications network that is owned and operated by Hays County. Radio networks used to transfer voice and data communications between agencies.	Existing
Independent School Districts	Independent School District Buses	Buses owned and operated by the independent school districts. May come equipped with security measures.	Existing
	Independent School District Dispatch	Dispatch function for each of the independent school districts in the Region. Includes radio communication with school buses.	Existing
	Independent School District Police	A private police force that patrols and responds to incidents on independent school district buses.	Existing
Intercity Carriers	Intercity Buses	The buses owned and operated by the intercity bus companies.	Planned
	Intercity Carrier Dispatch	The dispatch function for intercity bus systems (e.g. Greyhound).	Planned
Local Media	Local Print and Broadcast Media	Local TV (including cable TV), radio, and newspapers.	Existing
Lower Colorado River Authority	LCRA Flood Monitoring Center	The regional office/control center that monitors flood detection devices and provides real-time flood information to regional transportation providers.	Existing
	LCRA Flood Monitoring Field Equipment	Flood monitoring field equipment owned and operated by the Lower Colorado River Authority (LCRA) at the dams in the Region.	Existing
	LCRA Radio Systems	The radio communications network that is owned and operated by the Lower Colorado River Authority (LCRA). Radio networks used to transfer voice and data communications between agencies.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Municipalities	Municipal Asset Management System	This element represents a place-holder element for an asset management system for the municipalities within the Region (e.g. bridge restrictions, pavement management, etc.).	Planned
	Municipal Convention and Visitors Bureau	The municipal department of tourism that is responsible for attracting various travelers, conventions, etc. to the municipality.	Existing
	Municipal EOCs	The emergency operations centers owned and operated by the municipalities throughout the Region.	Existing
	Municipal Equipment Repair Garage	The maintenance shop for all roadside equipment owned and operated by the municipalities not specifically called out in this architecture. Also provides maintenance to the same municipality's vehicles.	Existing
	Municipal Fire Vehicles	Municipal fire vehicles, including preemption capabilities through the cities and the municipalities within the Region.	Existing
	Municipal ITS Field Equipment	Represents ITS field equipment owned and operated by the municipalities not expressly called out in this Architecture, but that are within the Region. Includes CCTV cameras, traffic sensors, traffic signals, etc.	Planned
	Municipal or County Permitting System	Every city (including Austin) that has a commercial vehicle HAZMAT and oversize/overweight permitting process.	Existing
	Municipal Pavement Management System	The Pavement Management System for all municipalities within the region (including Cedar Park, Georgetown, and San Marcos) that assists in storing, retrieving, analyzing, and reporting information to help with pavement-related decision-making processes.	Existing
	Municipal Public Information Office	The office provides the official interface between municipal traffic and maintenance departments and interests outside the departments such as the media.	Existing
	Municipal Public Safety Dispatch and PSAP	This is a general element that is meant to represent the 911 dispatch centers (dispatching police, fire and EMS) for the cities or municipalities within the Region that are not specifically called out in the architecture.	Existing
Municipal Public Safety Vehicles	Municipal emergency vehicles including police, fire, and EMS. Some preemption for fire and EMS vehicles.	Existing	

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Municipalities (continued)	Municipal PWD Vehicles	Maintenance and construction vehicles for the unnamed municipalities within the Region.	Existing
	Municipal School Programmable Flasher Systems	School Zone warning system installed in the municipalities within the Region at school zones to warn drivers. System includes pagers, flashers and DMS installed at flasher locations. Pagers are used to download/upload messages to the DMS and to activate/deactivate the flashers.	Planned
	Municipal Traffic Database	The archive data management system for traffic operations and traffic information for the municipalities within the Region.	Existing
	Municipal Website	Transportation information website for each municipality. In the future will include real-time construction, work zone, special event, incident, and traffic information.	Planned
	Municipal/County Crash Records Database	Crash records database collected by the municipalities or counties within the Region.	Existing
	Municipal/County PWD	The maintenance and construction division for the municipalities or counties within the Region. Operates as the dispatch function for the municipal or maintenance and construction vehicles.	Existing
	Municipal/County Traffic Operations Center	Municipal centers that operate traffic signal systems within the municipalities not specifically called out within the Region.	Planned
	Municipal/County Transit Operations Center	Municipal centers that operate transit systems within the municipalities not specifically called out within the Region. This element includes services such as the Round Rock Demand Response Bus Service.	Existing
NOAA	National Weather Service	Service for national, regional, and local weather information.	Existing
Other Regional Communications Providers	Other 800 MHz Communications Systems	Intended to represent the other 800 MHz communications systems that are not specifically identified in the architecture.	Planned
	Other 900 MHz Communications Systems	Intended to represent the other 900 MHz communications systems that are not specifically identified in the architecture.	Planned
Other Transit Management Agencies	Other Transit Management Agencies	Includes regional transit management agencies in the State of Texas including the Cities of Corpus Christi, Dallas, Fort Worth, Houston and San Antonio.	Existing
Private Concierge Service Provider	Private Concierge Service Provider	This element represents the private concierge (mayday) service providers in some private and commercial vehicles (e.g. OnStar).	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Private Information Provider	Private Sector Traveler Information Services	Traveler information service operated by a private entity.	Existing
	Social Media Networking Services	Subscription based services operated by private providers that provide an option for real-time traveler information dissemination. Examples of such services include Facebook or Twitter.	Existing
Private Rail Operations	Rail Operations Centers	The dispatch centers for major railroads in the region (e.g. Union Pacific in Omaha, NE).	Existing
	Rail Operators Rail Cars	Rail-based commercial vehicles.	Existing
	Rail Operators Wayside Equipment	The rail operated equipment at highway rail intersections. Interconnect with traffic control.	Existing
Private Tow/Wrecker Providers	Private Tow/Wrecker Dispatch	Dispatch function for privately owned tow or wrecker service. Based on a rotation list.	Existing
	Private Tow/Wrecker Vehicles	The tow or wrecker vehicles in the Region.	Existing
Private Transportation Providers	Private Transportation Provider Demand Response Vehicles	Demand response vehicles owned and operated by private transportation providers.	Existing
	Private Transportation Provider Fixed-route Vehicles	Fixed-route vehicles that are owned and operated by private transportation providers.	Existing
	Private Transportation Provider Kiosks	Kiosks that are owned and operated by private transportation providers. May include LED displays at bus stops, fare card purchasing, etc.	Planned
	Private Transportation Provider Operations	Private transportation providers that dispatch private taxis, shuttles, and Texas State University transportation services in the Region.	Existing
	Private Transportation Provider Operations Website	Local website for private transportation providers. May be able to request a demand response service from the agency website.	Planned
Private Travelers	Bicyclists	Individuals operating a vehicle that is powered by humans through pedaling with two or more wheels in tandem.	Existing
	Pedestrians	Individuals afoot or using a motorized or non-motorized wheelchair.	Existing
	Private Travelers Personal Computing Device	Includes personal and office computers, cell phones, and other devices used by travelers to receive ITS information.	Existing
	Private Vehicles	Vehicles owned by private individuals that traverse the Region.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Public/Private Ambulance Providers	Public/Private Ambulance Dispatch	Dispatch functions for public/private ambulance services within the Region.	Existing
	Public/Private Ambulance Vehicles	The vehicles dispatched by public or private ambulance companies.	Existing
Radio Network Users	Radio Network Users	This element represents the radio system for the Austin Region. The ultimate goal of this system is to provide interoperable voice and data radio communications to agencies in the Region.	Existing
Regional Event Promoter	Special Event Sponsors and Promoters	Promoters and sponsors of special events. They coordinate with traffic and emergency providers.	Existing
Regional Medical Centers	Regional Medical Centers	Medical facilities (public and private) found in the Region.	Existing
Regional Utility Companies	Regional Utility Companies	Utility companies that operate in the region and coordinate with maintenance activities of the local jurisdictions for right of way issues or service issues. Could also be contacted in the event of an incident where a certain utility could be threatened.	Existing
Rural Fire Departments	Rural Fire Department Dispatch	Volunteer fire departments dispatch. Frequently this is done by the County Sheriff's office.	Existing
	Rural Fire Department Vehicles	Fire vehicles owned and operated by volunteer fire departments.	Existing
Service Agencies	Service Agencies	Agencies that help subsidize the funding for paratransit operations for special case citizens to ensure that these citizens have transportation to and from where they need to go (generally to medical appointments).	Existing
Statewide Toll Authorities	Statewide Toll Collection SmarHUB	HUB system operated by toll authorities around the state for the reconciliation of tolls between toll authorities.	Existing
TCEQ – Texas Commission of Environmental Quality	TCEQ Field Emissions Monitors	Emissions monitoring field equipment owned and operated by the Texas Commission of Environmental Quality (TCEQ).	Existing
	TCEQ Monitoring Operations Section	The section 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
Texas DEM	Texas DEM Disaster District Information System	The disaster information system run by the Division of Emergency Management in the event of a natural or man-made disaster.	Planned
Travis County Public Safety	Travis County Public Safety Vehicles	Sheriff, fire, or EMS vehicles owned and operated by Travis County. Onboard ITS systems include MDTs, AVL, cameras, etc.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
Travis County Transportation and Natural Resources Department	Travis County Equipment Repair Garage	The maintenance shop for all roadside equipment owned and operated by Travis County. Also provides maintenance to Travis County vehicles.	Existing
	Travis County Maintenance and Construction Operations Dispatch	The maintenance and construction division for Travis County. Operates as the dispatch function for Travis County's maintenance and construction vehicles.	Existing
	Travis County Maintenance and Construction Vehicles	Maintenance and construction vehicles for Travis County.	Existing
TxDMV	TxDMV Central Permitting Office	The central permitting office for TxDMV. Coordinates permits with other states and acts as a data repository for regional permits.	Existing
	TxDMV Motor Carrier Routing Information	This on-line system allows motor carriers to view routing and roadway information, including load restricted bridges, low vertical clearance locations, metro lane closures, and permit restrictions. Bridge restriction information includes TxDOT as well as local agency bridges. Low vertical clearance, permit restriction, and metro lane closure information is available by TxDOT District.	Existing
	TxDMV Other Permitting Systems	Localized permitting systems in other regions.	Existing
TxDOT	Statewide Crash Records Information System	Statewide database of vehicle crash records. Input to system provided by elements in the Region.	Existing
	TxDOT 511 System	Planned statewide phone based traveler information system.	Planned
	TxDOT BRINSAP	TxDOT Bridge Inspection and Inventory System. Statewide system holding information regarding the inventory and inspection status of all bridges.	Existing
	TxDOT Demand Response Transit Intake Center	The center owned and operated by TxDOT where residents can either call in or go online and request and pay for a demand responsive transit plan.	Existing
	TxDOT Other District Maintenance Sections Dispatch	Municipal, county, and TxDOT Maintenance sections in neighboring regions.	Existing
	TxDOT Other District TMCs	Traffic Management Centers in other TxDOT Districts (i.e. TranStar, Stratus, DalTrans, TransVision, TransVista and Pegasus).	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
TxDOT (continued)	TxDOT Rest Areas/Visitor Centers/Truck Stops/Service Plaza Kiosks	This represents the rest areas and visitor centers with varied amenities that are existing or planned by TxDOT. Tourist information, emergency evacuation information, and general traffic information could be provided in the future.	Planned
	TxDOT San Antonio District TMC (TransGuide)	TransGuide serves as the TMC for the San Antonio District and also initiates AMBER Alert procedures in the other TxDOT Districts at the direction of the DPS.	Existing
	TxDOT Statewide Emergency Management Coordinator	TxDOT representative at State EOC who communicates information to the TxDOT maintenance sections and TxDOT traffic sections.	Existing
	TxDOT Statewide Pavement Management System	Statewide Pavement Management System that has an interface to the district Pavement Management System. This information is made available on the Internet.	Existing
	TxDOT Statewide Roadway Data Collection System	Collects roadway data across the state for TxDOT.	Existing
TxDOT Austin District	TxDOT Austin District Active Traffic Management	Lane control signals owned and operated by TxDOT Austin.	Existing
	TxDOT Austin District Area Engineers Office	Construction design and supervision (schedules and plans) for the Austin District. Provide content to TMC's for maintenance and construction road status.	Existing
	TxDOT Austin District CCTV Cameras	Closed Circuit Television Cameras (CCTV) owned and operated by TxDOT Austin.	Existing
	TxDOT Austin District Changeable Speed Limit Signs	City of Austin roadway equipment used to raise or lower speed limits on the roadway.	Planned
	TxDOT Austin District DMS	Dynamic Message Signs (DMS) owned and operated by TxDOT Austin.	Existing
	TxDOT Austin District Field Sensors	Traffic and vehicle sensors owned and operated by TxDOT Austin.	Existing
	TxDOT Austin District Flood Detectors	Flood warning systems owned and operated by TxDOT that detect flood events at low water crossings on TxDOT roads. System includes monitoring and alerting functions, and may be interconnected with other roadway equipment such as DMS or beacons to alert motorists that a roadway is flooded ahead.	Planned
	TxDOT Austin District HAR	Highway Advisory Radio (HAR) owned and operated by TxDOT Austin.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
TxDOT Austin District (continued)	TxDOT Austin District Historical Traffic Database	The archive data management system for traffic operations and traffic information for the TxDOT Austin District.	Existing
	TxDOT Austin District ITS Field Equipment	ITS field equipment not specifically called out in the architecture. Includes speed monitoring equipment, barrier system equipment, etc.	Existing
	TxDOT Austin District Maintenance and Construction Vehicles	Maintenance and construction vehicles for the TxDOT Austin District.	Existing
	TxDOT Austin District Maintenance Office	Office in charge of construction and maintenance operations for the TxDOT Austin district.	Existing
	TxDOT Austin District Maintenance Sections Dispatch	TxDOT maintenance sections for Austin Region. Dispatches maintenance vehicles and equipment for maintaining road and ITS equipment owned by TxDOT.	Existing
	TxDOT Austin District Mechanic Shop	This facility provides repair and maintenance services for TxDOT maintenance vehicles and equipment (e.g. portable DMS).	Existing
	TxDOT Austin District Pavement Management System	District Pavement Management System that assists in storing, retrieving, analyzing and reporting information to help with pavement-related decision-making processes.	Existing
	TxDOT Austin District Public Information Office	The office provides the official interface between the TxDOT traffic and maintenance departments and interests outside the departments such as the media.	Existing
	TxDOT Austin District Public Transportation Management System (PTMS)	Maintains a Transit Vehicle Inventory for public transit vehicles that receive federal and state funds. Also able to generate ridership information such as cost per mile, revenues per mile, total revenues, etc.	Existing
	TxDOT Austin District Ramp Metering Equipment	Roadway equipment used in the operation of a ramp metering system. Includes the signals and any other ITS equipment.	Planned
	TxDOT Austin District Roadway Data Collection System	The roadway data collection system (including loop detectors and counters) archive management system owned and operated by the TxDOT Austin district.	Existing
	TxDOT Austin District RWIS	Road weather information systems (RWIS) that are owned and operated by TxDOT Austin.	Planned
	TxDOT Austin District Security Monitoring Field Equipment	Security equipment owned and operated by the TxDOT Austin District.	Planned

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
TxDOT Austin District (continued)	TxDOT Austin District Signal Server	The traffic management center (server) that controls the traffic signal systems owned and operated by TxDOT Austin.	Existing
	TxDOT Austin District Signals	Traffic signals owned and operated by TxDOT Austin.	Existing
	TxDOT Austin District TMC (CTECC)	The traffic management center for the TxDOT Austin District. Controls all TxDOT ITS field equipment except signal systems. Located in CTECC, the Combined Transportation Emergency Communications Center.	Existing
	TxDOT Austin District Website	Transportation information website for the Austin district. In the future it will include real-time construction, work zone, special event, incident, and traffic information. (Handled by the Information Resource Office.)	Existing
	TxDOT Austin District Work Zone Equipment	Work zone monitoring and alerting equipment owned by TxDOT Austin.	Existing
TxDOT Travel Division	TxDOT Highway Conditions Reporting System	Provides detailed construction closures, detours, restrictions, permit and weather information. Compiled by District Public Information staff and area maintenance personnel. Accessible to the public on the internet at www.dot.state.tx.us/hcr/main.htm . The system provides access to information by route, county, or roadway condition. Includes contact information, Phone (800-452-9292) for construction, closures, hazards and detour information.	Existing
TxDOT TOD	Toll Payment Device	A device by which travelers can pay a toll – a Regional Smartcard system.	Existing
	TxDOT TOD DVAS	Digital Video Auditing System (DVAS) cameras that are activated by passing vehicles. TOD uses these images for auditing purposes only.	Existing
	TxDOT TOD Customer Service Center	The customer service center for the TxDOT Toll Operations Division. This represents the backend systems of the Turnpike.	Existing
	TxDOT TOD DMS	DMS owned and operated by TxDOT Toll Operations Division.	Planned
	TxDOT TOD Field Sensors	Field sensors (for traffic) owned and operated by the TxDOT Toll Operations Division.	Planned
	TxDOT TOD Toll Collection SmartHUB	A HUB device owned and operated by the TxDOT Toll Operations Division that relays toll collection information to toll authorities throughout the region for reconciliation of tolls.	Existing

Table 5 – Austin Inventory of ITS Elements (Continued)

Stakeholder	Element Name	Element Description	Status
TxDOT TOD (continued)	TxDOT TOD TxTag Toll Collection Website	Website for the Toll Operations Division.	Existing
	TxDOT TOD Toll Plazas	The toll plazas on TxDOT owned highways that include automated toll collection systems, tag readers, or other ITS devices.	Existing
University of Texas	UT Events Office	The event office at the University of Texas that coordinates with regional traffic systems for large events (football games, etc.).	Existing
	UT Police Dispatch	The police dispatch for the University Police Department.	Existing
	UT Police Vehicles	Police vehicles owned and operated by the University of Texas at Austin. Includes the ITS equipment installed on the cruisers (AVL, MDTs, etc.).	Existing
USGS	USGS Flood Monitoring Center	Flood warning devices owned and operated by the USGS in waterways in the Region including the Colorado River, Bull Creek, Barton Creek, and Onion Creek among numerous others.	Existing
	USGS Flood Monitoring Devices	Flood warning devices owned and operated by the USGS.	Existing
Williamson County Public Safety	Williamson County Emergency Communications Center	The local 911 dispatch center (rural) for Williamson County that dispatched Williamson County Sheriff, fire, EMS, rural fire department, and all municipal public safety vehicles). Has coordinated computer-aided dispatch (CAD) system with City of Round Rock.	Existing
	Williamson County EOC	The Williamson County emergency operations center (EOC).	Planned
	Williamson County Public Safety Vehicles	Sheriff, fire, or EMS vehicles owned and operated by Williamson County. Onboard ITS systems include MDTs, AVL, cameras, etc.	Existing
	Williamson County Radio Systems	The radio communications network that is owned and operated by Williamson County. Radio networks used to transfer voice and data communications between agencies.	Existing
Williamson County Road Department	Williamson County Equipment Repair Facility	The maintenance shop for all roadside equipment owned and operated by Williamson County. Also provides maintenance to Williamson County vehicles.	Existing
	Williamson County Maintenance and Construction Operations	The maintenance and construction division for Williamson County. Operates as the dispatch function for Williamson County maintenance and construction vehicles.	Existing
	Williamson County Maintenance and Construction Vehicles	Maintenance and construction vehicles for Williamson County.	Existing

5. REGIONAL ITS ARCHITECTURE

An important initial step in the architecture development process is to establish an inventory of existing ITS elements. At the Kick-Off Workshop and through subsequent discussions with agency representatives throughout the Region, Austin stakeholders provided the team with information about existing and planned systems that would play a role in the Region's ITS architecture. The National ITS Architecture has following eight groups of ITS service areas:

Traffic Management – Includes CTECC as well as other existing and future traffic management centers (TMCs) and traffic operations centers (TOCs), detection systems, CCTV cameras, fixed and portable dynamic message signs (DMS), electronic toll collection, and other related technologies.

Emergency Management – Includes emergency operations/management centers (including CTECC), 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 coordination with the Commercial Vehicle Information Systems and Networks (CVISN) program.

Traveler Information – Includes broadcast traveler information, traveler information kiosks and highway advisory radio (HAR).

Archived Data Management – Includes electronic data management and archiving systems.

Vehicle Safety – These systems were discussed; however, at this time, this service group is primarily a private sector initiative to incorporate technologies such as intersection collision avoidance and automated vehicle operation systems into vehicles. Stakeholders identified the need to plan and adapt to the changes that are associated with this service areas.

5.1 ITS Service Packages

In the National ITS Architecture, services that are provided by ITS are referred to as service packages. ITS service packages can include several stakeholders and elements that work together to provide a service in the Region. Examples of service packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 97 ITS service packages identified in the National ITS Architecture Version 7.0, which was the most recent version available of the National ITS architecture at the time of the Austin Regional ITS Architecture update. It should be noted that in previous versions of the Austin Area Regional ITS Architecture, ITS service packages were referred to as ITS market packages. The name change has been made to be consistent with the terminology that is now used in Version 7.0 of the national ITS Architecture.

5.1.1 OVERVIEW OF ITS SERVICE PACKAGE STRUCTURE

A service package is made up of elements and data flows. Each identified system or component in the Austin regional ITS inventory, which is documented in the previous section, was mapped to a subsystem or terminator in the National ITS Architecture. Subsystems and terminators represent the various functional categories that define the role of an element in ITS and the regional architecture. The elements are connected together by architecture flows that document the existing and planned flow of information. **Figure 3** depicts a sample service package with each of the components identified. Additional explanation of the terminology used can be found after the figure.

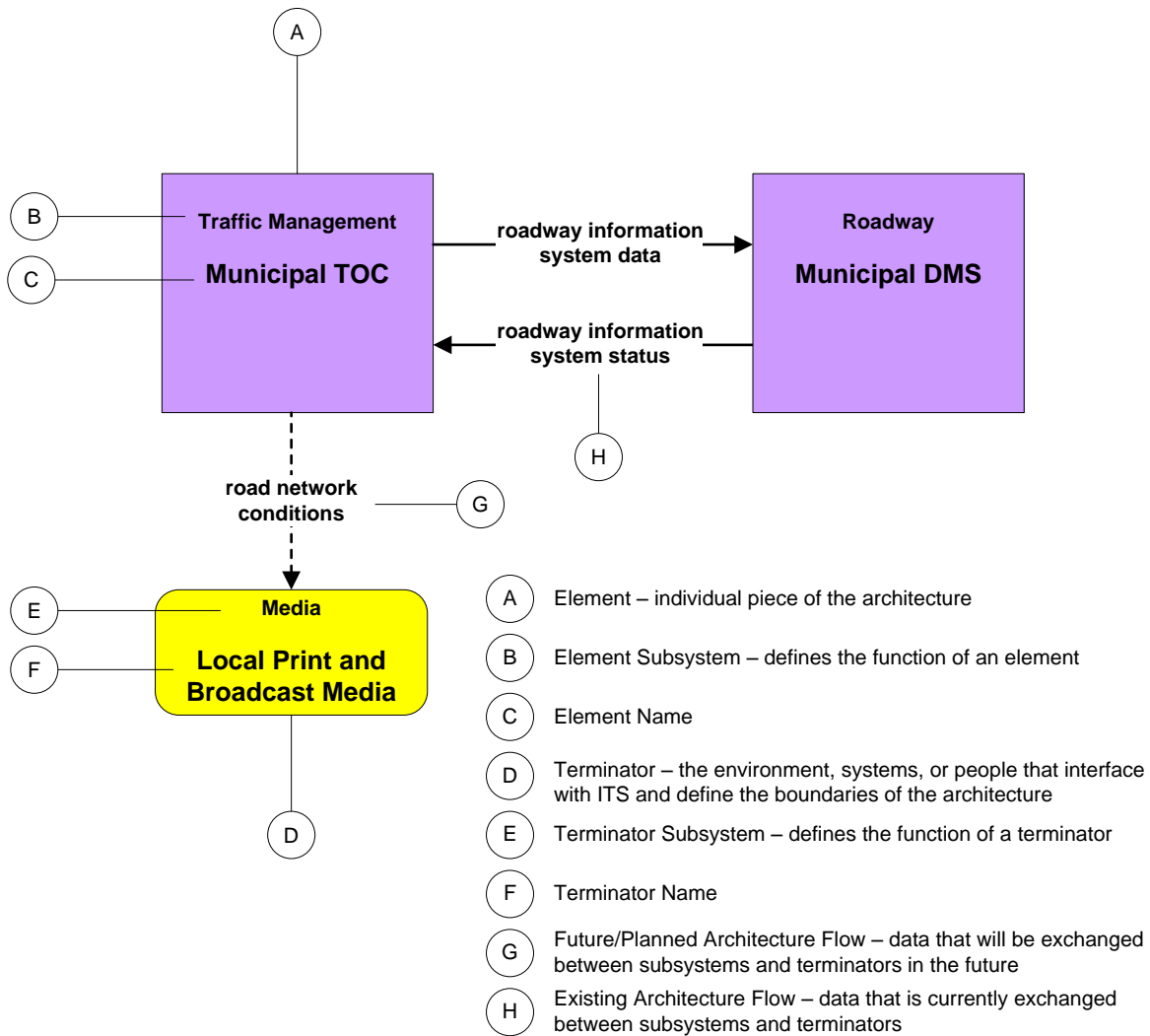


Figure 3 – Overview of Service Package Structure

Elements represent the ITS inventory for the Region. Both existing and planned elements have been included in the inventory and incorporated into the architecture through the development of the service package diagrams.

Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, Fields, Vehicles, and Travelers. Each of these major classes includes various subsystems that represent a set of transportation functions (or processes). Each set of functions is grouped under one agency, jurisdiction, or location, and corresponds to physical elements such as: traffic operations centers, traffic signals, or vehicles. Each element is assigned to one or more subsystems.

Terminators are the people, systems, other facilities, and environmental conditions outside of ITS that need to communicate or interface with ITS subsystems. Terminators help define the boundaries of the National ITS Architecture as well as a regional system. Examples of terminators include drivers, weather services, and information service providers.

Architecture Flows provide a standardized method for documenting the types of information that flow between elements. A flow can be shown as either existing or future/planned. Existing flows indicate a connection that has already been established to share at least a portion of the desired information, but showing a flow as existing is not meant to imply that the function is complete. For example, the traffic information coordination flow between traffic management agencies includes the sharing of video images, incident information and other relevant data. The flow could be shown as existing to capture the sharing of video images while incident information is still a future desired expansion of functionality. Many of the architecture flows have associated technical specifications, known as standards, which define the format of the data being shared. Additionally, flows between elements that may not exist in the National ITS Architecture are known as user-defined flows. These user-defined flows are included to show how connections are actually executed in the Region.

5.1.2 SELECTION AND PRIORITIZATION OF REGIONAL SERVICE PACKAGES

In the Austin Region, the National ITS Architecture service packages were reviewed by the stakeholders and selected based on the relevance of the functionality that the ITS service package could provide to the Region. Stakeholders selected 59 ITS service packages for implementation in the Region. The selected service packages are identified in **Table 6** grouped together by the ITS Service Area from the National ITS Architecture and priority that was assigned by the regional stakeholders. In **Table 7**, the individual service packages are matched to each agency that selected a particular service package. Only agencies with multiple ITS services packages are shown in **Table 7**.

Stakeholders prioritized the selected ITS service packages as high, medium, or low during the workshops and agency interviews. Priority of the ITS service packages was based on several factors.

High Priority ITS service packages include services that are currently deployed on a widespread basis, are actively being deployed, or stakeholders identified a high priority need to begin deploying the service in the short-term (typically within 5 years).

Medium Priority ITS service packages include service packages that have been deployed on a limited basis, are actively being deployed on a limited basis, or stakeholder agencies identified a medium level need to begin deploying the service in the short to mid-term (typically within 10 years.) In some cases the ITS service package may be deployed on a widespread bases but there may only be limited use of the service.

Low Priority ITS service packages include service packages where there is typically little deployment and agencies do not plan to actively deploy the service with the next 10 years. In some case, the ITS service package may be considered fully deployed and there is no need to expand the deployment or functionality of the service.

After selecting the service packages that were applicable for the Region, stakeholders reviewed each service package and the elements that could be included to customize it for the Region. This customization is discussed further in the next section (Section 5.1.3.).

It should be noted that while stakeholders identified a need to “plan for and adapt to changes in vehicle safety technologies such as connected vehicles,” none of the ITS service packages from the Advanced Vehicle Safety System Service Area from the National ITS Architecture were selected. In general, stakeholders felt that they were not ready to begin customizing ITS service package specific to connected vehicles for their agency, as additional research was needed. The stakeholder recognized the importance of connected vehicle services and expected that ITS service packages would be added to the Regional ITS Architecture during a future update. The USDOT is also developing a separate ITS architecture based on connected vehicles known as the Connected Vehicle Reference Implementation Architecture (CVRIA). As this technology advances, it will need to be integrated into the Austin Region and customization of the applications in the CVRIA should occur. Additional information on the CVRIA can be found at the following website: <http://www.iteris.com/cvria/index.html>

Table 6 – Austin ITS Service Packages Prioritization by Functional Area

High Priority Service Packages		Medium Priority Service Packages		Low Priority Service Packages	
Traffic Management					
ATMS01	Network Surveillance	ATMS02	Probe Surveillance	ATMS04	Traffic Metering
ATMS03	Traffic Signal Control	ATMS13	Standard Railroad Grade Crossing	ATMS11	Emissions Monitoring and Management
ATMS05	HOV Lane Management	ATMS16	Parking Facility Management	ATMS12	Roadside Lighting System Control
ATMS06	Traffic Information Dissemination	ATMS17	Regional Parking Management	ATMS15	Railroad Operations Coordination
ATMS07	Regional Traffic Management	ATMS19	Speed Warning and Enforcement	ATMS18	Reversible Lane Management
ATMS08	Traffic Incident Management System	ATMS21	Roadway Closure Management		
ATMS10	Electronic Toll Collection	ATMS22	Variable Speed Limits		
ATMS23	Dynamic Lane Management and Shoulder Use	ATMS24	Dynamic Roadway Warning		
		ATMS26	Mixed Use Warning System		
Emergency Management					
EM01	Emergency Call Taking and Dispatch	EM03	Mayday and Alarms Support	EM05	Transportation Infrastructure Protection
EM02	Emergency Routing	EM08	Disaster Response and Recovery		
EM04	Roadway Service Patrols	EM09	Evacuation and Reentry Management		
EM06	Wide-Area Alert	EM10	Disaster Traveler Information		
EM07	Early Warning System				
Maintenance and Construction Management					
MC03	Road Weather Data Collection	MC01	Maintenance and Construction Vehicle and Equipment Tracking	MC02	Maintenance and Construction Vehicle Maintenance
MC04	Weather Information Processing and Distribution	MC07	Roadway Maintenance and Construction	MC09	Work Zone Safety Monitoring
MC08	Work Zone Management				
MC10	Maintenance and Construction Activity Coordination				
Public Transportation Management (All Service Packages Selected as High Priority)					
APTS01	Transit Vehicle Tracking	APTS07	Multi-modal Coordination		
APTS02	Transit Fixed-Route Operations	APTS08	Transit Traveler Information		
APTS03	Demand Response Transit Operations	APTS09	Transit Signal Priority		
APTS04	Transit Fare Collection Management	APTS10	Transit Passenger Counting		
APTS05	Transit Security	APTS11	Multimodal Connection Protection		
APTS06	Transit Fleet Management				
Commercial Vehicle Operations					
		CVO10	HAZMAT Management	CVO04	CV Administrative Processes
Traveler Information					
ATIS01	Broadcast Traveler Information			ATIS05	ISP Based Trip Planning and Route Guidance
ATIS02	Interactive Traveler Information				
Archived Data Management					
AD1	ITS Data Mart				
AD2	ITS Data Warehouse				
AD3	Virtual ITS Data Warehouse				

5.1.3 CUSTOMIZATION OF REGIONAL ITS SERVICE PACKAGES

The service packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Austin Region. Service packages represent a service that will be deployed as an integrated capability. Each service package is shown graphically, with the service package name, local agencies involved, and desired data flows. The data flows are shown as either existing or planned/future. Data flows shown as existing indicate that in at least one location within the jurisdiction, the connection exists. Data flows shown as existing should not be interpreted to mean that deployment of that service is complete as there are many cases where a data flow exists in a service, but a need has been identified to expand the service to additional locations.

Figure 4 is an example of an Advanced Traffic Management System (ATMS) service package for Traffic Signal Control that has been customized for the Region. This instance focuses on the activities of the City of Austin. The ITS service package shows the two subsystems, Traffic Management and Roadway, and the associated entities (City of Austin TMC, Traffic Signals, School Programmable Flasher System, CCTV cameras and Field Sensors) for the management of traffic signals in the City of Austin. Data flows between the subsystems indicate what information is being shared. The City of Austin TMC controls the roadway subsystem devices and those devices sent data or status alerts back to the TMC. Service packages that were customized for the Austin Region are shown in **Appendix B**.

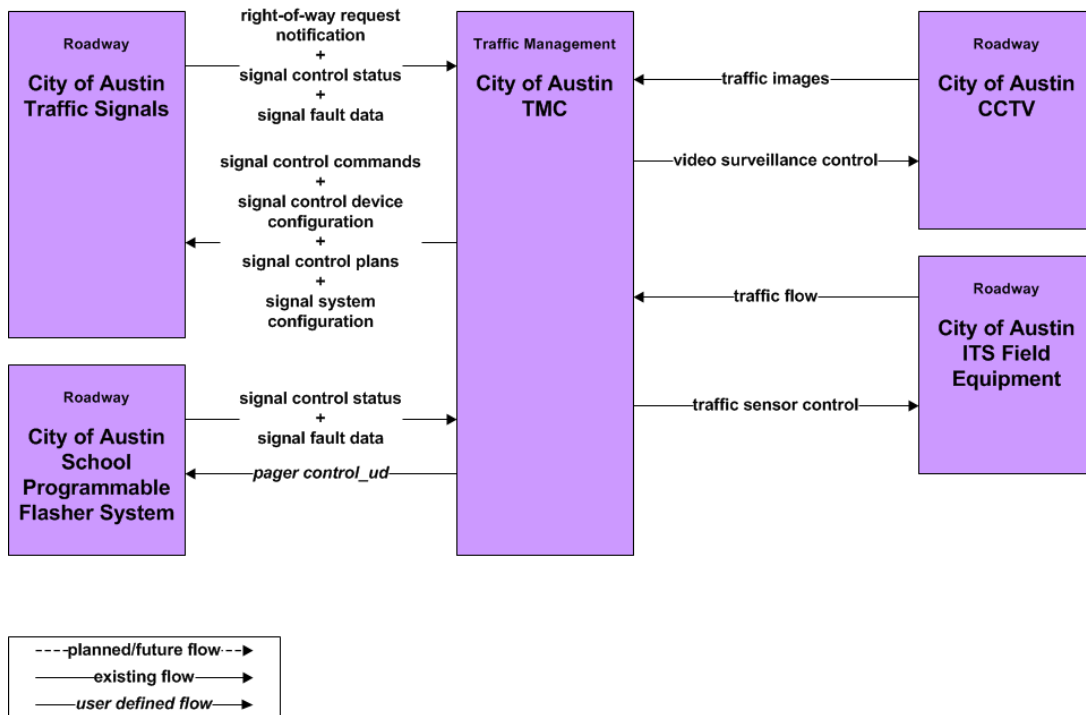


Figure 4 – Example Service Package Diagram: Traffic Signal Control

5.2 Architecture Interfaces

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

5.2.1 TOP LEVEL REGIONAL SYSTEM INTERCONNECT DIAGRAM

A system interconnect diagram, or “sausage diagram”, shows the systems and primary interconnects in the Region. The National ITS Architecture interconnect diagram has been customized for the Austin Region based on the system inventory and information gathered from the stakeholders. **Figure 5** summarizes the existing and planned ITS elements for the Austin 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 these are color-coded to the subsystem with which they are associated.

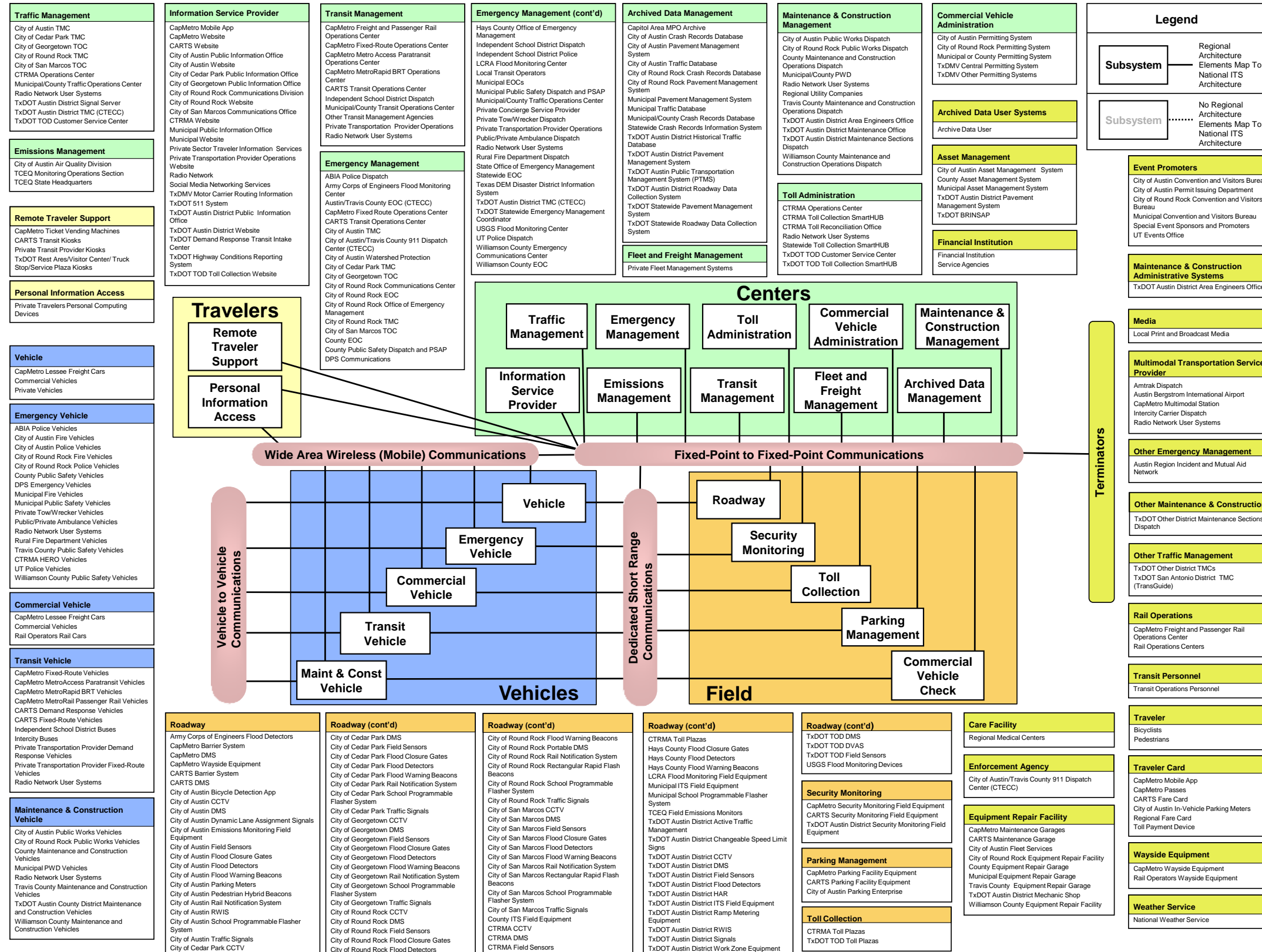


Figure 5 – Austin Regional System Interconnect Diagram

5.2.2 ELEMENT CONNECTIONS

A number of different elements are identified as part of the Austin Regional ITS Architecture. These elements include traffic management centers, transit vehicles, dispatch systems, emergency management agencies, media outlets, and others—essentially, all of the existing and planned physical components that contribute to the regional ITS. Interfaces have been identified for the Austin Regional ITS Architecture, and each element has been mapped to other elements with which it interacts. The Turbo Architecture software can generate interconnect diagrams for each element in the Region that show which elements are connected to one another. **Figure 6** is an example of an interconnect diagram from the Turbo Architecture database output. This particular interconnect diagram is for the City of Round Rock Traffic Signals.

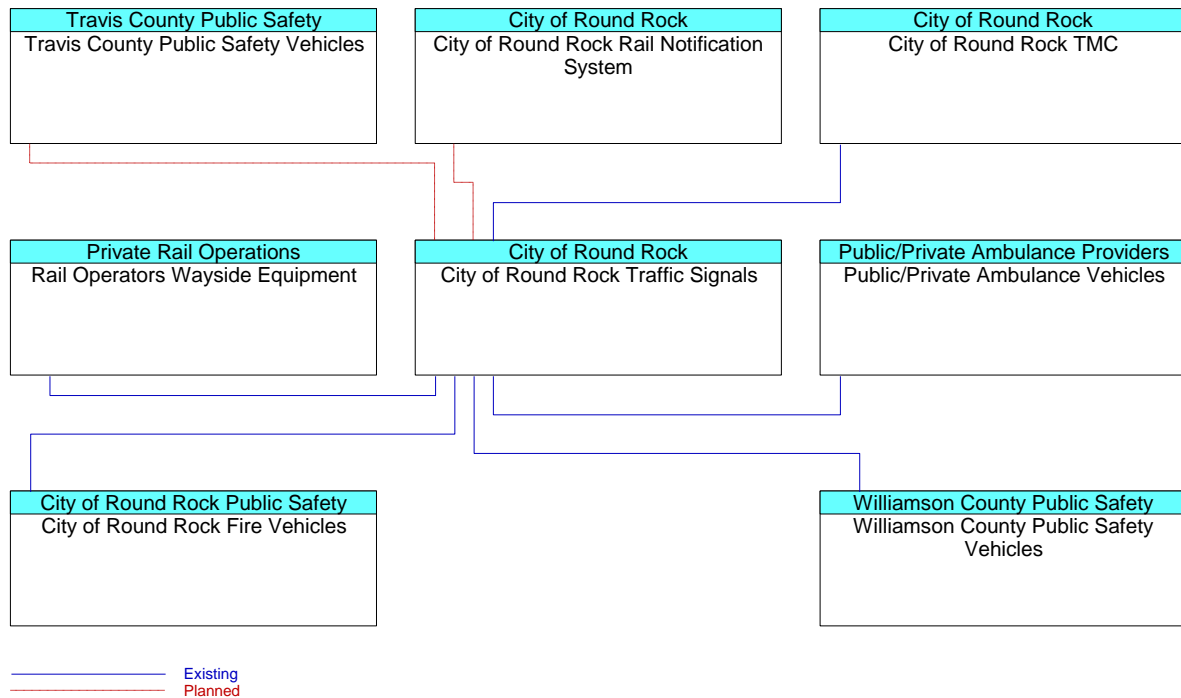


Figure 6 – Example Interconnect Diagram: City of Round Rock Traffic Signals

5.2.3 DATA FLOWS BETWEEN ELEMENTS

In the service package diagrams, flows between the subsystems and terminators define the specific information (data) that is exchanged between the elements and the direction of the exchange. The data flows could be requests for information, alerts and messages, status requests, broadcast advisories, event messages, confirmations, electronic credentials, and other key information requirements. Turbo Architecture can be used to output flow diagrams and can be filtered by service package for ease of interpretation; however, it is important to remember that custom data flows will not show up in diagrams that are filtered by service package. An example of a flow diagram that has been filtered for the ATMS01 – Network Surveillance service package is shown in **Figure 7**.

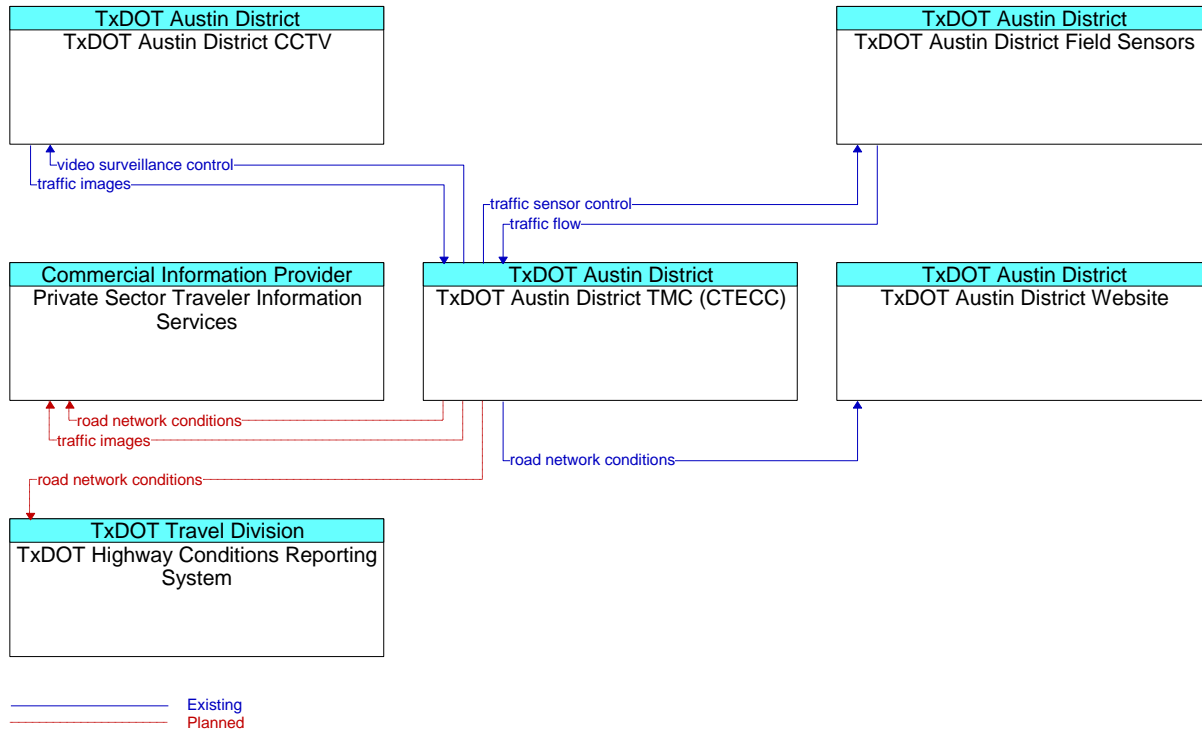


Figure 7 – Example Flow Diagram: ATMS01 – Network Surveillance

5.3 Functional Requirements

Functions are a description of what the system has to do. In the National ITS Architecture, functions are defined at several different levels, ranging from general subsystem descriptions through somewhat more specific equipment package descriptions to Process Specifications that include substantial detail. Guidance from the USDOT on developing a Regional ITS Architecture recommends that each Region determine the level of detail of the functional requirements for their Region. In the Austin 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 Austin Regional ITS Architecture, functional requirements have been identified at two levels. The customized service packages, discussed previously in Section 5.1.3, describe the services that ITS needs to provide in the Region and the architecture flows between the elements. These service packages and data flows describe what ITS in the Austin Region has to do and the data that needs to be shared among elements.

At a more detailed level, functional requirements for the Austin Region are described in terms of functions that each element in the architecture performs or will perform in the future. **Appendix C** contains a table that summarizes the functions by element.

5.4 Standards

Standards are an important tool that will allow efficient implementation of the elements in the Austin Regional ITS Architecture over time. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and as new approaches evolve. The USDOT’s ITS Joint Program Office is supporting Standards Development Organizations (SDOs) with an extensive, multi-year program of accelerated, consensus-based standards

development to facilitate successful ITS deployment in the United States. **Table 8** identifies each of the ITS standards that could apply to the Austin Regional ITS Architecture. These standards are based on the physical subsystem architecture flows previously identified in Section 5.2.3 and shown in the service package diagrams in **Appendix B**.

While **Table 8** does not match the standards to specific architecture flows, that information is available through the National ITS Architecture website and Turbo Architecture. Since the website is updated more frequently than the software and links directly to additional information about the applicable standard, the website is the preferred method for determining which standards apply to a particular architecture flow. To locate this information do the following:

- Go to the main page of the National Architecture website at <http://www.iteris.com/itsarch/>;
- In the menu bar at the top select the tab for Architecture;
- Select the link to Physical Architecture;
- Select the Architecture Flows link embedded in the descriptive paragraph about the Physical Architecture;
- From the alphabetical list of flows that appears locate and select the desired flow;
- Architecture flows are often used between multiple subsystems so scrolling may be required to find the appropriate information associated with the particular use of the flow, in the descriptive information any applicable standards will be identified; and
- For additional information on the applicable standards the standard name is a link that when selected leads to a more detailed description of the standard.

Three additional standards that are not based on the National ITS Architecture physical subsystems architecture flows have also been included.

- TxDOT Center-to-Center: This standard has been developed by TxDOT to support center-to-center communications for traffic information.
- APCO Project 25 (P25): This standard has been developed by the Association of Public Safety Communications Officials International to support interoperability of radio systems.
- Department of Justice Global Justice Data Dictionary (Global JXDD): This standard has been developed by the Department of Justice and is used for interoperability between CAD systems. This data dictionary differs from the data dictionary developed by the Institute of Traffic Engineers for sharing incident information but is required by the Department of Justice if they are funding a project.

Table 8 – Austin Regional ITS Standards

SDO	Document ID	Title	
AASHTO/ITE	ITE TMDD	Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)	
AASHTO/ITE/NEMA	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	Object Definitions for Environmental Sensor Stations	
	NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control	
	NTCIP1206	Object Definitions for Data Collection and Monitoring (DCM) Devices	
	NTCIP 1207	Object Definitions for Ramp Meter Control (RMC) Units	
	NTCIP 1208	Object Definition for CCTV Camera Switching	
	NTCIP 1209	Data Element Definitions for Transportation Sensor Systems	
	NTCIP 1210	Field Management Stations – Part 1: Object Definitions for Signal System Masters	
	NTCIP 1211	Object Definitions for Signal Control and Prioritization	
	NTCIP 1214	Object Definitions for Conflict Monitor Units (CMU)	
	NTCIP Center to Center Standards Group		
	NTCIP 1102	Octet Encoding Rules Base Protocol	
	NTCIP 1104	Center-to-Center Naming Convention Specification	
	NTCIP 2104	Ethernet Subnetwork Profile	
	NTCIP 2202	Internet (TCP/IP and UDP/IP) Transport Profile	
	NTCIP 2303	File Transfer Protocol (FTP) Application Profile	
	NTCIP 2304	Application Profile for DATEX-ASN (AP-DATEX)	
	NTCIP 2306	Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications (C2C XML)	
	NTCIP Center-to-Field Standards Group		
	NTCIP 1102	Octet Encoding Rules Base Protocol	
	NTCIP 1103	Transportation Management Protocols (TMP)	
	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	Simple Transportation Management Framework (STMF) Application Profile	
	NTCIP 2302	Trivial File Transfer Protocol (TFTP) Application Profile	
	NTCIP 2303	File Transfer Protocol (FTP) Application Profile	
	APTA	APTA TCIP-S-001 3.0.4	Standard for Transit Communications Interface Profiles

Table 8 – Austin Regional ITS Standards (Continued)

SDO	Document ID	Title
ASTM	ASTM E2468-05	Standard Practice for Metadata to Support Archived Data Management Systems
	ASTM E2665-08	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data
	Dedicated Short Range Communication at 915 MHz Standards Group	
	ASTM E2158-01	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band
ASTM/IEEE/SAE	Dedicated Short Range Communication at 5.9 GHz Standards Group	
	ASTM E2213-03	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 1609.1 – 2006	Standard for Wireless Access in Vehicular Environments (WAVE) – Resource Manager
	IEEE 1609.2 – 2006	Standard for Wireless Access in Vehicular Environments (WAVE) - Security Services for Applications and Management Messages
	IEEE 1609.3	Standard for Wireless Access in Vehicular Environments (WAVE) – Networking Services
	IEEE 1609.4 – 2006	Standard for Wireless Access in Vehicular Environments (WAVE) - Multi-Channel Operation
	IEEE 802.11p	Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part II: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification
	IEEE P1609.0	Standard for Wireless Access in Vehicular Environments (WAVE) - Architecture
IEEE	IEEE 1455-1999	Standard for Message Sets for Vehicle/Roadside Communications
	IEEE 1570-2002	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection
	IEEE P1609.11	Standard for Wireless Access in Vehicular Environments (WAVE) - Over-the-Air Data Exchange Protocol for Intelligent Transportation Systems (ITS)
	Incident Management Standards Group	
	IEEE 1512-2006	Standard for Common Incident Management Message Sets for use by Emergency Management Centers
	IEEE 1512.1-2006	Standard for Traffic Incident Management Message Sets for use by Emergency Management Centers
	IEEE 1512.2-2004	Standard for Public Safety Traffic Management Message Sets for use by Emergency Management Centers
	IEEE 1512.3-2006	Standard for Hazardous Material Incident Management Sets for use by Emergency Management Centers
	IEEE P1512.4	Standard for Common Traffic Incident Management Message Sets for use in Entities External to Centers

Table 8 – Austin Regional ITS Standards (Continued)

SDO	Document ID	Title
SAE	SAE J2735	Dedicated Short Rang Communications (DSRC) Message Set Directory
	Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group	
	SAE J2266	Location Referencing Message Specification (LRMS)
	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
	SAE J2540/2	ITIS (International Traveler Information Systems) Phrase Lists
	SAE J2540/3	National Names Phrase List
	Advanced Traveler Information Systems (ATIS) General Use Standards Group	
	SAE J2266	Location Referencing Message Specification (LRMS)
	SAE J2354	Message Set for Advanced Traveler Information System (ATIS)
	SAE J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards
	SAE J2540/1	RDS (Radio Data System) Phrase Lists
	SAE J2540/2	ITIS (International Traveler Information Systems) Phrase Lists
	SAE J2540/3	National Names Phrase List
	On-board Vehicle Mayday Standards Group	
	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 J2540	Messages for Handling Strings and Look-Up Tables in ATIS Standards
	SAE J2540/1	RDS (Radio Data System) Phrase Lists
	SAE J2540/2	ITIS (International Traveler Information Systems) Phrase Lists
	SAE J2540/3	National Names Phrase List

5.5 Operational Concepts

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

Traffic Signal 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.

Traffic Metering – The development of systems to monitor freeway (or tollway) traffic flow and roadway conditions, and provide strategies such as ramp metering or 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 and coordinating construction activities.

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

Table 9 – Austin Stakeholder Roles and Responsibilities

Transportation Service	Stakeholder	Roles/Responsibilities
Traffic Signal Control	TxDOT	Operate traffic signal systems on state owned arterials, including traffic signals, sensor systems, and pedestrian crossing signals.
	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on state owned arterials and City streets to facilitate traffic signal operations.	
	Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, and emergency vehicle preemptions.	
	Operate DMS for the distribution of traffic information and roadway conditions to travelers on the roadway.	
	Coordinate highway rail intersection (HRI) signal adjustments with regional and private Rail Operators.	
	Provide emergency signal preemption for the City and County public safety vehicles as well as DPS vehicles.	
	City of Austin	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on City streets to facilitate traffic signal operations.
	Operate traffic signal systems on City owned streets, including traffic signals, sensor systems, and CCTV detection devices.	
	Operate programmable flasher systems for City schools.	
	Operate Pedestrian Hybrid Beacons for non-motorized road users.	
	Coordinate HRI signal adjustments with regional and private Rail Operators.	
	Operate and control reversible lanes 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, the county's public safety vehicles, and public/private ambulances.	
	City of Cedar Park	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on City streets to facilitate traffic signal operations.
	Operate traffic signal systems on City owned streets, including traffic signals, sensor systems, and pedestrian crossing systems.	
	Operate programmable flasher systems for City schools.	
	Coordinate HRI signal adjustments with regional and private Rail Operators.	
	Provide emergency signal preemption for the City's Fire and EMS vehicles, the county's public safety vehicles, and public/private ambulances.	

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Traffic Signal Control (continued)	City of Georgetown	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on City streets to facilitate traffic signal operations.
		Operate traffic signal systems on City owned streets, including traffic signals, sensor systems, and pedestrian crossing systems.
		Operate programmable flasher systems for City schools.
		Coordinate HRI signal adjustments with regional and private Rail Operators.
		Provide emergency signal preemption for the City's Fire and EMS vehicles, the county's public safety vehicles, and public/private ambulances.
	City of Round Rock	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on City streets to facilitate traffic signal operations.
		Operate traffic signal systems on City owned streets, including traffic signals, sensor systems, and pedestrian crossing systems.
		Operate programmable flasher systems for City schools.
		Operate Rectangular Rapid Flash Beacons for non-motorized road users.
		Coordinate HRI signal adjustments with regional and private Rail Operators.
		Provide emergency signal preemption for the City's Fire and EMS vehicles, the county's public safety vehicles, and public/private ambulances.
	City of San Marcos	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on City streets to facilitate traffic signal operations.
		Operate traffic signal systems on City owned streets, including traffic signals, sensor systems, and pedestrian crossing systems.
		Operate programmable flasher systems for City schools.
		Operate Rectangular Rapid Flash Beacons for non-motorized road users.
		Coordinate HRI signal adjustments with regional and private Rail Operators.
		Provide emergency signal preemption for the City's Fire and EMS vehicles, the county's public safety vehicles, and public/private ambulances.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Traffic Signal Control (continued)	Municipalities	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on municipal streets to facilitate traffic signal operations.
		Operate traffic signal systems on municipal streets, including traffic signals, sensor systems, and pedestrian crossing systems.
		Operate programmable flasher systems for City schools.
		Coordinate HRI signal adjustments with regional and private Rail Operators.
		Provide emergency signal preemption for the municipality's Fire and EMS vehicles, the county's public safety vehicles, and public/private ambulances.
Freeway Management	TxDOT	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on State owned highways.
		Operate active traffic management on state owned highways.
		Provide traffic information to regional transportation agencies and the general public through traffic information devices (DMS, Highway Advisory Radio, HCRS, Texas 511, etc.).
		Provide security monitoring of critical infrastructure for the State.
		Coordinate traffic information and traffic control with other regional TMCs and the statewide TMC.
	CTRMA	Operate network surveillance equipment (CCTV cameras, field sensors, etc.) on toll roads.
		Coordinate traffic information and traffic control with other regional TMCs.
		Operate and collect tolls on CTRMA tolled facilities.
		Dispatch HERO service patrol vehicles.
		Provide HOV lane management for state owned highways. Provide travelers with real-time pricing information for HOV lanes via agency DMS.
	TxDOT TOD	Operate and collect tolls on TxDOT tolled facilities.
Coordinate traffic information and traffic control with other regional TMCs.		
Incident Management – Traffic	City of Austin	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management – Traffic (continued)	City of Cedar Park	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.
	City of Georgetown	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.
	City of Round Rock	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.
	City of San Marcos	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.
	TxDOT Austin District	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management – Traffic (continued)	City of Austin and Travis County (911 Dispatch)	Operate the 911 center for the City and County, with the ability to dispatch regional and statewide emergency services.
		Coordinate public safety resources for incident response with the City's traffic operations center (TOC).
		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 TOC.
		Coordinate an incident response with regional rail operations for incidents involving rail.
		Coordinate maintenance resources in response to incidents within the City and within the County.
		Coordinate incident response with other emergency dispatch agencies and the TxDOT Austin District TMC (CTECC) for incidents on state facilities.
	City of Round Rock Public Safety	Coordinate incident response with the County public safety departments.
		Dispatch the City's public safety vehicles (police, fire and EMS) as well as coordinate with all other public safety agencies within the region.
		Coordinate public safety resources for incident response with regional traffic agencies, including the City's TOC and regional TMCs.
		Coordinate with ambulance services in response to incidents within the City.
		Coordinate an incident response with regional rail operations for incidents involving rail.
	County Public Safety	Receive emergency calls for incidents within the counties.
		Dispatch the County's public safety vehicles (and track their location) as well as coordinate with all other public safety agencies within the region.
		Coordinate incident response with other emergency management agencies.
		Perform incident detection and verification for the streets within the county, and provide this information to the regional TMCs.
		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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management – Traffic (continued)	Department of Public Safety (DPS)	Dispatch DPS Police vehicles for incidents on highways and the parkway.
		Coordinate incident response with other public safety agencies (police, fire, EMS, sheriff, etc.) as well as with TxDOT Austin District TMC (CTECC) for incidents on state facilities.
		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.
	Municipalities	Receive emergency calls for incidents within the municipalities.
		Coordinate public safety resources for incident response with the municipality's TOC or 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.
		Perform incident detection and verification for the streets within the municipalities, and provide this information to the municipality TOCs.
		Coordinate an incident response with regional rail operations for incidents involving rail.
		Coordinate with ambulance services in response to incidents within the City.
		Coordinate maintenance resources in response to incident with the municipality.
	TxDOT Austin District	Perform incident detection and verification for the state highways, and provide this information to the municipality TOCs.
		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.
		Coordinate public safety resources for incident response with municipal I traffic agencies.
	University of Texas	Receive emergency calls for incidents within the University.
		Dispatch the University Police vehicles as well as coordinate with all other public safety agencies within the region (City and County level).
		Coordinate incident response with the City Police.
		Perform incident detection and verification for the streets within the University, and provide this information to the regional and City TMC.
		Coordinate maintenance resources in response to incident within the University.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Transit Management	CapMetro	Track vehicle location on all agency fixed-route transit vehicles, demand response vehicles, and commuter rail.
		Provide transit schedule and fare information to the agency's website, mobile app, the TxDOT 511 system, regional traveler information providers, and private sector traveler information service providers.
		Provide fixed-route bus service for the agency's defined service area through fixed-route transit vehicles and commuter rail.
		Provide demand response bus service (MetroAccess paratransit) for the agency's defined service area, with the ability to provide a demand response transit plan on the agency's website.
		Provide transit passenger electronic fare payment on all agency fixed-route, MetroRapid BRT, MetroAccess Paratransit, and MetroRail Passenger Rail transit vehicles.
		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, MetroRapid BRT, MetroAccess Paratransit, and MetroRail Passenger Rail transit vehicles.
		Obtain traffic signal priority from the municipalities in the agency's service area through the municipality's field equipment for all MetroRapid BRT 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 real-time CapMetro vehicle arrival status boards at MetroRapid BRT bus stops and MetroRail Passenger Rail stations and location information on the CapMetro Website and Cap Metro Mobile App.
	Operate on-board systems to provide next stop annunciation.	
	Coordinate emergency plans with Municipal, County, and Statewide EOCs and provide emergency transit services for evacuations, fires, and disasters (including re-entry).	
	CARTS	Track vehicle location and evaluate schedule performance on all agency fixed-route transit vehicles and demand response transit 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.		

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Transit Management (continued)	CARTS (continued)	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 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).
	Independent School Districts	Track vehicle location and evaluate schedule performance on all school district vehicles.
		Provide school bus schedule and route information to the school district website.
		Provide fixed-route school bus service for the cities, municipalities, and counties within the State of Texas.
		Provide transit security on all transit vehicles through silent alarms and surveillance systems.
		Provide automated transit maintenance scheduling through automated vehicle conditions reports on all Independent School District buses.
		Coordinate emergency plans with Municipal, County, and Statewide EOCs and provide emergency transit services for evacuations, fires, and disasters (including re-entry).
	Private Transportation Providers	Track vehicle location and evaluate schedule performance on all agency fixed-route transit vehicles and demand response transit 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 service for the agency defined service area.
		Provide transit passenger electronic fare payment on all agency fixed-route and demand response transit vehicles.
		Provide transit passenger electronic fare payment on all agency fixed-route and demand response transit vehicles.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Transit Management (continued)	Private Transportation Providers (continued)	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 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).
		Coordinate transit service with other regional transit providers, as well as regional intermodal terminals, AMTRAK stations, and regional airports.
		Provide automated transit maintenance scheduling through automated vehicle condition reports on all agency fixed-route and demand response transit vehicles.
		Provide transit security on all agency transit vehicles through silent alarms and surveillance systems.
	TxDOT	Provide a demand-response intake center to aid the traveling public in coordinating with demand response transit vehicles.
		Provide the ability to determine a demand response transit plan.
Traveler Information	TxDOT	Operate the state 511 system.
		Collect traffic, incident, transit schedule, road maintenance, and weather information various agencies in the region 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.
		Provide traffic information reports to regional and private information service providers as well as the Texas 511 System (through the highway conditions reporting system [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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
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.
		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).
		Operate PSAP for statewide services, but has the ability to dispatch regional and statewide emergency services.
		Coordinate 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 Alert 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 Austin 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 Alert 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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	City of Austin 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).
		Dispatch the City's fire 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 Alert 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.
	City of Round Rock Public Safety	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 911 center for the City and County, with the ability to dispatch regional and statewide emergency services.
		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.
		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 City's traffic signals, and regional traffic signals.
		Perform incident detection and verification for streets within the City.
		Receive AMBER Alert and other Wide-Area Alert information from DPS.
		Receive Wide-Area Alert information from the Regional EOCs.
	Municipalities	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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Municipalities (continued)	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 Alert 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 Public Safety	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).
		Operate 911 center for the County, with the ability to dispatch regional and statewide emergency services.
		Dispatch the 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.
		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 Alert 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.
	Travis County Public Safety	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 County's public safety vehicles (and track their location) as well as coordinate with all other public safety agencies within the county and 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 regional traffic signals.
		Perform incident detection and verification for county roads.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Travis County Public Safety (continued)	Receive AMBER Alert 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.
	Williamson County Public Safety	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).
		Operate a PSAP for the County, with the ability to dispatch regional and statewide emergency services.
		Dispatch the County's public safety vehicles (and track their location) as well as coordinate with all other public safety agencies within the county and 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 municipal traffic signals as well as regional traffic signals.
		Perform incident detection and verification on county roads.
		Receive AMBER Alert 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.
	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 Alert 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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	City of Austin and Travis County (911 Dispatch)	Operate 911 center for the City and County, with the ability to dispatch regional and statewide emergency services.
		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 City fire vehicles with suggested route information and track the vehicles to the incident.
		Receive and respond to threat information from regional transportation infrastructure protection equipment.
		Dispatch all city, county, municipality, and DPS vehicles to incidents within the region.
		Receive AMBER Alert 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.
	Austin/Travis 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 Alert 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.
	City of Austin Aviation 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).
		Receive AMBER Alert 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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Public/Private Ambulance Providers	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).
		Coordinates with regional and statewide emergency services to dispatch and track their own vehicles.
		Coordinates with regional medical centers regarding the status of the care facility as well as the patient status en route to the medical center.
		Dispatch ambulance vehicles with suggested route information and track the vehicles to the incident.
		Receive signal preemption from municipal and City traffic signals as well as regional traffic signals.
		Receive AMBER Alert 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.
	University of Texas	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 Special Police vehicles (and track their location) as well as coordinate with all other public safety agencies within the City.
		Perform incident detection and verification for streets within the specified area of responsibility.
		Receive AMBER Alert 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.
	Army Corps of Engineers	Receive flood monitoring information from its own field equipment.
		Provide flood warning information to regional TMCs/TOCs and regional transit agencies.
	Lower Colorado River Authority	Receive flood monitoring information from its own field equipment.
		Provide flood warning information to regional TMCs/TOCs and regional transit agencies.
	TxDOT	Receive flood monitoring information from its 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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	US Geological Survey	Receive flood monitoring information from its own field equipment.
		Provide flood warning information to regional TMCs/TOCs and regional transit agencies.
	City of Austin	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.
	City of Cedar Park	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.
	City of Georgetown	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.
	City of Round Rock	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.		

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	City of San Marcos	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.
		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 fleet maintenance with the agency's district 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.
		Coordinate maintenance activities with the agency's district engineer and with the agency's asset management system.
		Dispatch agency maintenance vehicles and get operations status from these vehicles.
		Provide maintenance to all field equipment owned and operated by the agency.
		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.
		Coordinate maintenance and construction activities with other regional maintenance and construction agencies.
		Distribute 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.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	City of Austin	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.
		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 these 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.
		Coordinate maintenance and construction activities with other regional maintenance and construction agencies.
		Distribute maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.
		City of Round Rock
	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 facility.	
	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 these vehicles.	
	Provide maintenance to all field equipment owned and operated by the City.	

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	City of Round Rock (continued)	Manage work zones on City streets, and monitors the safety of work zones status with City owned vehicles and field equipment.
		Coordinate maintenance and construction activities with other regional maintenance and construction agencies.
		Distribute maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.
	Municipalities	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.
	Municipalities (continued)	Provide maintenance of streets within the municipalities, including pavement maintenance and all construction activities.
		Coordinate maintenance activities with the municipal TOC and with the agency's asset management system.
		Dispatch agency maintenance vehicles and get operations status from these vehicles.
		Provide maintenance to all field equipment owned and operated by the municipality.
		Manage work zones on municipal streets.
		Coordinate maintenance and construction activities with other regional maintenance and construction agencies.
		Distribute maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.
	Travis County Transportation and Natural Resources Department	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 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	Travis County Transportation and Natural Resources Department (continued)	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 these vehicles.
		Provide maintenance to all field equipment owned and operated by the county.
		Manage work zones on county streets.
		Coordinate maintenance and construction activities with other regional maintenance and construction agencies.
		Distribute maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.
	Williamson County Road Department	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 facility.
		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 these vehicles.
Provide maintenance to all field equipment owned and operated by the county.		
Manage work zones on county streets.		
Coordinate maintenance and construction activities with other regional maintenance and construction agencies.		
Distribute maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.		

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	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 these vehicles.
		Provide maintenance to all field equipment owned and operated by the county.
		Manage work zones on county streets.
		Coordinate maintenance and construction activities with other regional maintenance and construction agencies.
		Distribute maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, emergency operations, rail operations, and the media.
Parking Management	CapMetro	Monitor parking lots and determine the availability of parking spaces at transit facilities.
		Operate a barrier system to control access to parking lots.
		Provide parking lot information through mobile app, website, and DMS to transit riders.
	CARTS	Monitor parking lots and determine the availability of parking spaces at transit facilities.
		Operate a barrier system to control access to parking lots.
		Provide parking lot information through mobile app, kiosks, and DMS to transit riders.
	City of Austin	Monitor parking lots and on-street spaces to determine the availability of parking spaces.
		Provide parking lot information through website and DMS to motorist.
		Provide electronic parking payment through field parking meters or in-vehicle parking meters.

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Archived Data Management	TxDOT	Collect and archive transit and ridership information for the region's transit agencies.
		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 emergency management agencies and DPS.
		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 Austin	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.
	City of Round Rock	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.
	Municipalities	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.
	Capital Area MPO	Collect and archive traffic information from regional traffic management providers, emergency information from regional public safety providers, transit information from regional transit agencies, toll information from regional toll authorities, and parking information from regional parking providers for planning purposes.
		Serve as a data warehouse for regional traffic, emergency, transit, toll, and parking management agencies.
		Serve as a virtual data warehouse for all archive systems in the region.
	CapMetro	Collect and archive transit and ridership information.
Department of Public Safety	Collect and maintain crash record information from regional and statewide emergency management agencies.	

Table 9 – Austin Stakeholder Roles and Responsibilities (Continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Commercial Vehicle Operations	City of Austin	Provide for commercial vehicle permits (oversize/overweight) through the agency website and through coordination with other regional permitting systems.
		Provide credential verification and route restrictions for regional commercial vehicles.
		Coordinate fee and credential information and payment with regional and municipal permitting systems.
	City of Round Rock	Provide for commercial vehicle permits (oversize/overweight) through the agency website and through coordination with other regional permitting systems.
		Provide credential verification and route restrictions for regional commercial vehicles.
		Coordinate fee and credential information and payment with regional and municipal permitting systems.
	Commercial Vehicle Fleet Operations	Provide emergency notification and HAZMAT information to regional emergency management providers through a concierge service provider.
		Provide HAZMAT information to regional emergency management providers.
		Provide emergency notification and HAZMAT information to regional emergency management providers through a concierge service provider.
		Provide HAZMAT information to regional emergency management providers.
	Municipalities	Provide for commercial vehicle permits (oversize/overweight) through the agency website and through coordination with other regional permitting systems.
		Provide credential verification and route restrictions for regional commercial vehicles.
		Coordinate fee and credential information and payment with regional and municipal permitting systems.
	Texas DEM	Coordinate and provide alert or evacuation information for commercial vehicle incidents (accidents or HAZMAT spills).
	TxDMV	Provides an electronic (web based) credentials interface for commercial vehicle credentials applications.
Coordinate fee and credential information and payment with regional and municipal permitting systems.		
Provide route information to regional and statewide information service providers, including 511 and HCRS.		
TxDOT	Provide route information to regional and statewide information service providers, including 511 and HCRS.	

5.6 Potential Agreements

The Regional ITS Architecture for the Austin Region has identified many agency interfaces, information exchanges, and integration strategies that would be needed to provide the ITS services and systems identified by the stakeholders in the Region. Interfaces and data flows among public and private entities in the Austin 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 Regional 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.

Agreements should avoid being specific with regard to technology when possible. Technology is likely to change and changes to technology could require an update of the agreement if the agreement was not technology neutral. Focus of the agreement should be on the responsibilities of the agencies and types of information that need to be exchanged. Depending on the type of agreement being used, agencies should be prepared for the process to complete an agreement to take several months to years. Agencies must first reach consensus on what should be in an agreement and then proceed through the approval process. The approval process for formal agreements varies by agency and can often be quite lengthy, so it is recommended that agencies plan ahead to ensure that the agreement does not delay the project.

When implementing an agreement for ITS, it is recommended that as a first step any existing agreements are reviewed to determine whether they can be amended or modified to include the additional requirements that will come with deploying a system. If there are no existing agreements that can be modified or used for ITS implementation, then a new agreement will need to be developed. The formality and type of agreement used is a key consideration. If the arrangement will be in effect for an extended duration or involve any sort of long-term maintenance, then written agreements should be used. Often during long term operations, staff may change and a verbal agreement between agency representatives may be forgotten by new staff.

Common agreement types and potential applications include:

Handshake Agreement: Handshake agreements are often used in the early stage of a project. This type of informal agreement depends very much on relationships between agencies and may not be appropriate for long term operations where staff is likely to change.

Memorandum of Understanding (MOU): A MOU demonstrates general consensus but is not typically very detailed. MOUs often identify high-level goals and partnerships.

Interagency and Intergovernmental Agreements: These agreements between public agencies can be used for operation, maintenance, or funding projects and systems. They can include documentation on the responsibility of each agency, functions they will provide, and liability.

Funding Agreements: Funding agreements document the funding arrangements for ITS projects. At a minimum, funding agreements include a detailed scope, services to be performed, and a detailed project budget. Agency funding expectations or funding sources are also typically identified.

Master Agreements: Master agreements include standard contract language for an agency and serve as the main agreement between two entities which guides all business transactions. Use of a master agreement can allow an agency to do business with another agency or private entity without having to go through the often lengthy development of a formal agreement each time.

Table 10 provides a list of existing and potential agreements for the Austin 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.

In **Appendix E**, copies of the existing agreements that were available have been included. These agreements include:

- Austin-Area Incident Management for Highways (AIMHigh) – Memorandum of regional cooperation regarding incident management for various agencies and private entities including TxDOT, City of Austin, Municipalities/Counties, Texas DPS, Travis County, Williamson County, Austin Towing Association, and HERO program contractors;
- Data Sharing and Usage (TxDOT Austin District and Media) – Agreement that allows media outlets to receive transportation related information from TxDOT and broadcast CCTV camera images;
- Fatal Crash Agency Coordination – Agreement among agencies in Travis County and City of Austin that identifies the procedures for the movement and transportation of deceased individuals from the roadway;
- Joint Operations/Shared Control Memorandum (911 RDMT Project) – Memorandum of understanding between TxDOT, CapMetro, City of Austin, and Travis County regarding the establishment of a unified public safety communications system;
- Railroad Right-of-Way – Agreement between TxDOT and Private Railroad concerning the installation and maintenance of fiber optic cable both above and below railroad tracks;
- Sharing Fiber Optic Cable and/or related Infrastructure – Agreement between TxDOT and local municipalities regarding the connection of each agency’s respective fiber optic cable and other related infrastructure;
- Standard Operating Procedures for CTECC – Interlocal agreement among TxDOT, City of Austin, Travis County, and CapMetro for the operation and maintenance of the CTECC facility;
- Traffic Signal Operation and Maintenance (City of Austin and Travis County) – Agreement between the City of Austin and Travis County in which the City would design, construct, maintain, and upgrade traffic control devices at the request and expense of the County;
- Traffic Signal Operation and Maintenance (TxDOT and City of San Marcos) – Memorandum between TxDOT and the City of San Marcos that gives the City the responsibility to operate and maintain traffic signals at certain State Highway System Intersections; and
- Transit Signal Priority – Agreement between CapMetro and the City of Austin regarding traffic signal priority for transit vehicles operating on the bus rapid transit (BRT) routes.

The agreements listed above can be found on the project website located at www.AustinITSArchitecture.com. The Interface Control Documents for Electronic Toll Interoperability can be found at the TeamTexas website located at <http://www.team-tx.org/Interoperability/>.

Table 10 – Austin Regional Agreements

Status	Agreement and Agencies	Agreement Description
Existing	<p>Austin-Area Incident Management for Highways (Public-Public)</p> <p>CAMPO, City of Austin, City of Georgetown, City of Round Rock, DPS, Municipalities/Counties, Travis County, TxDOT, Williamson County, Austin Towing Association, and HERO program contractors</p>	<p>Memorandum that outlines regional coordination among the State, local agencies, and private entities within the Austin Region regarding traffic incident management. Agencies and entities have established very effective interagency communication through the Austin-area Incident Management for Highways (AIMHigh) cooperative.</p>
Existing	<p>Data Sharing and Usage (Public-Private)</p> <p>TxDOT Austin District and Media</p>	<p>License agreements to access and broadcast TxDOT CCTV camera video feeds.</p>
Existing	<p>Electronic Toll Interoperability (Public-Public)</p> <p>TxDOT TOD, CTRMA, , Other Texas Regional Tolling Authorities</p>	<p>Agreements to define electronic toll collection interoperability between TxDOT TOD, CTRMA, and other Texas regional tolling authorities such as the North Texas Tollway Authority and Harris County Toll Road Authority.</p>
Existing	<p>Fatal Crash Agency Coordination (Public-Public)</p> <p>City of Austin and Travis County</p>	<p>Agreement outlines the procedures that must be followed by TxDOT personnel, police, and other first responders who are knowledgeable of the medical examiner's office processes when clearing the roadway (without the presence of a representative from the medical examiner's office) once a fatal crash has occurred.</p>
Existing	<p>Joint Operations/Shared Control Memorandum (911 RDMT Project) (Public-Public)</p> <p>TxDOT Austin District, Travis County, City of Austin, CapMetro, Austin ISD, ABIA</p>	<p>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, all of which might be operated from a fully integrated combined center.</p>
Existing	<p>Railroad Right-of-Way (Public-Private)</p> <p>TxDOT and Public or Private Railroad Operators</p>	<p>Agreement allows TxDOT to install and maintain fiber optic cable within the railroad right-of-way.</p>
Existing	<p>Sharing Fiber Optic Cable and/or related Infrastructure (Public-Public)</p> <p>TxDOT Austin District and Municipalities</p>	<p>Agreement for the connection and sharing of fiber optic cable and/or related infrastructure owned by either TxDOT or a local municipality for the use of sending and receiving transportation related data.</p>
Existing	<p>Standard Operating Procedures (Public-Public)</p> <p>CTECC Partners</p>	<p>CTECC partner agencies have developed standard operating procedures to cover the many different aspects of operating the center. Agreements are categorized into function codes that cover the following areas:</p> <ul style="list-style-type: none"> Function Code 00 – SOP Process Function Code 01 – General Office Function Code 02 – Facility Maintenance Function Code 03 – Building Security/Building Emergency Function Code 05 – System Security/Application Administration Function Code 07 – Radio Function Code 08 – CTECC Administration

Table 10 – Austin Regional Agreements (Continued)

Status	Agreement and Agencies	Agreement Description
Existing	Traffic Signal Operation and Maintenance (Public-Public) City of Austin and Travis County	Agreement that the City of Austin will plan for, design, install, maintain and upgrade traffic control devices within the county of county roadways.
Existing	Traffic Signal Operation and Maintenance (Public-Public) TxDOT and City of San Marcos.	Memorandum that the City of San Marcos will operate and maintain forty (40) interconnected TxDOT traffic signals within the City with financial support from TxDOT for certain signals. The City of San Marcos will also maintain the integrated traffic control system that was installed to control the interconnected traffic signals.
Existing	Transit Signal Priority (Public-Public) City of Austin, CapMetro	Agreement between the City of Austin and CapMetro regarding transit signal priority at specific signals that are along CapMetro MetroRapid BRT routes.
Future	Data Sharing and Usage (Public-Private) TxDOT Austin District and Private Information Service Provider	Agreements would 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	Data Sharing and Usage (Public-Public) TxDOT Austin District and Williamson County	Agreement would define the parameters, guidelines, and policies for inter-agency ITS data sharing between the TxDOT TMC at CTECC and Williamson County operations center that is currently in the planning phase.
Future	Frequent Training of Key Personnel (Public-Public) TxDOT Austin District, City of Austin, City of Round Rock, City of Georgetown, City of Cedar Park, City of Round Rock, City of San Marcos, CapMetro, CARTS, CTRMA, County Departments, TxDOT TOD, DPS Municipalities.	Agreement would provide on-going training for key personnel at various agencies regarding incident response, maintenance, and operations of the transportation system.
Future	Incident Data Sharing and Usage (Public-Public) TxDOT Austin District and Emergency Management Agencies	Agreement 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.
Future	ITS and Traffic Signal Timing Data Sharing and Usage (Public-Public) TxDOT Austin District, City of Austin, City of Cedar Park, City of Georgetown, City of Round Rock, and City of San Marcos	Agreement would define the parameters, guidelines, and policies for inter-agency ITS and traffic signal timing sharing between the TxDOT TMC at CTECC and cities that are at or near 50,000 in population and maintaining their own traffic signal systems.

Table 10 – Austin Regional Agreements (Continued)

Status	Agreement and Agencies	Agreement Description
Future	<p>Operations and Maintenance Agreement (Public-Public)</p> <p>TxDOT Austin District, TxDOT TOD, and CTRMA</p>	<p>Agreement to operate ITS equipment on TXDOT TOD and CTRMA facilities as well as dispatch courtesy patrol vehicles. The agreement will need to address funding of these services.</p>

5.7 Phases of Implementation

The Austin Regional ITS Architecture will be implemented over time through a series of projects led by both public sector and private sector agencies. Though stakeholder in the Region have made significant ITS deployments in the Region, there are enormous opportunities to continue implementing ITS to improve the regional transportation system.

A sequence of projects and their respective time frames have been identified in the 2015 Austin Regional ITS Deployment Plan. These projects have been sequenced over a period of time that coincides with the 2040 CAMPO Regional Transportation Plan (RTP), with projects identified for deployment in the short-term (0-5 years), mid-term (5-10 years) and long-term (beyond 10 years.)

For more information on the phases of implementation and recommended ITS projects for deployment, please review to the 2015 Austin Regional ITS Deployment Plan.

6. USE AND MAINTENANCE OF THE REGIONAL ITS ARCHITECTURE

The ITS Architecture developed for the Austin Region addresses the Region's vision for ITS implementation at the time the plan was developed. With the growth of the Region, needs will change and as technology progresses, new ITS opportunities will arise. Shifts in regional needs and focus as well as changes in the National ITS Architecture will necessitate that the Austin Regional ITS Architecture be updated periodically to remain a useful resource for the Region. As projects are developed and deployed, it will be important that those projects conform to the Regional ITS Architecture so that they are consistent with both the Region's vision for ITS as well as the National standards described in the Regional ITS Architecture. In some cases, if projects do not conform, it may be necessary to modify the Regional ITS Architecture to reflect changes in the Region's vision for ITS rather than modify the project. In this Section, a process for determining architecture conformity of projects is presented and a plan for how to maintain and update the Regional ITS Architecture is described.

In 2001 the FHWA issued Final Rule 23 CFR 940, which required that ITS projects using federal funds (or ITS projects that integrate with systems that were deployed with federal funds) conform to a regional ITS architecture and also be developed using a systems engineering process. The purpose of this Section is to discuss how the Austin Regional ITS Architecture can be used to support meeting the ITS architecture conformity and systems engineering requirements. A process for maintaining the Regional ITS Architecture, including the Regional ITS Deployment Plan, is also presented.

The Regional ITS Architecture is considered a living document. As the Region grows, needs will change, and, as technology progresses, new ITS opportunities will arise. Shifts in regional needs and focus as well as changes in the National ITS Architecture will necessitate that the Austin Regional ITS Architecture be updated to remain a useful resource for the Region. In the Regional ITS Architecture, a process for maintaining the plan was developed in coordination with stakeholders. The process covers both major updates to the Regional ITS Architecture that will happen approximately every four or five years as well as minor changes that may be needed between major updates of the documents. These processes have been included in this Section.

6.1 Incorporation into the Regional Planning Process

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. The FHWA and FTA require that any project that is implemented with federal funds conform to the Regional ITS Architecture. Many metropolitan or transportation planning organizations around the country now require that an agency certify that a project with ITS elements conforms to the Regional ITS Architecture before allowing the project to be included in the Transportation Improvement Program (TIP).

The Regional ITS Architecture can serve as a valuable resource in the development of the Regional Transportation Plan (RTP), formally known as Long Range Transportation Plan (LRTP). **Figure 8** illustrates the CAMPO planning process and the involvement of the ITS Architecture in that process. The CAMPO Congestion Management Process and ITS Working Group provides input into the RTP on ITS needs for the Region. The needs identified in the ITS Architecture should be considered by the Working Group when providing this input. During the project selection process the service package prioritization developed by stakeholders during the ITS architecture development process should be utilized to facilitate the selection of projects for inclusion in the RTP.

As projects transition from the RTP to the Transportation Improvement Program (TIP), each project should be evaluated to determine if the project includes any ITS elements. If the project contains an ITS element, then the Regional ITS Architecture needs to be reviewed to ensure that the project is in conformance. TxDOT or CAMPO will assist agencies as they perform this examination as part of the project application process using the procedure outlined in Section 6.3

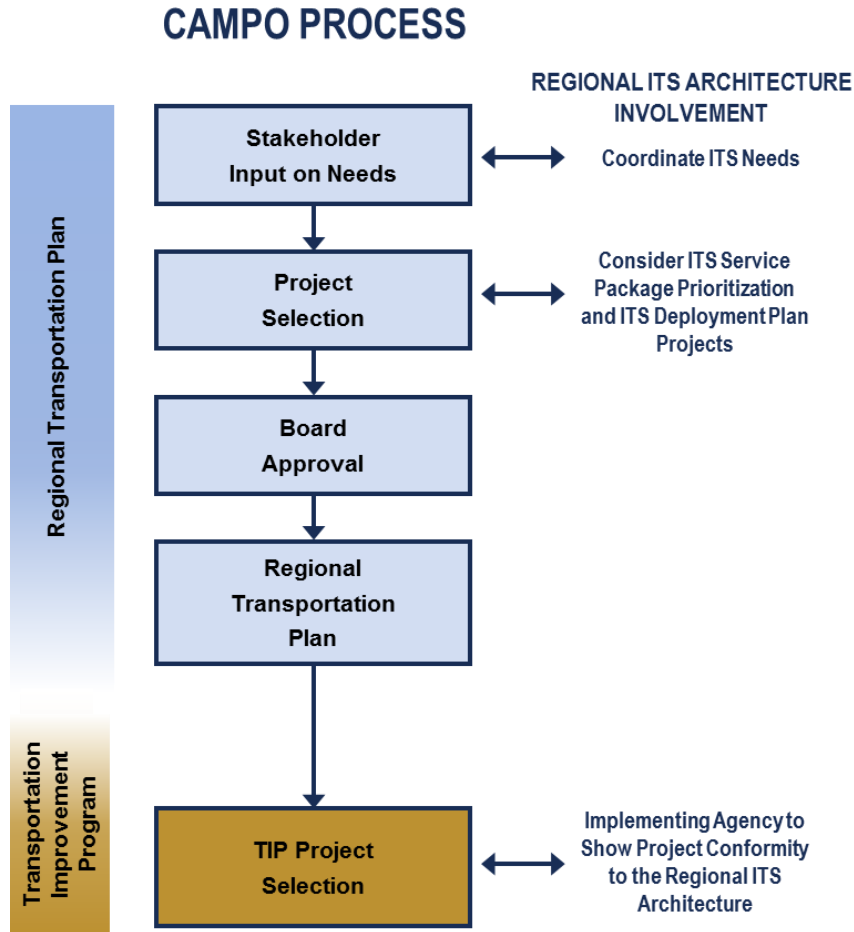


Figure 8 – CAMPO Regional Planning Process and ITS Architecture Involvement

6.2 Regional ITS Architecture Maintenance Process

CAMPO will lead the effort to maintain the Regional ITS Architecture for the six county Region within the MPO planning boundary, which is comprised of Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson Counties. TxDOT will be responsible for maintaining the other five counties included in the Austin Regional ITS Architecture. These counties lie outside of the CAMPO planning boundaries, but within the TxDOT Austin District boundary, and include Blanco, Gillespie, Lee, Llano, and Mason Counties. A summary of the maintenance plan for the Regional ITS Architecture and Deployment Plan is included in **Table 11**.

Table 11 – Austin Regional ITS Architecture and Deployment Plan Maintenance Summary

Maintenance Details	Regional ITS Architecture and Deployment Plan	
	Modification	Complete Update
Timeframe for Updates	As needed	Review prior to update of Regional Transportation Plan (RTP) to determine need for update. Review annually if not updated in conjunction with the RTP update.
Scope of Update	Update ITS service packages to satisfy architecture conformity requirements of projects. Other changes to the Regional ITS Architecture and Deployment Plan as required.	Entire Regional ITS Architecture and Deployment Plan
Lead Agency	CAMPO - Responsible for Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson Counties TxDOT – Responsible for Blanco, Gillespie, Lee, Llano, and Mason Counties	Joint TxDOT and CAMPO led effort
Participants	Stakeholders impacted by modifications to ITS service packages	Entire stakeholder group
Results	Documentation of changes to ITS service packages or other components of the Regional ITS Architecture and Deployment Plan	Updated Austin Regional ITS Architecture and Deployment Plan document, Appendices, and Turbo Architecture database

Stakeholders should document any changes to the Regional ITS Architecture that are necessary for project conformity, and provide those changes to TxDOT or CAMPO so they can retain a record of requested changes. The changes that are kept by CAMPO and TxDOT will be incorporated into the Regional ITS Architecture and Deployment Plan during the next complete update.

The need for a full update of the plan will be considered prior to the update of the CAMPO Regional Transportation Plan (RTP), which should occur approximately four years after the completion of the Regional ITS Architecture and Deployment Plan. TxDOT and CAMPO will review the Regional ITS Architecture to determine if an update is needed based on the status of ITS deployments in the Region, as well as changes to the National ITS Architecture. If it is determined that an update of the Regional ITS Architecture and Deployment Plan is not needed at that time, TxDOT and CAMPO will review the Regional ITS Architecture and Deployment Plan on an annual basis to determine when an update will be required.

6.3 Process for Determining ITS Architecture Conformity

The Austin Regional ITS Architecture documents the customized service packages that were developed as part of the ITS architecture process. To satisfy FHWA and FTA requirements and remain eligible to use federal funds, a project must be accurately documented. The steps of the process are as follows:

- Identify the ITS components in the project;
- Identify the corresponding service packages(s) from the Regional ITS Architecture;
- Locate the component within the service 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 Regional ITS Architecture or the project to ensure there is conformance.

The steps for determining ITS architecture conformity of a project are described in more detail below.

Step 1 – Identify the ITS Components

ITS components can be fairly apparent in an ITS focused project such as CCTV camera or DMS deployments, but could also be included in other types of projects where they are not as apparent. 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 a city's closed loop signal system. These are all ITS deployments and should be part of the ITS architecture.

Step 2 – Identify the Corresponding Service Packages

If a project was included in the list of projects in the Austin Regional ITS Deployment Plan, then the applicable service package(s) for that project were also identified. However, ITS projects are not required to be included in the ITS Deployment Plan in order to be eligible for federal funding; therefore, service packages might need to be identified for projects that have not been covered in the ITS Deployment Plan. In that case, the service packages selected and customized for the Austin Region should be reviewed to determine if they adequately cover the project. Service packages selected for the Austin Region are identified in **Table 6** of this document, detailed service package definitions are located in **Appendix A**.

Step 3 - Identify the Component within the Service Package

The customized service packages for the Austin Region are located in **Appendix B**. Once the element is located within the appropriate service package, the evaluator should determine if the element name used in the service package is accurate or if a change to the name is needed. For example, a future element called TxDOT Austin District Changeable Speed Limit Signs was included in the Austin Regional ITS Architecture for future implementation of variable speed limits along controlled-access highways operated by TxDOT. Detailed planning has not begun, and TxDOT Austin District may select a different name for the system once planning and implementation are underway. Such a name change in the project should be documented using the process outlined in Section 6.4.

Step 4 – Evaluate the Connections and Flows

The connections and architecture flows documented in the service package diagrams were selected based on the information available at the time the Regional ITS Architecture was developed. As the projects are designed, decisions will be made on the system layout that might differ from what is shown in the service package. These changes in the project should be documented in the ITS service packages using the process outlined in Section 6.4.

Step 5 – Document Required Changes

If any changes are needed to accommodate the project under review, Section 6.4 describes how those changes should be documented. Any changes will be incorporated during the next Regional architecture

update. Conformance will be accomplished by documenting how the service package(s) should be modified so that the connections and data flows are consistent with the project.

6.4 Procedure for Submitting ITS Architecture Changes Between Scheduled Updates

Updates to the Austin Regional ITS Architecture will occur on a regular basis as described in Section 6.23 to maintain the architecture as a useful planning tool. Between major plan updates, smaller modifications will likely be required to accommodate ITS projects in the Region. Section 6.3 contains step by step guidance for determining whether or not a project requires architecture modifications to the Regional ITS Architecture.

For situations where a change is required, an ITS Architecture Maintenance Documentation Form was developed and is included in **Appendix F**. This form should be completed and submitted to the architecture maintenance contact person identified on the form whenever a change to the Regional ITS Architecture is proposed. There are several key questions that need to be answered when completing the Architecture Maintenance Documentation Form including those described below.

Change Information: The type of change that is being requested can include an Administrative Change, Functional Change – Single Agency, Functional Change – Multiple Agency, or a Project Change. A description of each type of change is summarized below.

- Administrative Change – Basic changes that do not affect the structure of the ITS service packages in the Regional ITS Architecture. Examples include changes to stakeholder or element names, element status, or data flow status.
- Functional Change – Single Agency: Structural changes to the ITS service packages that impact only one agency in the Regional ITS Architecture. Examples include the addition of a new ITS service package or changes to data flow connections of an existing service package. The addition or change would only impact a single agency.
- Functional Change – Multiple Agencies: Structural changes to the ITS service packages that have the potential to impact multiple agencies in the Regional ITS Architecture. Examples include the addition of a new ITS service package or changes to data flow connections of an existing ITS service package. The addition or changes would impact multiple agencies and require coordination between the agencies.
- Project Change – Addition, modification, or removal of a project in the Regional ITS Deployment Plan Section of the Regional ITS Architecture.

Description of the requested change: A brief description of the type of change being requested should be included.

Service packages being impacted by the change: Each of the ITS service packages that are impacted by the proposed change should be listed on the ITS Architecture Maintenance Documentation Form. If the proposed change involves creating or modifying an ITS service package, then the agency completing the ITS Architecture Maintenance Documentation Form is asked to include a sketch of the new or modified service package.

Impact of proposed change on other stakeholders: If the proposed change is expected to have any impact on other stakeholders in the Region, then those stakeholders should be listed on the ITS Architecture Maintenance Documentation Form. A description of any coordination that has occurred with other stakeholders that may be impacted by the change should be also included. Ideally all stakeholders that may be impacted by the change should be contacted and consensus should be reached on any new or modified ITS service packages that will be included as part of the Regional ITS Architecture.

CAMPO will review and accept the proposed changes. When a complete update is performed by CMAPO or TxDOT, all of the documented changes will be incorporated into the architecture. This documentation will most likely be performed in conjunction with project conformance documentation as part of the TIP

project application process; however, changes could be documented at other times as agencies are planning for future projects using the same form.