Chattanooga

Regional ITS Architecture

Regional ITS Architecture Report

A Chattanooga-Hamilton County/North Georgia Transportation Planning Organization Project

Prepared by:

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AD	Archived Data
AMBER	America's Missing: Broadcast Emergency Response
APTA	American Public Transportation Association
APTS	Advanced Public Transportation System
ASTM	American Society for Testing and Materials
ATIS	Advanced Traveler Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
C2C	Center-to-Center
CARTA	Chattanooga Area Regional Transportation Authority
CHCNGA-TPO	Chattanooga-Hamilton County/North Georgia Transportation Planning Organization
CCTV	Closed Circuit Television
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
DSRC	Dedicated Short Range Communication
EM	Emergency Management
EMA	Emergency Management Agency
EMS	Emergency Medical Services
EOC	Emergency Operations Center
FDS	Fog Detection System
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GDOT	Georgia Department of Transportation
HAR	Highway Advisory Radio
HAZMAT	Hazardous Materials
IEEE	Institute of Electrical and Electronics Engineers
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
IVR	Interactive Voice Response

LIST OF ACRONYMS

LRTP	Long-Range Transportation Plan
MC	Maintenance and Construction
MOU	Memorandum of Understanding
NEMA	National Electrical Manufacturers Association
NOAA	National Oceanic and Atmospheric Administration
NTCIP	National Transportation Communications for ITS Protocol
PSAP	Public Safety Answering Point
RDS	Radar Detection System
RPA	Regional Planning Agency
RTMS	Remote Traffic Microwave Sensor
RWIS	Road Weather Information System
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible and Efficient Transportation Equity Act – A Legacy for Users
SDO	Standards Development Organization
SETHRA	Southeast Tennessee Human Resource Agency
TDOT	Tennessee Department of Transportation
TEA-21	Transportation Equity Act for the 21st Century
TEMA	Tennessee Emergency Management Agency
TIP	Transportation Improvement Program
THP	Tennessee Highway Patrol
TITAN	Tennessee Integrated Traffic Analysis Network
TMC	Transportation Management Center
TOC	Traffic Operations Center
TPO	Transportation Planning Organization
TraCS	Traffic and Criminal Software
TSIS	TDOT SmartWay Information System
USDOT	United States Department of Transportation
VIVDS	Video Image Vehicle Detection Systems
WAVE	Wireless Access in Vehicular Environments

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Chattanooga-Hamilton County / North Georgia Transportation Planning Organization (TPO)

The Chattanooga-Hamilton County / North Georgia TPO Technical Coordinating Committee (TCC) (formerly the Executive Staff) and TPO Executive Board members representing the counties of Hamilton in Tennessee, and Dade, Catoosa and Walker in Georgia including their respective municipal governments within the Chattanooga-Hamilton County / North Georgia TPO Boundary.

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1. INTRODUCTION

1.1 Project Overview

The Chattanooga Regional Intelligent Transportation System (ITS) Architecture was first developed in 2003 by the Tennessee Department of Transportation (TDOT). Since that time the Chattanooga Region has seen the implementation of a number of significant ITS programs and projects including the TDOT Chattanooga SmartWay ITS which provides freeway management capabilities for a majority of the urban freeway system in Chattanooga. Regional ITS architectures are living documents and need to be continuously updated in order for them to accurately reflect the ITS needs, plans, and visions within a region. In October 2009 the Chattanooga-Hamilton County/North Georgia Transportation Planning Organization (TPO), in coordination with TDOT, began the update of the Chattanooga Regional ITS Architecture with the goal of completing the update by June 2010.

A regional ITS architecture provides a framework for implementing ITS projects, encourages interoperability and resource sharing among agencies, identifies applicable standards to apply to projects, and allows for cohesive long-range planning among regional stakeholders. ITS architectures allow stakeholders to plan for what they want their system to look like in the long-term and then break out the system into smaller pieces that can be implemented as funding permits. A regional ITS architecture is also 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, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) bill passed in 2005. In response to Section 5206(e) of TEA-21, the Federal Highway Administration (FHWA) issued a final rule and the Federal Transit Administration (FTA) issued a final policy that required regions implementing any ITS project to have an ITS architecture in place by April 2005. After this date, any ITS projects must show conformance with their regional ITS architecture in order to be eligible for funding from FHWA or FTA. In order to show this conformance, it is important that any region deploying ITS have an updated regional ITS architecture in place.

The Chattanooga Regional ITS Architecture update included the same geographic boundaries as the Chattanooga-Hamilton County/North Georgia TPO plus a portion of I-75 in Bradley County where TDOT has deployed a fog detection system. Stakeholders developed the Regional ITS Architecture based on a 20-year vision of how they wanted to implement and operate ITS in the Chattanooga Region. In addition to the Regional ITS Architecture, a separate ITS Deployment Plan was developed to identify and prioritize specific ITS projects recommended for the Region in order to implement the ITS Architecture.

The Chattanooga Regional ITS Architecture and the ITS Deployment Plan were both developed with significant input from local, state, and federal officials. A series of three workshops were held to solicit input from stakeholders and ensure that the plans reflected the unique needs of the Region. Copies of the draft reports were provided to all stakeholders. The Regional ITS Architecture and Deployment Plan developed reflects an accurate snapshot of existing ITS deployments and future ITS plans in the Region. Needs and priorities of the Region will change over time and in order to remain effective this plan should be periodically reviewed and updated.

1.2 Document Overview

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

Section 1 – Introduction

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

Section 2 – Regional ITS Architecture Development Process

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

Section 3 – Regional Needs and Inventory

This section contains a summary of regional needs that are related to ITS for the Chattanooga Region as well as a description of the stakeholders and ITS elements in the Region. Elements are grouped based on the owner, such as the City of Chattanooga or CARTA, and their current status is listed as either existing or planned in the Region.

Section 4 – Regional ITS Architecture

This section describes how the National ITS Architecture was customized to meet the ITS needs, plans, and visions for the Chattanooga Region. The ITS market packages that were selected for the Region 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 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 5 – Use and Maintenance of the Regional ITS Architecture

This section describes how the Regional ITS Architecture can be use 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 Chattanooga Regional ITS Architecture also contains five appendices:

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

1.3 Chattanooga Region

1.3.1 Geographic Boundaries

The Chattanooga Region is comprised of Hamilton County in Tennessee and the northern portions of Dade, Walker, and Catoosa Counties in Georgia. The geographic boundaries of the Region are shown in **Figure 1**. These boundaries correspond with the boundaries of the Chattanooga-Hamilton County/North Georgia TPO. Also considered within the Chattanooga Region is the fog detection system that has been deployed by TDOT on I-75 in

Bradley County but is operated by the TDOT SmartWay Traffic Management Center (TMC) in Chattanooga.

When developing the stakeholder group, the project team coordinated with the Chattanooga-Hamilton County/North Georgia TPO to invite the appropriate city, county, regional, state and federal agencies. Stakeholders included both local representatives as well as representatives from the TDOT Long Range Planning Division in Nashville, Georgia Department of Transportation (GDOT) in Atlanta, and FHWA from both the Tennessee Division Office in Nashville and Georgia Division Office in Atlanta.

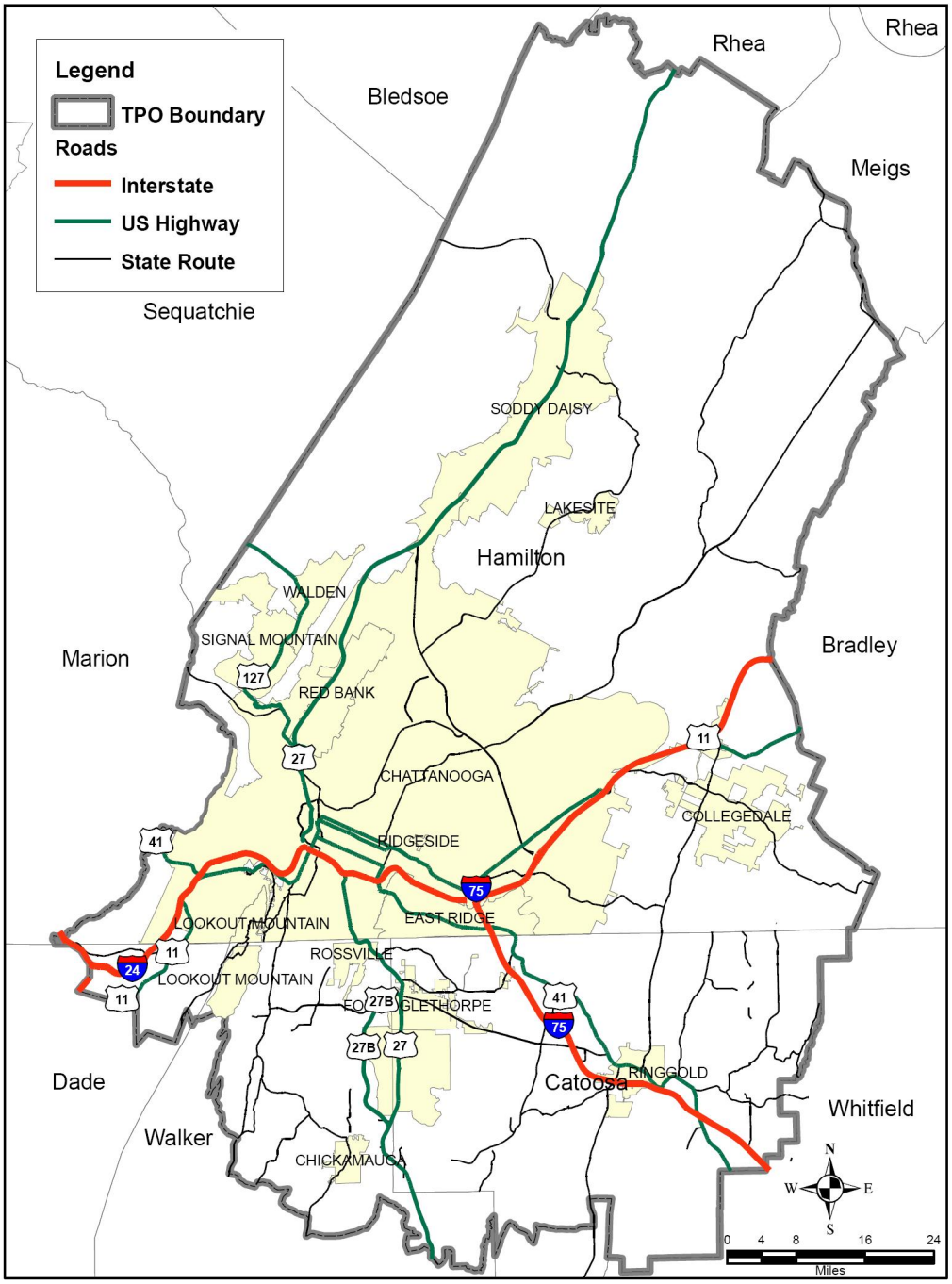

Figure 1 – Chattanooga Regional ITS Architecture Boundaries

1.3.2 Transportation Infrastructure

The Chattanooga Region is served by a number of significant State and Federal highways. The primary access control facilities include I-75, I-24, US 27, and SR 153. There are presently no toll facilities operating or planned within the Chattanooga Region.

I-75 and I-24 are the principal highway corridors for this Region. I-75 is one of the principal north-south corridors that is critical to movement of goods and people through East Tennessee as well as the United States. I-24 is the principal east-west corridor linking the Chattanooga Region to Central Tennessee.

US 27 and SR 153 predominately facilitates Chattanooga commuter traffic linking the Chattanooga urban area to communities to the north. Chattanooga generally lacks any high volume circumferential routes to provide alternatives for any of these principal corridors.

Fixed route and paratransit services are provided in Hamilton County by the Chattanooga Area Regional Transportation Authority (CARTA). Demand response service in the Chattanooga Region is provided by several different providers depending on the County. Within Tennessee, the Southeast Tennessee Human Resource Agency provides demand response in Hamilton County. In Georgia, demand response service is provided by Catoosa Trans-Aid in Catoosa County, Dade County Transit in Dade County, and Walker County Transit in Walker County. Commuter rail and light rail service does not exist within the Region.

1.3.3 Chattanooga Region ITS Initiatives and Activities

The Chattanooga Region has undertaken several deployments of ITS programs throughout the Region. These programs have come from multiple agencies and cover multiple 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 Chattanooga Region:

- **Incident Management Task Force** – The Chattanooga-Hamilton County/North Georgia TPO currently leads an Incident Management Task Force to focus on issues related to the management of crashes on freeways. The Task Force is made up of representatives from police and fire departments, emergency medical services, state and local transportation departments, towing and recovery companies, environmental agencies, and hazardous spill and containment companies. The Incident Management Task Force provides a forum for these agencies to review responses to incidents and promote better communication and cooperation.
- **TDOT SmartWay Program** – TDOT's SmartWay platform is predominately a freeway traffic management platform comprised of closed circuit television (CCTV) cameras, dynamic message signs (DMS), radar detection systems (RDS), and highway advisory radio (HAR). An early deployment project consisting of only the CCTV camera elements was deployed in 2007. A deployment is presently underway to supplement the CCTV camera coverage with the remaining ITS elements covering roughly 50 miles of freeway in the Chattanooga Region. A fiber-optic communication backbone network is being constructed to support up to roughly 70 miles of ITS coverage. The system will be managed from the new SmartWay Regional TMC that is also currently under construction.
- **TDOT HELP** – The TDOT HELP program has been in operation in the Chattanooga Region since 2000. The HELP program trucks patrol freeways including I-75, I-24, US

27 and SR 153 and assist motorist with minor repairs such as flat tire changes, fuel, and push services to move disabled vehicles out of the through lanes. HELP operators also assist with traffic control and detours during major incidents.

- **I-75 Fog Detection System (FDS)** – TDOT has constructed another ITS system just north of Chattanooga consisting of the same ITS elements as their SmartWay freeway management system but with the addition of a fog detection system (FDS). The I-75 FDS covers roughly 20 miles of I-75 in Bradley and McMinn Counties and is presently operated by the Tennessee Highway Patrol (THP) District 2 Headquarters in Chattanooga. The current SmartWay deployment project is extending the associated fiber optic communications backbone from the northern limits of the Chattanooga ITS deployment to the southern limits of the I-75 FDS. The shared communication network will permit the I-75 FDS to be managed from the new SmartWay Regional TMC as well as the THP District 2 Headquarters.
- **City of Chattanooga Traffic Management Center and Advanced Traffic Management System** – The City of Chattanooga is presently updating an Advanced Traffic Management System (ATMS) supporting real time monitoring and control of traffic signals within their downtown. The ATMS will provide the City of Chattanooga TMC the capability to implement traffic signal plans in response to changing traffic patterns as well as the capability to monitor traffic conditions and equipment status. This capability will be for downtown traffic signals as well as various closed loop traffic signal systems outside of the downtown area. The City is also in the process of creating a wireless mesh blanket that will provide coverage in the downtown area with some expansion in outlying areas. This system is being incorporated into the ATMS design and could potentially be used for other ITS applications such as CCTV camera communication.
- **Center-to Center (C2C) Communication** – The TDOT SmartWay communication backbone has facilitated C2C communication links between the TDOT TMC, the City of Chattanooga TMC, the THP District 2 Headquarters, and the Chattanooga E-911 Emergency Management Center.
- **CARTA ITS** – CARTA has an extensive ITS program that includes a number of different programs that are either fully implemented or in the process of being implemented. CARTA's bus fleet includes automated vehicle location (AVL), mobile data terminals (MDTs), automated passenger counters, electronic fare payment, and on-board security cameras and alarms. Software for dispatching and scheduling is being upgraded and next bus arrival signs are in place at several locations in Chattanooga. Traffic signal priority also exists with the City of Chattanooga traffic signals.

1.3.4 Project Participants

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 Chattanooga 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 in the Chattanooga Region who have participated in the project workshops or provided input to the study team as to the needs and issues that should be considered as part of the 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 – Chattanooga Stakeholder Agencies and Contacts

Stakeholder Agency	Address	Contact
City of Chattanooga Fire Department	910 Wisdom St. Chattanooga, TN 37406	William Knox
City of Chattanooga Fire Department	910 Wisdom St. Chattanooga, TN 37406	Daniel Hague
City of Chattanooga Fire Department	910 Wisdom St. Chattanooga, TN 37406	Phil Hyman
City of Chattanooga Office of the City Attorney	101 E. 11th Street Chattanooga, TN 37402	Ken Fritz
City of Chattanooga Police Department	3410 Amnicola Hwy. Chattanooga, TN 37406	John Collins
City of Chattanooga Police Department	3410 Amnicola Hwy. Chattanooga, TN 37406	Jeff Francis
City of Chattanooga Police Department	3410 Amnicola Hwy. Chattanooga, TN 37406	Steve Jones
City of Chattanooga Police Department	3410 Amnicola Hwy. Chattanooga, TN 37406	Stan Maffett
City of Chattanooga Public Works Department	1250 Market Street Chattanooga, TN 37402	Steve Leach
City of Chattanooga Traffic Engineering and Operations	1250 Market Street Suite 3030 Chattanooga, TN 37402	Tommy Trotter
City of Chattanooga Traffic Engineering and Operations	1250 Market Street Suite 3030 Chattanooga, TN 37402	John Van Winkle
City of Chattanooga Traffic Engineering and Operations	1250 Market Street Suite 3030 Chattanooga, TN 37402	John Wall
City of East Ridge	1517 Tombras Ave. East Ridge, TN 37412	Bill Middleton
Chattanooga Area Regional Transportation Authority (CARTA)	1617 Wilcox Boulevard Chattanooga, TN 37406	Annie Powell
Chattanooga Metropolitan Airport Authority	1001 Airport Road Suite 14 Chattanooga, TN 77421	Michael Landguth
Chattanooga-Hamilton County Health Department	921 East Third Street Chattanooga, TN 37403	Dawn Ford
Chattanooga-Hamilton County Regional Planning Agency	1250 Market Street Suite 2000, DRC Chattanooga, TN 37402	Patrick Hall
Chattanooga-Hamilton County Regional Planning Agency	1250 Market Street Suite 2000 , DRC Chattanooga, TN 37402	Melissa Taylor
FHWA Georgia Division	61 Forsyth Street Suite 17T100 Atlanta, GA 30303	Lokesh Hebbani
FHWA Tennessee Division	404 BNA Drive Building 200, Suite 508 Nashville, TN 37217	Don Gedge
Georgia Department of Public Safety	1300 Joe Frank Harris Parkway Cartersville, GA 30120	Joe Hamby

Table 1 – Chattanooga Stakeholder Agencies and Contacts (continued)

Stakeholder Agency	Address	Contact
Georgia DOT	935 East Confederate Ave., Bldg. 24 Atlanta, GA 30316	Ronald Boodhoo
Georgia DOT	935 East Confederate Ave., Bldg. 24 Atlanta, GA 30316	Hugh Colton
Northwest Georgia Regional Commission (NWGRC)	1 Jackson Hill Drive, Rome, GA 30162-1798	David Kenemer
TDOT Region 2	4005 Cromwell Rd. Chattanooga, TN 37421	Holly Crittenden
TDOT Region 2	4005 Cromwell Rd. Chattanooga, TN 37421	James Ball
TDOT Region 2	4005 Cromwell Rd. Chattanooga, TN 37421	Landon Castleberry
TDOT Region 2	4005 Cromwell Rd. Chattanooga, TN 37421	Bob Van Horn
TDOT Region 2	4005 Cromwell Rd. Chattanooga, TN 37421	Alan Wolfe
TDOT Long Range Planning Division	505 Deaderick Street Suite 900, James K Polk Bldg Nashville, TN 37243-0334	Terry Gladden
TDOT Long Range Planning Division	505 Deaderick Street Suite 900, James K Polk Bldg Nashville, TN 37243-0334	Mike Presley
TDOT Office of Incident Management	6603 Centennial Blvd. Nashville, TX 37243	Frank Horne
Tennessee Highway Patrol	4120 Cummings Hwy Chattanooga, TN	Patricia Maines-Riggs

2. REGIONAL ITS ARCHITECTURE UPDATE PROCESS

The update of the Regional ITS Architecture and Deployment Plan for the Chattanooga Region relied heavily on stakeholder input to ensure that the architecture reflected local needs. A series of three workshops were held with stakeholders to gather input, and draft documents were made available to stakeholders for review and comment.

The process followed for the Chattanooga 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.

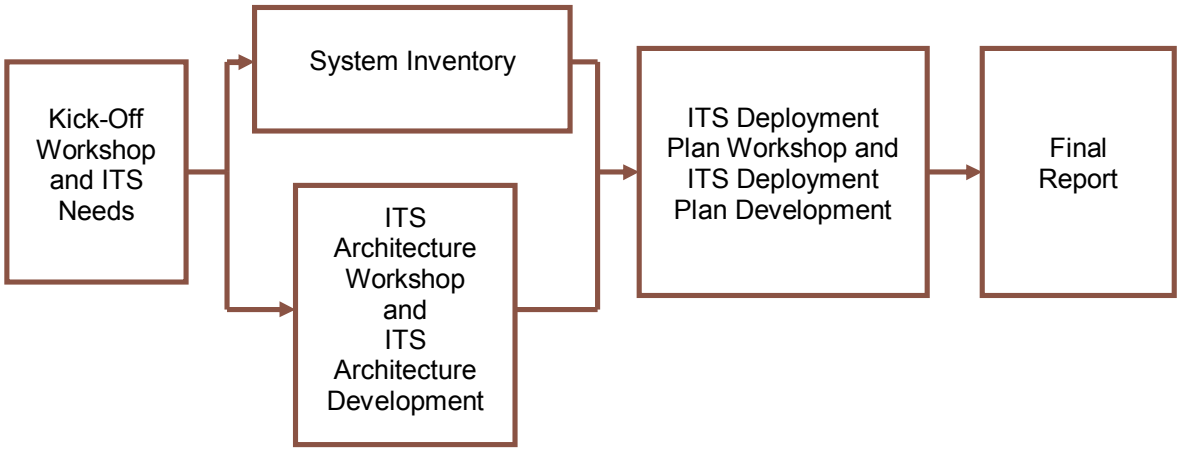

Figure 2 – Chattanooga Regional ITS Architecture and Deployment Plan Development Process

2.1 Stakeholder Workshops

A total of three workshops with stakeholders over a period of five months were held to update the Chattanooga Regional ITS Architecture and Deployment Plan. These workshops included:

- Kick-Off Workshop;
- Regional ITS Architecture Development Workshop; and
- ITS Deployment Plan Workshop.

Key components of the process are described below:

Task 1 – Kick-Off Workshop and ITS Needs: A stakeholder group was identified that included representatives from regional transportation, public works, public safety, and emergency management agencies. The group was invited to the project Kick-Off Workshop where ITS needs for the Region were identified and dates for upcoming workshops agreed upon.

Task 2 – System Inventory: Collecting information for the system inventory began at the Kick-Off Workshop through discussions with the stakeholders to determine existing and planned ITS elements in the Region. After the Kick-Off Workshop, follow-up calls and additional research was conducted to complete the system inventory.

Task 3 – ITS Architecture Workshop and ITS Architecture Development: The purpose of the Regional ITS Architecture Workshop was to review the system inventory with stakeholders and update the Chattanooga Regional ITS Architecture. Training on the National ITS Architecture was integrated into the workshop so that key elements of the architecture, such as market packages, could be explained prior to the selection and editing of these elements. Stakeholders reviewed the market packages that are currently available in the National ITS Architecture as well as those that were included in the 2003 Chattanooga Regional ITS Architecture. A consensus was reached on which market packages to include in the 2010 update and then the selected market packages were customized for the Region.

The result of the Regional ITS Architecture Workshop was an ITS architecture for the Chattanooga Region that included a system inventory, interconnect diagram, customized market packages, functional requirements, and relevant ITS standards. Following the workshop, a Draft Regional ITS Architecture document was prepared and sent to stakeholders for review and comment.

Task 4 – ITS Deployment Plan Workshop and ITS Deployment Plan Development: A draft project listing for the Region was presented to stakeholders at the Regional ITS Deployment Plan Workshop. Stakeholders were asked to provide input on the recommended projects, responsible agencies, associated costs, and deployment timeframe. Following the workshop, a Draft Regional ITS Deployment Plan document was prepared and sent to stakeholders for review and comment.

Task 5 – Comment Resolution Workshop and Final Report: Comments on the Draft Regional ITS Architecture and Draft Regional ITS Deployment Plan were addressed and a Final Draft Regional ITS Architecture and Final Draft Regional ITS Deployment Plan were developed and sent to stakeholders for a second round of comments before the final reports were developed. In addition, an Executive Summary was also developed as well as a Turbo Architecture database. Project documents were made available to all stakeholders on the project website. Hard copies of the final documents as well as an electronic copy of the Turbo Architecture database for the Chattanooga Region were also sent to representatives from the Chattanooga-Hamilton County Regional Planning Agency (RPA), TDOT Long Range Planning Division, and the FHWA Tennessee Division Office.

2.2 Turbo Architecture

Turbo Architecture Version 4.1 was used to develop the Chattanooga 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 4.1 of Turbo Architecture was released in March 2009 and was developed to support Version 6.1 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 the FTA.

In the Chattanooga Region, the Turbo Architecture database that was developed was based on the ITS market packages which are provided in **Appendix B** of this report. The ITS market packages provide a graphical representation of the services stakeholders in the Region would like ITS to provide. In each market package the elements, such as a 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**.

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.
Market Packages Report	Identifies each of the market packages selected for the Region and the elements associated with each market 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 market packages to view all of the elements and connections in each market 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.

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 4.1 was the most recent version available.

3. REGIONAL NEEDS AND INVENTORY

3.1 Regional Needs

Regional needs that could be addressed by ITS were identified by stakeholders in the Chattanooga Regional ITS Architecture workshops held in October and December of 2009 and February 2010. In addition, the Chattanooga-Hamilton County/North Georgia 2035 Long-Range Transportation Plan (LRTP) was reviewed to determine other regional needs that could possibly be addressed in some way through ITS. The 2035 LRTP was being developed at the same time as the Chattanooga Regional ITS Architecture and a final version of the LRTP was completed in the spring of 2010 prior to completion of the Regional ITS Architecture.

Within the 2035 LRTP there were six goals that were defined for the plan. Two of these goals could be met in part or fully through the deployment of ITS. The two goals and their corresponding objective from the 2035 LRTP are listed below.

2035 Long-Range Transportation Plan Goal: Develop and maintain a transportation system which provides for the safe and secure movement of people and goods. This goal had a corresponding objective to reduce traffic injuries and fatalities for motorized and non-motorized system users. ITS deployments can assist in reducing incident clearance times, providing advanced notice to motorists of road closures or lane blockages, and providing advanced notice to operators of the system of potential problems such as severe weather, equipment malfunctions, or debris in roadways. Through the use of ITS, the transportation system can be made safer and the number of traffic accidents can be reduced.

2035 Long-Range Transportation Plan Goal: Develop system operations strategies that improve travel mobility and maximize the life of the transportation system. The corresponding objective for this goal was to encourage the use of ITS in improving system performance, safety, and security. In the Chattanooga Regional ITS Architecture ITS market packages (which describe the services that ITS can provide) were selected that address system performance, safety, and security.

The needs identified through the Regional ITS Architecture development process as well as the 2035 LRTP provided guidance for determining which market packages should be included in the architecture. Stakeholders identified ITS needs for the Chattanooga Region in the following areas:

- Traffic management;
- Emergency management;
- Public transportation management; and
- Traveler information.

In addition to the above areas, during discussions of specific ITS market packages for the Region stakeholders also identified market packages in the areas of Maintenance and Construction Management, Commercial Vehicles Operations, and Archived Data Management.

In Section 4.1.4 a complete list of regional needs is presented along with the ITS market packages that have been recommended for the Region to consider implementing or expanding (if the market package currently exists.) Some of the key needs that were specific to ITS and identified through the development of the Regional ITS Architecture included:

- Development of alternate signal timing plans and DMS messages that can be implemented during incidents, special events, or construction detours;
- Coordination between the TDOT SmartWay Regional TMC and the City of Chattanooga TMC for joint control of the CCTV cameras deployed on the freeway system;
- Coordination of traffic signal system timing between the City of Chattanooga and adjacent cities;
- Expansion of the traffic signal system communications and system detection capabilities;
- Optimization of the traffic signal timing throughout the Region; and
- Implementation of a coordinated regional dispatch system for transit that is accessible through a single number.

3.2 Regional Inventory

The inventory and needs documented at the Kick-Off Workshop are the starting point for developing an ITS architecture for the Region. These ITS systems and components are used to customize the National ITS Architecture and create the Regional ITS Architecture for the Chattanooga Region.

When developing customized elements, the stakeholder group agreed to create individual traffic, maintenance, and emergency management elements for the City of Chattanooga and individual traffic elements for the City of East Ridge, City of Red Bank, and City of Soddy Daisy. 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 monies on potential future ITS deployments even if there are no specific plans for ITS implementation at this time.

3.2.1 Stakeholders

Each element included in the Chattanooga Regional ITS Architecture is associated with a stakeholder agency. A listing of stakeholders as identified in the Chattanooga Regional ITS Architecture can be found in **Table 3** along with a description of the stakeholder. Rather than individually documenting each of the smaller municipalities in the Region, a single stakeholder was created for municipal agencies which represents the cities and towns not specifically called out in the architecture.

Table 3 – Chattanooga Region Stakeholder Descriptions

Stakeholder	Stakeholder Description
CARTA	Chattanooga Area Regional Transportation Authority. Responsible for fixed route transit service in Hamilton County, paratransit service, and a downtown shuttle and parking system.
Catoosa County	County government for Catoosa County. Includes all county departments including the Sheriff's Office and Highway Department as well as the Catoosa County Emergency Management Agency.
Catoosa County Trans-Aid	Catoosa County demand response rural transportation provider.
Chattanooga-Hamilton County/North Georgia TPO	Transportation Planning Organization for the Chattanooga-Hamilton County/North Georgia Regional Planning Agency.
City of Chattanooga	Municipal government for the City of Chattanooga. Covers all city departments including those that deal with traffic and public safety.
City of Cleveland	Municipal government for the City of Cleveland. Covers all city departments including those that deal with traffic and public safety.
City of East Ridge	Municipal government for the City of East Ridge. Covers all city departments including those that deal with traffic and public safety.
City of Red Bank	Municipal government for the City of Red Bank. Covers all city departments including those that deal with traffic and public safety.
City of Soddy Daisy	Municipal government for the City of Soddy Daisy. Covers all city departments including those that deal with traffic and public safety.
Commercial Vehicle Operators	Operators of commercial vehicles.
Dade County	County government for Dade County. Includes all county departments including the Sheriff's Office and Highway Department as well as the Dade County Emergency Management Agency.
Dade County Transit	Dade County demand response rural transportation provider.
Financial Institution	Institution that handles exchange of money for transit electronic fare collection.
GDOT	Georgia Department of Transportation. Responsible for the construction, maintenance, and operation of state roadways in Georgia.
GEMA	Georgia Emergency Management Agency. Responsible for emergency operations during a disaster or large scale incident.
GSP	Georgia State Patrol. Responsible for statewide enforcement of traffic safety laws as well as commercial vehicle regulations.
Hamilton County	County government for Hamilton County. Includes all county departments including the Sheriff's Office and Highway Department as well as the Hamilton County Emergency Management Agency.
Media	Local media outlets including television stations, newspapers, radio stations and their associated websites.
Municipal/County Government	Government for various municipalities and counties within the Region that are not specifically called out. Covers all departments including those that deal with traffic and public safety.
NOAA	The National Oceanic and Atmospheric Administration gathers weather information and issues severe weather warnings.
Other Agencies	This stakeholder represents a wide variety of agencies. The associated elements are groups of agencies or providers that do not have a primary stakeholder agency.
Private Information Provider	Private sector business responsible for the gathering and distribution of traveler information. This service is typically provided on a subscription basis.

Table 3 – Chattanooga Region Stakeholder Descriptions (continued)

Stakeholder	Stakeholder Description
Rail Operators	Companies that operate rail systems including the dispatch and control of trains and the maintenance and operations of railroad tracks.
SETHRA	Southeast Tennessee Human Resource Agency. Responsible for demand response transportation services in the Region.
System Users	All of the users of the transportation system.
TDOT	Tennessee Department of Transportation. Responsible for the construction, maintenance, and operation of state roadways in Tennessee.
TEMA	Tennessee Emergency Management Agency. Responsible for emergency operations during a disaster or large scale incident.
Tennessee Bureau of Investigation	Statewide law enforcement agency responsible for issuing statewide AMBER Alerts in Tennessee.
Tennessee Department of Health and Human Services	State department that manages funding for medical transportation services.
THP	Tennessee Highway Patrol. Responsible for statewide enforcement of traffic safety laws as well as commercial vehicle regulations.
Walker County	County government for Walker County. Includes all county departments including the Sheriff's Office and Highway Department as well as the Walker County Emergency Management Agency.
Walker County Transit	Walker County demand response rural transportation provider.

3.2.2 ITS Elements

The ITS inventory is documented in the Regional ITS Architecture as elements. **Table 4** 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 the status of the element. In many cases an element classified as existing might still need to be enhanced to attain the service level desired by the Region.

The naming convention used for elements in the Chattanooga Regional ITS Architecture is consistent with the naming convention used in the Statewide ITS Architecture. This consistency provides seamless connections between the Regional and Statewide ITS Architecture.

Table 4 – Chattanooga Region Inventory of ITS Elements

Stakeholder	Element Name	Element Description	Status
CARTA	CARTA Bus Stop DMS	Chattanooga Area Regional Transportation Authority (CARTA) real-time next bus arrival information boards at transit transfer centers and select bus stops.	Existing
	CARTA Care-A-Van Dispatch Center	Chattanooga Area Regional Transportation Authority paratransit service dispatch center for Care-A-Van.	Existing
	CARTA Data Archive	Chattanooga Area Regional Transportation Authority data archive for transit data	Existing
	CARTA Fixed Route Dispatch Center	Chattanooga Area Regional Transportation Authority fixed route dispatch center.	Existing
	CARTA Fixed-Route Vehicles	Chattanooga Area Regional Transit Authority fixed route vehicles. Includes neighborhood routes, downtown shuttles, express buses and any other fixed route service.	Existing
	CARTA Paratransit Vehicles	Chattanooga Area Regional Transportation Authority paratransit vehicles dispatched through the Care-A-Van Dispatch Center.	Existing
	CARTA Routing Application	Chattanooga Area Regional Transportation Authority online routing application to assist travelers in developing a customized transit plan for an upcoming trip.	Planned
	CARTA Transit Center CCTV Camera Surveillance	Chattanooga Area Regional Transportation Authority closed circuit television camera surveillance at transit transfer centers or other transit facilities.	Planned
	CARTA Transit Kiosks	Chattanooga Area Regional Transportation Authority kiosks for dissemination of transit traveler information. Kiosks can also be used for the purchase and recharging of electronic fare payment cards.	Planned
	CARTA Website	Chattanooga Area Regional Transportation Authority website. In the future it is envisioned that the website will have real-time information about transit status.	Existing
	Electronic Fare Payment Card	Medium for collection of transit fares electronically.	Existing
	Regional Transit Coordination Center	Joint effort of regional demand response transit agencies to provide a single point of contact for demand response transit patrons to streamline the reservation process.	Planned
Catoosa County	Catoosa County EMA	Catoosa County Emergency Management Agency. Responsible for disaster planning for the County and operating the emergency operations center (EOC).	Existing

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Catoosa County (continued)	Catoosa County 911 Dispatch	Catoosa County 911 Public Safety Answering Point (PSAP). Responsible for answering all 911 calls made within the County and dispatching emergency responders.	Existing
Catoosa County Trans-Aid	Catoosa Trans-Aid Data Archive	Data archive for Catoosa Trans-Aid data.	Planned
	Catoosa Trans-Aid Dispatch Center	Dispatch center for Catoosa County Trans-Aid vehicles.	Existing
	Catoosa Trans-Aid Transit Center CCTV Camera Surveillance	Closed circuit television camera surveillance at transit transfer centers or other transit facilities.	Planned
	Catoosa Trans-Aid Vehicles	Vehicles used by Catoosa County Trans-Aid to provide demand response transit service in Catoosa County. The fleet is equipped with AOA approved wheelchair lifts.	Existing
	Catoosa Trans-Aid Website	Website with information about fares and schedules.	Planned
Chattanooga-Hamilton County Air Pollution Control Bureau	Chattanooga-Hamilton County Air Pollution Control Bureau	Air Pollution Control Bureau for Chattanooga-Hamilton County. Responsible for administering local air pollution control laws and monitoring air quality in Hamilton County.	Existing
	Chattanooga-Hamilton County Air Pollution Control Bureau Website	Air Pollution Control Bureau website that displays daily air quality measurements and forecasts.	Existing
	Chattanooga-Hamilton County Air Quality Sensors	Air quality sensors that monitor ozone and particulate matter levels.	Existing
Chattanooga-Hamilton County/North Georgia TPO	CHC/NG TPO Information Research Division Data Archive	Data archive for the transportation related data in Chattanooga-Hamilton County/North Georgia Transportation Planning Organization.	Existing
City of Chattanooga	City of Chattanooga CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Planned
	City of Chattanooga City Engineers Office	City Engineer's Office responsible for the administration of maintenance and construction projects within the City.	Existing
	City of Chattanooga City-Wide Services	Subset of the Public Works Department responsible for providing daily logistical planning, resource and personnel management services, and oversight of the implementation of various services that include street construction and maintenance, emergency response, and street cleaning.	Existing
	City of Chattanooga City-Wide Services Vehicles	Vehicles used for street construction, street maintenance, and emergency maintenance response.	Existing
	City of Chattanooga DMS	Dynamic message signs for traffic information dissemination.	Planned

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
City of Chattanooga (continued)	City of Chattanooga Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems (VIVDS), remote traffic microwave sensors (RTMS), or traditional loops.	Existing
	City of Chattanooga Fire Vehicles	City of Chattanooga Fire Department vehicles.	Existing
	City of Chattanooga Police Department	Police department for the City of Chattanooga. The emergency dispatch functions for the Police Department are included in the Hamilton County 911 Dispatch. Non-emergency functions include the collection of crash data and enforcement of speed limits and commercial vehicles.	Existing
	City of Chattanooga Police Vehicles	City of Chattanooga Police Department vehicles.	Existing
	City of Chattanooga Portable DMS	Portable dynamic message signs used for traffic information dissemination during maintenance and construction activities, special events, or incidents.	Planned
	City of Chattanooga Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Planned
	City of Chattanooga Road Closure Notification System	Existing email and fax distribution system for disseminating road closure notification information to the media and emergency dispatch.	Existing
	City of Chattanooga RWIS	Road weather information system sensors to monitor weather conditions at the roadway.	Planned
	City of Chattanooga Speed Monitoring Equipment	Roadway equipment used to monitor vehicle speeds for use in targeting locations for police enforcement.	Planned
	City of Chattanooga TOC	Traffic operations center for the City of Chattanooga. Responsible for the operation of the traffic signal system, closed circuit television (CCTV) cameras, dynamic message signs (DMS), and any other ITS infrastructure deployed by the City of Chattanooga.	Existing
City of Cleveland	City of Cleveland TOC	Traffic operations center for the City of Cleveland. Responsible for the operation of the traffic signal system, closed circuit television (CCTV) cameras, and any other ITS infrastructure deployed by the City of Cleveland.	Existing
City of East Ridge	City of East Ridge CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Planned

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
City of East Ridge (continued)	City of East Ridge Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems (VIVDS), remote traffic microwave sensors (RTMS), or traditional loops.	Planned
	City of East Ridge Public Safety Vehicles	Vehicles used by public safety in the City of East Ridge.	Existing
	City of East Ridge TOC	Traffic operations center for the City of East Ridge. Responsible for the operation of the traffic signal system, closed circuit television (CCTV) cameras, and any other ITS infrastructure deployed by the City of East Ridge.	Planned
	City of East Ridge Traffic Signals	Traffic signal system operated by the City of East Ridge.	Existing
	City of East Ridge Website	Website for the City of East Ridge. Includes information on City departments and in the future it is envisioned that the website will have real-time information about roadway conditions.	Existing
City of Red Bank	City of Red Bank CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Planned
	City of Red Bank Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems (VIVDS), remote traffic microwave sensors (RTMS), or traditional loops.	Planned
	City of Red Bank Public Safety Vehicles	Vehicles used by public safety in the City of Red Bank.	Existing
	City of Red Bank TOC	Traffic operations center for the City of Red Bank. Responsible for the operation of the traffic signal system, closed circuit television (CCTV) cameras, and any other ITS infrastructure deployed by the City of Red Bank.	Planned
	City of Red Bank Traffic Signals	Traffic signal system operated by the City of Red Bank.	Existing
	City of Red Bank Website	Website for the City of Red Bank. Includes information on City departments and in the future it is envisioned that the website will have real-time information about roadway conditions.	Existing
City of Soddy Daisy	City of Soddy Daisy 911 Dispatch	911 Public Safety Answering Point (PSAP) responsible for answering all 911 calls made within the City and dispatching emergency responders.	Existing
	City of Soddy Daisy CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Planned

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
City of Soddy Daisy (continued)	City of Soddy Daisy Field Sensors	Roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems (VIVDS), remote traffic microwave sensors (RTMS), or traditional loops.	Planned
	City of Soddy Daisy Public Safety Vehicles	Vehicles used by public safety in the City of Soddy Daisy.	Existing
	City of Soddy Daisy TOC	Traffic operations center for the City of Soddy Daisy. Responsible for the operation of the traffic signal system, closed circuit television (CCTV) cameras, and any other ITS infrastructure deployed by the City of Soddy Daisy.	Planned
	City of Soddy Daisy Traffic Signals	Traffic signal system operated by the City of Soddy Daisy.	Existing
	City of Soddy Daisy Website	Website for the City of Soddy Daisy. Includes information on City departments and in the future it is envisioned that the website will have real-time information about roadway conditions.	Existing
Commercial Vehicle Operators	Commercial Vehicles	Privately owned commercial vehicles traveling within the Region.	Existing
Dade County	Dade County 911 Dispatch	911 Public Safety Answering Point (PSAP) responsible for answering all 911 calls made within the county and dispatching emergency responders.	Existing
	Dade County EMA	Emergency management agency for Dade County. Responsible for disaster planning for the County and operating the emergency operations center (EOC).	Existing
Dade County Transit	Dade County Transit Center CCTV Camera Surveillance	Closed circuit television camera surveillance at transit transfer centers or other transit facilities.	Planned
	Dade County Transit Data Archive	Data archive for Dade County Transit data.	Planned
	Dade County Transit Dispatch Center	Transit dispatch center responsible for the tracking, scheduling, and dispatching of demand response vehicles operated by Dade County Transit.	Existing
	Dade County Transit Vehicles	Demand response transit vehicles operated by Dade County Transit.	Existing
	Dade County Transit Website	Website with information about fares and schedules.	Planned
Financial Institution	Financial Service Provider	Handles exchange of money for transit electronic payment collection.	Existing

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
GDOT	GDOT Atlanta TMC	GDOT traffic management center that serves as the Statewide Traffic Management Center. The TMC, part of the GDOT Office of Traffic Operations, has communication with all of the TCCs around the State.	Existing
	GDOT CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Planned
	GDOT District 6 Construction and Maintenance	GDOT entity responsible for the oversight of construction and maintenance in District 6.	Existing
	GDOT District 6 Dalton Area Office	GDOT Office that serves Catoosa, Dade, Murray, Walker, and Whitfield Counties.	Existing
	GDOT District 6 Dalton/Whitfield TCC	GDOT District 6 Transportation Control Center (TCC) located in Dalton/Whitfield County. The TCC will be connected to the Statewide TMC.	Existing
	GDOT District 6 Engineers Office	GDOT Office responsible for administration of maintenance and construction projects within the District as well as communicating work zone information to the public through the Public Information Office.	Existing
	GDOT DMS	GDOT dynamic message signs used for traffic information dissemination.	Existing
	GDOT Emergency Services Coordinator	GDOT coordinator responsible for managing the GDOT response in a large scale incident or disaster in which the Georgia Emergency Management Agency (GEMA) activates the state emergency operations center (EOC).	Existing
	GDOT Field Sensors	GDOT roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as VIVDS, RTMS, or traditional loops.	Existing
	GDOT Maintenance Vehicles	GDOT vehicles used in maintenance operations.	Existing
	GDOT Public Information Office	GDOT Office responsible for the dissemination of traffic information to the media and the public.	Existing
	GDOT Smart Work Zone Equipment	GDOT portable ITS equipment that can be used in work zones to more efficiently manage traffic and provide traveler information. Includes portable closed circuit television (CCTV) cameras, vehicle detection, and dynamic message signs (DMS).	Existing
	GDOT Traffic Signals	GDOT traffic signal system operated on state highways.	Existing

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
GDOT (continued)	Georgia 511 System	Statewide 511 traveler information system central server.	Existing
	Georgia NaviGAtor System	System to consolidate real-time traffic, incident and construction road closure information. The information is used by agencies around the state and provides the data available on the NaviGAtor website and through 511.	Existing
	GDOT Statewide Construction and Maintenance System	Currently the Transportation Incident Report (TIR) application is used	Existing
	Other GDOT District Construction and Maintenance	Other GDOT District Construction and Maintenance Offices.	Existing
GEMA	GEMA	Georgia Emergency Management Agency. Responsible for managing emergency operations during a disaster or large scale incident.	Existing
GSP	GSP Troop A Dispatch	Georgian State Patrol Troop A dispatch area that includes the northern Georgina counties included in the Chattanooga Regional ITS Architecture.	Existing
	GSP Vehicles	Georgia State Patrol vehicles.	Existing
Hamilton County	Hamilton County E911	911 Public Safety Answering Point (PSAP) responsible for answering all 911 calls made within the county and dispatching emergency responders.	Existing
	Hamilton County EMA	Hamilton County Emergency Management Agency. Responsible for disaster planning for the County and operating the emergency operations center (EOC).	Existing
	Hamilton County EMS	Hamilton County emergency Medical Services. Calls are forwarded from Hamilton County E911.	Existing
	Hamilton County Sheriff Vehicles	Hamilton County Sheriff's Office vehicles.	Existing
	Hamilton County Sheriff's Office	Law enforcement agency for Hamilton County. The emergency dispatch functions for the Sheriff's Office are included in the Hamilton County E911. Non-emergency functions include the collection of crash data.	Existing
Media	Local Print and Broadcast Media	Local media that provide traffic or incident information to the public.	Existing
Municipal/County Government	Municipal CCTV Cameras	Municipal closed circuit television cameras for traffic surveillance and incident management.	Planned

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Municipal/County Government	Municipal Field Sensors	Municipal roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems (VIVDS), remote traffic microwave sensors (RTMS), or traditional loops.	Planned
	Municipal Police Department	Municipal police departments within the Region responsible for law enforcement. The emergency dispatch functions for the police departments are included in the Hamilton County E911. Non-emergency functions include the collection of crash data.	Existing
	Municipal Rail Notification System	Municipal roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Planned
	Municipal TOC	Municipal traffic operations centers responsible for the operation of municipal signal systems and any other municipal ITS infrastructure.	Planned
	Municipal Traffic Signals	Municipal traffic signal systems within the Chattanooga Region.	Existing
	Municipal/County Engineers Office	Municipal or County Offices responsible for the administration of maintenance and construction projects within the municipality or county.	Existing
	Municipal/County Maintenance	Municipal or County Department that oversees the maintenance of streets, sidewalks, and roadway right-of-way.	Existing
	Municipal/County Maintenance Vehicles	Municipal or County vehicles used by Municipal/County maintenance departments in maintenance and construction activities.	Existing
	Municipal/County Portable DMS	Municipal or County portable dynamic message signs used for traffic information dissemination during maintenance and construction activities, special events, or incidents.	Planned
	Municipal/County Public Safety Vehicles	Municipal or County law enforcement, fire, and EMS vehicles.	Existing
	Municipal/County RWIS	Municipal or County road weather information system sensors to monitor weather conditions at the roadway.	Planned
	Municipal/County Website	Municipal or county website that includes information on agency departments. In the future it is envisioned that the website would have real-time information about roadway conditions.	Existing
NOAA	National Weather Service	Provides official US weather, marine, fire, and aviation forecasts, warnings, meteorological products, climate forecasts, and information about meteorology.	Existing

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Other Agencies	Other Maintenance and Construction Management Agencies	Additional maintenance and construction operations agencies with which information is shared for coordination in an emergency situation.	Existing
	Other Traffic Management Agencies	Additional traffic management agencies with which information is shared for coordination in an emergency situation.	Existing
Private Information Provider	Private Sector Traveler Information Services	Traveler information service operated by a private entity.	Existing
	Social 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
Rail Operators	Rail Operator Wayside Equipment	Equipment located along the tracks including railroad crossing gates, bells, and lights as well as the interface to the traffic signal controller indicating the presence of a train.	Existing
SETHRA	SETHRA Data Archive	Southeast Tennessee Human Resource Agency data archive for transit data.	Planned
	SETHRA Demand Response Transit Vehicles	Southeast Tennessee Human Resource Agency demand response vehicle fleet.	Existing
	SETHRA Transit Center CCTV Camera Surveillance	Southeast Tennessee Human Resource Agency closed circuit television camera surveillance at transit transfer centers or other transit facilities.	Planned
	SETHRA Transportation Dispatch Center	Southeast Tennessee Human Resource Agency dispatch center responsible for the tracking, scheduling and dispatching of SETHRA demand response services. SETHRA operates in Bledsoe, Bradley, Grundy, Marion, McMinn, Meigs, Polk, Rhea, and Sequatchie Counties.	Existing
	SETHRA Website	Website with information about fares and schedules.	Planned
System Users	Archive Data User	Users that request information from the data archive systems.	Existing
	Personal Computing Devices	Computing devices that travelers use to access public information.	Existing
	Private Vehicle	Private vehicles used by travelers.	Existing
	Traveler	Users of the transportation system.	Existing
	Vehicle Operator	Operators of commercial vehicles.	Existing
TDOT	Other TDOT Region Construction Office	Other TDOT regional construction offices besides the Region 2 Construction Office.	Existing
	Other TDOT Region Maintenance	Other TDOT regional maintenance offices.	Existing

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT (continued)	TDOT CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Existing
	TDOT Changeable Speed Limit Signs	TDOT roadway equipment that is part of the fog management system used to lower speed limits on the affected roadway segment during fog conditions.	Existing
	TDOT District Maintenance	TDOT Office that handles most of the routine roadway maintenance and responds to incidents when services are requested by local emergency management.	Existing
	TDOT DMS	TDOT dynamic message signs for traffic information dissemination.	Existing
	TDOT Emergency Services Coordinator	TDOT coordinator responsible for managing the TDOT response in a large scale incident or disaster in which the Tennessee Emergency Management Agency (TEMA) activates the state emergency operations center (EOC).	Existing
	TDOT Field Sensors	TDOT roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as video image vehicle detection systems (VIVDS), remote traffic microwave sensors (RTMS), or traditional loops.	Existing
	TDOT Fog Sensors	TDOT roadway equipment used to detect the presence of fog and activate the rest of the fog management system.	Existing
	TDOT Fog Zone Speed Detection	TDOT roadway equipment that is part of the fog management system used to detect vehicle speeds.	Existing
	TDOT HAR	TDOT highway advisory radio for traffic information dissemination.	Existing
	TDOT HELP Vehicles	TDOT roadway service patrol vehicles. Currently operate in and are dispatched elsewhere in the Region for large incidents.	Existing
	TDOT Maintenance Headquarters	TDOT maintenance headquarters.	Existing
	TDOT Maintenance Vehicles	TDOT vehicles used in maintenance operations.	Existing
	TDOT On-Ramp Closure Gates	TDOT roadway equipment that is part of the fog management system used to close freeway on-ramps during a fog event.	Existing
	TDOT Project Planning Division Archive	TDOT data archive for the Project Planning Division. The Division is responsible for traffic data collection and analysis and includes the Short Range Planning Office.	Existing
	TDOT Public Information Office	TDOT Office responsible for the dissemination of traffic information to the media and the public.	Existing

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT (continued)	TDOT Ramp Metering Equipment	TDOT roadway equipment used in the operation of a ramp metering system. Includes the signals and any other ITS equipment.	Planned
	TDOT Region 1 TMC - Knoxville	TDOT Transportation management center for Region 1, located in Knoxville. Responsible for the operation of the ITS equipment located in Region 1. This includes the freeway management system in Knoxville as well as rural ITS deployments.	Existing
	TDOT Region 2	TDOT Region responsible for the administration and operation of the state highway system in 24 counties in southeast Tennessee, including Hamilton County.	Existing
	TDOT Region 2 Construction Office	TDOT Office responsible for oversight of construction projects in Region 2.	Existing
	TDOT Region 2 Engineers Office	TDOT Office is responsible for administration of maintenance and construction projects within the Region as well as communicating work zone information to the public through the Public Information Office.	Existing
	TDOT Region 2 HELP Dispatch	TDOT roadway service patrol dispatch. Currently service is limited to the Chattanooga area except in the case of a large scale incident.	Existing
	TDOT Region 2 Maintenance	TDOT Region 2 maintenance headquarters. Responsible for maintenance operations in the Region; however, most routine maintenance is handled by the District Maintenance Offices. There are several District Maintenance Offices within the Region.	Existing
	TDOT Region 3 TMC - Nashville	TDOT transportation management center for Region 3, located in Nashville. Responsible for the operation of the ITS equipment located in Region 3. This includes the freeway management system in Nashville as well as rural ITS deployments.	Existing
	TDOT Region 4 TMC - Memphis	TDOT transportation management center for Region 4, located in Memphis. Responsible for the operation of the ITS equipment located in Region 4. This includes the freeway management system in Memphis as well as rural ITS deployments.	Existing
	TDOT RWIS Sensors	TDOT road weather information system sensors to monitor weather conditions at the roadway.	Existing
	TDOT Smart Work Zone Equipment	TDOT portable ITS equipment that can be used in work zones to more efficiently manage traffic and provide traveler information. Includes portable closed circuit television (CCTV) cameras, vehicle detection, and dynamic message signs (DMS).	Planned

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT	TDOT SmartWay Information System (TSIS)	TDOT SmartWay Information System is a statewide roadway conditions database. Currently information can be entered by District and Regional maintenance personnel as well as staff at any of the traffic management centers (TMCs) and the Tennessee Highway Patrol (THP). TSIS feeds the Statewide 511 system and SmartWay website.	Existing
	TDOT SmartWay Website	TDOT SmartWay website providing road network conditions including incident and construction information and camera views. Much of the data for the website comes from TSIS.	Existing
	TDOT SmartWay Website	TDOT SmartWay website providing road network conditions including incident and construction information and camera views. Much of the data for the website comes from TSIS.	Existing
	TDOT Toll Plazas	TDOT toll plazas used for electronic toll collection on potential future toll roads.	Planned
	Tennessee 511 IVR	Tennessee 511 Interactive Voice Response. TDOT contracts the IVR operation to a vendor. The IVR accepts callers' requests and provides responses to specific traveler information needs. This is the customer interface component of the 511 phone system.	Existing
	Tennessee 511 System	Tennessee 511 traveler information system central server.	Existing
	Tennessee GoSmart Kiosks	Kiosks in rest areas that provide traveler information, including weather, road, and travel conditions.	Existing
TEMA	TEMA	Tennessee Emergency Management Agency responsible for managing emergency operations during a disaster or large scale incident.	Existing
Tennessee Bureau of Investigation	Tennessee Bureau of Investigation	Agency responsible for issuing statewide America's Missing: Broadcast Emergency Response (AMBER) Alerts in Tennessee.	Existing
Tennessee Department of Health and Human Services	Health and Human Services	Agency responsible for providing health related services including the subsidization of transportation to obtain medical services.	Existing
THP	THP CVO Enforcement	Tennessee Highway Patrol commercial vehicle operations inspection and enforcement.	Existing
	THP Dispatch	Tennessee Highway Patrol dispatch center. There are several THP dispatch centers around the state of Tennessee.	Existing
	THP District 2 Office	Tennessee Highway Patrol District 2 Office. The District 2 Office has the ability to directly control the fog zone management system.	Existing

Table 4 – Chattanooga Region Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
THP (continued)	THP Truck Weigh and Inspection Station	Commercial vehicle inspection station with the capability to weigh commercial vehicles and evaluate their credentials.	Existing
	THP Vehicles	Tennessee Highway Patrol vehicles.	Existing
	THP Weigh-in-Motion	Tennessee Highway Patrol facilities with the capability to weigh commercial vehicles while they are traveling at highway speeds.	Existing
	TITAN Database	Tennessee Integrated Traffic Analysis Network database. The Tennessee Department of Safety crash record database maintained by THP for the collection of crash record information. TITAN interfaces with the TraCS (Traffic and Criminal Software) system.	Existing
Walker County	Walker County 911 Dispatch	Walker County 911 Public Safety Answering Point (PSAP). Responsible for answering all 911 calls made within the county and dispatching emergency responders.	Existing
	Walker County EMA	Walker County Emergency Management Agency. Responsible for disaster planning for the County and operating the emergency operations center (EOC).	Existing
Walker County Transit	Walker County Transit Center CCTV Camera Surveillance	Closed circuit television camera surveillance at transit transfer centers or other transit facilities.	Planned
	Walker County Transit Data Archive	Data archive for Walker County Transit data.	Planned
	Walker County Transit Dispatch Center	Transit dispatch center responsible for the tracking, scheduling, and dispatching of demand response vehicles operated by Walker County Transit.	Existing
	Walker County Transit Vehicles	Vehicles used by Walker County Transit to provide demand response transit service in Walker County.	Existing
	Walker County Transit Website	Website with information about fares and schedules.	Planned

4. REGIONAL ITS ARCHITECTURE

Upon completion of the system inventory, the next step in the development of the Regional ITS Architecture was to identify the ITS services that are important to the Chattanooga Region. The National ITS Architecture has the following eight groups of ITS service areas:

- ***Traffic Management*** – includes the TDOT SmartWay TMC in Chattanooga as well as other existing and future TMCs and traffic operations centers (TOCs), detection systems, CCTV cameras, fixed and portable dynamic message signs (DMS), and other related technologies.
- ***Emergency Management*** – includes emergency operations/management centers, improved information sharing among traffic and emergency services, automated vehicle location (AVL) on emergency vehicles, traffic signal preemption for emergency vehicles, and wide-area alerts.
- ***Maintenance and Construction Management*** – includes work zone management, roadway maintenance and construction information, and road weather detection systems.
- ***Public Transportation Management*** – includes transit and paratransit AVL, transit travel information systems, electronic fare collection, and transit security.
- ***Commercial Vehicle Operations*** – includes coordination with CVISN efforts.
- ***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, but 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.

Existing, planned, and future systems in the Region were considered in each of the service areas. Vehicle Safety was not included in the Chattanooga Regional ITS Architecture because implementation of those market packages would primarily be by private sector automobile manufacturers and information service providers.

4.1 Market Packages

In the National ITS Architecture, services are referred to as market packages. Market packages can include several stakeholders and elements that work together to provide a service in the Region. Examples of market packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 91 market packages identified in the National ITS Architecture Version 6.1.

4.1.1 Overview of Market Package Structure

A market package is made up of elements and data flows. Each identified system or component in the Chattanooga 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 market package with each of the components identified. Additional explanation of the terminology used can be found after the figure.

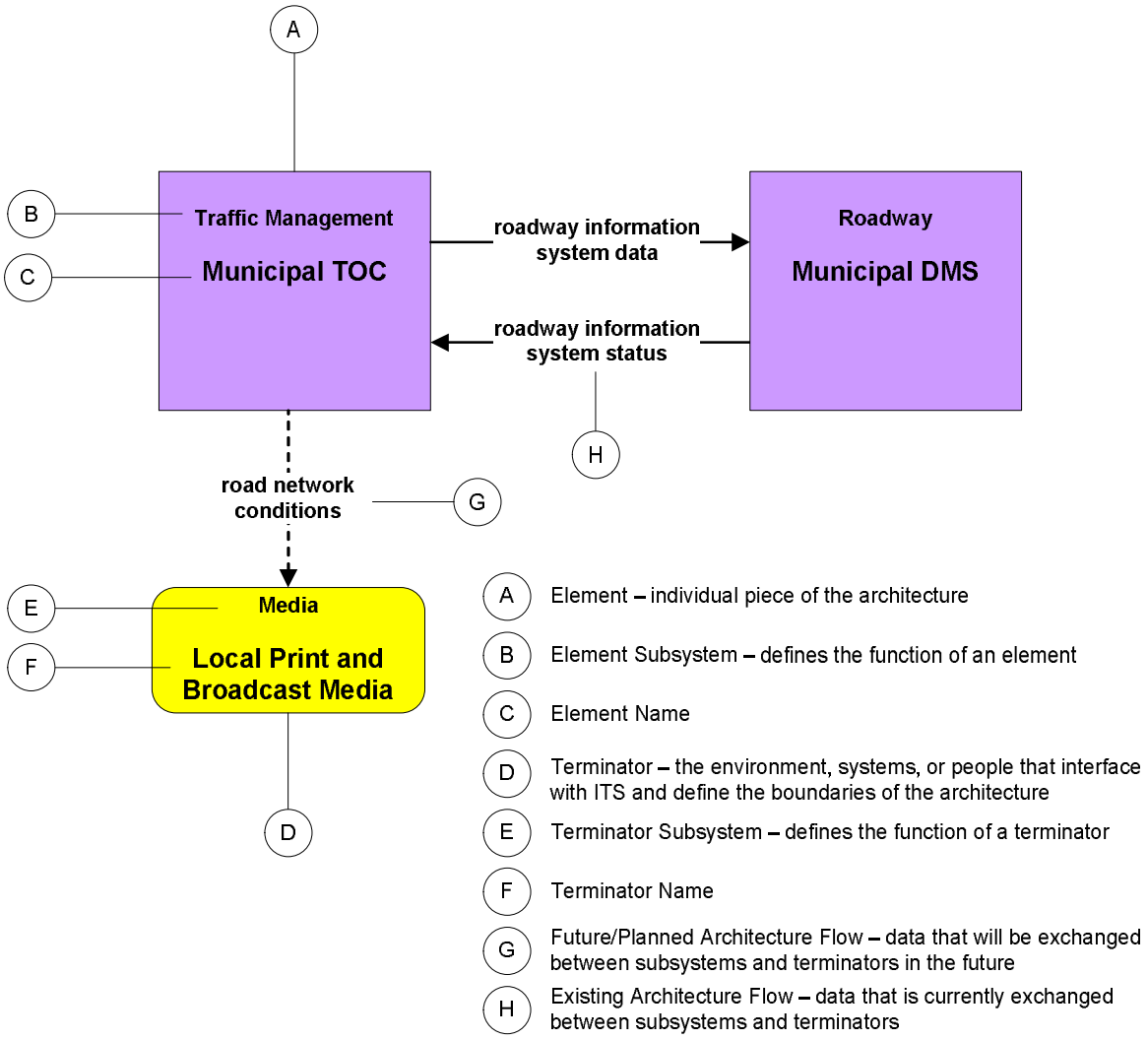

Figure 3 – Overview of Market Package Structure

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 market 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, Field, 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 correspond 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.

4.1.2 Selection and Prioritization of Regional Market Packages

In the Chattanooga Region, the National ITS Architecture market packages were reviewed by the stakeholders and selected based on the relevance of the service that the market package could provide to the Region. Stakeholders selected 38 market packages for implementation in the Region. They are identified in **Table 5**. Stakeholders prioritized the selected market packages during the workshop, and the table organizes the market packages into service areas and priority groupings.

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

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

Table 5 – Chattanooga Region Market Package Prioritization by Functional Area

High Priority Market Packages	Medium Priority Market Packages	Low Priority Market Packages
Traffic Management		
ATMS01 Network Surveillance ATMS03 Surface Street Control ATMS06 Traffic Information Dissemination ATMS07 Regional Traffic Management ATMS08 Traffic Incident Management System	ATMS04 Freeway Control ATMS13 Standard Railroad Grade Crossing ATMS19 Speed Monitoring	ATMS10 Electronic Toll Collection ATMS11 Emissions Monitoring and Management ATMS21 Roadway Closure Management
Emergency Management		
EM01 Emergency Call-Taking and Dispatch EM02 Emergency Routing EM04 Roadway Service Patrols	EM06 Wide-Area Alert EM08 Disaster Response and Recovery EM09 Evacuation and Reentry Management EM10 Disaster Traveler Information	
Maintenance and Construction Management		
MC08 Work Zone Management MC10 Maintenance and Construction Activity Coordination	MC01 Maintenance and Construction Vehicle and Equipment Tracking MC03 Road Weather Data Collection MC04 Weather Information Processing and Distribution	
Public Transportation Management		
APTS01 Transit Vehicle Tracking APTS02 Transit Fixed-Route Operations APTS03 Demand Response Transit Operations APTS08 Transit Traveler Information	APTS04 Transit Fare Collection Management APTS05 Transit Security APTS06 Transit Fleet Management APTS07 Multi-Modal Coordination APTS09 Transit Signal Priority APTS10 Transit Passenger Counting	
Traveler Information		
ATIS01 Broadcast Traveler Information ATIS02 Interactive Traveler Information		
Commercial Vehicle Operations		
	CVO06 Weigh-in-Motion	
Archived Data Management		
	AD1 ITS Data Mart	AD3 ITS Virtual Data Warehouse

4.1.3 Customization of Regional Market Packages

The market packages in the National ITS Architecture were customized to reflect the unique systems, subsystems, and terminators in the Chattanooga Region. Market packages represent a service that will be deployed as an integrated capability. Each market package is shown graphically with the market 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) market package for traffic information dissemination that has been customized for the Region. This instance focuses on the activities of TDOT. The market package shows the distribution of traffic information from the TDOT Region 2 TMC to emergency dispatch agencies and the media as well as in the future to transit management agencies. Messages are also placed on DMS and HAR and entered into TSIS for inclusion on the SmartWay website and 511. Data flows between the subsystems indicate what information is being shared. The remainder of the market packages that were customized for the Chattanooga Region are shown in **Appendix B**.

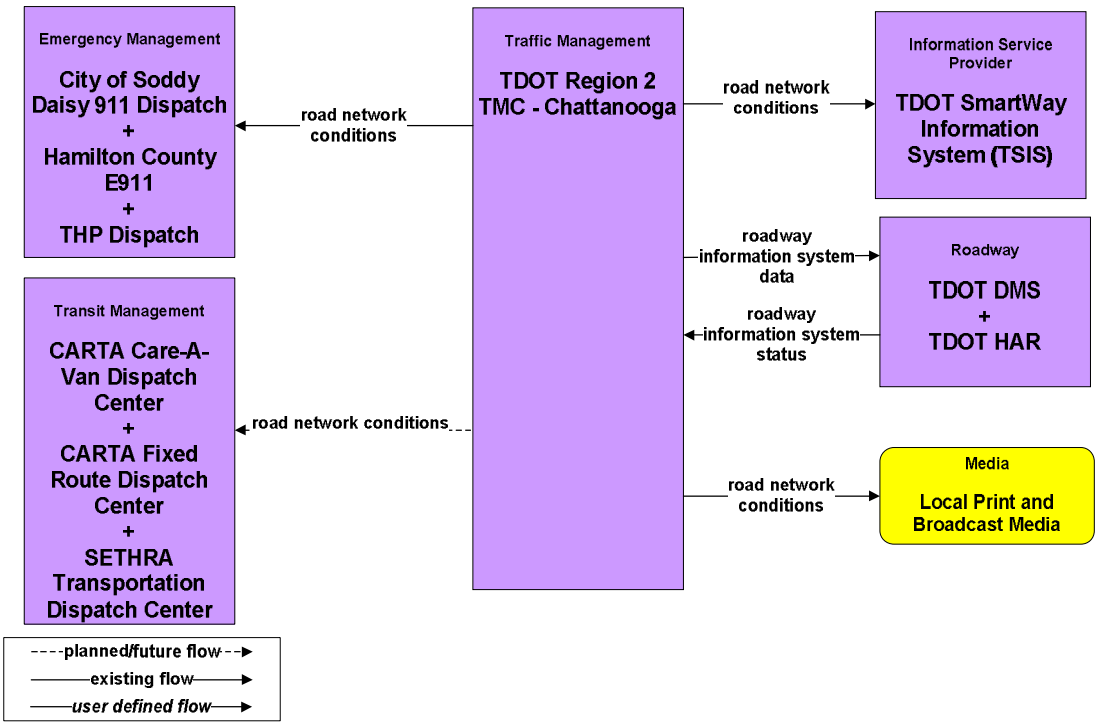

Figure 4 – Example Market Package Diagram: ATMS06 – Traffic Information Dissemination (TDOT Region 2 TMC)

4.1.4 Regional Needs and Corresponding Market Packages

Input received from stakeholders at the Chattanooga Regional ITS Architecture workshops provided valuable input for the market package customization process. The needs identified in the ITS Architecture workshops, as well as needs from the Chattanooga Hamilton County/North Georgia 2035 Long-Range Transportation Plan are identified in **Table 6**. The table also identifies which market package documents the particular ITS need.

Table 6 – Chattanooga Regional ITS Needs and Corresponding Market Packages

ITS Need	Market Package
Traffic Management and Traveler Information	
Need to develop and maintain a transportation system which provides for the safe and secure movement of people and goods	ATMS01 – Network Surveillance ATMS04 – Freeway Control ATMS06 – Traffic Information Dissemination ATMS08 – Traffic Incident Management System ATMS13 - Standard Railroad Grade Crossing ATMS19 – Speed Monitoring ATMS21 – Roadway Closure Management EM02 – Emergency Routing EM04 – Roadway Service Patrols MC03 – Road Weather Data Collection MC04 – Weather Info Processing and Distribution MC08 – Work Zone Management
Need to develop system operations strategies that improve travel mobility and maximize the life of the transportation system	ATMS03 – Surface Street Control ATMS04 – Freeway Control ATMS06 – Traffic Information Dissemination ATMS07 – Regional Traffic Management ATMS08 – Traffic Incident Management System ATMS01 – Broadcast Traveler Information ATMS02 – Interactive Traveler Information
Need to develop alternate signal timing plans and DMS messages that can be implemented during incidents, special events, or construction detours	ATMS03 – Surface Street Control ATMS07 – Regional Traffic Management MC08 – Work Zone Management
Need to provide alternate route information when incidents occur on the interstate	ATMS01 – Network Surveillance ATMS06 – Traffic Information Dissemination ATIS01 – Broadcast Traveler Information ATIS02 – Interactive Traveler Information
Need coordination of traffic signal system timing between the City of Chattanooga and adjacent cities	ATMS03 – Surface Street Control ATMS07 – Regional Traffic Management
Need to expand the traffic signal system communications and system detection capabilities	ATMS01 – Network Surveillance ATMS03 – Surface Street Control
Need to optimize the traffic signal timing throughout the Region	ATMS03 – Surface Street Control ATMS07 – Regional Traffic Management
Need to convey driver information through dynamic message signs and highway advisory radio	ATMS06 – Traffic Information Dissemination
Need to monitor rail crossing and convey blockages to drivers	ATMS13 – Standard Railroad Grade Crossing
Emergency Management	
Need to assist emergency vehicle movement with traffic signal preemption and monitoring	EM02 – Emergency Routing

Table 6 – Chattanooga Regional ITS Needs and Corresponding Market Packages (continued)

ITS Need	Market Package
Public Transportation Management	
Need to implement a coordinated regional dispatch system for transit that is accessible through a single number	APTS02 – Transit Fixed-Route Operations APTS03 – Demand Response Transit Operations APTS08 – Transit Traveler Information
Need to implement bus priority strategies at congested locations for rerouting buses	APTS09 – Transit Signal Priority
Need to monitor bus schedule adherence and effectively solve the cause of schedule delays	APTS01 – Transit Vehicle Tracking APTS02 – Transit Fixed-Route Operations
Need to monitor bus engine operation to identify problems	APTS06 – Transit Fleet Management
Need to monitor bus passenger activity to improve service	APTS10 – Transit Passenger Counting
Need to facilitate fare information for management evaluation	APTS04 – Transit Fare Collection Management
Need to provide dynamic information to bus riders waiting at bus shelters	APTS01 – Transit Vehicle Tracking APTS 08 – Transit Traveler Information

4.2 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 ITS architecture is to identify the connectivity between transportation systems in the Chattanooga Region. The system interconnect diagram shows the high-level relationships of the subsystems and terminators in the Chattanooga Region and the associated local projects and systems. The customized market packages represent services that can be deployed as an integrated capability and the market package diagrams show the information flows between the subsystems and terminators that are most important to the operation of the market packages. How these systems interface with each other is an integral part of the overall ITS architecture.

4.2.1 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 Chattanooga Region based on the system inventory and information gathered from the stakeholders. **Figure 4** summarizes the existing and planned ITS elements for the Chattanooga 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.

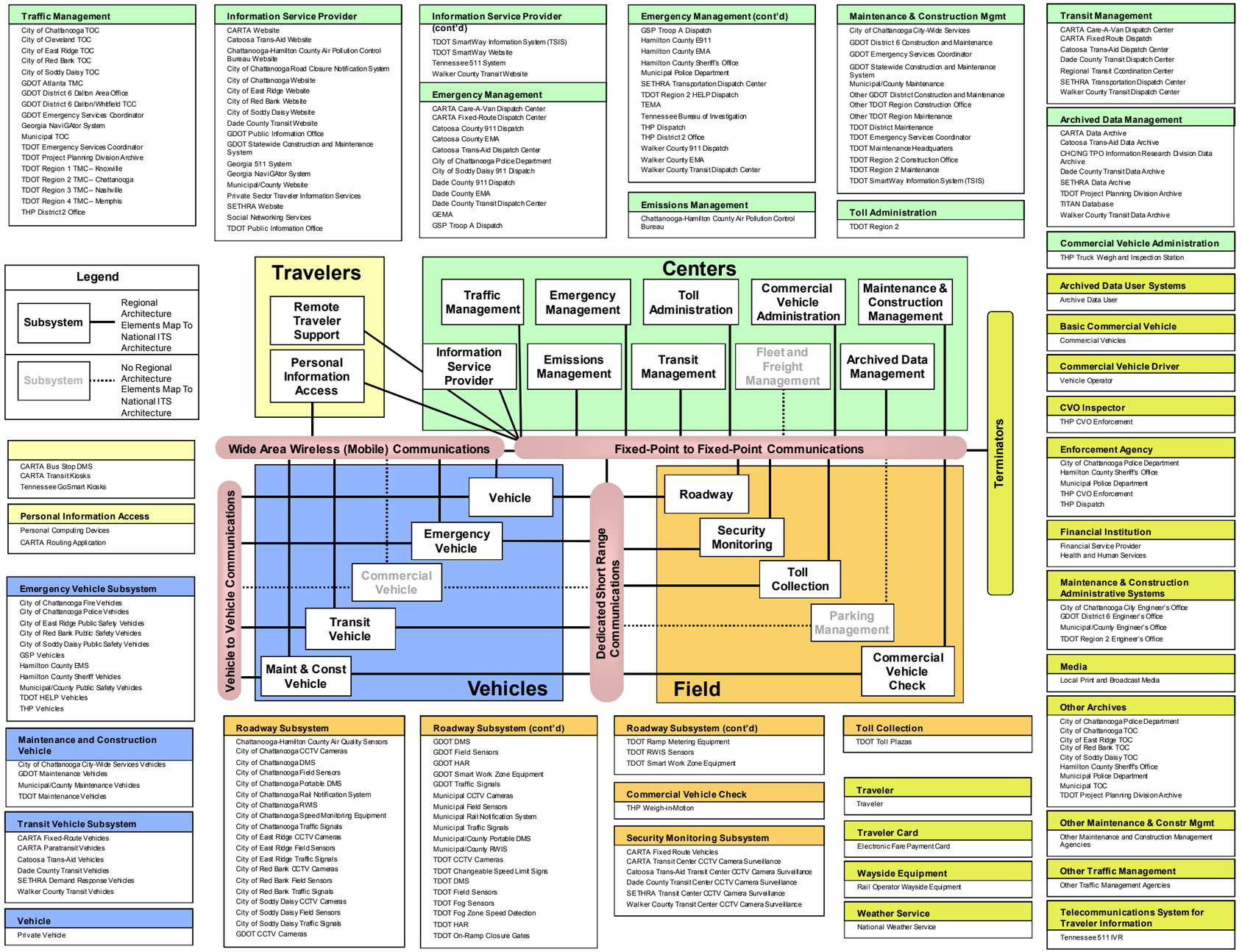

Figure 5 – Chattanooga Regional System Interconnect Diagram

4.2.2 Element Connections

A number of different elements are identified as part of the Chattanooga Regional ITS Architecture. These elements include transportation 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 each element in the Chattanooga Regional ITS Architecture and each element has been mapped to those other elements with which it must interface. 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 database output. This particular interconnect diagram is for the City of Chattanooga Traffic Signals.

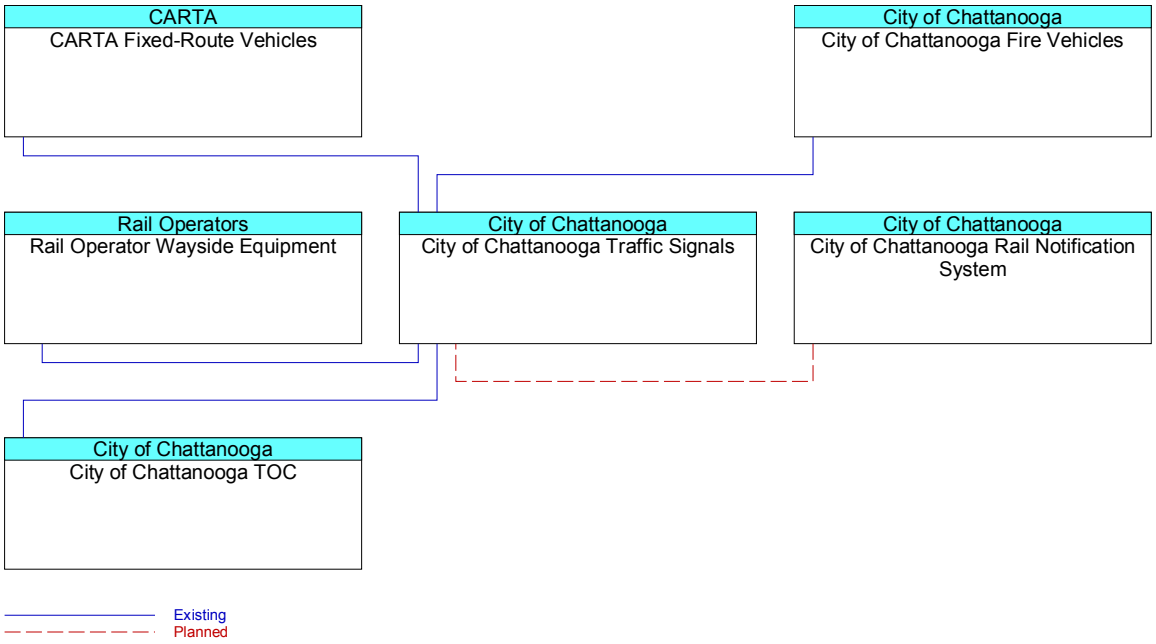

Figure 6 – Example Interconnect Diagram: City of Chattanooga Traffic Signals

4.2.3 Data Flows Between Elements

In the market 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 market 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 market package. An example of a flow diagram that has been filtered for the ATMS01 – Network Surveillance market package is shown in **Figure 7**.

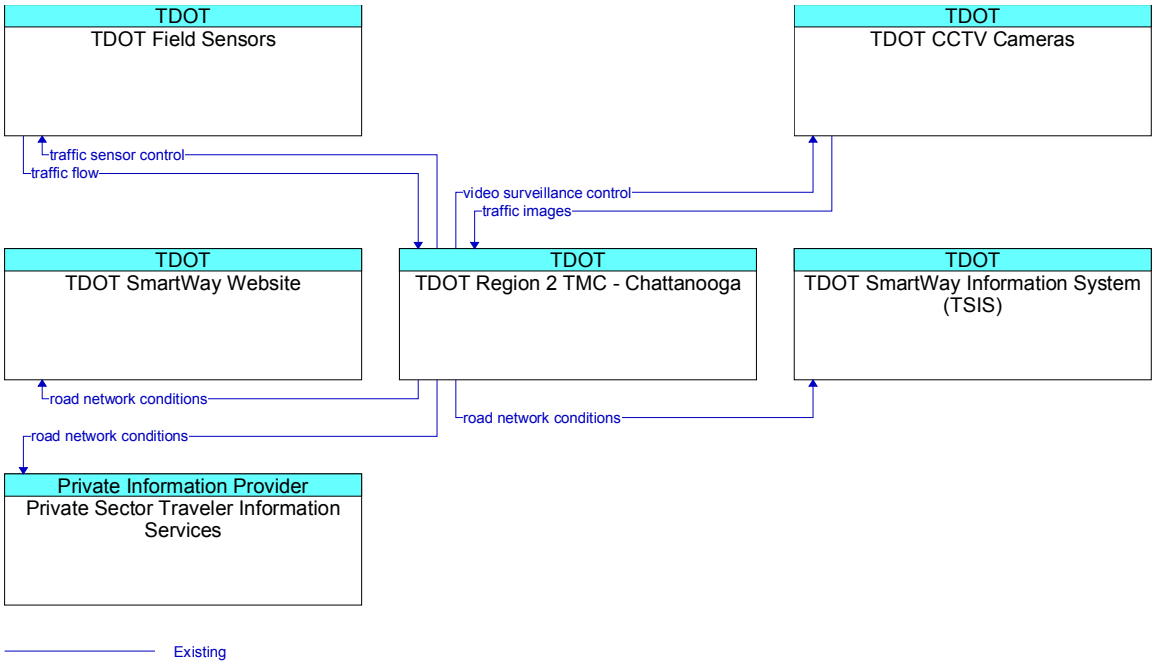

Figure 7 – Example Flow Diagram: ATMS01 – Network Surveillance

4.3 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 Chattanooga 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 Chattanooga Regional ITS Architecture, functional requirements have been identified at two levels. The customized market packages, discussed previously in Section 4.1.3, describe the services that ITS needs to provide in the Region and the architecture flows between the elements. These market packages and data flows describe what ITS in the Chattanooga Region has to do and the data that needs to be shared among elements.

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

4.4 Standards

Standards are an important tool that will allow efficient implementation of the elements in the Chattanooga Regional ITS Architecture over time. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances, vendors change, and as new approaches evolve. The USDOT's ITS Joint

Program Office is supporting Standards Development Organizations (SDOs) with an extensive, multi-year program of accelerated, consensus-based standards development to facilitate successful ITS deployment in the United States. **Table 7** identifies each of the ITS standards that could apply to the Chattanooga Regional ITS Architecture. These standards are based on the physical subsystem architecture flows previously identified in Section 4.2.3 and shown in the market package diagrams in **Appendix B**.

While **Table 7** 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 on the left hand side select the tab for 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.

Table 7 – Chattanooga Region Applicable ITS Standards

SDO	Document ID	Title
AASHTO/ITE/NEMA	NTCIP 1102	Octet Encoding Rules Base Protocol
	NTCIP 1103	Transportation Management Protocols
	NTCIP 1104	Center-to-Center Naming Convention Specification
	NTCIP 1201	Global Object Definitions
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller Units
	NTCIP 1203	Object Definitions for Dynamic Message Signs (DMS)
	NTCIP 1204	Object Definitions for Environmental Sensor Stations
	NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control
	NTCIP 1208	Object Definition for CCTV Camera Switching
	NTCIP 1207	Object Definitions for Ramp Meter Control Units
	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 2101	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile
	NTCIP 2102	Point to Multi-Point Protocol Using Frequency Shift Keying 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 Transmission Control Protocol/Internet Protocol and Universal Datagram Protocol/Internet Protocol Transport Profile
	NTCIP 2301	Simple Transportation Management Framework Application Profile
	NTCIP 2302	Trivial File Transfer Protocol Application Profile
	NTCIP 2303	File Transfer Protocol Application Profile
	NTCIP 2304	Application Profile for DATEX-ASN (AP-DATEX)
	NTCIP 2306	Application Profile for Extensible Markup Language (XML) Message Encoding and Transport in ITS Center-to-Center Communications
AASHTO/ITE	ITE TMDD	Traffic Management Data Dictionary and Message Sets for External TMC Communications (TMDD and MS/ETMCC)
APTA	APTA TCIP-S-001 3.0.0	Standard for Transit Communications Interface Profiles
ASTM	ASTM E2158-01	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band
	ASTM E2213-03	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems – 5 GHz Band DSRC Medium Access Control and Physical Layer Specifications
	ASTM E2468-05	Standard Practice for Metadata to Support Archived Data Management Systems
	ASTM WK7604	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data

Table 7 – Chattanooga Region Applicable ITS Standards (continued)

SDO	Document ID	Title
IEEE	IEEE 1455-1999	Standard Message Sets for Vehicle/Roadside Communications
	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 1570-2002	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection
	IEEE P1609.0	Standard Wireless Access in Vehicular Environments (WAVE) - Architecture
	IEEE 1609.1 – 2006	Standard for WAVE – Resource Manager
	IEEE 1609.2 – 2006	Standard for WAVE – Security Services for Applications and Management Messages
	IEEE 1609.4 – 2006	Standard for WAVE – Multi-Channel Operation
	IEEE 1609.3	Standard for WAVE – Networking Services
	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 and Physical Layer Specifications
	IEEE P1512.4	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers
SAE	SAE J2266	Location Referencing Message Specification
	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	Radio Data System Phrase Lists
	SAE J2540/2	International Traveler Information Systems Phrase Lists
	SAE J2540/3	National Names Phrase List

4.5 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 operation of the regional ITS. The services covered are:

- ***Surface Street 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.
- ***Freeway Management*** – The development of systems to monitor freeway 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.
- ***Traveler Information*** – The development of systems to provide static and real time transportation information to travelers.
- ***Commercial Vehicle Operations*** – The development of systems to facilitate the management of commercial vehicles (e.g., electronic clearance).
- ***Archived Data Management*** – The development of systems to collect transportation data for use in non-operational purposes (e.g., planning and research).

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

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities

Transportation Service	Stakeholder	Roles/Responsibilities
Surface Street Management	City of Chattanooga	Operate and maintain traffic signal systems within the City.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City 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.
		Provide traffic signal preemption for emergency vehicles.
		Provide traffic signal priority for transit vehicles.
		Operate DMS for the distribution of traffic information and roadway conditions to travelers on the roadway.
	City of East Ridge	Operate and maintain traffic signal systems within the City.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City 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.
		Provide traffic signal preemption for emergency vehicles.
	City of Red Bank	Operate and maintain traffic signal systems within the City.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City 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 preemption requests.
		Provide traffic signal preemption for emergency vehicles.
	City of Soddy Daisy	Operate and maintain traffic signal systems within the City.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City 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 preemption requests.
		Provide traffic signal preemption for emergency vehicles.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Surface Street Management (continued)	Municipal Government	Operate and maintain traffic signal systems within the municipality.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City 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 preemption requests.
		Provide traffic signal preemption for emergency vehicles.
	GDOT	Operate and maintain traffic signal systems on State Routes.
		Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, and emergency vehicle preemptions.
		Provide traffic signal preemption for emergency vehicles.
Freeway Management	GDOT	Operate DMS and HAR to distribute traffic information and roadway conditions to travelers on the roadway.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on state roadways.
	TDOT	Operate DMS and HAR to distribute traffic information and roadway conditions to travelers on the roadway.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on state roadways.
		Remotely operate ramp metering systems to manage the use of freeways.
Incident Management (Traffic)	City of Chattanooga	Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Operate DMS to distribute incident information to travelers on the roadway.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Coordinate maintenance resources for incident response.
	City of East Ridge	Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Coordinate maintenance resources for incident response.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management (Traffic) (continued)	City of Red Bank	Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Coordinate maintenance resources for incident response.
	City of Soddy Daisy	Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Coordinate maintenance resources for incident response.
	Municipal Government	Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Coordinate maintenance resources for incident response.
	GDOT	Remotely control traffic and video sensors from the Atlanta TMC or District 6 Dalton/Whitfield TCC to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Operate DMS and HAR to distribute incident information to travelers on the roadway.
		Responsible for coordination with other TOCs and emergency management agencies for coordinated incident management.
		Responsible for the development, coordination, and execution of special traffic management strategies during an evacuation.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management (Traffic) (continued)	TDOT	Remotely control traffic and video sensors from the SmartWay TMC to support incident detection and verification.
		Responsible for the dissemination of traffic related data to other centers and the media.
		Operate DMS and HAR to distribute incident information to travelers on the roadway.
		Responsible for coordination with other TOCs and emergency management agencies for coordinated incident management.
		Responsible for the development, coordination, and execution of special traffic management strategies during an evacuation.
Incident Management (Emergency)	City of Soddy Daisy 911 Dispatch	Dispatch public safety vehicles to incidents.
		Coordinate incident response with emergency dispatch agencies, the City of Soddy Daisy TOC, and the TDOT SmartWay Center in Chattanooga for incidents on state facilities.
	Catoosa County 911 Dispatch	Dispatch public safety vehicles to incidents.
		Coordinate incident response with emergency dispatch agencies, any municipal TOCs, and the GDOT Atlanta TMC for incidents on state facilities.
	Dade County 911 Dispatch	Dispatch public safety vehicles to incidents.
		Coordinate incident response with emergency dispatch agencies, any municipal TOCs, and the GDOT Atlanta TMC for incidents on state facilities.
	Hamilton County E911	Dispatch public safety vehicles to incidents.
		Coordinate incident response with emergency dispatch agencies, the City of Chattanooga TOC, City of East Ridge TOC and City of Red Bank TOC as well the TDOT SmartWay Center for incidents on state facilities.
	Walker County 911 Dispatch	Dispatch public safety vehicles to incidents.
		Coordinate incident response with emergency dispatch agencies, any municipal TOCs, and the GDOT Atlanta TMC for incidents on state facilities.
	GSP Dispatch	Dispatch public safety vehicles to incidents.
		Coordinate incident response with other public safety and traffic management agencies as well as the GDOT Atlanta TMC for incidents on state facilities.
	THP Dispatch	Dispatch public safety vehicles to incidents.
		Coordinate incident response with other public safety and traffic management agencies as well as the TDOT SmartWay Center in Chattanooga for incidents on state facilities.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management	City of Soddy Daisy 911 Dispatch	Responsible for emergency call-taking for the City of Soddy Daisy as the 911 PSAP.
		Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Catoosa County 911 Dispatch	Responsible for emergency call-taking for Catoosa County as the 911 PSAP.
		Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Catoosa County EMA	Operates the EOC for Catoosa County in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the County.
		Lead regional efforts for emergency planning to support large-scale incidents and disasters.
		Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Dade County 911 Dispatch	Responsible for emergency call-taking for Dade County as the 911 PSAP.
		Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Dade County EMA	Operates the EOC for Dade County in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the County.
		Lead regional efforts for emergency planning to support large-scale incidents and disasters.
		Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Hamilton County E911	Responsible for emergency call-taking for all of Hamilton County, except the City of Soddy Daisy, as the 911 PSAP.
		Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Hamilton County EMA	Operates the EOC for Hamilton County in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the County.
		Lead regional efforts for emergency planning to support large-scale incidents and disasters.
		Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Walker County 911 Dispatch	Responsible for emergency call-taking for Walker County as the 911 PSAP.
		Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Walker County EMA	Operates the EOC for Walker County in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the County.
		Lead regional efforts for emergency planning to support large-scale incidents and disasters.
		Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	GEMA	Operates the EOC for the State of Georgia in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the State.
		Responsible for coordination with adjacent states, including the State of Tennessee, as needed to support emergency management.
		Lead statewide efforts for emergency planning to support large-scale incidents and disasters.
		Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	GSP	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	TEMA	Operates the EOC for the State of Tennessee in the event of a disaster or other large-scale emergency situation.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the State.
		Responsible for coordination with adjacent states, including the State of Georgia, as needed to support emergency management.
		Lead statewide efforts for emergency planning to support large-scale incidents and disasters.
		Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	THP	Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Tennessee Bureau of Investigation	Responsible for the initiation of AMBER Alerts.
Maintenance and Construction Management	City of Chattanooga Public Works Department	Responsible for the tracking and dispatch of maintenance vehicles.
		Supports coordinated response to incidents.
		Monitors environmental sensors and distributes information about road weather conditions.
		Supports work zone activities including the dissemination of work zone information through portable DMS and sharing of information with other groups.
		Disseminates work zone activity schedules and current asset restrictions to other agencies.
	Municipal/County Maintenance	Responsible for the tracking and dispatch of maintenance vehicles.
		Supports coordinated response to incidents.
		Monitors environmental sensors and distributes information about road weather conditions.
		Supports work zone activities including the dissemination of work zone information through portable DMS and sharing of information with other groups.
		Disseminates work zone activity schedules and current asset restrictions to other agencies.
	GDOT	Responsible for the tracking and dispatch of maintenance vehicles.
		Supports coordinated response to incidents.
		Supports work zone activities including the dissemination of work zone information through portable DMS, HAR, and sharing of information with other groups.
		Responsible for entering and updating work zone information in the Georgia Statewide Construction and Maintenance System.
		Disseminates work activity schedules and current asset restrictions to other agencies.
		Operates work zone traffic control equipment including portable surveillance equipment, DMS, and HAR transmitters.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	TDOT	Monitors environmental sensors and distributes information about road weather conditions.
		Responsible for the tracking and dispatch of maintenance vehicles.
		Supports coordinated response to incidents.
		Supports work zone activities including the dissemination of work zone information through portable DMS, HAR, and sharing of information with other groups.
		Responsible for entering and updating work zone information in TSIS.
		Disseminates work activity schedules and current asset restrictions to other agencies.
		Operates work zone traffic control equipment including portable surveillance equipment, DMS, and HAR transmitters.
Transit Management	CARTA	Operates fixed route and paratransit services from central dispatch facilities responsible for tracking their location and status.
		Provide transit passenger electronic fare payment on fixed route transit vehicles.
		Provide transit security on transit vehicles and at transit terminals through silent alarms and surveillance systems.
		Coordinate with the Public Works Department on transit signal priority.
		Provide transit traveler information to the agency website, local private sector traveler information services, and the Tennessee 511 system.
		Operate real-time arrival information boards at transit stops and at transfer stations.
		Operate on-board systems to provide next stop annunciation.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	SETHRA	Operates demand response transit services from a central dispatch facility responsible for tracking vehicle location and status.
		Provide transit security on transit vehicles and at transit terminals through silent alarms and surveillance systems.
		Provide transit traveler information to the agency website, local private sector traveler information services, and the Tennessee 511 Traveler Information System.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Catoosa Trans-Aid	Operates demand response transit services from a central dispatch facility responsible for tracking vehicle location and status.
		Provide transit security on transit vehicles and at transit terminals through silent alarms and surveillance systems.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Transit Management (continued)	Catoosa Trans-Aid (continued)	Provide transit traveler information to the agency website, local private sector traveler information services, and the Georgia 511 Traveler Information System.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Dade County Transit	Operates demand response transit services from a central dispatch facility responsible for tracking vehicle location and status.
		Provide transit security on transit vehicles and at transit terminals through silent alarms and surveillance systems.
		Provide transit traveler information to the agency website, local private sector traveler information services, and the Georgia 511 Traveler Information System.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
	Walker County Transit	Operates demand response transit services from a central dispatch facility responsible for tracking vehicle location and status.
		Provide transit security on transit vehicles and at transit terminals through silent alarms and surveillance systems.
		Provide transit traveler information to the agency website, local private sector traveler information services, and the Georgia 511 Traveler Information System.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
Traveler Information	City of Chattanooga	Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
		Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.
	City of East Ridge	Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
		Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.
	City of Red Bank	Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
		Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.

Table 8 – Chattanooga Region Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Traveler Information (continued)	City of Soddy Daisy	Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
		Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.
	Municipal Government	Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
		Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.
	GDOT	Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event and weather information to travelers via the NaviGAtor Website and the Georgia 511 system.
	TDOT	Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event and weather information to travelers via the SmartWay Website and the Tennessee 511 system.
		Provide transportation information to travelers via traveler information kiosks.
		Provide transportation network condition data to private sector information service providers.
Commercial Vehicle Operations	THP	Operate weigh-in-motion commercial vehicle inspection station.
		Enforce commercial vehicle regulations in the State of Tennessee.
Archived Data Management	CARTA	Collect and maintain transit archive data.
	Catoosa Trans-Aid	Collect and maintain transit archive data.
	Dade County Transit	Collect and maintain transit archive data.
	C-HC/NG TPO	Collect and maintain data from regional traffic, transit, and emergency management agencies.
	TDOT	Collect and maintain traffic archive data.
	THP	Collect and maintain crash record information from regional emergency management agencies.
	Walker County Transit	Collect and maintain transit archive data.

4.6 Potential Agreements

The Regional ITS Architecture for the Chattanooga 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 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 9 provides a list of existing and potential agreements for the Chattanooga Region based on the interfaces identified in the Regional ITS Architecture. It is important to note that as ITS services and systems are implemented in the Region, part of the planning and review process for those projects should include a review of potential agreements that would be needed for implementation or operations.

Table 9 – Chattanooga Region Existing and Potential Agreements

Status	Agreement and Agencies	Agreement Description
Existing/ Future	**Data Sharing and Usage (Public-Private)** – (TDOT (existing), City of Chattanooga, Media)	Agreement would allow private sector media and information service providers to access and broadcast public sector transportation agency CCTV camera video feeds, real time traffic speed and volume data, and incident data. Agreements should specify the control priority to allow traffic agencies first priority to control cameras during incidents or other events. The ability of the traffic agency to deny access to video and data feeds if a situation warrants such action should also be part of the agreement.
Future	**Data Sharing and Usage (Public-Public)** – (TDOT, GDOT, City of Chattanooga, City of East Ridge, City of Red Bank, City of Soddy Daisy)	Agreement would define the parameters, guidelines, and policies for inter-agency ITS data sharing between public sector agencies including CCTV camera feeds. Similar to data sharing and usage agreements for public-private agencies, the agency that owns the equipment should have first priority of the equipment and the ability to discontinue data sharing if a situation warrants such action.
Future	**Traffic Signal Timing Data Sharing and Usage** – (City of Chattanooga, City of Red Bank)	Agreement would define the parameters, guidelines, and policies for inter-agency traffic signal timing, including sharing of timing plans and joint operations of signals, between cities and counties.
Future	**Incident Data Sharing and Usage** – (TDOT, Hamilton County E911, THP)	Agreement would define the parameters, guidelines, and policies for inter-agency sharing of incident data between transportation and emergency management agencies in the Region. Incident information could be sent directly to computer-aided dispatch systems and include information on lane closures, travel delays, and weather.

4.7 Phases of Implementation

The Chattanooga Regional ITS Architecture will be implemented over time through a series of projects. Though TDOT has already made significant ITS deployments in the Region, for other agencies key foundation systems will need to be implemented in order to support other systems that have been identified in the Regional ITS Architecture. The deployment of all of the systems required to achieve the final Regional ITS Architecture build out will occur over many years.

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

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

- ATMS01 – Network Surveillance;
- ATMS03 – Surface Street Control;
- ATMS06 – Traffic Information Dissemination;
- ATMS08 – Traffic Incident Management System;
- ATMS 13 – Standard Railroad Grade Crossing;
- EM02 – Emergency Routing;
- EM04 – Roadway Service Patrols;
- MC03 – Road Weather Data Collection;
- MC04 – Weather Information Processing and Distribution;
- APTS01 – Transit Vehicle Tracking;
- APTS02 – Transit Fixed-Route Operations; and
- APTS03 – Demand Response Transit Operations.

5. USE AND MAINTENANCE OF THE REGIONAL ITS ARCHITECTURE

The Regional ITS Architecture developed for the Chattanooga 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 Chattanooga 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 either 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.

5.1 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 for the Chattanooga Region. The plans need to be incorporated into the regional planning process so that the ITS vision for the Region is considered when implementing ITS projects in the future, and to ensure that the Region remains eligible for federal funding. 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).

Stakeholders in the Chattanooga Region agreed that as projects are submitted for inclusion in the TIP each project should be evaluated by the submitting agency to determine if the project includes any ITS elements. If the project contains any ITS elements, then the project needs to be reviewed to determine if the ITS elements in the project are in conformance with the Regional ITS Architecture. The submitting agency will perform this examination as part of the planning process using the procedure outlined in Section 5.2 and the Chattanooga-Hamilton County RPA will review each project to confirm it does conform to the Regional ITS Architecture.

5.2 Process for Determining Architecture Conformity

The Chattanooga Regional ITS Architecture documents the customized market 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 market packages(s) from the Regional ITS Architecture;
- Locate the component within the market package;
- Compare the connections to other agencies or elements documented in the ITS architecture as well as the information flows between them to the connections that will be part of the project; and
- Document any changes necessary to the 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 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 functions and should be included in the ITS Architecture.

Step 2 – Identify the Corresponding Market Packages

If a project was included in the projects identified in the Chattanooga Regional ITS Deployment Plan, then the applicable market package(s) for that project are identified in a column of the tables. However, ITS projects are not required to be included in the ITS Deployment Plan in order to be eligible for federal funding; therefore, market packages might need to be identified for projects that have not been covered in the ITS Deployment Plan. In that case, the market packages selected and customized for the Chattanooga Region should be reviewed to determine if they adequately cover the project. Market packages selected for the Chattanooga Region are identified in **Table 5** of this document and detailed market package definitions are located in **Appendix A**.

Step 3 – Identify the Component within the Market Package

The customized market packages for the Chattanooga Region are located in **Appendix B**. Once the element is located within the appropriate market package the evaluator should determine if the element name used in the market package is accurate or if a change to the name is needed. For example, a future element called the City of East Ridge TOC was included in the Chattanooga Regional ITS Architecture. Detailed planning for this center has not begun and it would not be unusual for the City to select a different name for the TOC once planning and implementation is underway. Such a name change should be documented using the process outlined in Section 5.4.

Step 4 – Evaluate the Connections and Flows

The connections and architecture flows documented in the market 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 market package. These changes in the project should be documented in the ITS market packages using the process outlined in Section 5.4.

Step 5 – Document Required Changes

If any changes are needed to accommodate the project under review, Section 5.4 describes how those changes should be documented. Any changes will be incorporated during the next Regional ITS Architecture update. Conformance will be accomplished by documenting how the market package(s) should be modified so that the connections and data flows are consistent with the project.

5.3 Maintenance Process

The Chattanooga-Hamilton County RPA will be responsible for leading the process to update the Chattanooga Regional ITS Architecture and Deployment Plan in coordination with the TDOT

Long Range Planning Division. **Table 10** summarizes the maintenance process agreed upon by stakeholders in the Region.

Table 10 – Regional ITS Architecture and Deployment Plan Maintenance Summary

Maintenance Details	Regional ITS Architecture		Regional ITS Deployment Plan	
	Minor Update	**Major Update**	**Minor Update**	**Major Update**
Timeframe for Updates	As needed	Approximately every 4 years	Annually	Approximately every 4 years
Scope of Update	Review and update market packages to satisfy architecture compliance requirements of projects or to document other changes that impact the Regional ITS Architecture	Entire Regional ITS Architecture	Review and update project status and add or remove projects as needed	Entire Regional ITS Deployment Plan
Lead Agency	Chattanooga-Hamilton County RPA		Chattanooga-Hamilton County RPA	
Participants	Stakeholders impacted by market package modifications	Entire stakeholder group	Entire stakeholder group	
Results	Market package or other change(s) documented for next complete update	Updated Regional ITS Architecture document, Appendices, and Turbo Architecture database	Updated project tables	Updated Regional ITS Deployment Plan document

Stakeholders agreed that a full update of the Regional ITS Architecture and Deployment Plan should occur approximately every four years in the year preceding the Long Range Transportation Plan (LRTP) update. By completing a full update in the year prior to the LRTP update, stakeholders will be able to determine the ITS needs and projects that are most important to the Region and document those needs and projects for consideration when developing the LRTP. The Chattanooga-Hamilton County RPA, in coordination with the TDOT Long Range Planning Division, will be responsible for completing the full updates. During the update process all of the stakeholder agencies that participated in the original development of the Regional ITS Architecture and Deployment Plan should be included as well as any other agencies in the Region that are deploying or may be impacted by ITS projects.

Minor changes to the Regional ITS Architecture should occur as needed between full updates of the plan. In Section 5.4 of this document the procedure for submitting a change to the Regional ITS Architecture is documented. Documentation of changes to the Regional ITS Architecture is particularly important if a project is being deployed and requires a change to the Regional ITS Architecture in order to establish conformity.

Stakeholders recommended that the Chattanooga-Hamilton County RPA lead an annual meeting to review projects in the Regional ITS Deployment Plan to update project status, remove projects that were completed, add project detail when available, and add new projects. Minor changes to

the Regional ITS Deployment Plan should be noted by the Chattanooga-Hamilton County RPA. Any corresponding changes to the Regional ITS Architecture will be documented and retained by the RPA for inclusion during the next complete update.

5.4 Procedure for Submitting ITS Architecture Changes Between Major Updates

Updates to the Chattanooga Regional ITS Architecture will occur on a regular basis as described in Section 5.3 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 5.2 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 Architecture Maintenance Documentation Form was developed and is included in **Appendix E**. 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 market 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 market packages that impact only one agency in the Regional ITS Architecture. Examples include the addition of a new ITS market package or changes to data flow connections of an existing market package. The addition or change would only impact a single agency.
- Functional Change – Multiple Agencies: Structural changes to the ITS market packages that have the potential to impact multiple agencies in the Regional ITS Architecture. Examples include the addition of a new ITS market package or changes to data flow connections of an existing ITS market 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.

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

Market packages being impacted by the change: Each of the ITS market 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 market package then the agency completing the ITS Architecture Maintenance Documentation Form is asked to include a sketch of the new or modified market 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 market packages that will be included as part of the Regional ITS Architecture.

The Chattanooga-Hamilton County RPA will review and accept the proposed changes and forward the form to the TDOT Long Range Planning Division for their records. When a major update is performed all of the documented changes should be incorporated into the Regional ITS Architecture.

APPENDIX A – MARKET PACKAGE DEFINITIONS

Market Package	Market Package Name	Description
Traffic Management Service Area		
ATMS01	Network Surveillance	Includes traffic detectors, CCTV cameras, other surveillance equipment, supporting field equipment and fixed point to point communications to transmit the collected data back to a traffic management center.
ATMS02	Traffic Probe Surveillance	Provides an alternative approach for surveillance of the roadway network. Probe vehicles are tracked, and the vehicle's position and speed information are utilized to determine road network conditions such as average speed and congestion conditions.
ATMS03	Surface Street Control	Provides the central control and monitoring equipment, communication links and signal control equipment that support local street and/or arterial traffic management. This market package is consistent with typical urban traffic signal control systems.
ATMS04	Freeway Control	Provides the communications and roadside equipment to support ramp control, lane controls and interchange control for freeways. This market package is consistent with typical urban traffic freeway control systems. Also includes the capability to utilize surveillance information for detection of incidents.
ATMS05	HOV Lane Management	Manages HOV lanes by coordinating freeway ramp meters and connector signals with HOV lane usage signals.
ATMS06	Traffic Information Dissemination	Provides driver information using roadway equipment such as dynamic message signs or highway advisory radio. Information can include traffic and road conditions, closure and detour information, incident information, emergency alerts and driver advisories.
ATMS07	Regional Traffic Management	Sharing of traffic information and control among traffic management centers to support a regional management strategy. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions.
ATMS08	Traffic Incident Management System	Manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. This market package includes incident detection capabilities and coordination with other agencies. It supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel.
ATMS09	Traffic Forecast and Demand Management	Recommends courses of action based on an assessment of the current and forecast road network performance as well as information on special events, parking, or transit operations if applicable. Example responses include predefined incident response plans, variable toll rates, transit strategies, and congestion management strategies.
ATMS10	Electronic Toll Collection	Provides toll operators with the ability to collect tolls electronically and detect and process violations.
ATMS11	Emissions Monitoring and Management	Monitors individual vehicle emissions and provides general air quality monitoring using distributed sensors to collect the data.
ATMS12	Roadside Lighting System Control	Manages electrical lighting systems by monitoring operational conditions and using the lighting controls to vary the amount of light provided along the roadside.
ATMS13	Standard Railroad Grade Crossing	Manages highway traffic at highway-rail intersections (HRIs) where rail operational speeds are less than 80 mph.
ATMS14	Advanced Railroad Grade Crossing	Manages highway traffic at highway-rail intersections (HRIs) where operational speeds are greater than 80 mph. Augments Standard Railroad Grade Crossing market package with additional safety features to mitigate the risks associated with higher rail speeds.
ATMS15	Railroad Operations Coordination	Provides an additional level of strategic coordination between freight rail operations and traffic management centers. Could include train schedules, maintenance schedules or any other anticipated HRI closures.

Market Package	Market Package Name	Description
Traffic Management Service Area (continued)		
ATMS16	Parking Facility Management	Provides enhanced monitoring and management of parking facilities. Market package assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees.
ATMS17	Regional Parking Management	Supports communication and coordination between parking facilities as well as coordination between parking facilities and traffic and transit management systems.
ATMS18	Reversible Lane Management	Provides for the management of reversible lane facilities and includes the field equipment, physical lane access controls, and associated control electronics.
ATMS19	Speed Monitoring	Monitors the speeds of vehicles traveling through a roadway system. This service can also support notifications to an enforcement agency to enforce the speed limit and roadside safe speed advisories based on current roadway conditions.
ATMS20	Drawbridge Management	Supports systems that manage drawbridges at rivers and canals and other multimodal crossings. Includes control devices as well as traveler information systems.
ATMS21	Roadway Closure Management	Closes roadways to vehicular traffic when driving conditions are unsafe, maintenance must be performed, or other situations. Market package covers general road closures applications; specific closure systems that are used at railroad grade crossings, drawbridges, reversible lanes, etc. are covered by other market packages.
Emergency Management Service Area		
EM01	Emergency Call-Taking and Dispatch	Provides basic public safety call-taking and dispatch services. Includes emergency vehicle equipment, equipment used to receive and route emergency calls, wireless communications and coordination between emergency management agencies.
EM02	Emergency Routing	Supports automated vehicle location and dynamic routing of emergency vehicles. Traffic information, road conditions and suggested routing information are provided to enhance emergency vehicle routing. Includes signal preemption and priority applications.
EM03	Mayday and Alarms Support	Allows the user to initiate a request for emergency assistance and enables the emergency management subsystem to locate the user, gather information about the incident and determine the appropriate response.
EM04	Roadway Service Patrols	Supports the roadway service patrol vehicles that aid motorists, offering rapid response to minor incidents (flat tire, crashes, out of gas) to minimize disruption to the traffic stream. This market package monitors service patrol vehicle locations and supports vehicle dispatch.
EM05	Transportation Infrastructure Protection	Includes the monitoring of transportation infrastructure (e.g. bridges, tunnels and management centers) for potential threats using sensors, surveillance equipment, barriers and safeguard systems to preclude an incident, control access during and after an incident or mitigate the impact of an incident. Threats can be acts of nature, terrorist attacks or other incidents causing damage to the infrastructure.
EM06	Wide-Area Alert	Uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather, civil emergencies or other situations that pose a threat to life and property.
EM07	Early Warning System	Monitors and detects potential, looming and actual disasters including natural, technological and man-made disasters.
EM08	Disaster Response and Recovery	Enhances the ability of the surface transportation system to respond to and recover from disasters. Supports coordination of emergency response plans, provides enhanced access to the scene and better information about the transportation system in the vicinity of the disaster, and maintains situation awareness.

Market Package	Market Package Name	Description
Emergency Management Service Area (continued)		
EM09	Evacuation and Reentry Management	Supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. This market package supports both anticipated, well-planned and orderly evacuations such as for a hurricane, as well as sudden evacuations with little or no time for preparation or public warning such as a terrorist act. Employs a number of strategies to maximize capacity along an evacuation route including coordination with transit.
EM10	Disaster Traveler Information	Use of ITS to provide disaster-related traveler information to the general public, including evacuation and reentry information and other information concerning the operation of the transportation system during a disaster.
Maintenance and Construction Management Service Area		
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Tracks the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities.
MC02	Maintenance and Construction Vehicle Maintenance	Performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities. Includes on-board sensors capable of automatically performing diagnostics.
MC03	Road Weather Data Collection	Collects current road weather conditions using data collected from environmental sensors deployed on and about the roadway.
MC04	Weather Information Processing and Distribution	Processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators can make decisions on corrective actions to take.
MC05	Roadway Automated Treatment	Automatically treats a roadway section based on environmental or atmospheric conditions. Includes the sensors that detect adverse conditions, automated treatment (such as anti-icing chemicals), and driver information systems.
MC06	Winter Maintenance	Supports winter road maintenance. Monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities.
MC07	Roadway Maintenance and Construction	Supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.
MC08	Work Zone Management	Directs activity in work zones, controlling traffic through portable dynamic message signs and informing other groups of activity for better coordination management. Also provides speed and delay information to motorists prior to the work zone.
MC09	Work Zone Safety Monitoring	Includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. Detects vehicle intrusions in work zones and warns workers and drivers of safety hazards when encroachment occurs.
MC10	Maintenance and Construction Activity Coordination	Supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations. (i.e., traffic management, transit, emergency management)
MC11	Environmental Probe Surveillance	Collects data from vehicles in the road network that can be used to directly measure on infer current environmental conditions.
MC12	Infrastructure Monitoring	Monitors the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure using both fixed and vehicle-based infrastructure monitoring sensors. Monitors vehicle probes used to determine current pavement conditions.

Market Package	Market Package Name	Description
Public Transportation Service Area		
APTS01	Transit Vehicle Tracking	Monitors current transit vehicle location using an automated vehicle location system. Location data may be used to determine real time schedule adherence and update the transit system's schedule in real time.
APTS02	Transit Fixed-Route Operations	Performs vehicle routing and scheduling, as well as operator assignment and system monitoring for fixed-route and flexible-route transit services.
APTS03	Demand Response Transit Operations	Performs vehicle routing and scheduling, as well as operator assignment and system monitoring for demand responsive transit services.
APTS04	Transit Fare Collection Management	Manages transit fare collection on-board transit vehicles and at transit stops using electronic means. Allows the use of a traveler card or other electronic payment device.
APTS05	Transit Security	Provides for the physical security of transit passengers and transit vehicle operators. Includes on-board security cameras and panic buttons.
APTS06	Transit Fleet Management	Supports automatic transit maintenance scheduling and monitoring for both routine and corrective maintenance.
APTS07	Multi-modal Coordination	Establishes two way communications between multiple transit and traffic agencies to improve service coordination.
APTS08	Transit Traveler Information	Provides transit users at transit stops and on board transit vehicles with ready access to transit information. Services include stop annunciation, imminent arrival signs and real-time transit schedule displays. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.
APTS09	Transit Signal Priority	Determines the need for transit priority on routs and at certain intersections and requests transit vehicle priority at these locations to improve on-time performance of the transit system.
APTS10	Transit Passenger Counting	Counts the number of passengers entering and exiting a transit vehicle using sensors mounted on the vehicle and communicates the collected passenger data back to the management center.
Commercial Vehicle Operations Service Area		
CVO01	Fleet Administration	Provides the capabilities to manage a fleet of commercial vehicles. Vehicle routing and tracking as well as notification of emergency management of any troublesome route deviations (such as a HAZMAT vehicle) are part of this market package.
CVO02	Freight Administration	Tracks the movement of cargo and monitors the cargo condition.
CVO03	Electronic Clearance	Provides for automatic clearance at roadside check facilities. Allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using transponders and dedicated short range communications to the roadside.
CVO04	CV Administrative Processes	Provides for electronic application, processing, fee collection, issuance and distribution of CVO credentials and tax filing.
CVO05	International Border Electronic Clearance	Provides for automated clearance at international border crossings.
CVO06	Weigh-In-Motion	Provides for high speed weigh-in-motion with or without automated vehicle identification capabilities.
CVO07	Roadside CVO Safety	Provides for automated roadside safety monitoring and reporting. Automates commercial vehicle safety inspections at the roadside check facilities.
CVO08	On-board CVO and Freight Safety and Security	Provides for on-board commercial vehicle safety monitoring and reporting as well as roadside support for reading on-board safety data via tags.
CVO09	CVO Fleet Maintenance	Supports maintenance of CVO fleet vehicles with on-board monitoring equipment and automated vehicle location capabilities.
CVO10	HAZMAT Management	Integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents.

Market Package	Market Package Name	Description
Commercial Vehicle Operations Service Area (continued)		
CVO11	Roadside HAZMAT Security Detection and Mitigation	Provides the capability to detect and classify security sensitive HAZMAT on commercial vehicles using roadside sensing and imaging technology. Credentials information can be accessed to verify if the commercial driver, vehicle and carrier are permitted to transport the identified HAZMAT.
CVO12	CV Driver Security Authentication	Provides the ability for fleet and freight management to detect when an unauthorized commercial vehicle driver attempts to drive a vehicle based on stored identity information. If an unauthorized driver has been detected the commercial vehicle can be disabled.
CVO13	Freight Assignment Tracking	Provides for the planning and tracking of the commercial vehicle, freight equipment and the commercial vehicle driver.
Traveler Information Service Area		
ATIS01	Broadcast Traveler Information	Collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadly disseminates this information through existing infrastructures (radio, cell phones, etc.).
ATIS02	Interactive Traveler Information	Provides tailored information in response to a traveler request. The traveler can obtain current information regarding traffic conditions, roadway maintenance and construction, transit services, ride share/ride match, parking management, detours and pricing information.
ATIS03	Autonomous Route Guidance	Using vehicle location and other information, this market package enables route planning and detailed route guidance based on static, stored information.
ATIS04	Dynamic Route Guidance	Offers advanced route planning and guidance that is responsive to current conditions.
ATIS05	ISP Based Trip Planning and Route Guidance	Offers the user pre-trip route planning and en-route guidance services. Routes may be based on static or real time network conditions.
ATIS06	Transportation Operations Data Sharing	Collects, processes, and stores current information on traffic and travel conditions and other information about the current state of the transportation network and makes the information available to transportation system operators.
ATIS07	Yellow Pages and Reservation	Provides yellow pages and reservations services to the user.
ATIS08	Dynamic Ridesharing	Provides dynamic ridesharing/ride matching services to travelers.
ATIS09	In Vehicle Signing	Supports the distribution of traffic and travel advisory information to drivers through in-vehicle devices.
ATIS10	VII Traveler Information	Provides location specific information to travelers in vehicles using Vehicle Infrastructure Integration (VII).
Archived Data Management Service Area		
AD1	ITS Data Mart	Provides a focused archive that houses data collected and owned by a single agency or other organization. Focused archive typically covers a single transportation mode and one jurisdiction.
AD2	ITS Data Warehouse	Includes all the data collection and management capabilities of the ITS Data Mart. Adds the functionality to allow collection of data from multiple agencies and data sources across modal and jurisdictional boundaries.
AD3	ITS Virtual Data Warehouse	Provides the same broad access to multimodal, multidimensional data from varied sources as in the ITS Data Warehouse Market Package, but provides this access using enhanced interoperability between physically distributed ITS archives that are each locally managed.

Market Package	Market Package Name	Description
Vehicle Safety Service Area		
AVSS01	Vehicle Safety Monitoring	Diagnoses critical components of the vehicle and warns the driver of potential dangers. On-board sensors will determine the vehicle's condition, performance, and on-board safety data and display that information to the driver.
AVSS02	Driver Safety Monitoring	Determines the driver's condition and warns the driver of potential dangers. On-board sensors will determine the driver's condition, performance, and on-board safety data and display that information to the driver.
AVSS03	Longitudinal Safety Monitoring	Uses on-board safety sensors and collision sensors to monitor the areas in front of and behind the vehicle and present warnings to the driver about potential hazards.
AVSS04	Lateral Safety Warning	Uses on-board safety sensors and collision sensors to monitor the areas to the sides of the vehicle and present warnings to the driver about potential hazards.
AVSS05	Intersection Safety Warning	Determines the probability of a collision in an equipped intersection (either highway-highway or highway-rail) and provides timely warnings to drivers in response to hazardous conditions. Monitors in the roadway infrastructure assess vehicle locations and speeds near an intersection. Using this information, a warning is determined and communicated to the approaching vehicle using a short range communications system. Information can be provided to the driver through the ATIS09 – In-Vehicle Signing market package.
AVSS06	Pre-Crash Restraint Deployment	Provides in-vehicle sensors to monitor the vehicle's local environment (lateral and longitudinal gaps, weather, and roadway conditions), determine collision probability, and deploy a pre-crash safety system.
AVSS07	Driver Visibility Improvement	Enhances the driver visibility using an enhanced vision system. On-board display hardware is needed.
AVSS08	Advanced Vehicle Longitudinal Control	Automates the speed and headway control functions on board the vehicle utilizing safety sensors and collision sensors combined with vehicle dynamics processing to control the throttle and brakes. Requires on-board sensors to measure longitudinal gaps and a processor for controlling the vehicle speed.
AVSS09	Advanced Vehicle Lateral Control	Automates the steering control on board the vehicle utilizing safety sensors and collision sensors combined with vehicle dynamics processing to control the steering. Requires on-board sensors to measure lane position and lateral deviations and a processor for controlling the vehicle steering.
AVSS10	Intersection Collision Avoidance	Determines the probability of an intersection collision and provides timely warnings to approaching vehicles so that avoidance actions can be taken. This market package builds on the intersection collision warning infrastructure and in-vehicle equipment and adds equipment in the vehicle that can take control of the vehicle in emergency situations.
AVSS11	Automated Highway System	Enables "hands-off" operation of the vehicle on the automated portion of the highway system. Implementation requires lateral lane holding, vehicle speed and steering control, and automated highway system check-in and check-out.
AVSS12	Cooperative Vehicle Safety Systems	Enhances the on-board longitudinal and lateral warning stand-alone systems by exchanging messages wirelessly with other surrounding vehicles. Vehicles send out information concerning their location, speed, and direction to any surrounding vehicles. Special messages from approaching emergency vehicles may also be received and processed.

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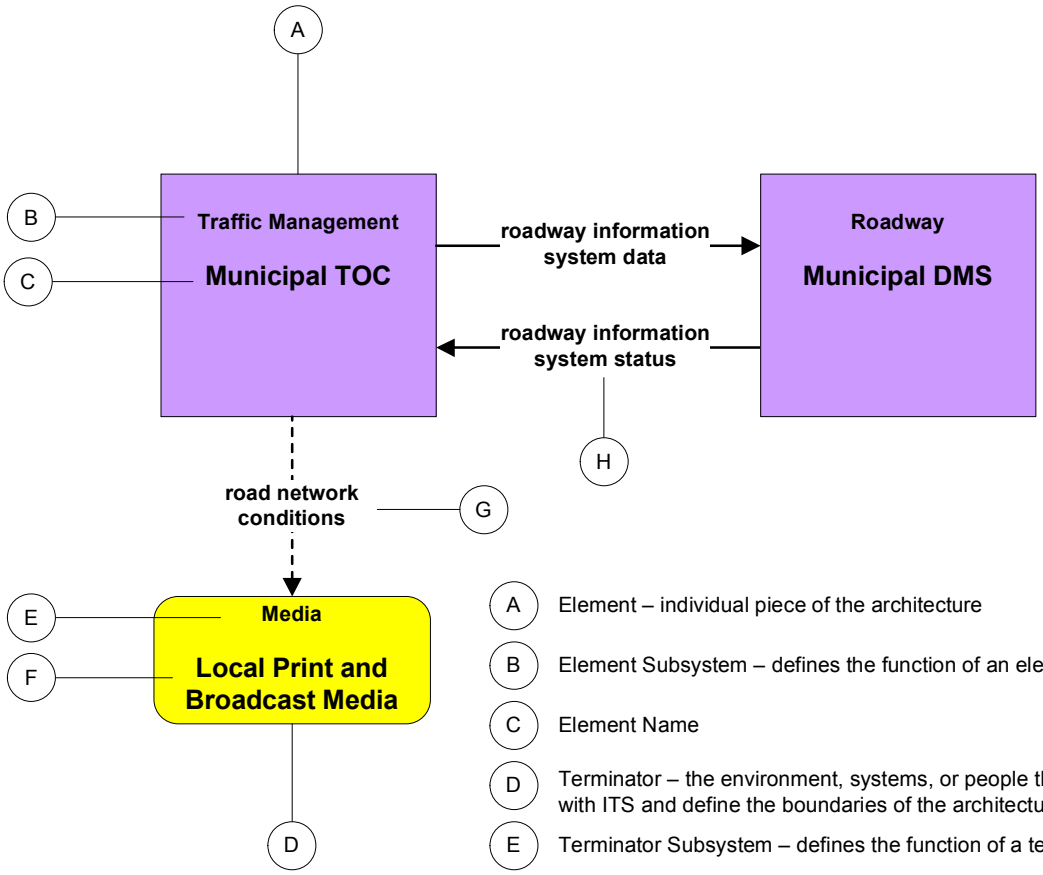
APPENDIX B

MARKET PACKAGE DIAGRAM COMPONENT AND TERMINOLOGY KEY



A – Element – individual piece of the architecture

B – Element Subsystem – defines the function of an element

C – Element Name

D – Terminator – the environment, systems, or people that interface with ITS and define the boundaries of the architecture

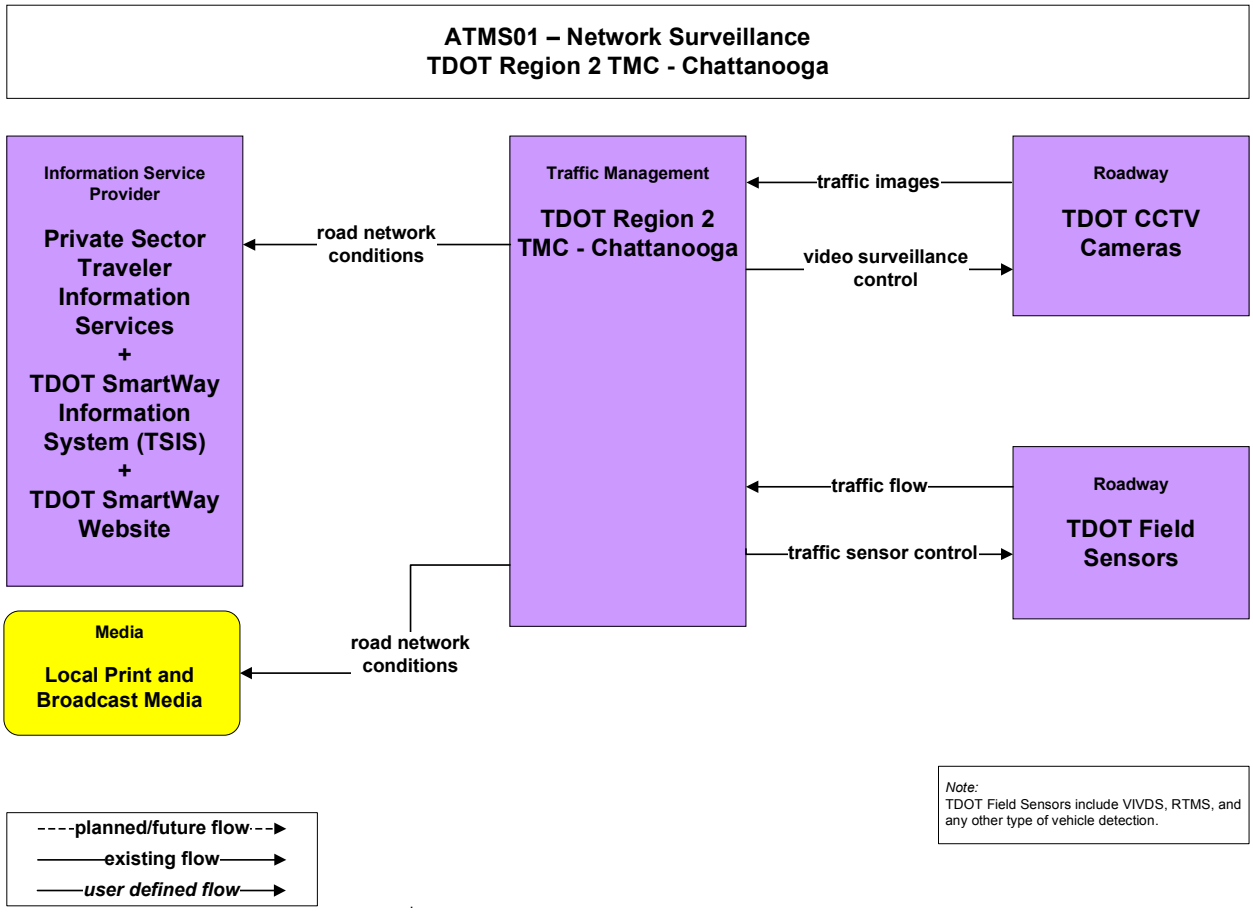
E – Terminator Subsystem – defines the function of a terminator

F – Terminator Name

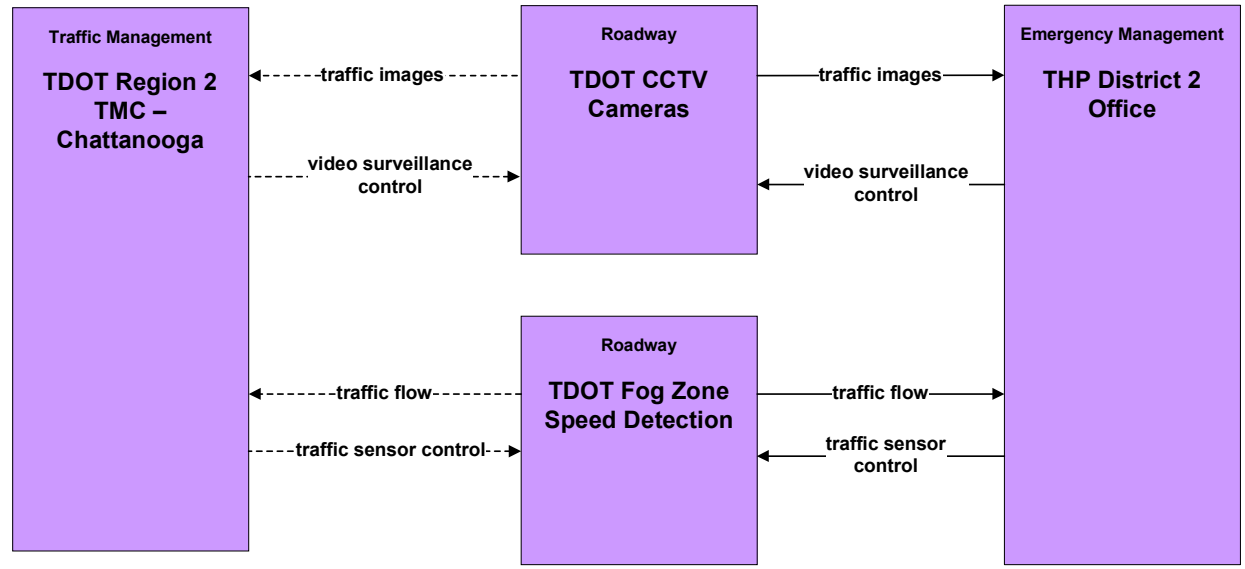
G – Future/Planned Architecture Flow – data that will be exchanged between subsystems and terminators in the future

H – Existing Architecture Flow – data that is currently exchanged between subsystems and terminators

Advanced Traffic Management System



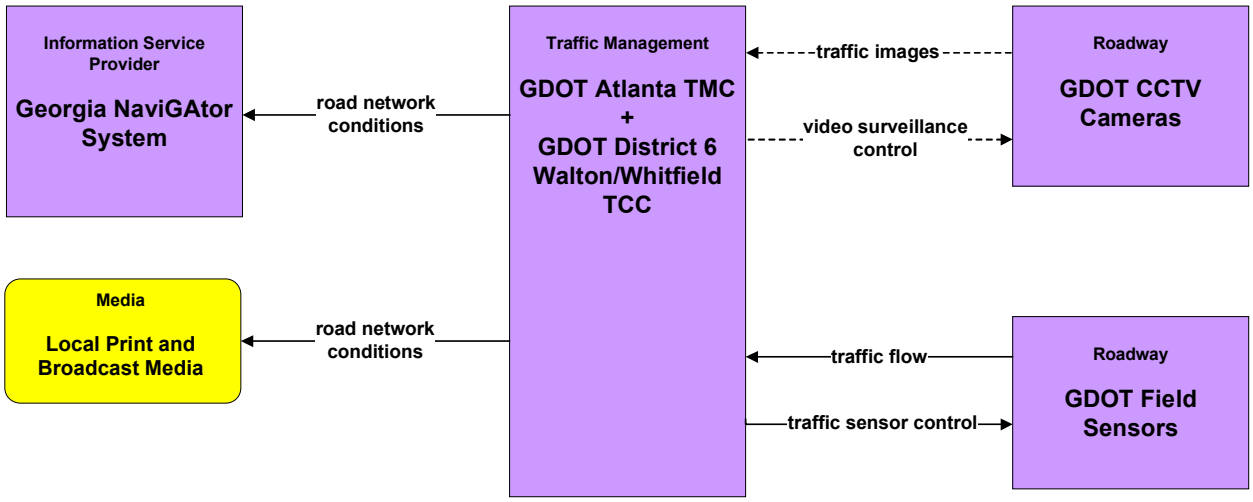
ATMS01 – Network Surveillance
TDOT Fog Management System



planned/future flow
existing flow
user defined flow

Note:
Other portions of the fog management system can be found in ATMS19, ATMS21, MC03 and MC04.

ATMS01 – Network Surveillance
GDOT

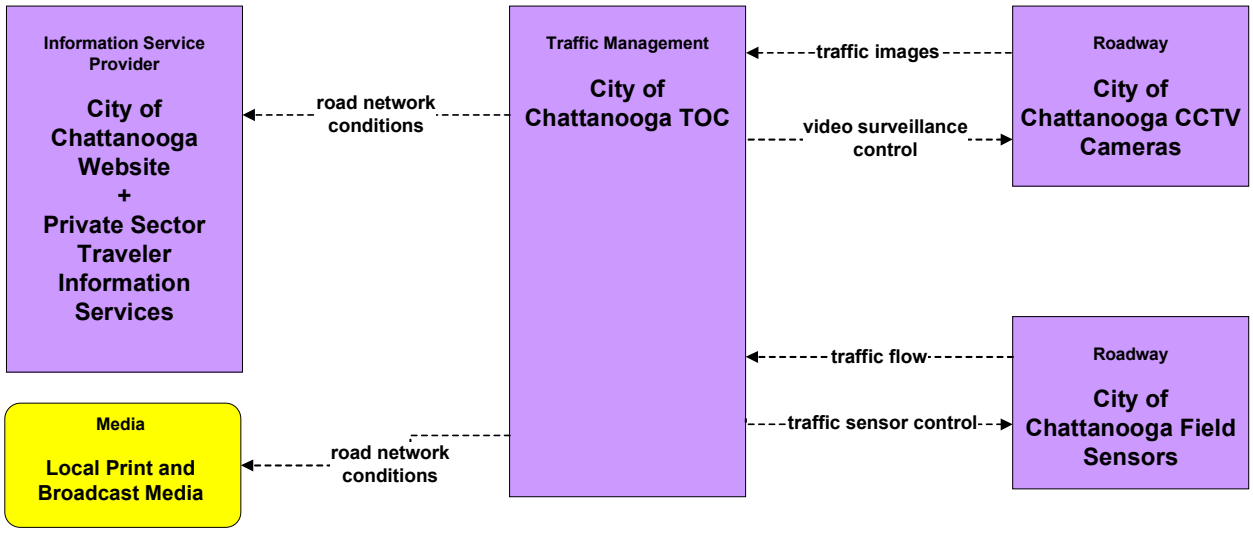


Note:
GDOT currently has CCTV cameras in the Dalton area, but none within the Chattanooga regional boundaries.

GDOT Field Sensors include VIVDS, RTMS, and any other type of vehicle detection.

planned/future flow
existing flow
user defined flow

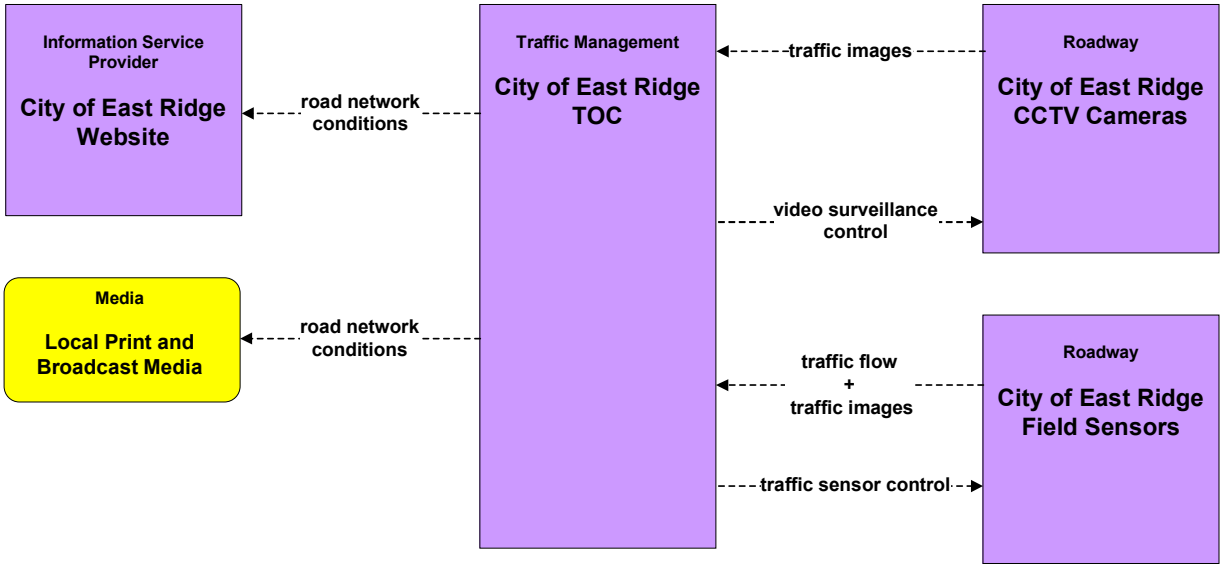
ATMS01 – Network Surveillance
City of Chattanooga



Note:
City of Chattanooga Field Sensors include VIVDS, RTMS, and any other type of vehicle detection.

planned/future flow
existing flow
user defined flow

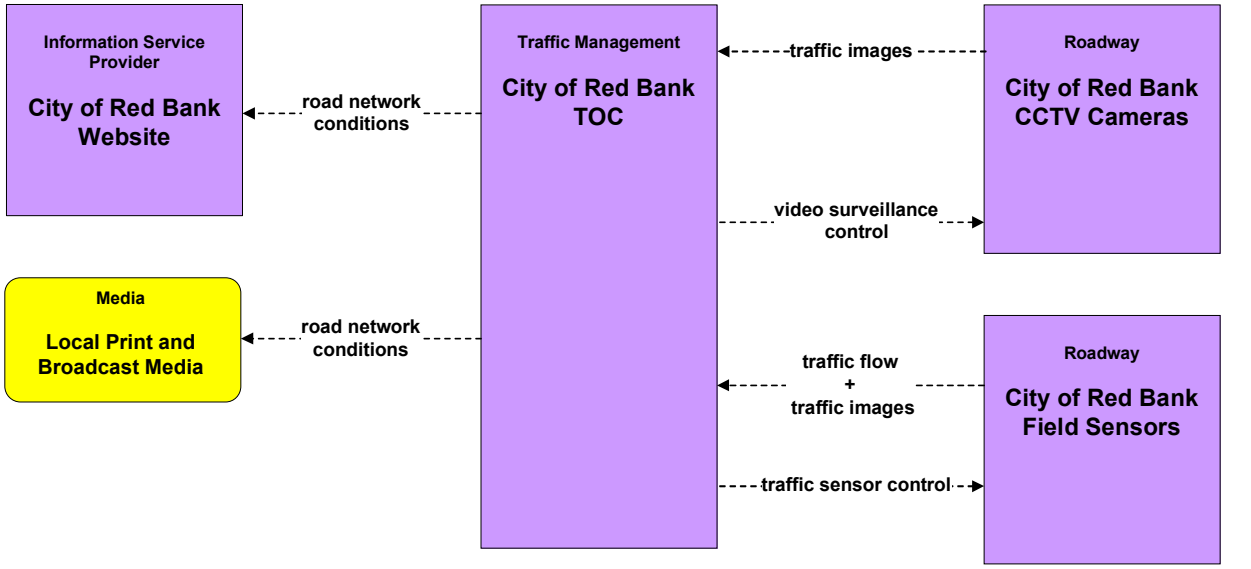
ATMS01 – Network Surveillance
City of East Ridge



Note:
City of East Ridge Field Sensors include VIVDS and any other type of vehicle detection.

planned/future flow
existing flow
user defined flow

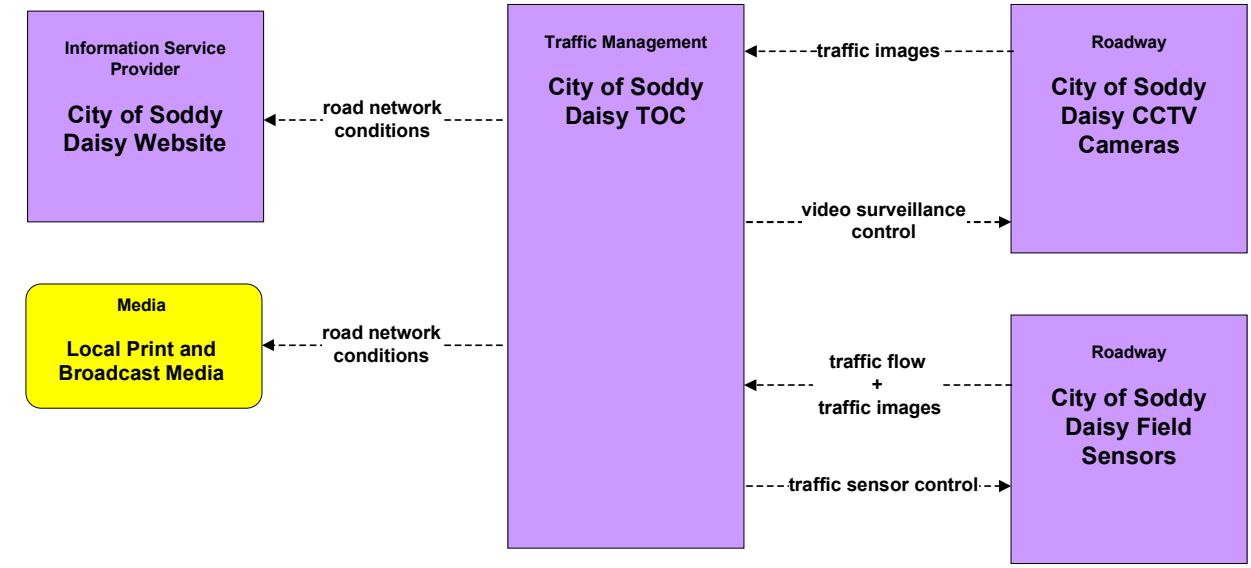
ATMS01 – Network Surveillance
City of Red Bank



planned/future flow
existing flow
user defined flow

Note:
City of Red Bank Field Sensors include VIVDS and any other type of vehicle detection.

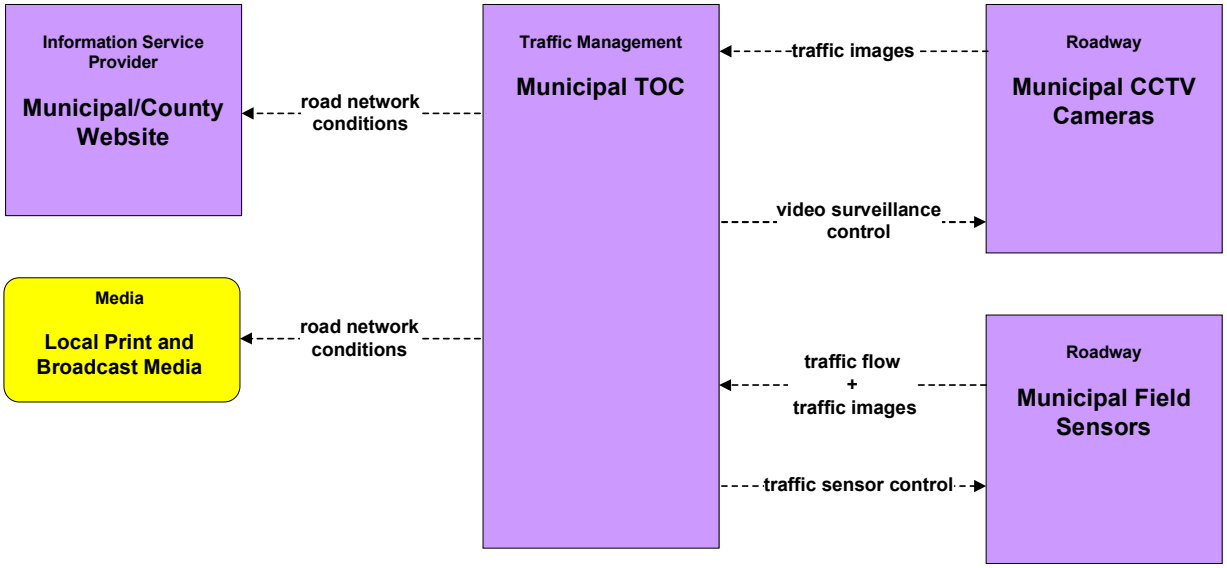
ATMS01 – Network Surveillance
City of Soddy Daisy

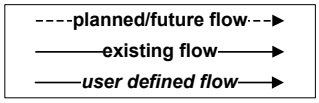


planned/future flow
existing flow
user defined flow

Note:
City of Soddy Daisy Field Sensors include VIVDS and any other type of vehicle detection.

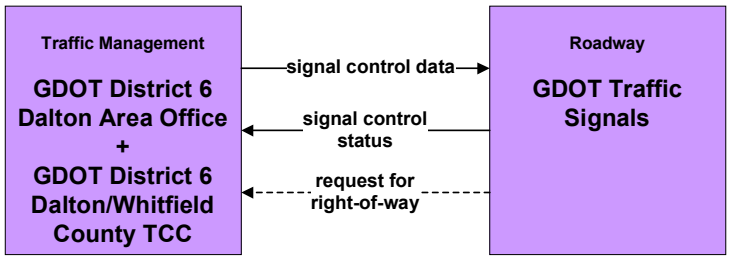
ATMS01 – Network Surveillance
Municipal

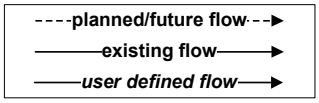




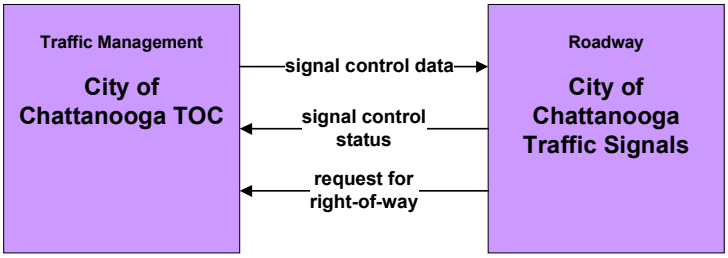
Note:
Municipal Field Sensors include VIVDS and any other type of vehicle detection.

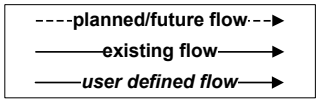
ATMS03 – Surface Street Control
GDOT



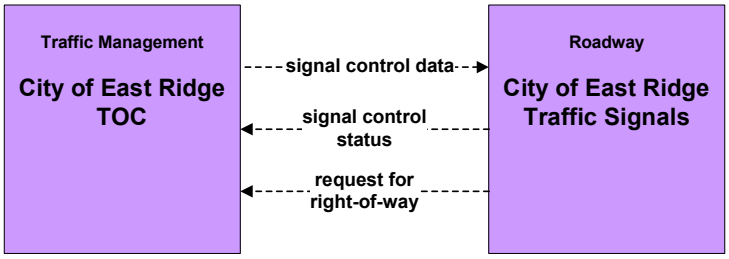


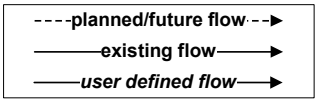
ATMS03 – Surface Street Control
City of Chattanooga



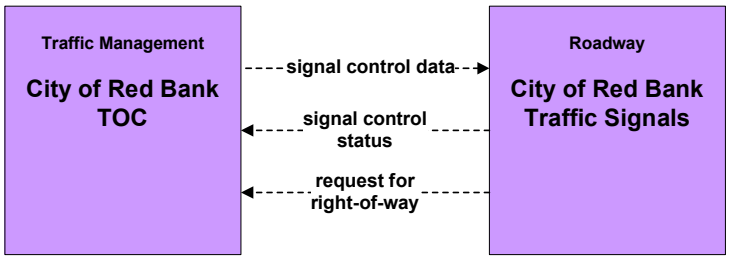


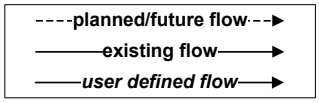
ATMS03 – Surface Street Control
City of East Ridge



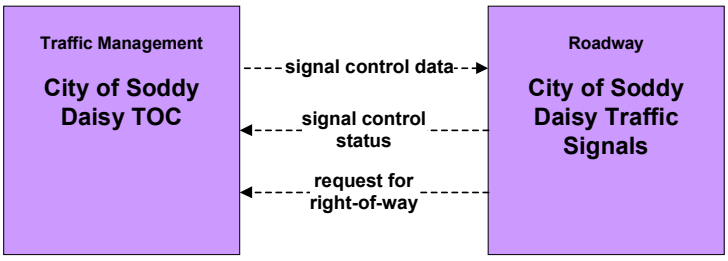


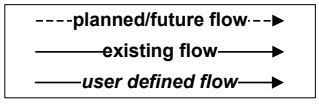
ATMS03 – Surface Street Control
City of Red Bank



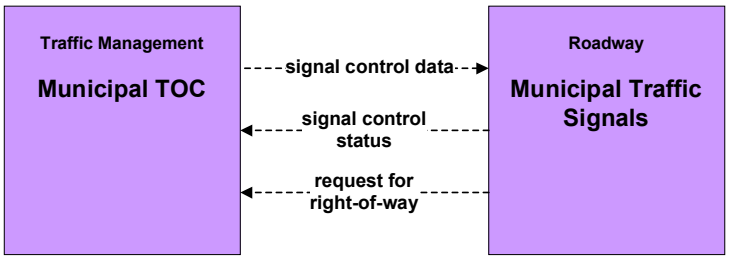


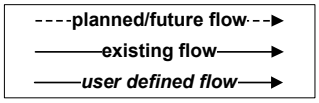
ATMS03 – Surface Street Control
City of Soddy Daisy



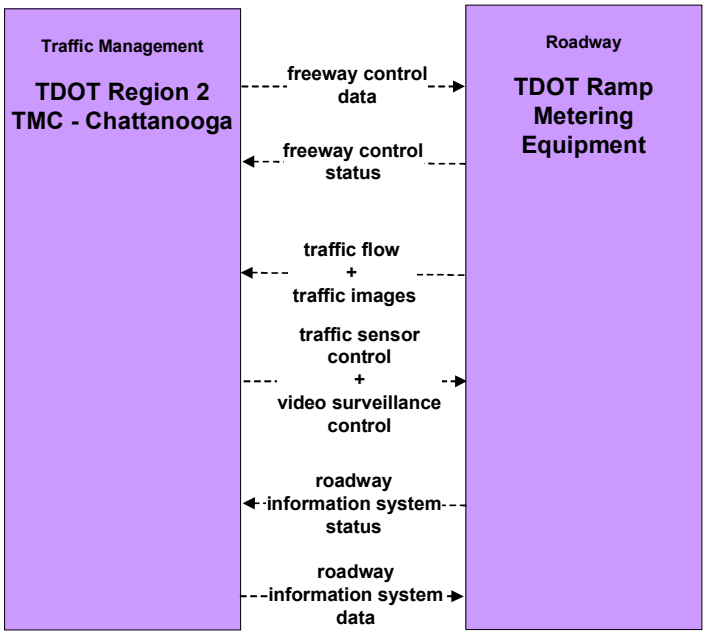


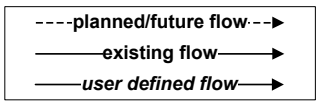
ATMS03 – Surface Street Control
Municipal



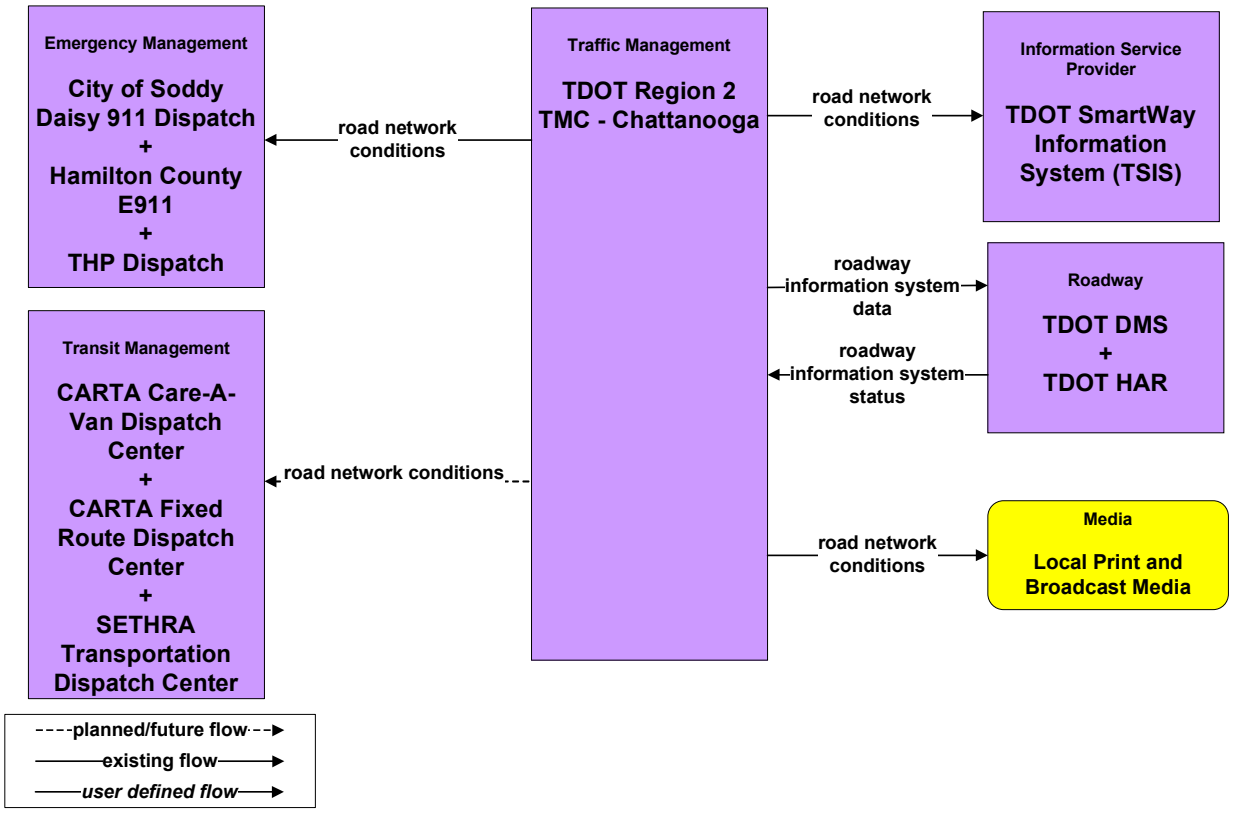


ATMS04 – Freeway Control
TDOT

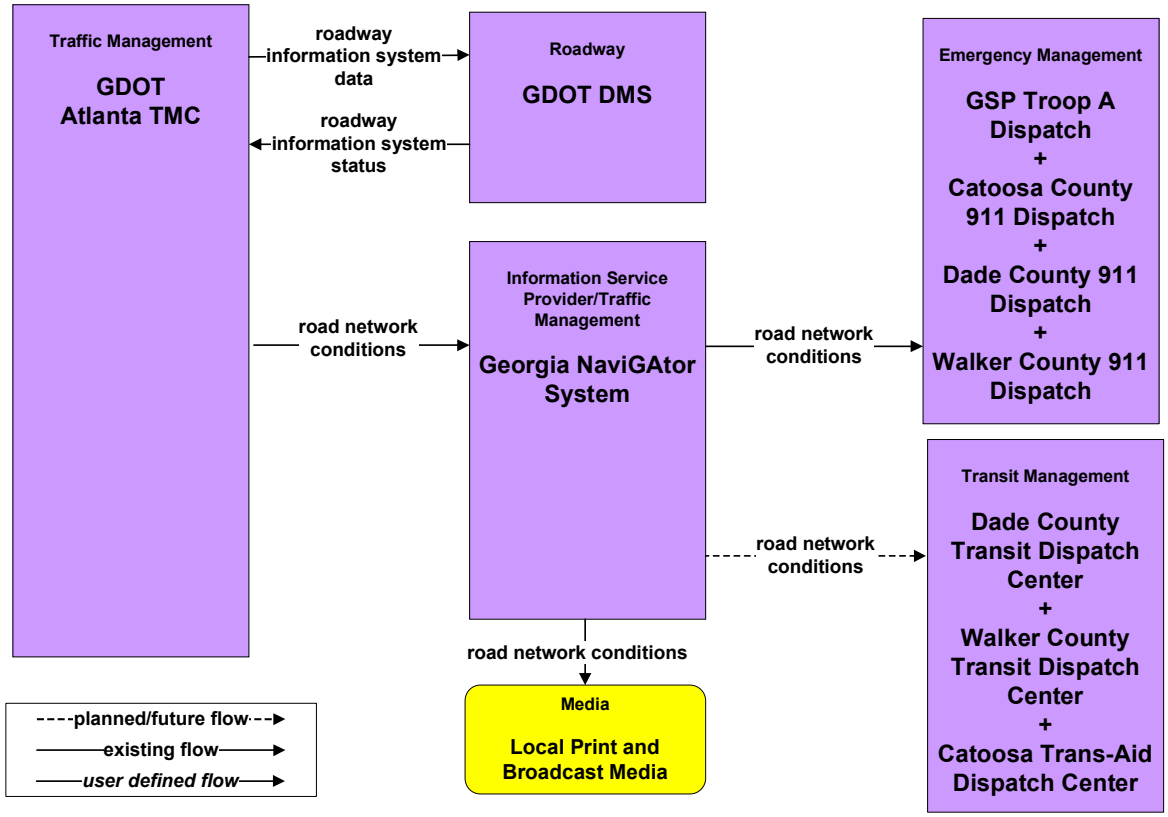




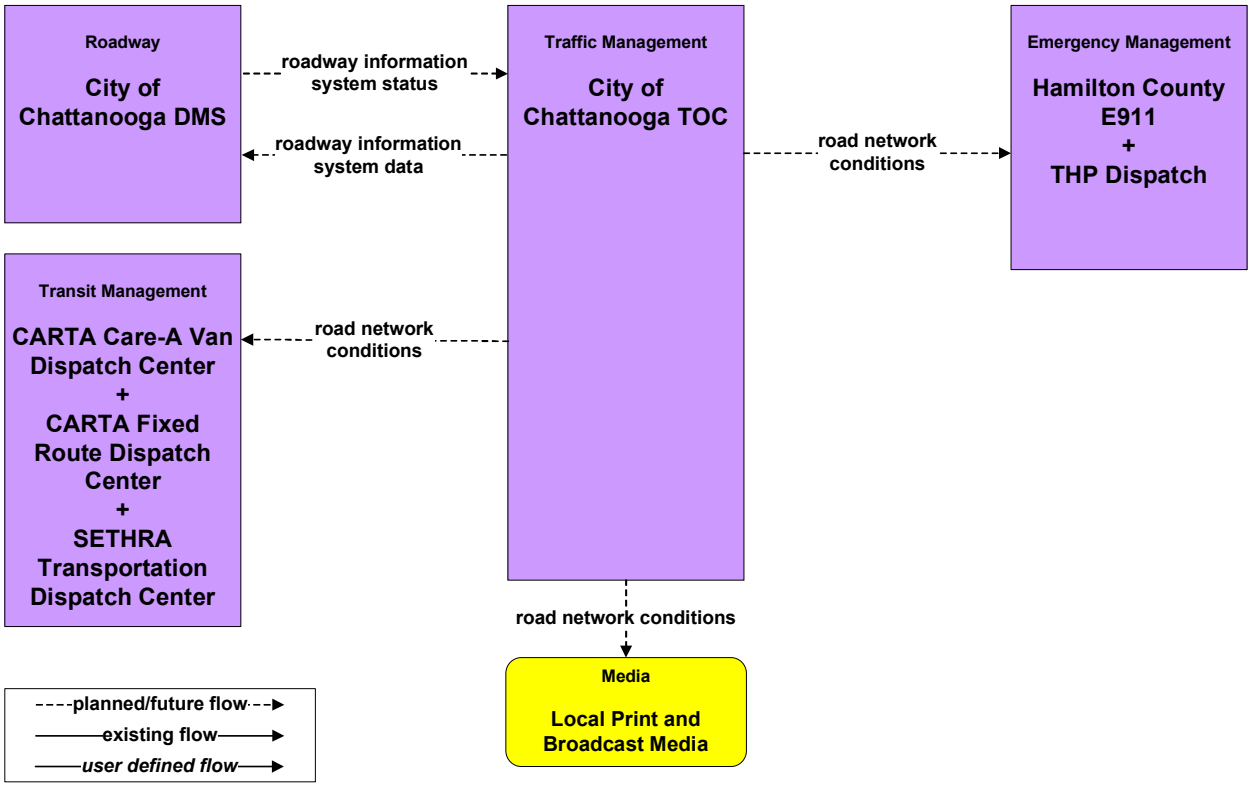
ATMS06 – Traffic Information Dissemination
TDOT Region 2 TMC - Chattanooga



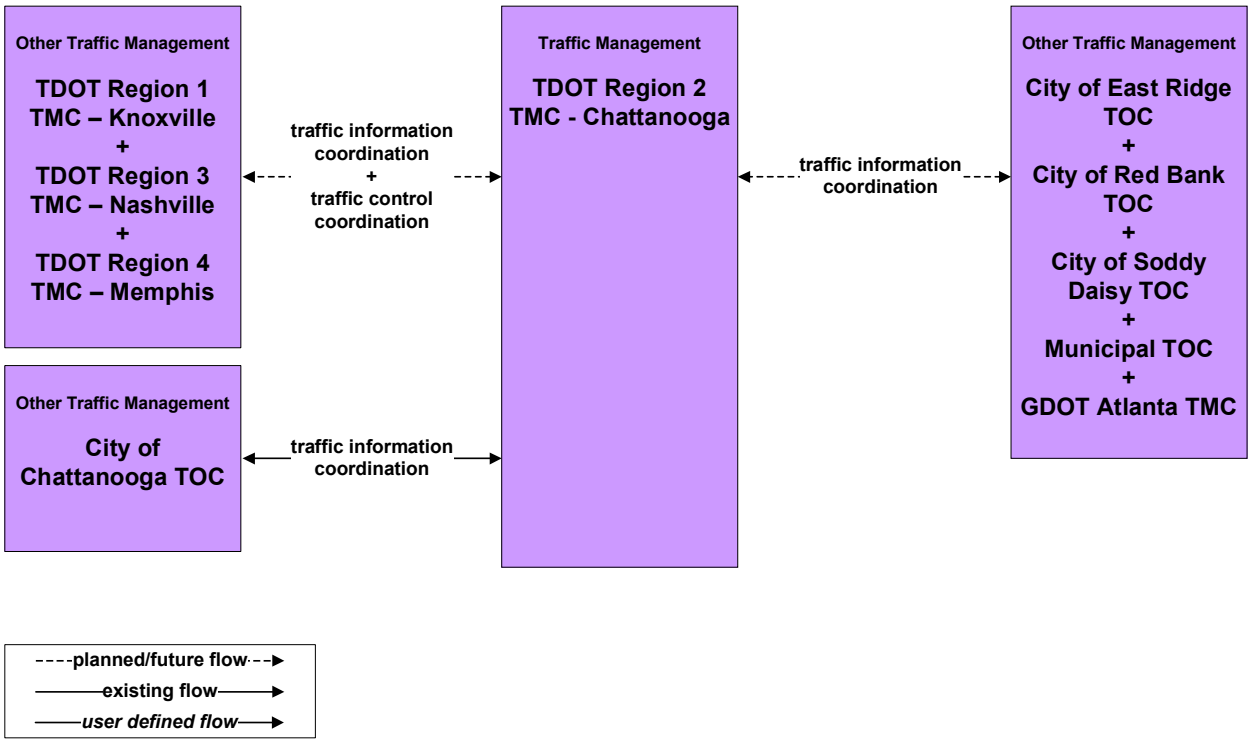
ATMS06 – Traffic Information Dissemination
GDOT



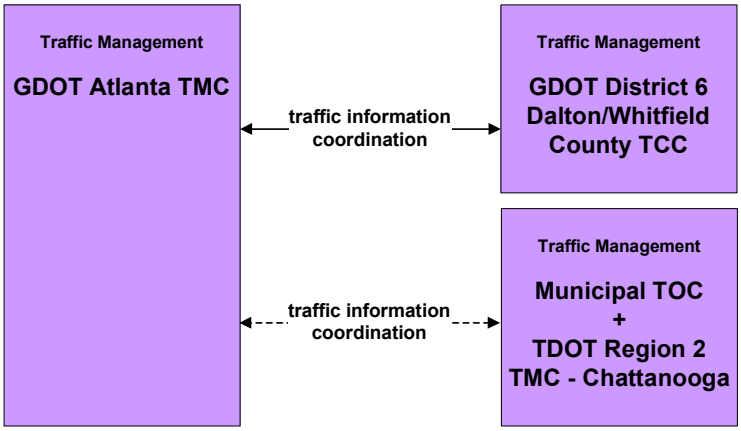
ATMS06 – Traffic Information Dissemination
City of Chattanooga



ATMS07 - Regional Traffic Management
TDOT Region 2 TMC - Chattanooga



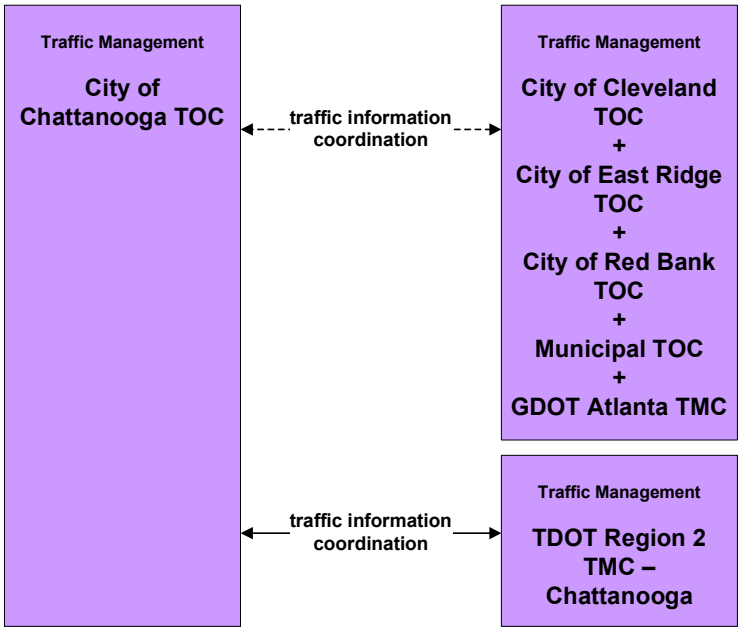
ATMS07 – Regional Traffic Management
GDOT



Note:
Traffic Information Coordination connection is existing/available through NaviGAtor Web.

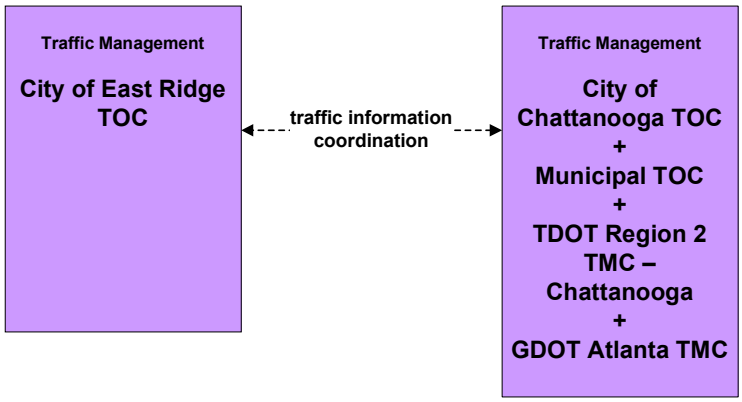
----planned/future flow---►
————existing flow————►
——*user defined flow*——►

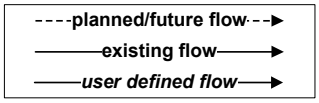
ATMS07 – Regional Traffic Management
City of Chattanooga



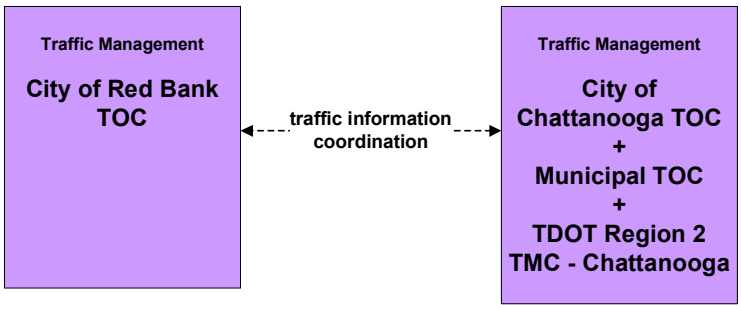
----planned/future flow---►
————existing flow————►
——*user defined flow*——►

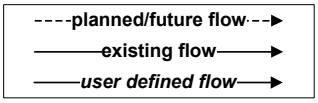
ATMS07 – Regional Traffic Management
City of East Ridge



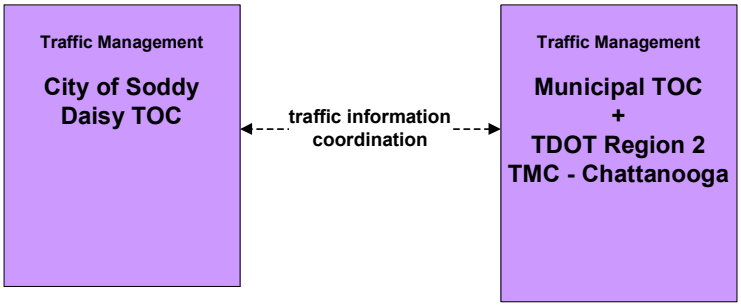


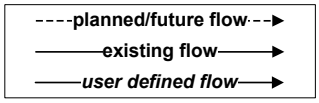
ATMS07 – Regional Traffic Management
City of Red Bank



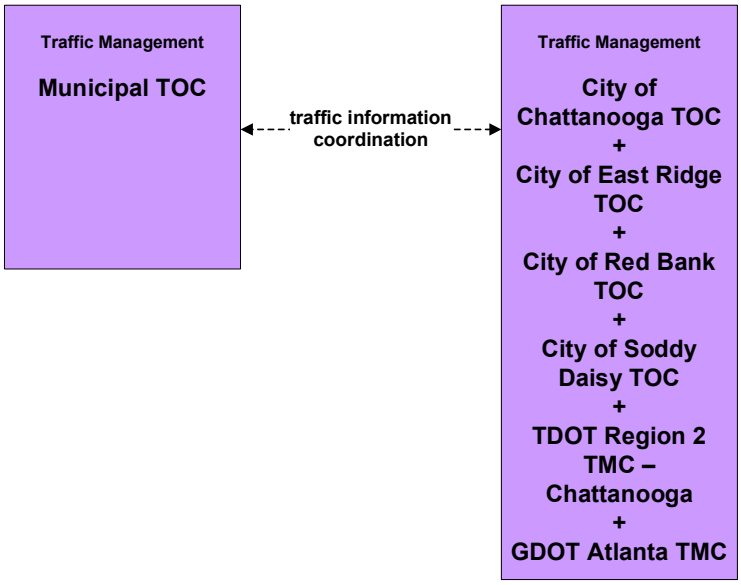


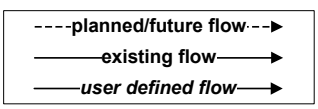
ATMS07 – Regional Traffic Management
City of Soddy Daisy TOC

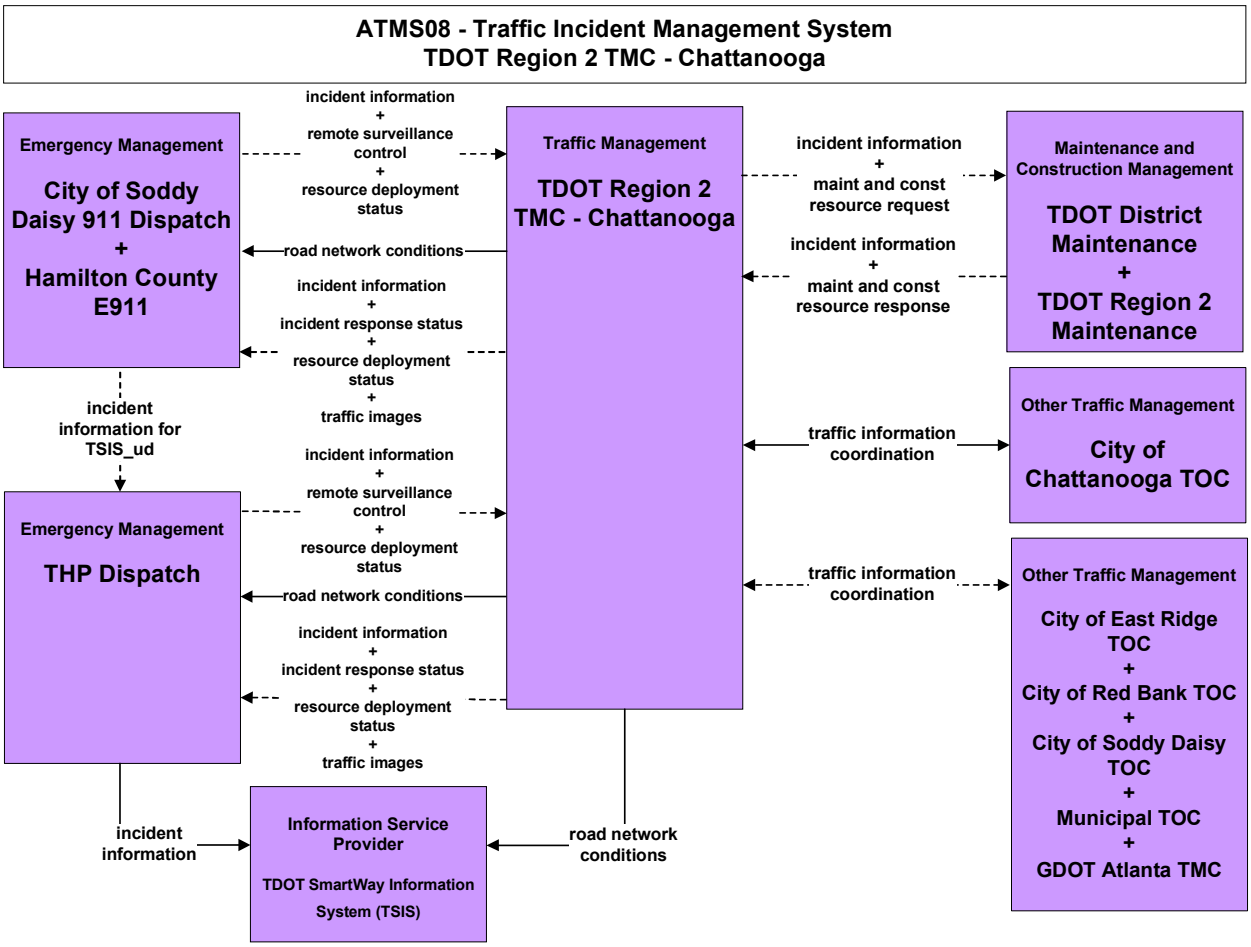


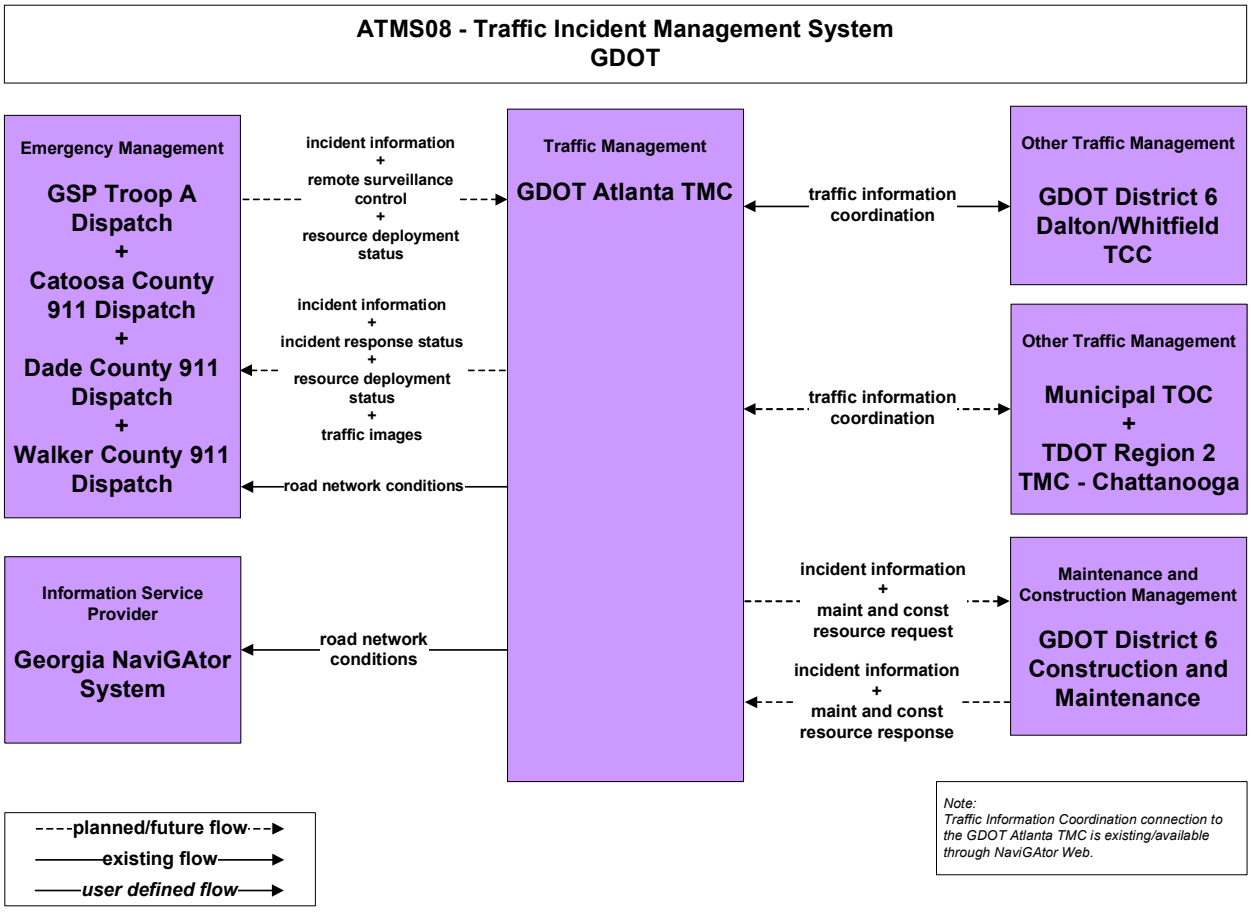


ATMS07 – Regional Traffic Management
Municipal

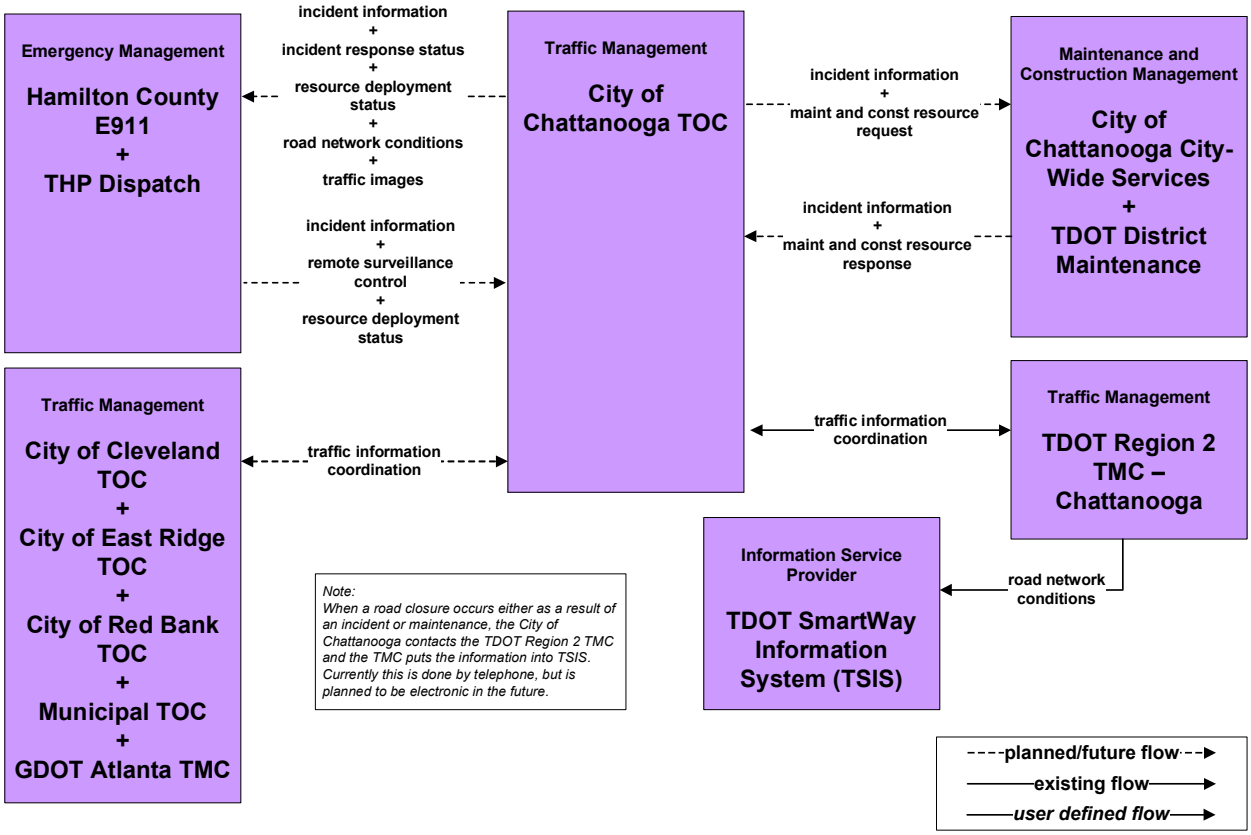




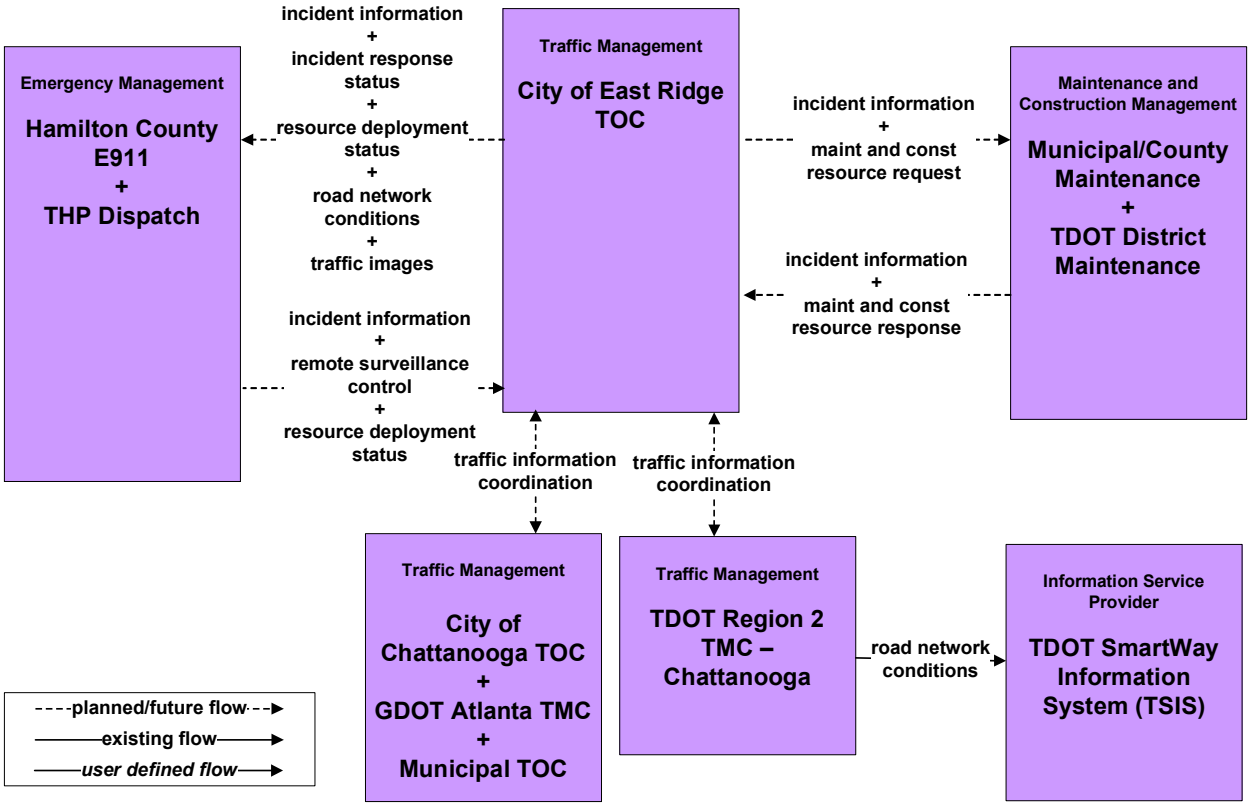

ATMS08 - Traffic Incident Management System
TDOT Region 2 TMC - Chattanooga
Emergency Management
City of Soddy Daisy 911 Dispatch + Hamilton County E911
incident information + remote surveillance control + resource deployment status
road network conditions
incident information + incident response status + resource deployment status + traffic images
incident information for TSIS_ud
Traffic Management
TDOT Region 2 TMC - Chattanooga
incident information + maint and const resource request
incident information + maint and const resource response
Maintenance and Construction Management
TDOT District Maintenance + TDOT Region 2 Maintenance
traffic information coordination
Other Traffic Management
City of Chattanooga TOC
Emergency Management
THP Dispatch
incident information + remote surveillance control + resource deployment status
road network conditions
incident information + incident response status + resource deployment status + traffic images
traffic information coordination
Other Traffic Management
City of East Ridge TOC + City of Red Bank TOC + City of Soddy Daisy TOC + Municipal TOC + GDOT Atlanta TMC
incident information
Information Service Provider
TDOT SmartWay Information System (TSIS)
road network conditions


ATMS08 - Traffic Incident Management System
GDOT
Emergency Management
GSP Troop A Dispatch + Catoosa County 911 Dispatch + Dade County 911 Dispatch + Walker County 911 Dispatch
incident information + remote surveillance control + resource deployment status
incident information + incident response status + resource deployment status + traffic images
road network conditions
Traffic Management
GDOT Atlanta TMC
traffic information coordination
Other Traffic Management
GDOT District 6 Dalton/Whitfield TCC
traffic information coordination
Other Traffic Management
Municipal TOC + TDOT Region 2 TMC - Chattanooga
Information Service Provider
Georgia NaviGAtor System
road network conditions
incident information + maint and const resource request
incident information + maint and const resource response
Maintenance and Construction Management
GDOT District 6 Construction and Maintenance
planned/future flow
existing flow
user defined flow
Note:
Traffic Information Coordination connection to the GDOT Atlanta TMC is existing/available through NaviGAtor Web.

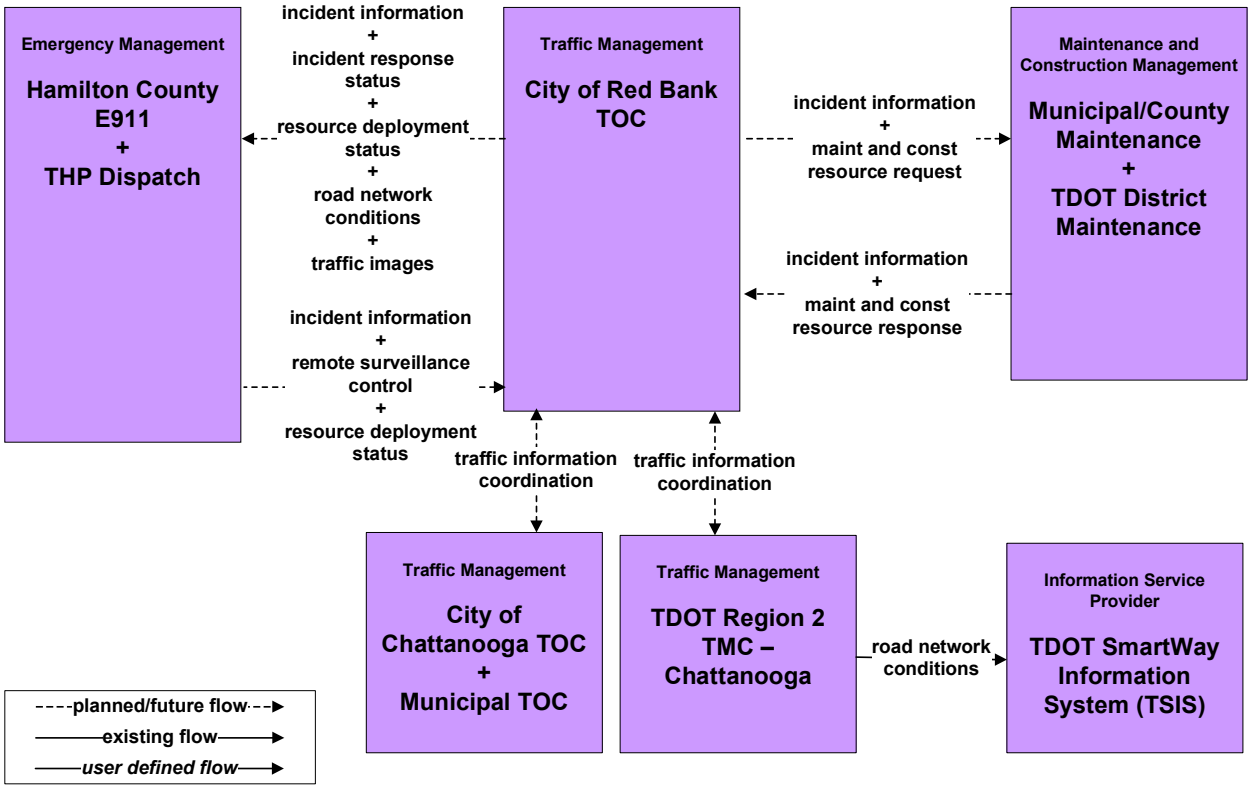
ATMS08 - Traffic Incident Management System
City of Chattanooga



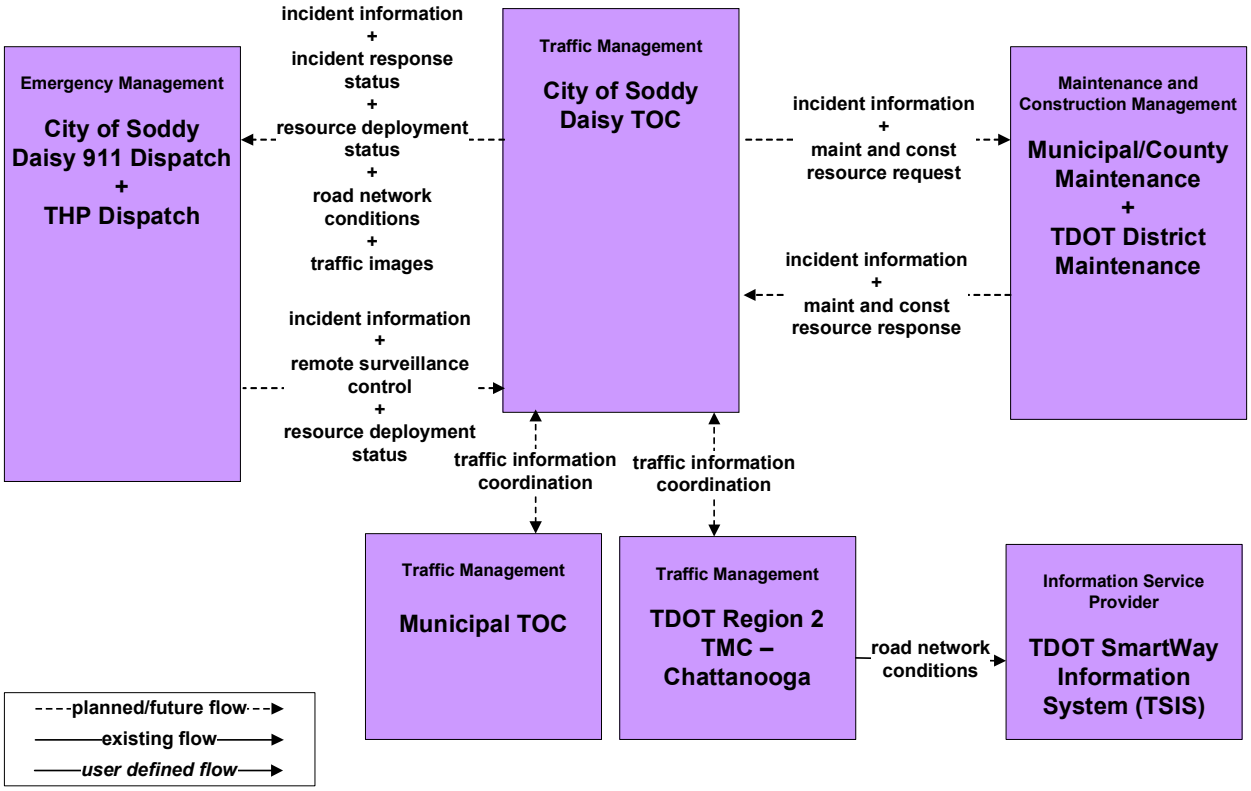
ATMS08 - Traffic Incident Management System
City of East Ridge

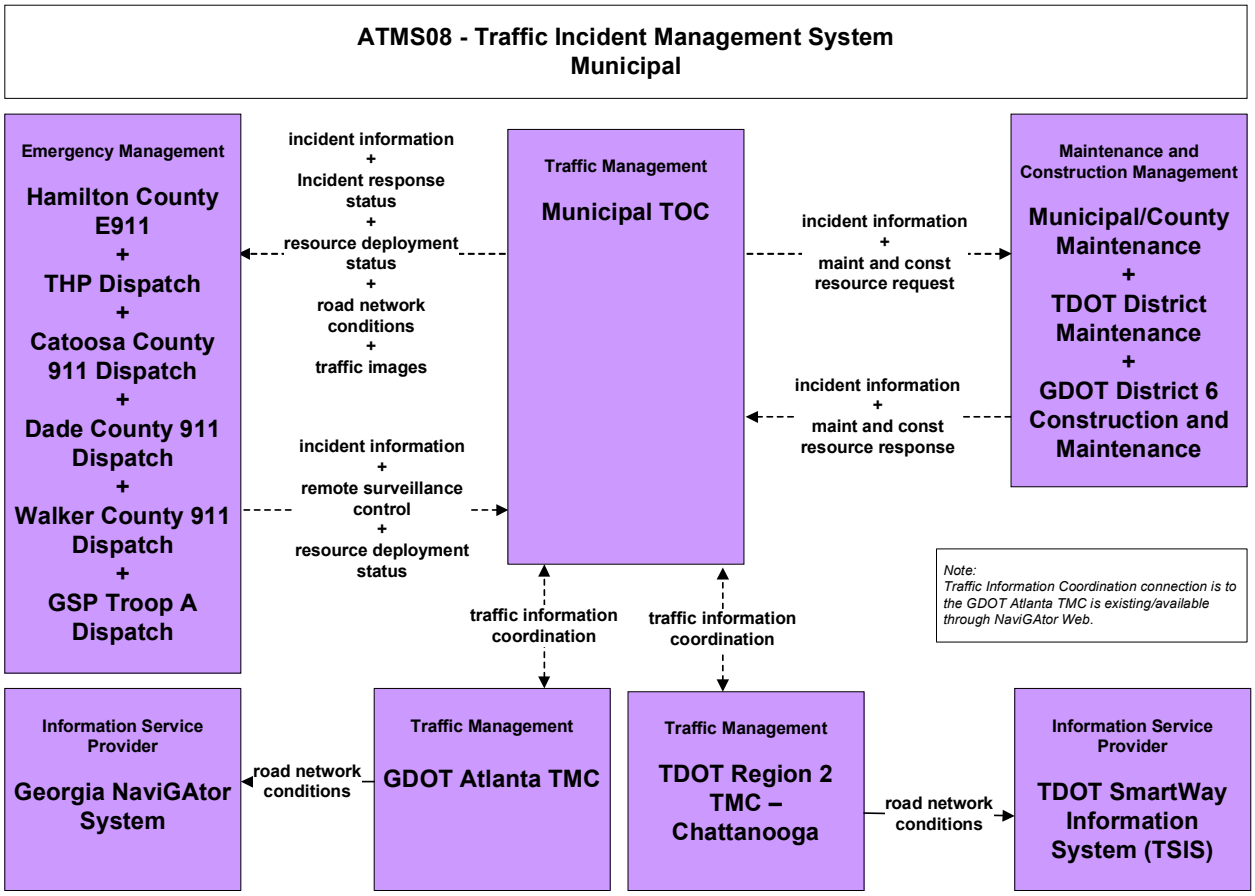


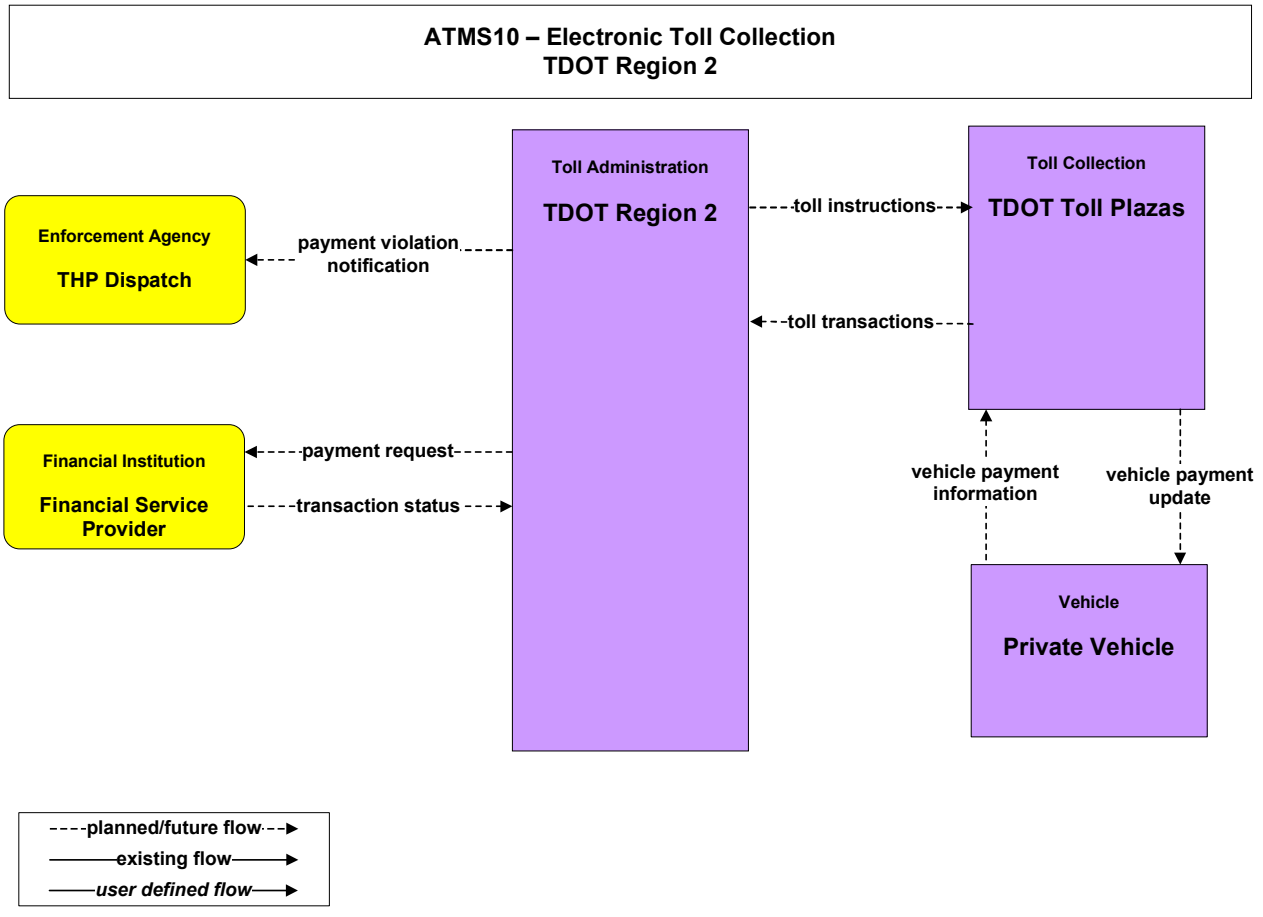
ATMS08 - Traffic Incident Management System
City of Red Bank



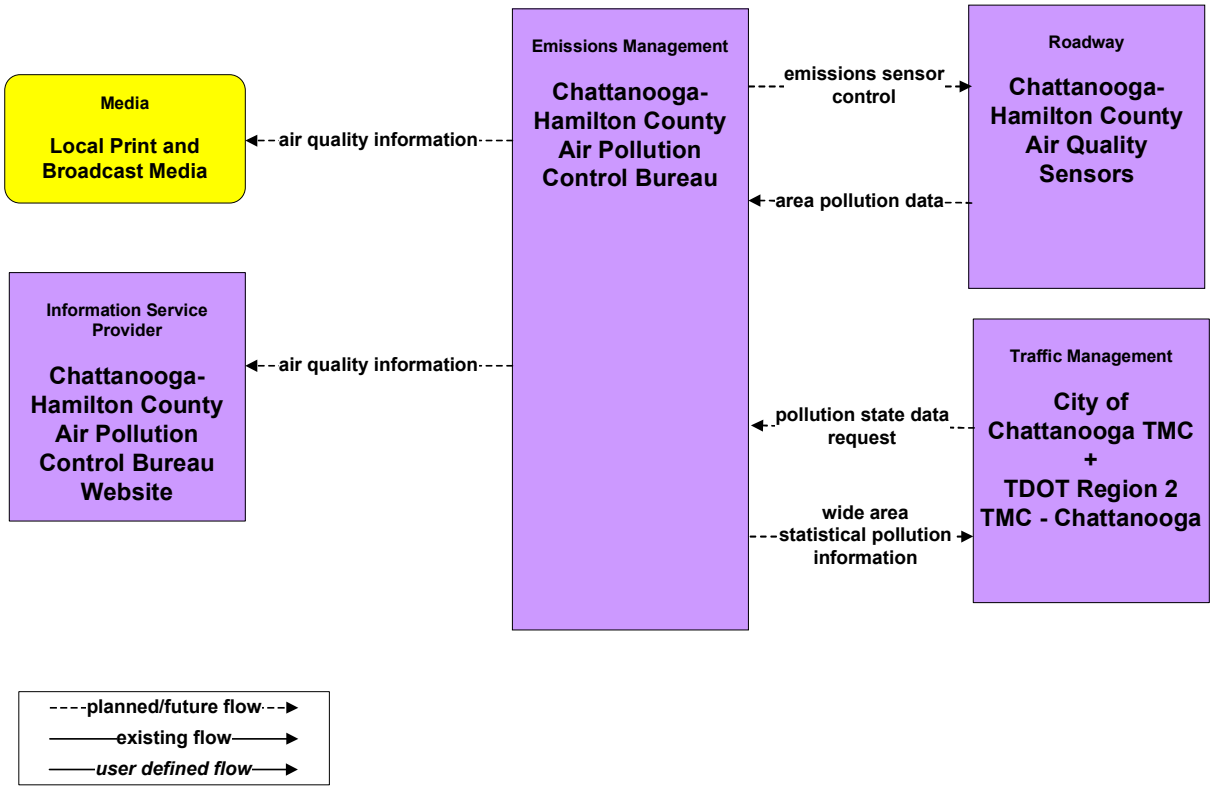
ATMS08 - Traffic Incident Management System
City of Soddy Daisy



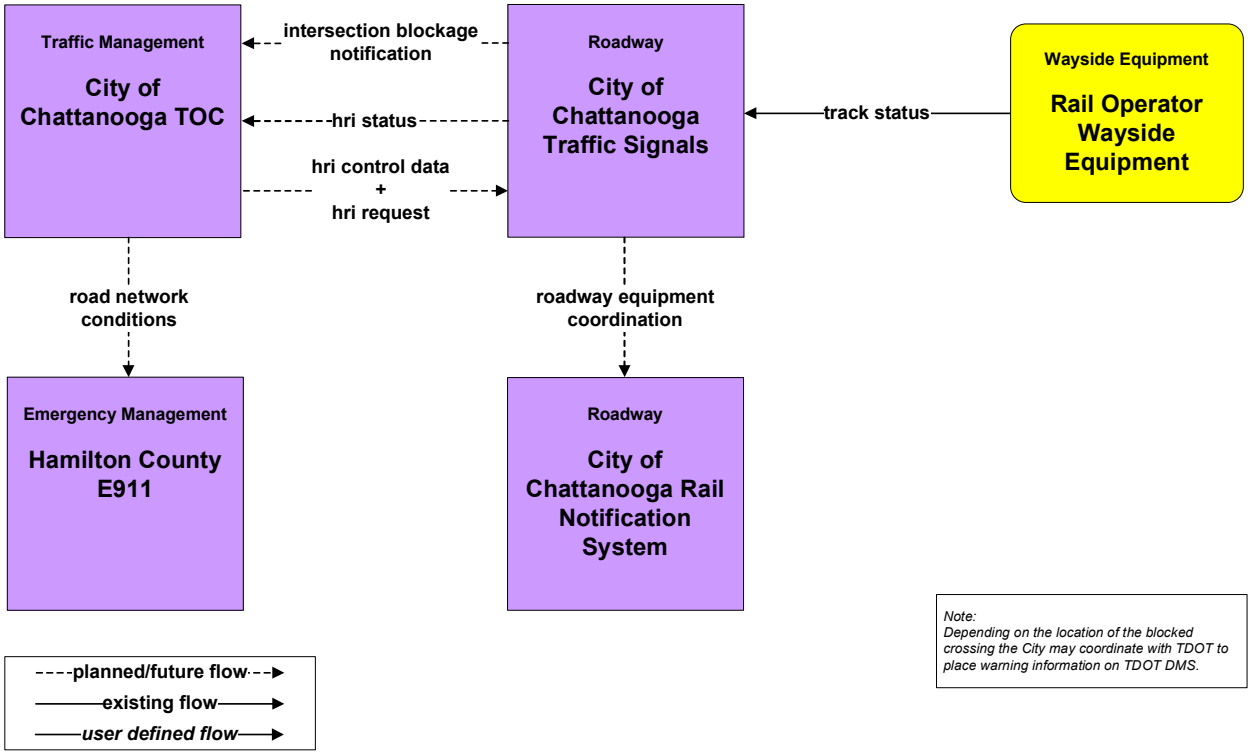

ATMS08 - Traffic Incident Management System
Municipal
Emergency Management
Hamilton County E911
+
THP Dispatch
+
Catoosa County 911 Dispatch
+
Dade County 911 Dispatch
+
Walker County 911 Dispatch
+
GSP Troop A Dispatch
incident information
+
Incident response status
+
resource deployment status
+
road network conditions
+
traffic images
incident information
+
remote surveillance control
+
resource deployment status
Traffic Management
Municipal TOC
incident information
+
maint and const resource request
incident information
+
maint and const resource response
Maintenance and Construction Management
Municipal/County Maintenance
+
TDOT District Maintenance
+
GDOT District 6 Construction and Maintenance
Note:
Traffic Information Coordination connection is to the GDOT Atlanta TMC is existing/available through NaviGAtor Web.
traffic information coordination
traffic information coordination
Information Service Provider
Georgia NaviGAtor System
road network conditions
Traffic Management
GDOT Atlanta TMC
Traffic Management
TDOT Region 2 TMC – Chattanooga
road network conditions
Information Service Provider
TDOT SmartWay Information System (TSIS)


ATMS10 – Electronic Toll Collection
TDOT Region 2
Enforcement Agency
THP Dispatch
payment violation notification
Toll Administration
TDOT Region 2
toll instructions
Toll Collection
TDOT Toll Plazas
toll transactions
Financial Institution
Financial Service Provider
payment request
transaction status
vehicle payment information
vehicle payment update
Vehicle
Private Vehicle
planned/future flow
existing flow
user defined flow

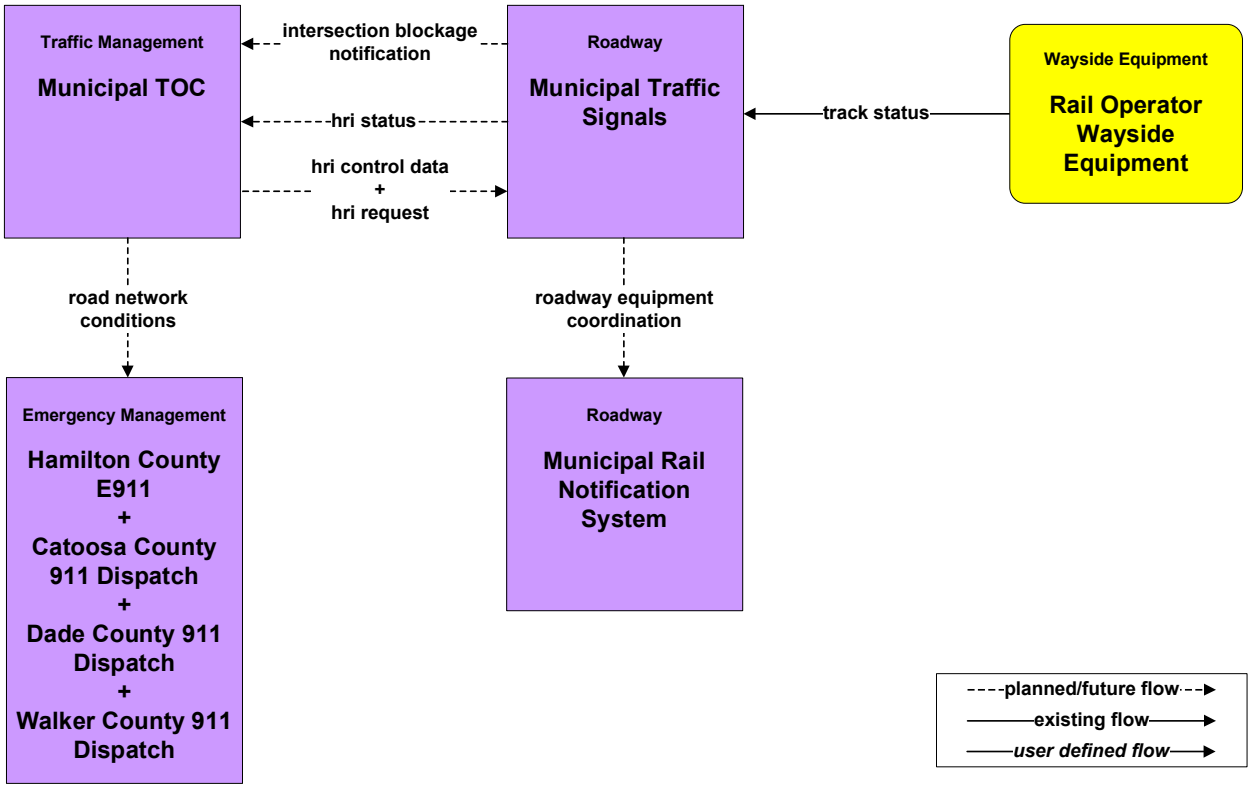
ATMS11 – Emissions Monitoring and Management
Chattanooga-Hamilton County/North Georgia TPO



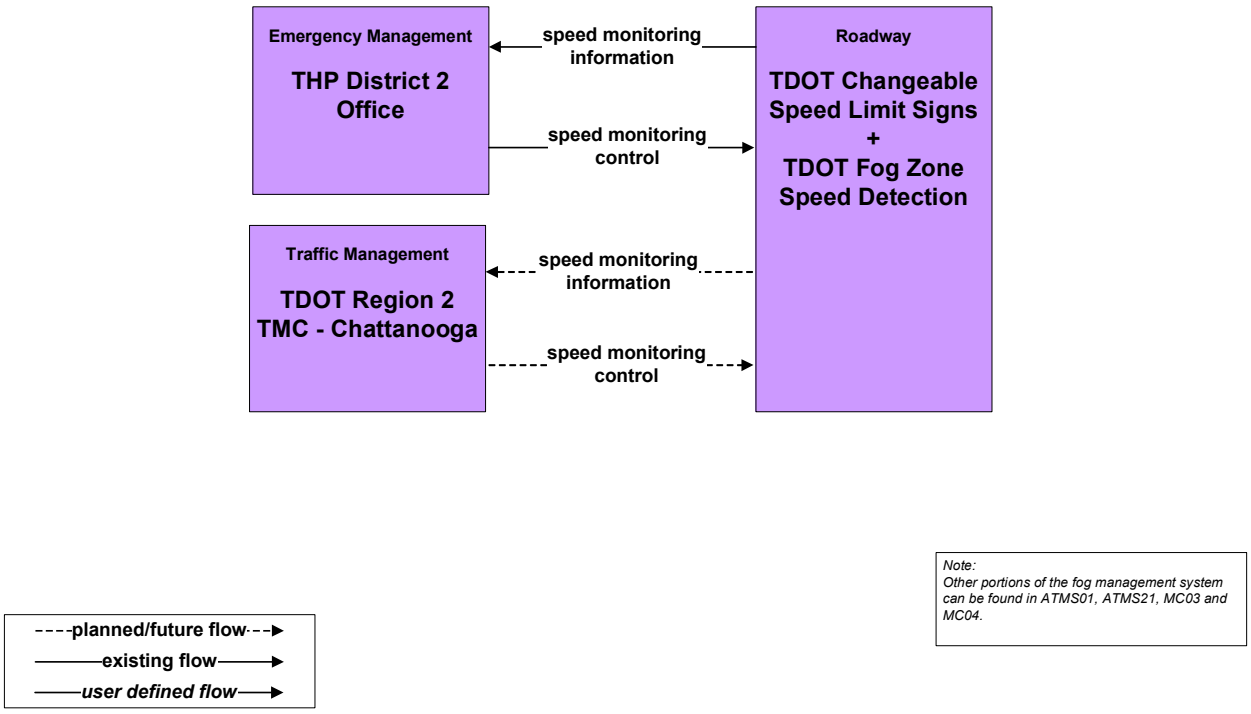
ATMS13 – Standard Railroad Grade Crossing
City of Chattanooga



ATMS13 – Standard Railroad Grade Crossing
Municipal

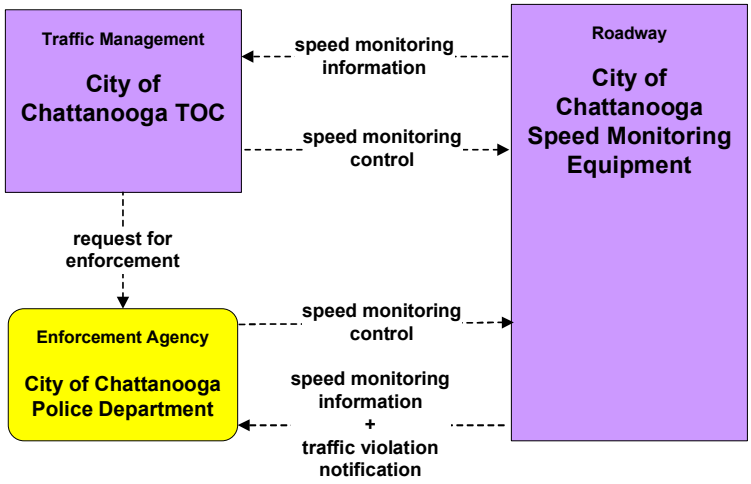


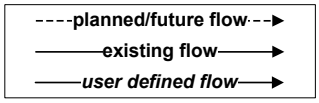
ATMS19 – Speed Monitoring
TDOT Fog Management System



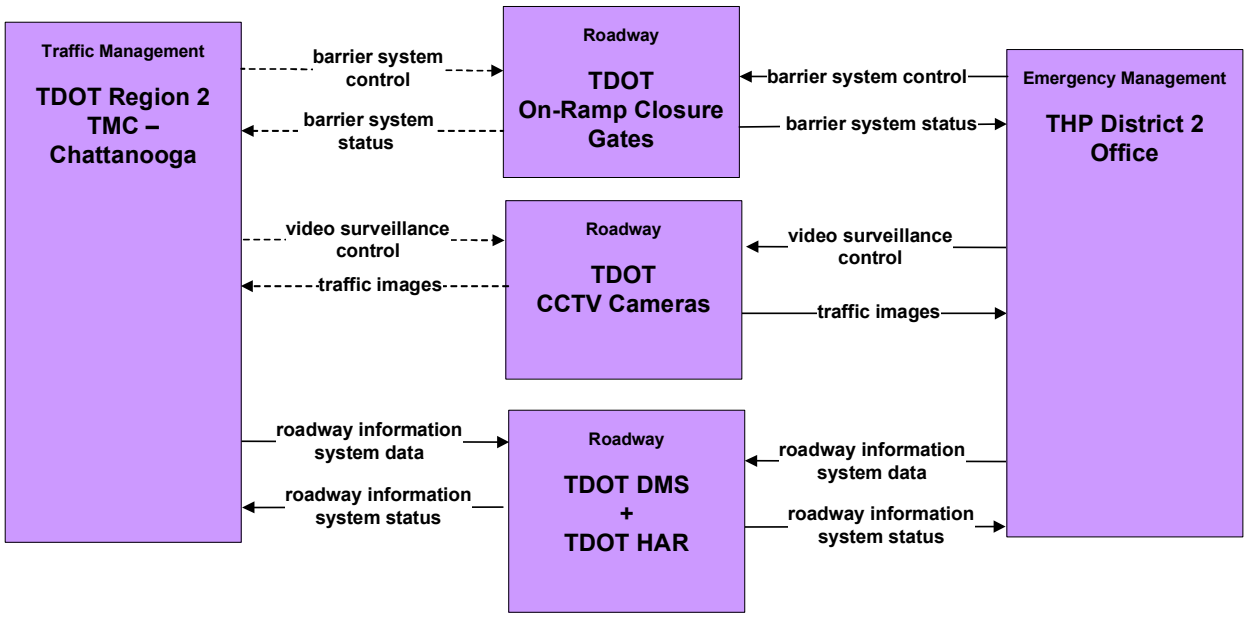
Note:
Other portions of the fog management system can be found in ATMS01, ATMS21, MC03 and MC04.

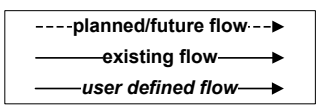
ATMS19 – Speed Monitoring
City of Chattanooga





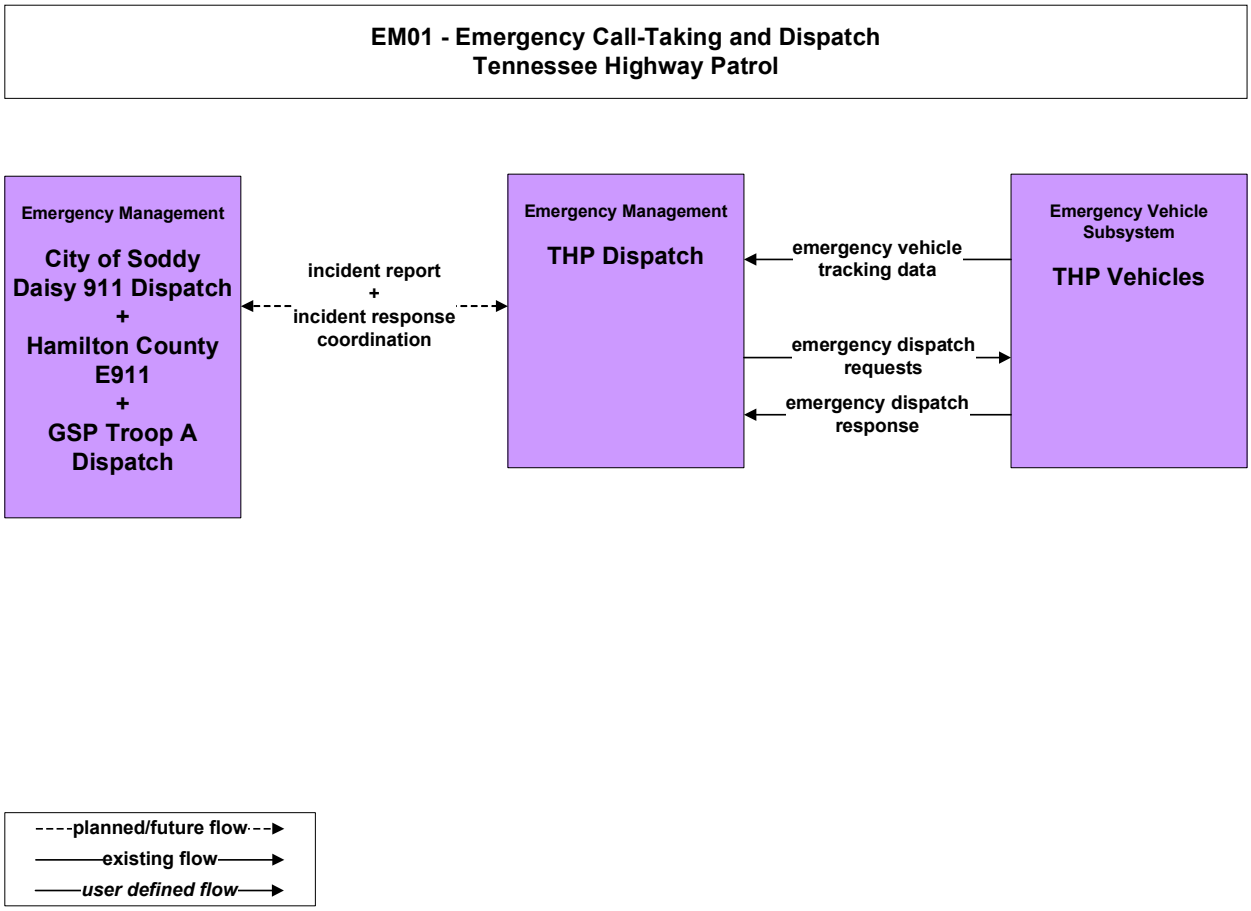
ATMS21 – Roadway Closure Management
TDOT Fog Management System



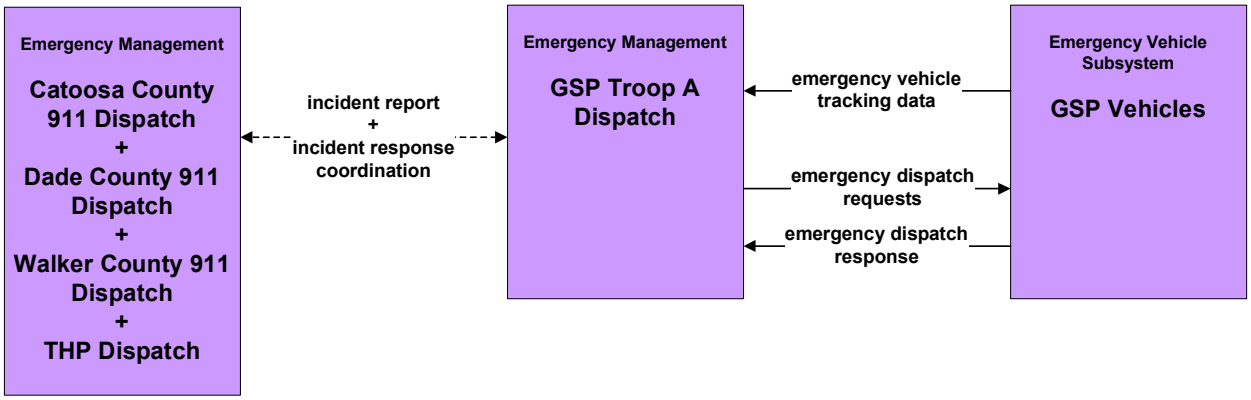


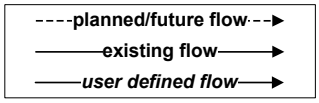
Note:
Other portions of the fog management system can be found in ATMS01, ATMS19, MC03 and MC04.

Emergency Management

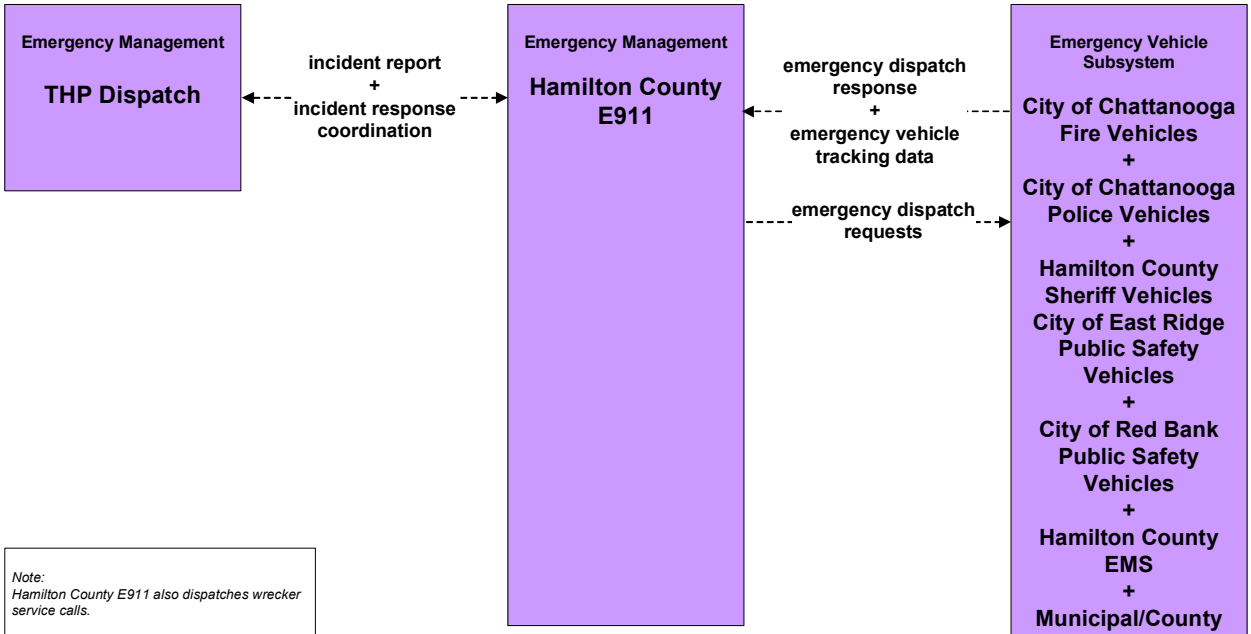


EM01 - Emergency Call-Taking and Dispatch
Georgia State Patrol

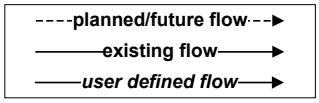




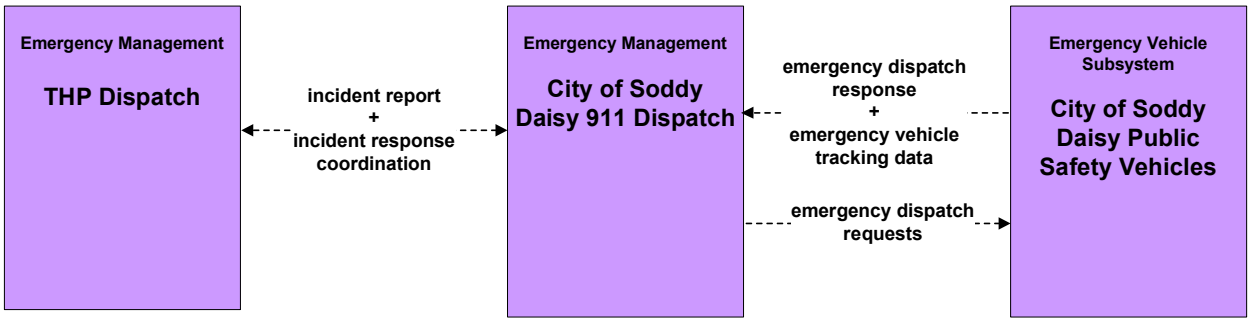
EM01 - Emergency Call-Taking and Dispatch
Hamilton County E911

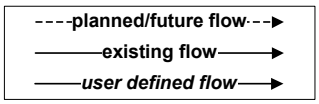


Note:
Hamilton County E911 also dispatches wrecker service calls.

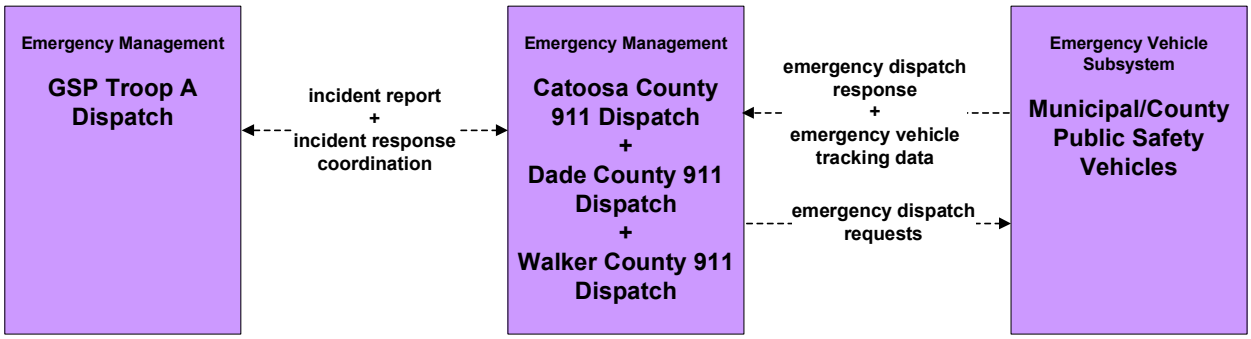


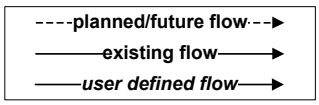
EM01 - Emergency Call-Taking and Dispatch
City of Soddy Daisy

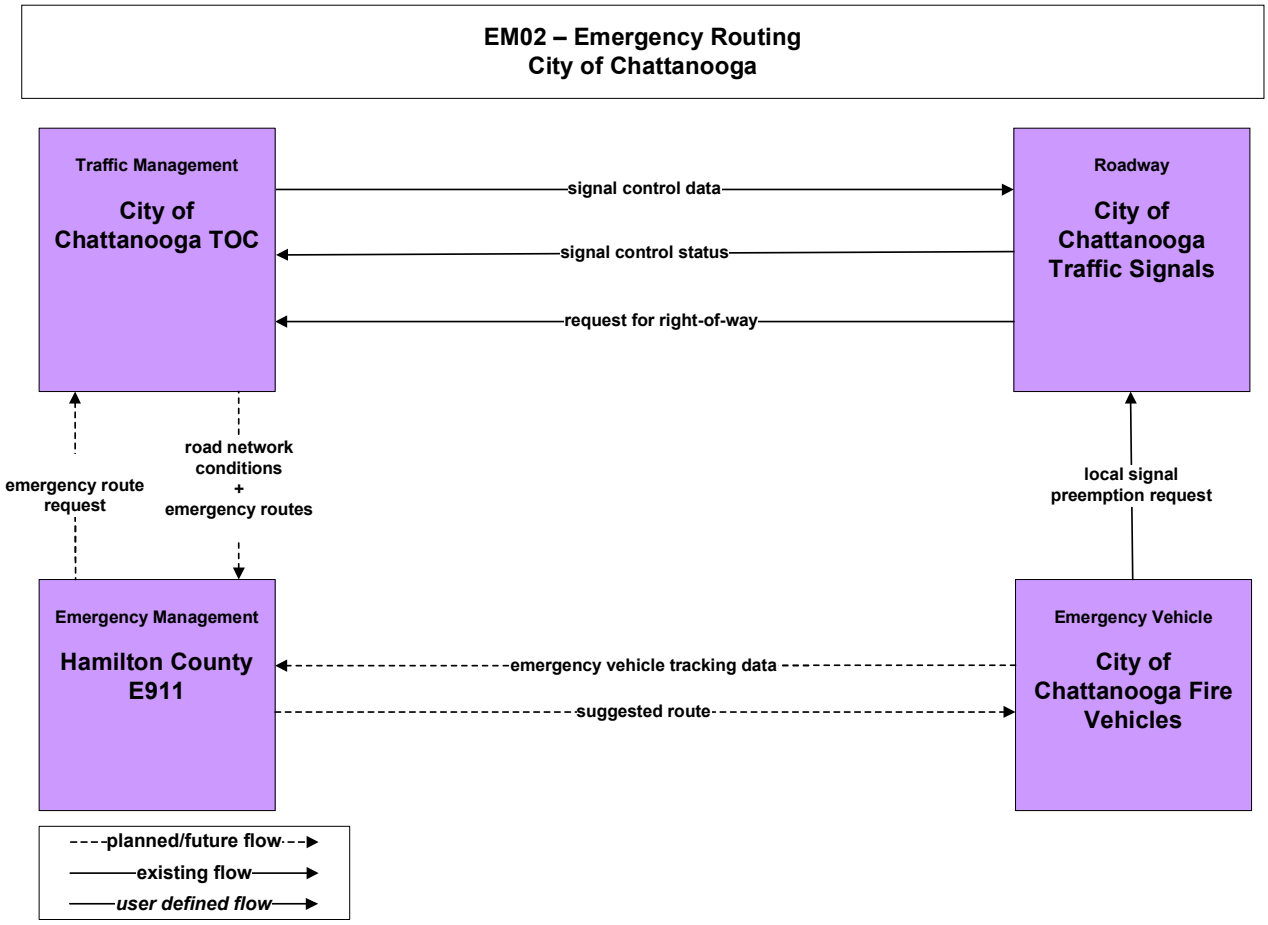


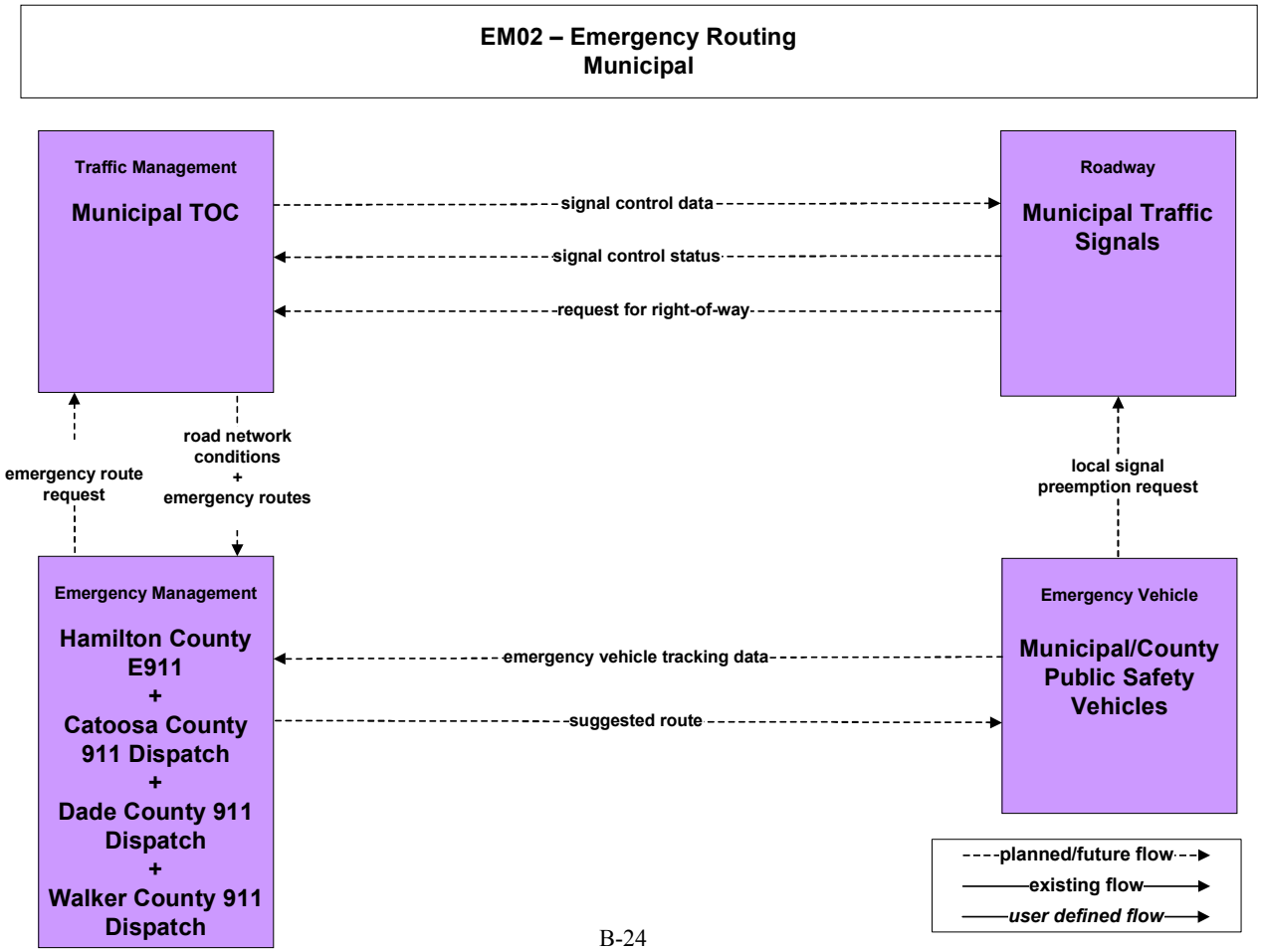


EM01 - Emergency Call-Taking and Dispatch
Georgia County 911 Dispatch Centers

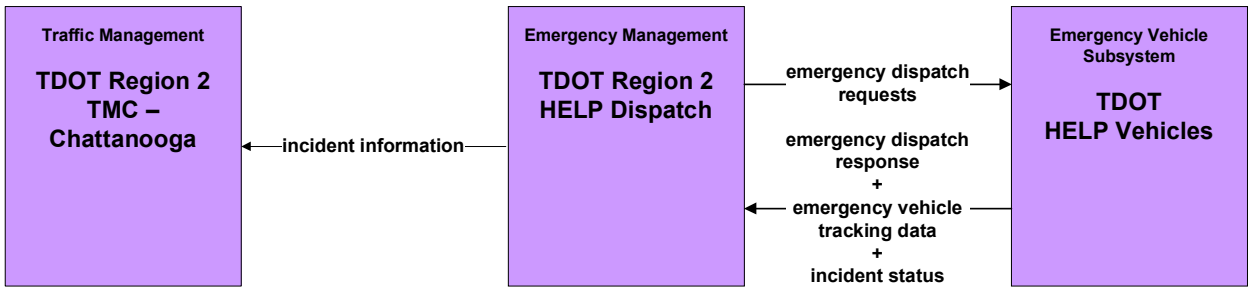


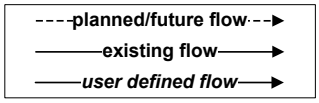



EM02 – Emergency Routing
City of Chattanooga
Traffic Management
City of Chattanooga TOC
Roadway
City of Chattanooga Traffic Signals
signal control data
signal control status
request for right-of-way
emergency route request
road network conditions + emergency routes
local signal preemption request
Emergency Management
Hamilton County E911
Emergency Vehicle
City of Chattanooga Fire Vehicles
emergency vehicle tracking data
suggested route
planned/future flow
existing flow
user defined flow

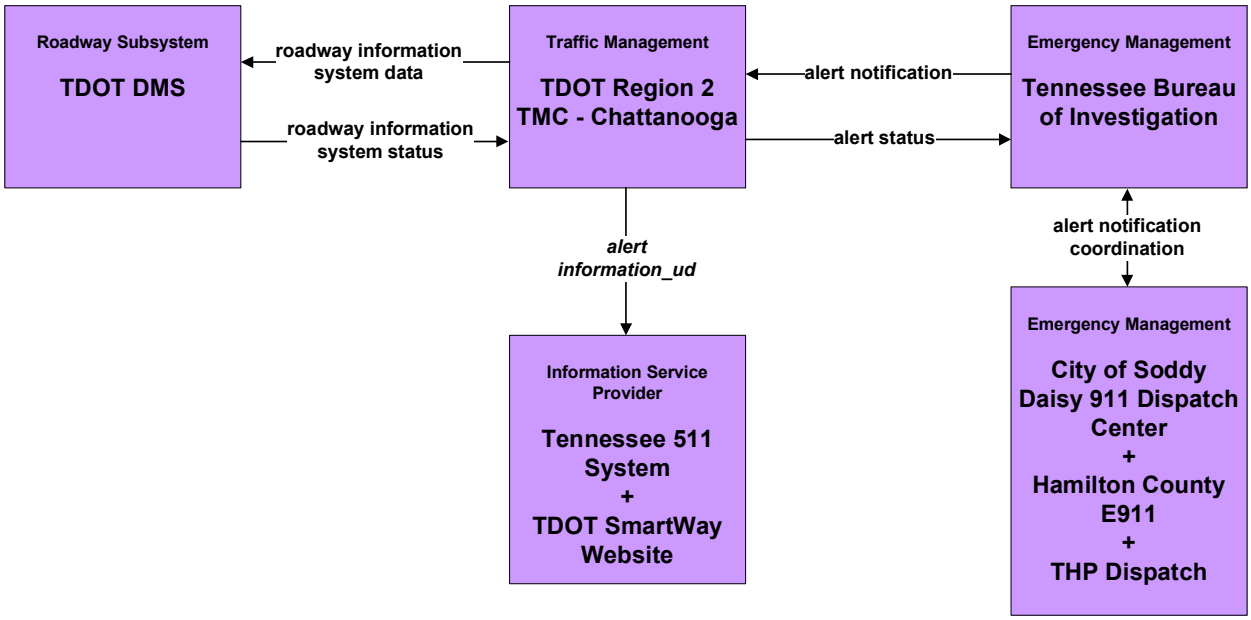

EM02 – Emergency Routing
Municipal
Traffic Management
Municipal TOC
Roadway
Municipal Traffic Signals
signal control data
signal control status
request for right-of-way
emergency route request
road network conditions + emergency routes
local signal preemption request
Emergency Management
Hamilton County E911 + Catoosa County 911 Dispatch + Dade County 911 Dispatch + Walker County 911 Dispatch
Emergency Vehicle
Municipal/County Public Safety Vehicles
emergency vehicle tracking data
suggested route
planned/future flow
existing flow
user defined flow

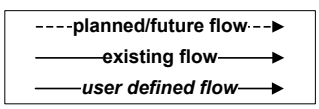
EM04 – Roadway Service Patrols
HELP

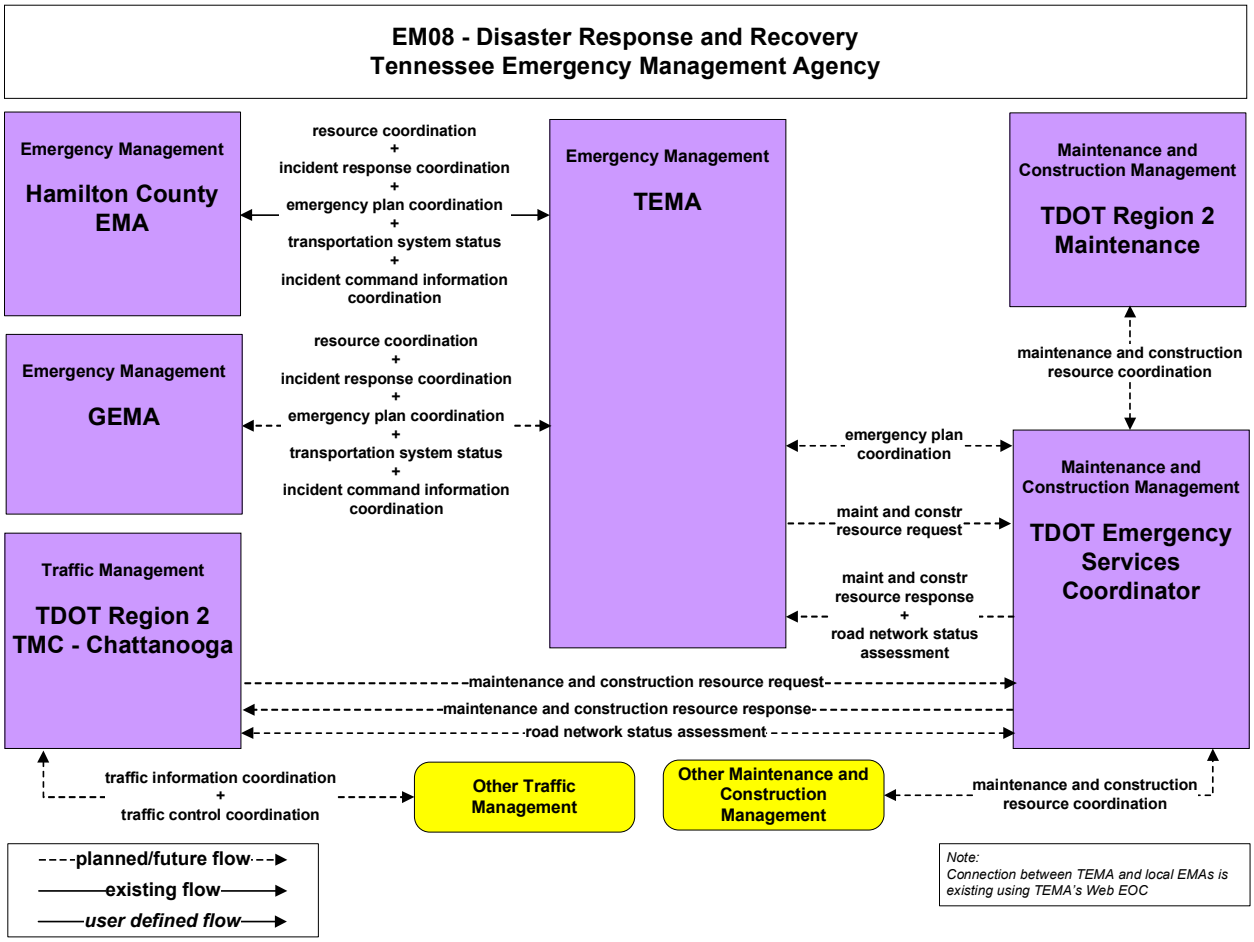


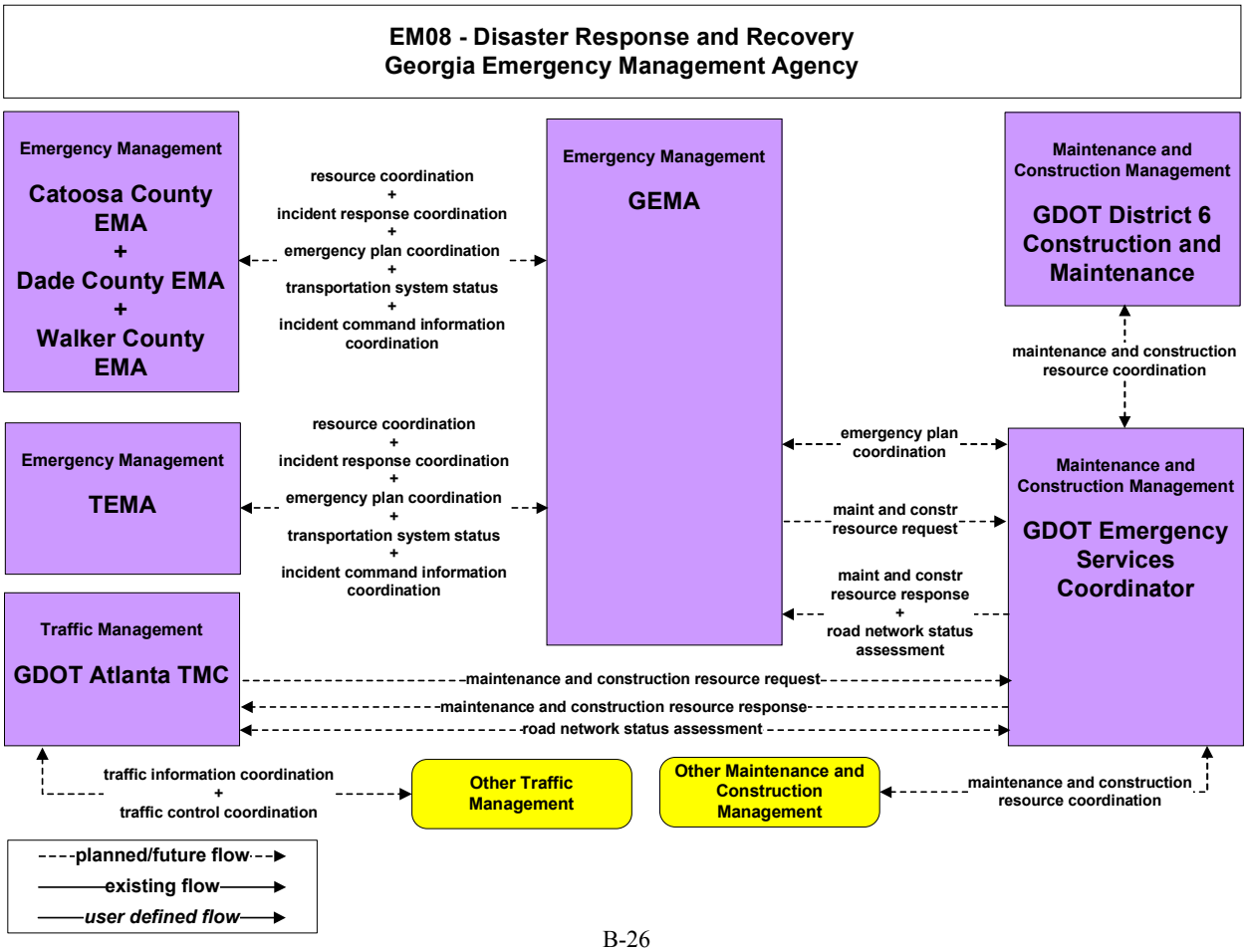


EM06 - Wide-Area Alert
Tennessee AMBER Alert

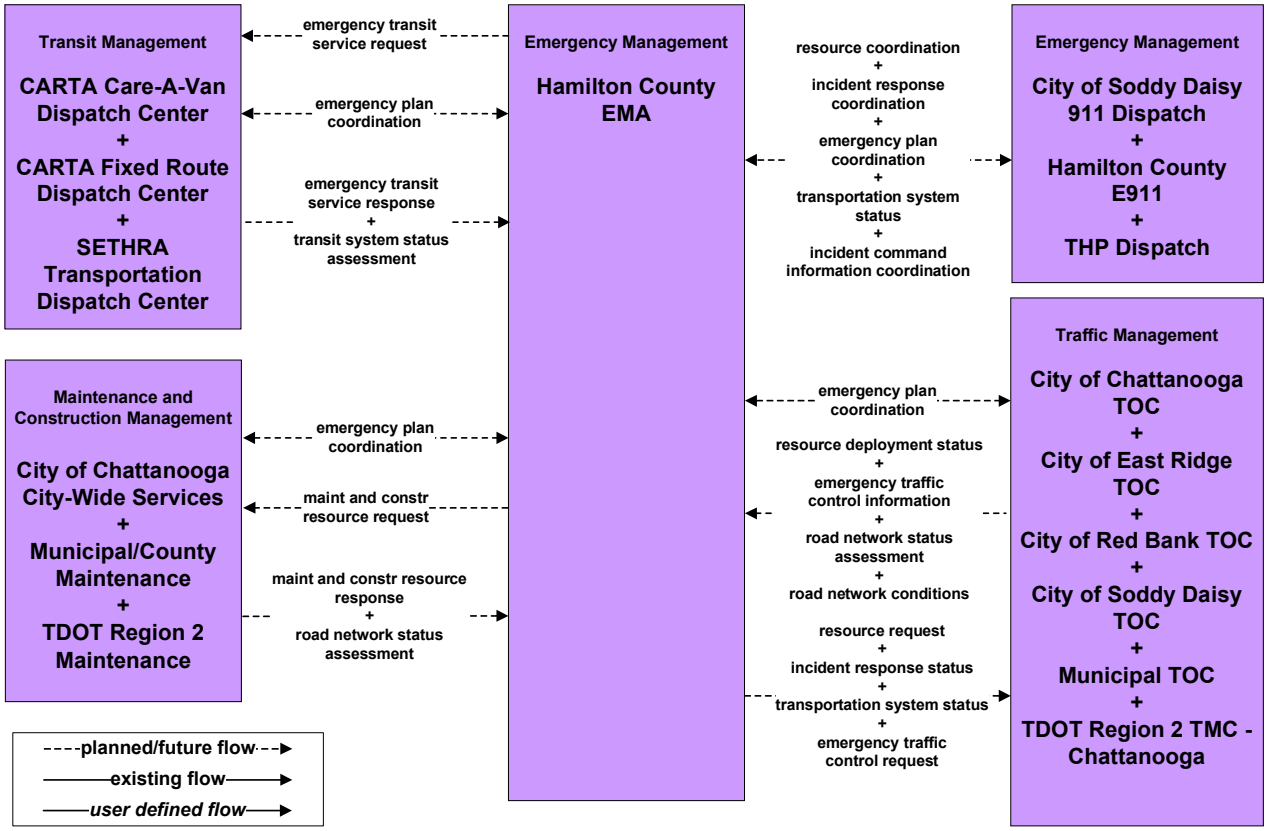




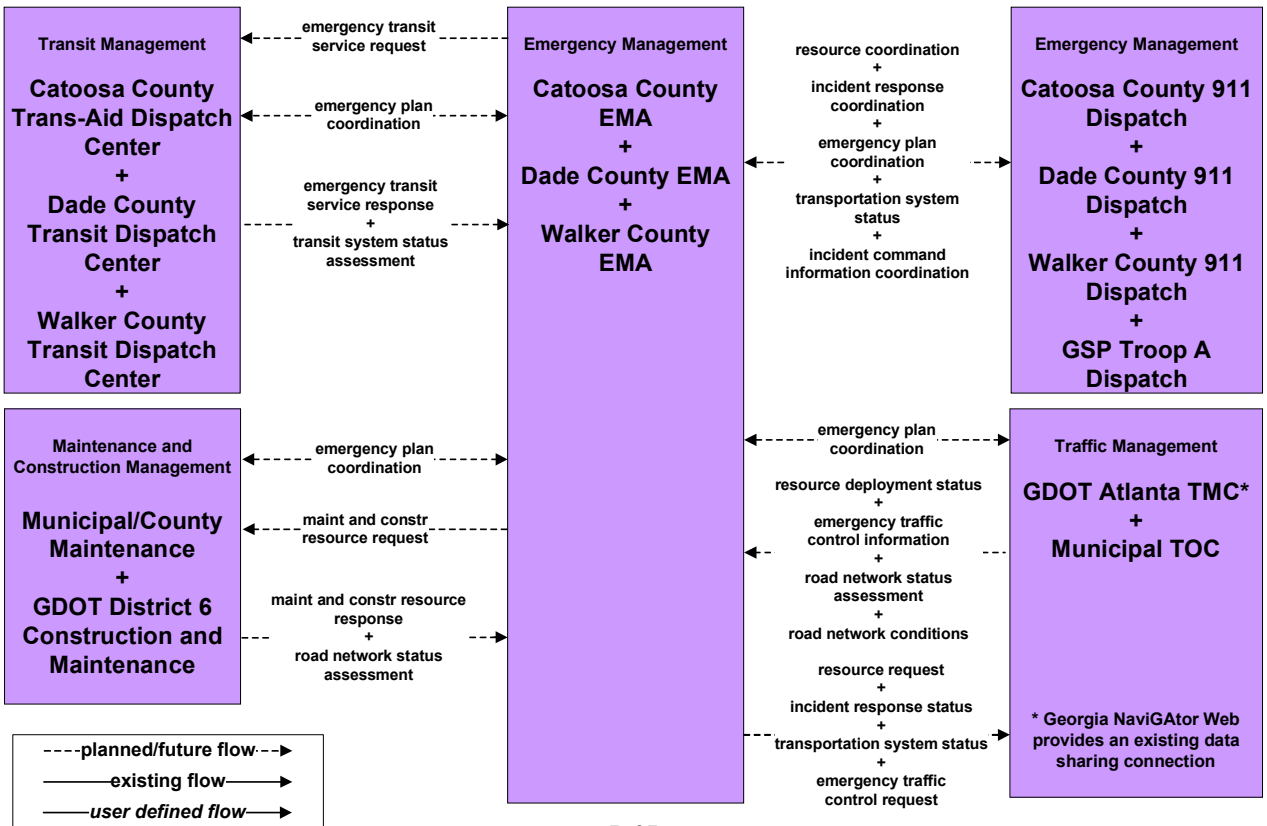

EM08 - Disaster Response and Recovery
Tennessee Emergency Management Agency
Emergency Management
Hamilton County EMA
resource coordination + incident response coordination + emergency plan coordination + transportation system status + incident command information coordination
Emergency Management
TEMA
Maintenance and Construction Management
TDOT Region 2 Maintenance
maintenance and construction resource coordination
Emergency Management
GEMA
resource coordination + incident response coordination + emergency plan coordination + transportation system status + incident command information coordination
emergency plan coordination
maint and constr resource request
maint and constr resource response + road network status assessment
Maintenance and Construction Management
TDOT Emergency Services Coordinator
Traffic Management
TDOT Region 2 TMC - Chattanooga
maintenance and construction resource request
maintenance and construction resource response
road network status assessment
traffic information coordination + traffic control coordination
Other Traffic Management
Other Maintenance and Construction Management
maintenance and construction resource coordination
planned/future flow
existing flow
user defined flow
Note:
Connection between TEMA and local EMAs is existing using TEMA's Web EOC


EM08 - Disaster Response and Recovery
Georgia Emergency Management Agency
Emergency Management
Catoosa County EMA + Dade County EMA + Walker County EMA
resource coordination + incident response coordination + emergency plan coordination + transportation system status + incident command information coordination
Emergency Management
GEMA
Maintenance and Construction Management
GDOT District 6 Construction and Maintenance
maintenance and construction resource coordination
Emergency Management
TEMA
resource coordination + incident response coordination + emergency plan coordination + transportation system status + incident command information coordination
emergency plan coordination
maint and constr resource request
maint and constr resource response + road network status assessment
Maintenance and Construction Management
GDOT Emergency Services Coordinator
Traffic Management
GDOT Atlanta TMC
maintenance and construction resource request
maintenance and construction resource response
road network status assessment
traffic information coordination + traffic control coordination
Other Traffic Management
Other Maintenance and Construction Management
maintenance and construction resource coordination
planned/future flow
existing flow
user defined flow

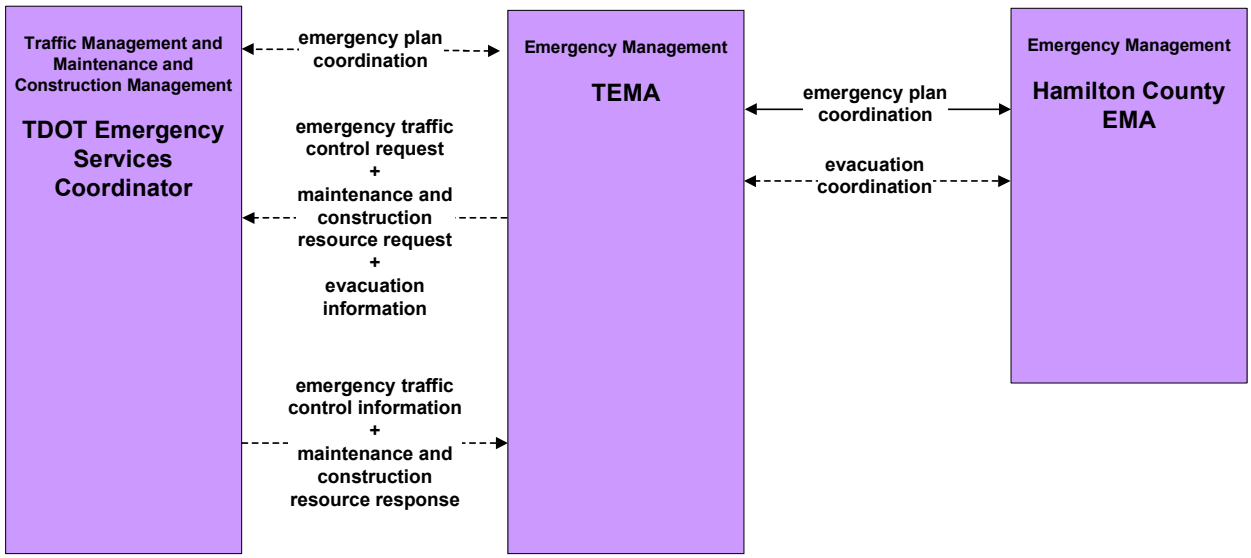
EM08 - Disaster Response and Recovery
Hamilton County Emergency Management Agency



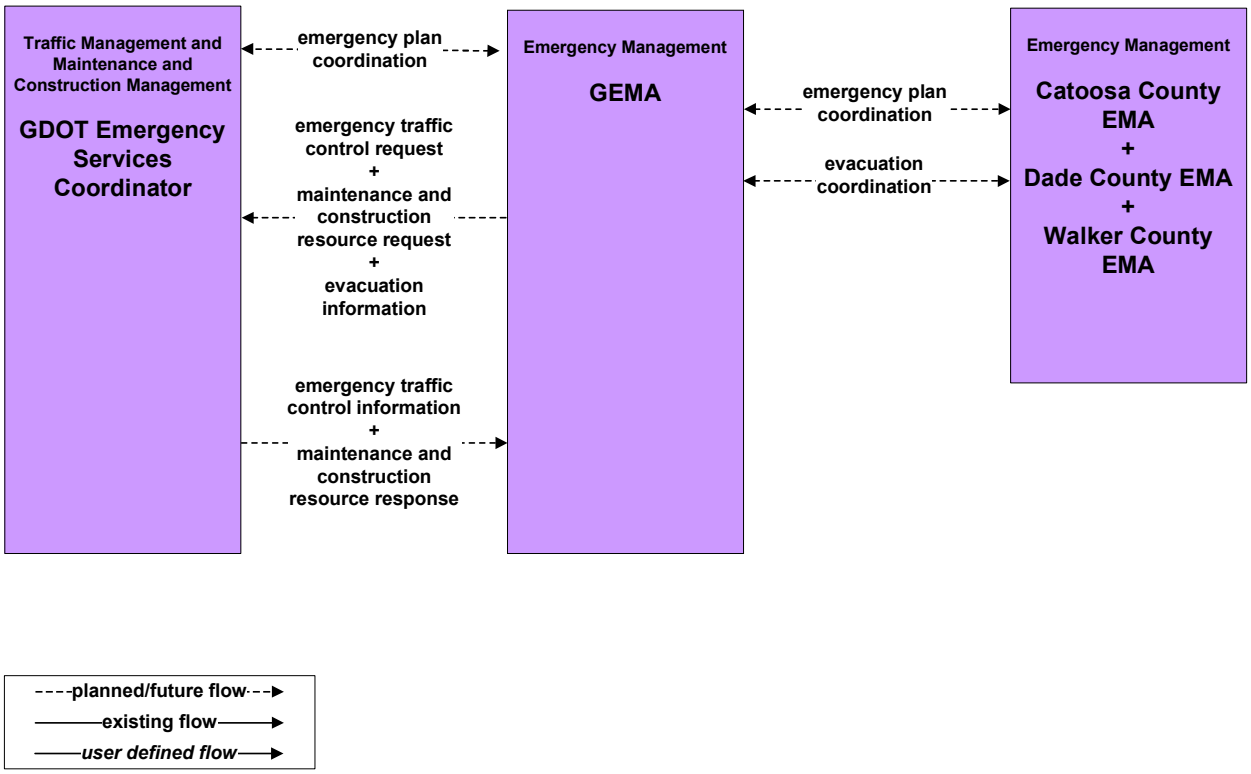
EM08 - Disaster Response and Recovery
Georgia County Emergency Management Agencies



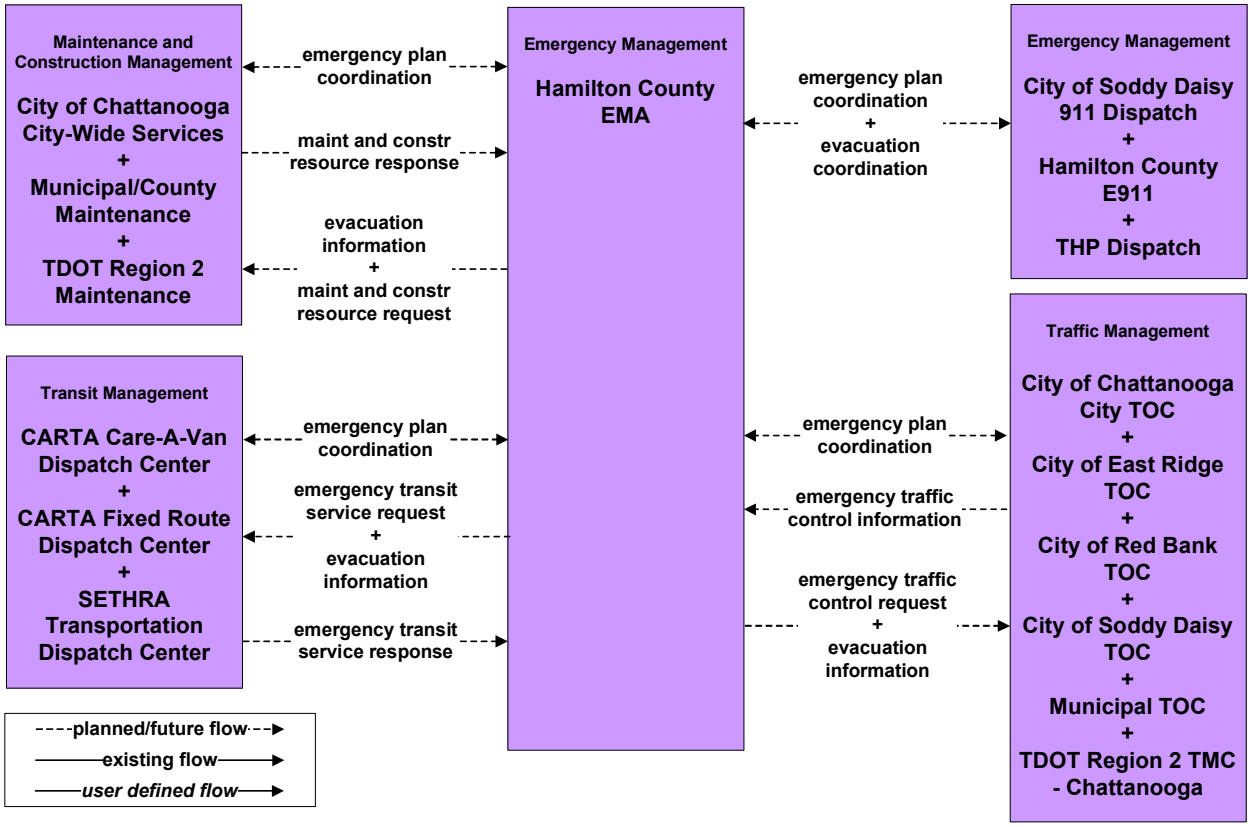
EM09 - Evacuation and Reentry Management
Tennessee Emergency Management Agency



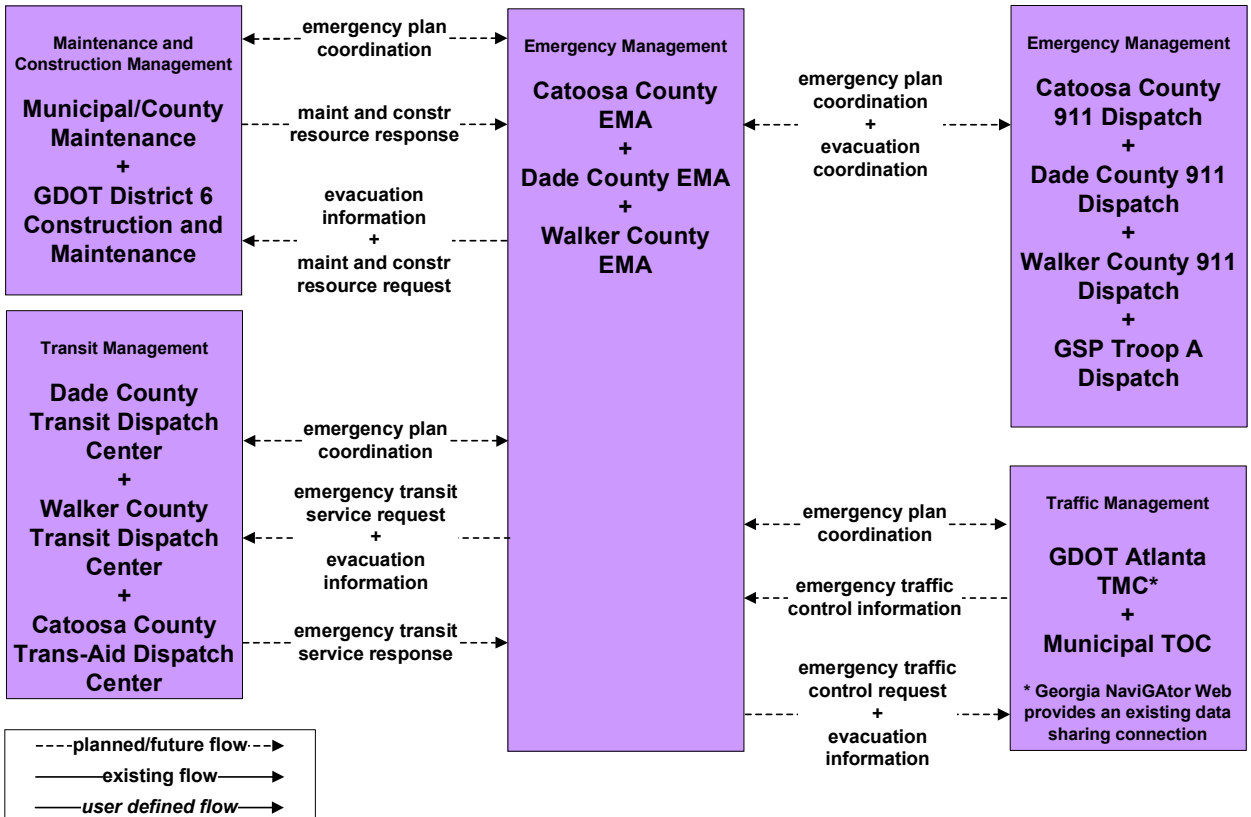
EM09 - Evacuation and Reentry Management
Georgia Emergency Management Agency



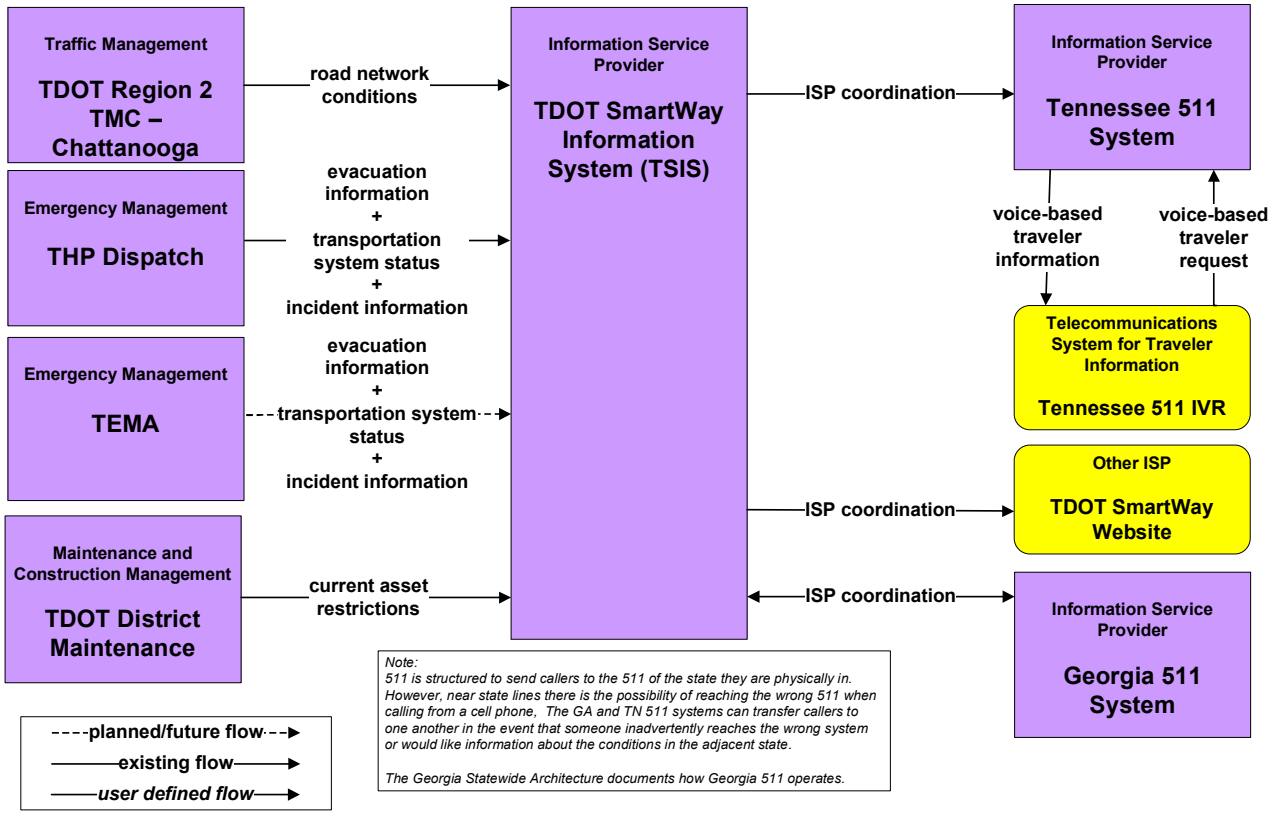
EM09 - Evacuation and Reentry Management
Hamilton County Emergency Management Agency



EM09 - Evacuation and Reentry Management
Georgia County Emergency Management Agencies



EM10 – Disaster Traveler Information
Tennessee 511 and TSIS

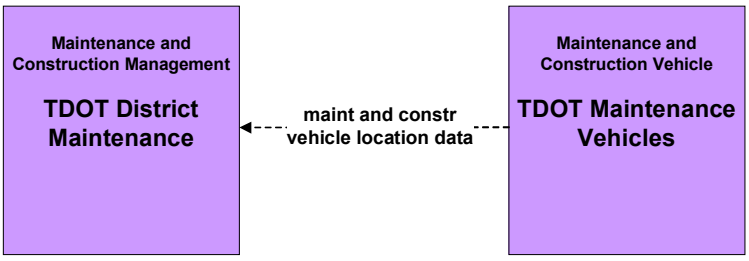


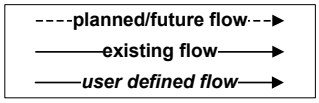
Note:
511 is structured to send callers to the 511 of the state they are physically in. However, near state lines there is the possibility of reaching the wrong 511 when calling from a cell phone, The GA and TN 511 systems can transfer callers to one another in the event that someone inadvertently reaches the wrong system or would like information about the conditions in the adjacent state.

The Georgia Statewide Architecture documents how Georgia 511 operates.

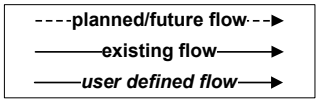
Maintenance and Construction Management

MC01 – Maintenance and Construction Vehicle and Equipment Tracking
TDOT District Maintenance

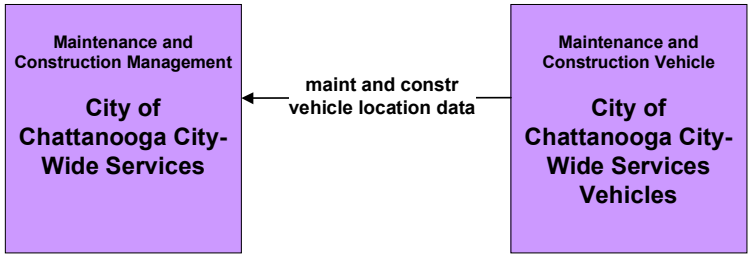


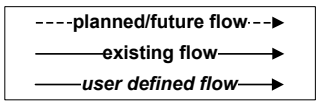


MC01 – Maintenance and Construction Vehicle and Equipment Tracking
GDOT District 6

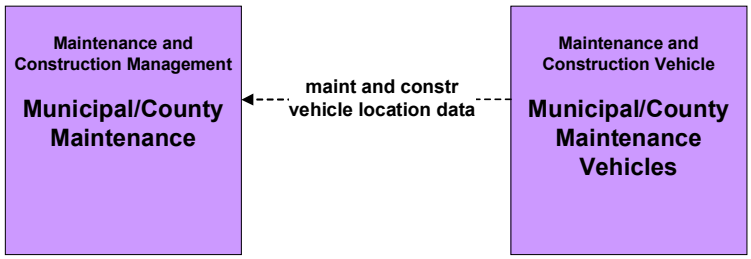


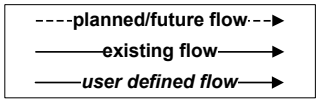
MC01 – Maintenance and Construction Vehicle and Equipment Tracking
City of Chattanooga



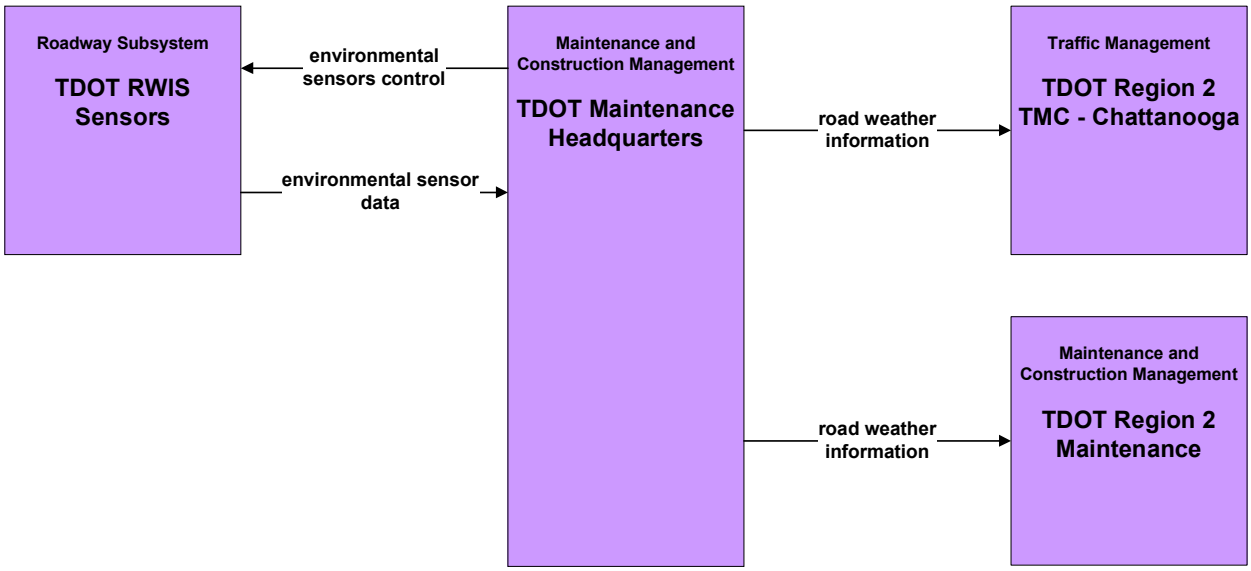


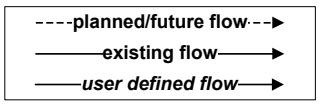
MC01 – Maintenance and Construction Vehicle and Equipment Tracking
Municipal/County



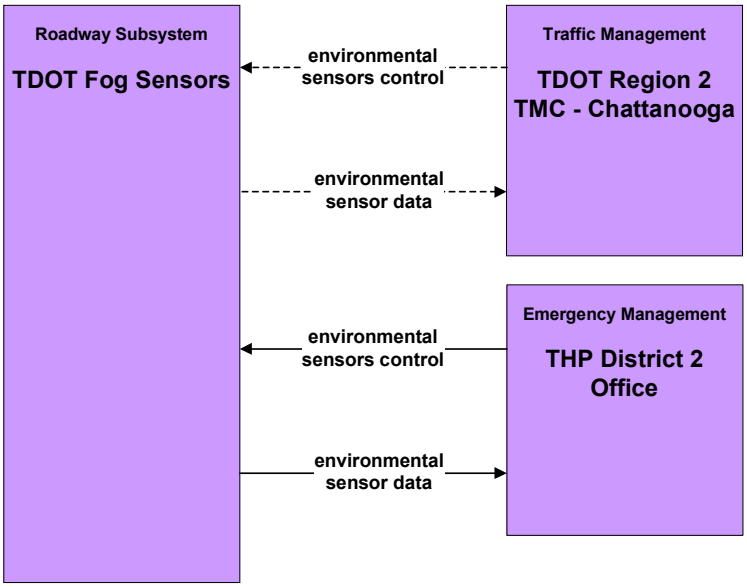


MC03 – Road Weather Data Collection
TDOT RWIS





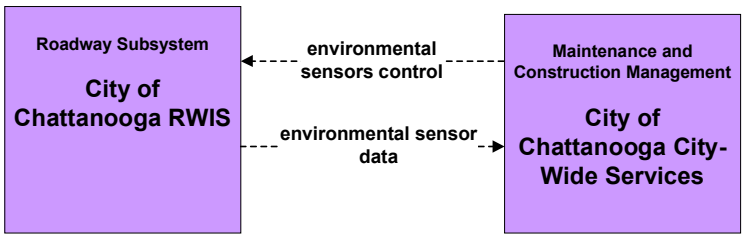
MC03 – Road Weather Data Collection
TDOT Fog Management System



Note:
Other portions of the fog management system can be found in ATMS01, ATMS19, ATMS21, and MC04.

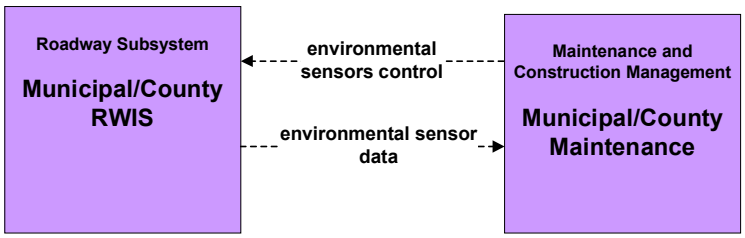
----planned/future flow--->
————existing flow————>
——*user defined flow*——>

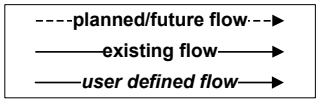
MC03 – Road Weather Data Collection
City of Chattanooga



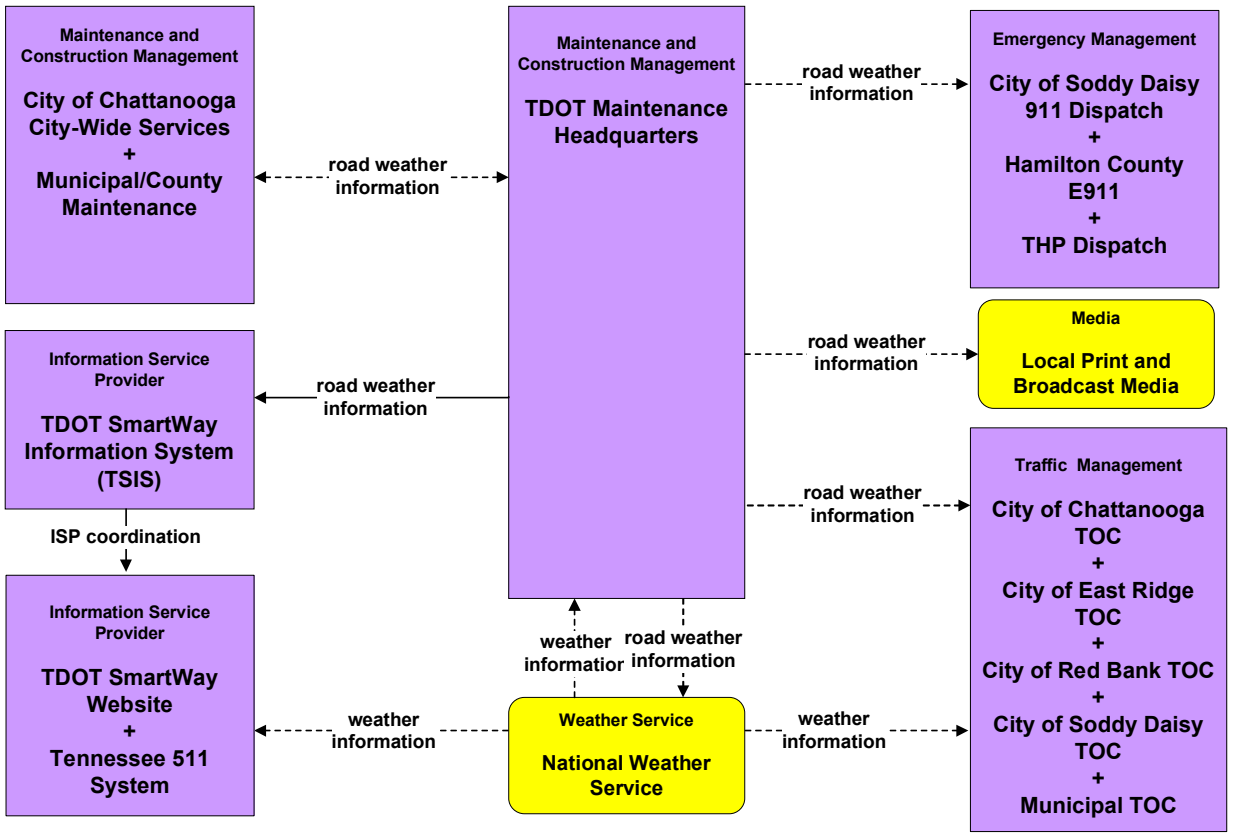
----planned/future flow--->
————existing flow————>
——*user defined flow*——>

MC03 – Road Weather Data Collection
Municipal/County

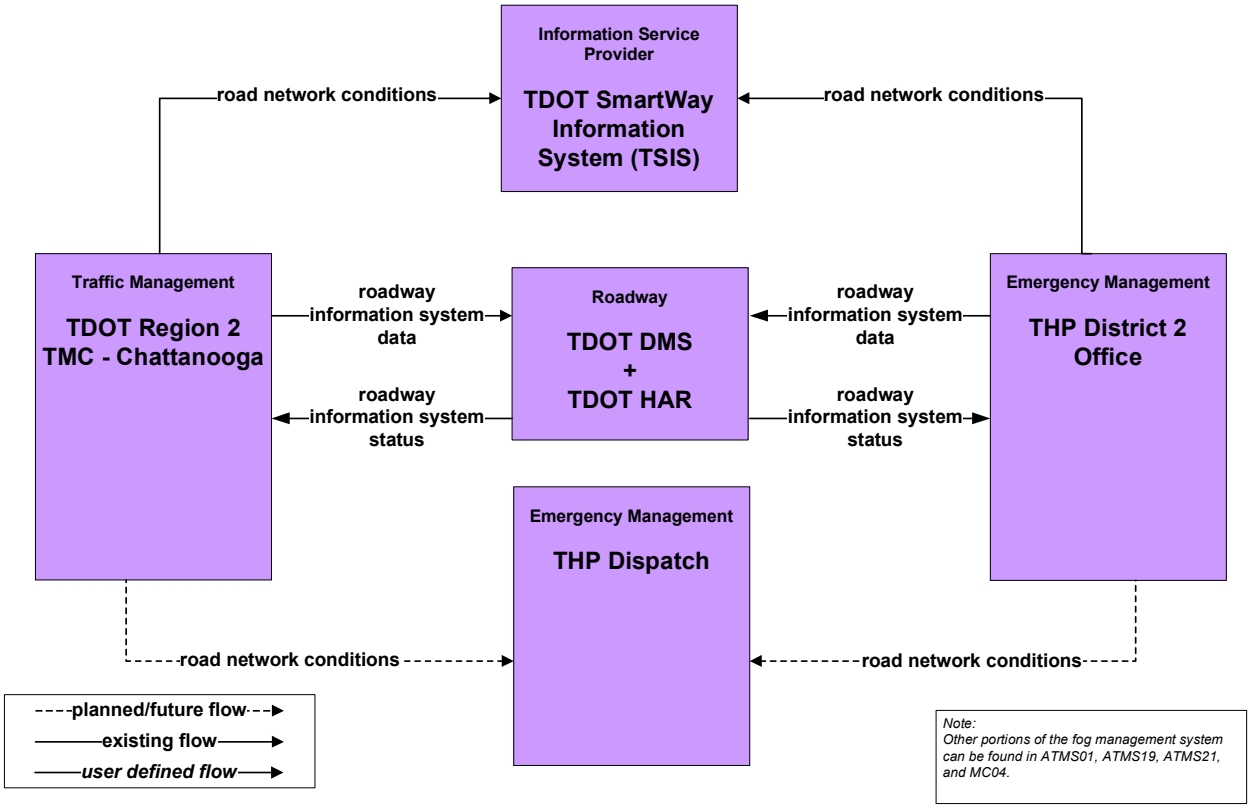




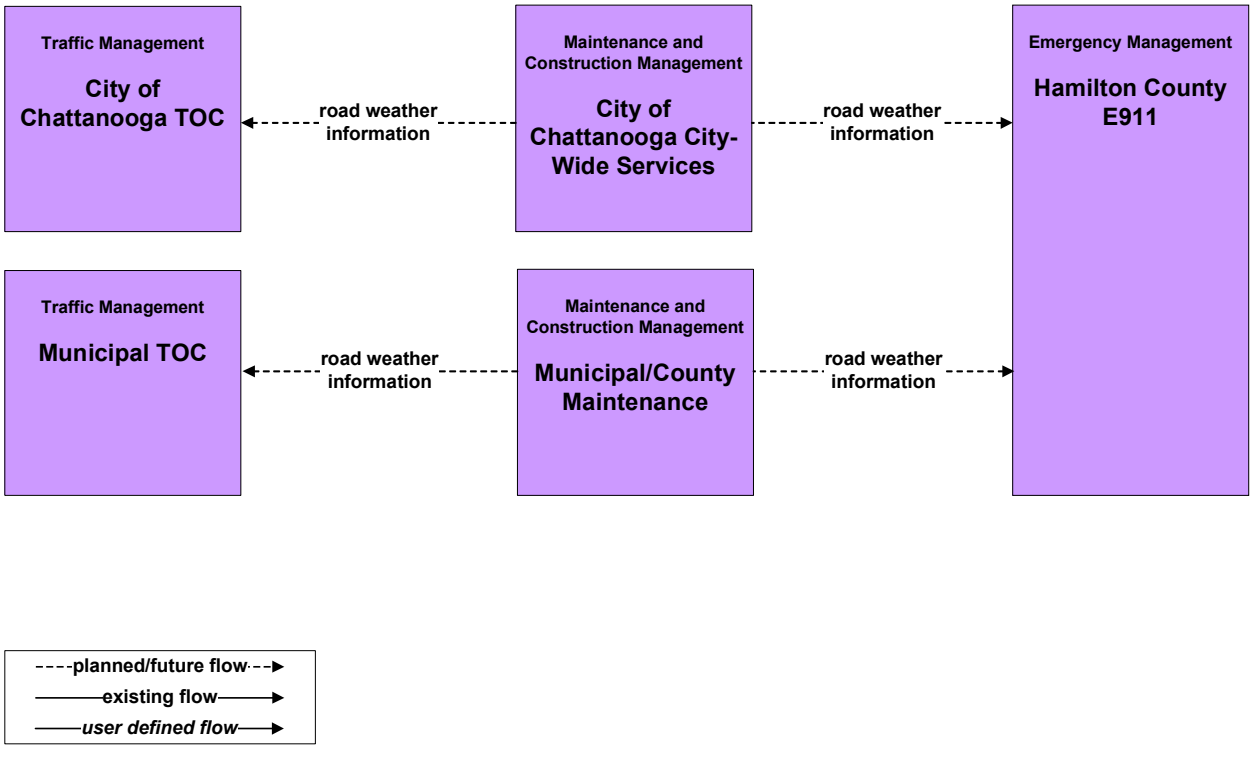
MC04 – Weather Information Processing and Distribution
TDOT Maintenance Headquarters

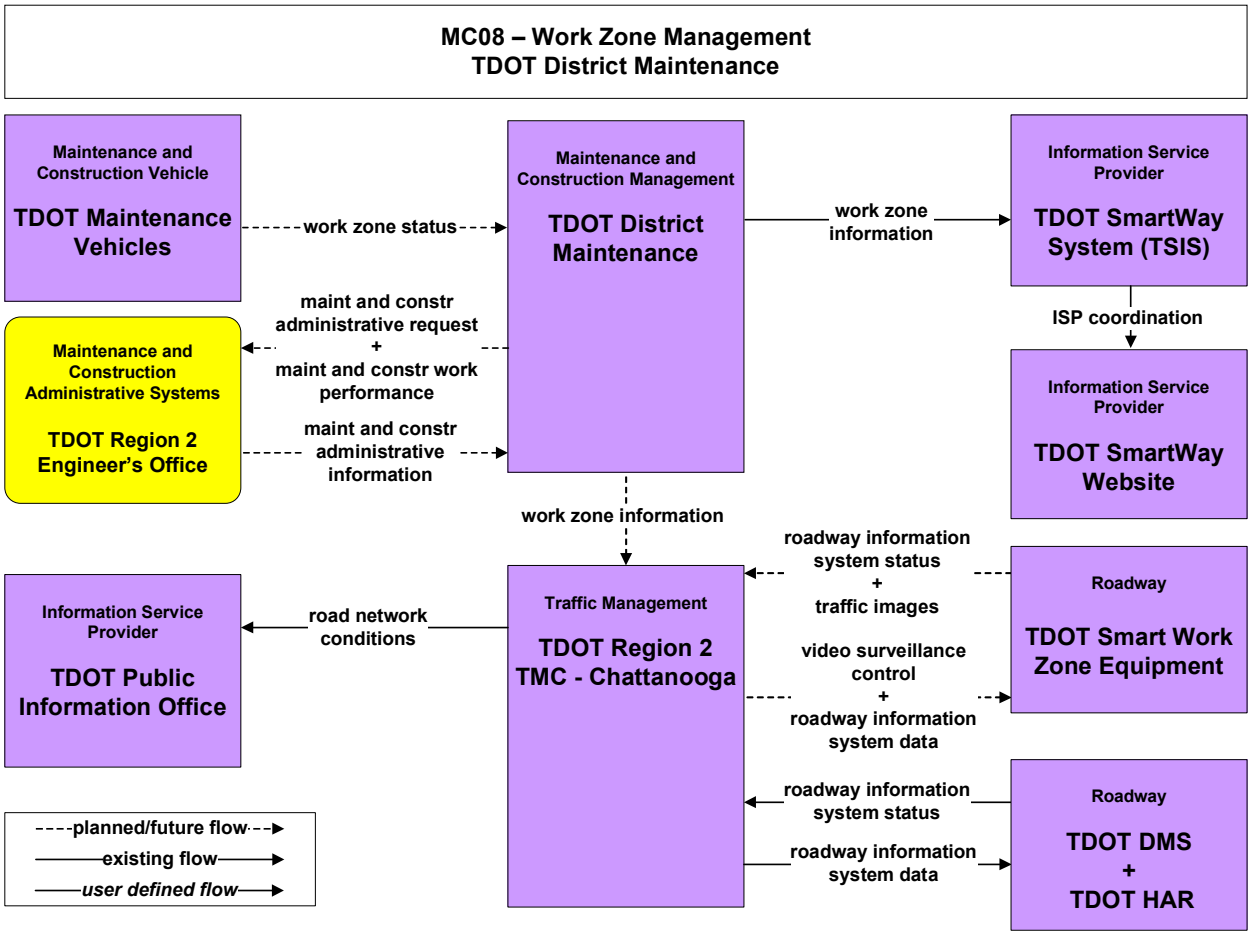


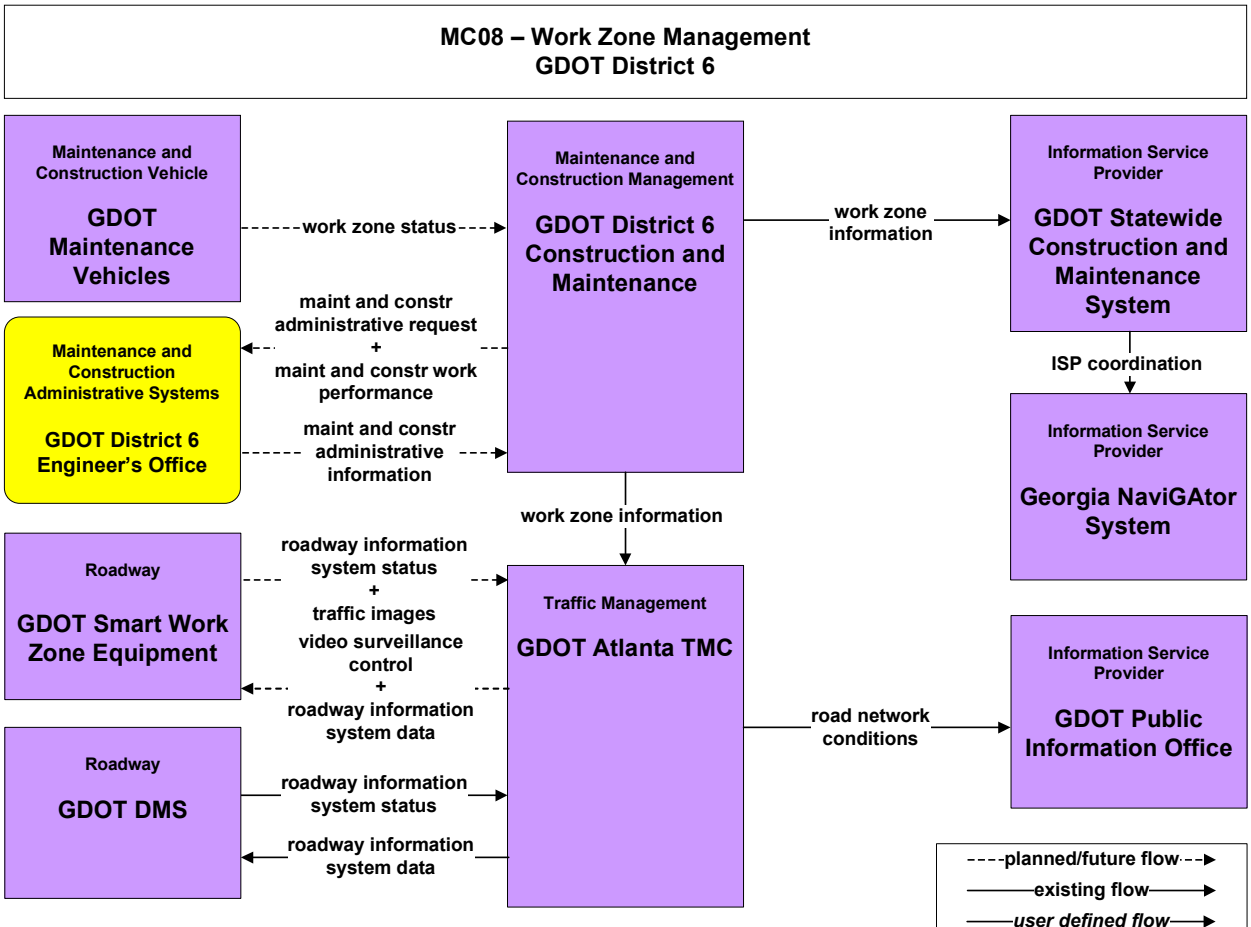
MC04 – Weather Information Processing and Distribution
TDOT Fog Management System



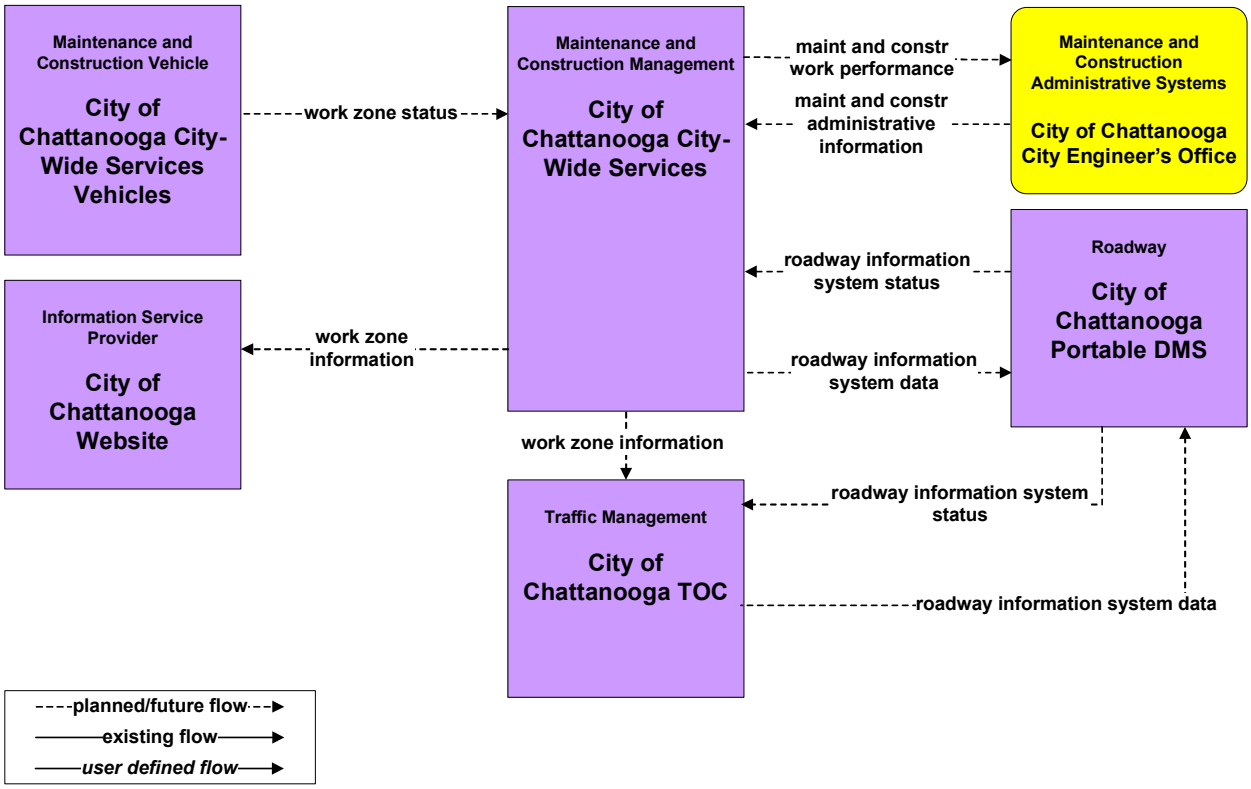
MC04 – Weather Information Processing and Distribution
Hamilton County



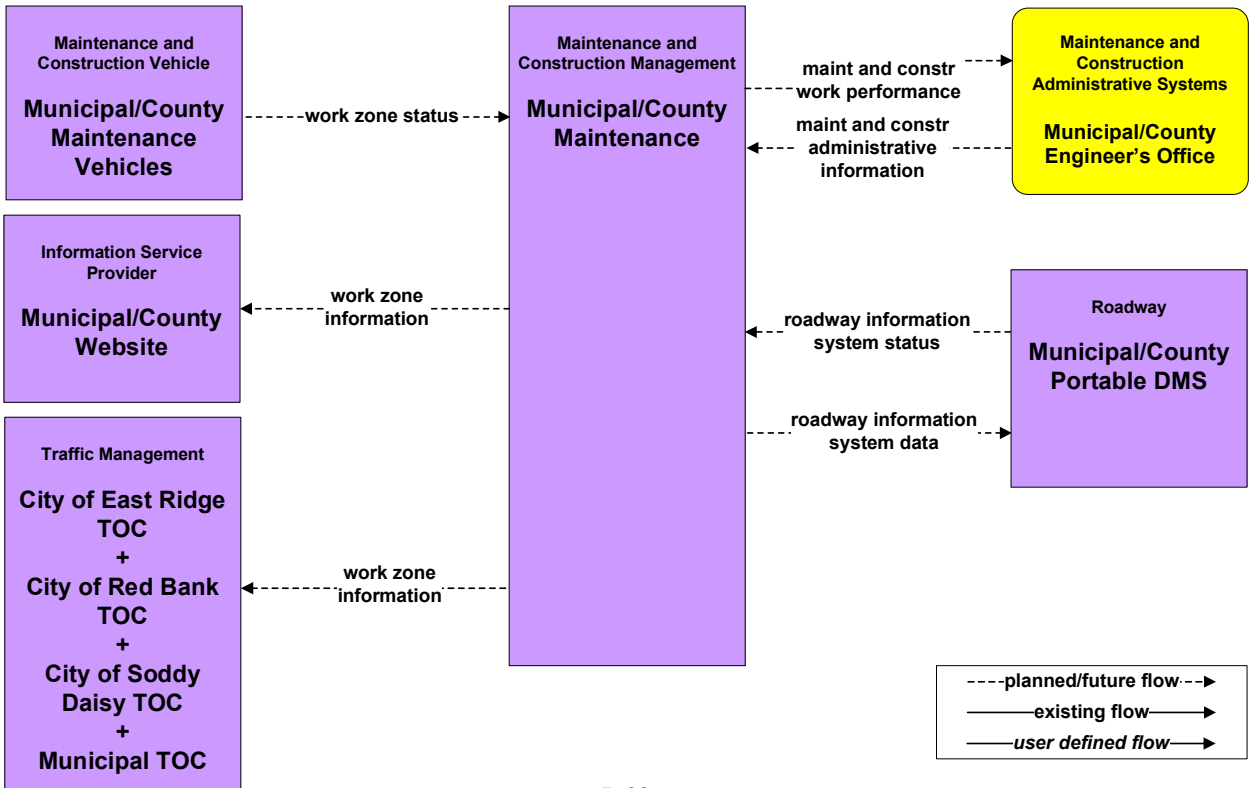

MC08 – Work Zone Management
TDOT District Maintenance
Maintenance and Construction Vehicle
TDOT Maintenance Vehicles
work zone status
Maintenance and Construction Management
TDOT District Maintenance
work zone information
Information Service Provider
TDOT SmartWay System (TSIS)
ISP coordination
Information Service Provider
TDOT SmartWay Website
maint and constr administrative request
+
maint and constr work performance
Maintenance and Construction Administrative Systems
TDOT Region 2 Engineer's Office
maint and constr administrative information
work zone information
roadway information system status
+
traffic images
Roadway
TDOT Smart Work Zone Equipment
Information Service Provider
TDOT Public Information Office
road network conditions
Traffic Management
TDOT Region 2 TMC - Chattanooga
video surveillance control
+
roadway information system data
roadway information system status
roadway information system data
Roadway
TDOT DMS
+
TDOT HAR
planned/future flow
existing flow
user defined flow


MC08 – Work Zone Management
GDOT District 6
Maintenance and Construction Vehicle
GDOT Maintenance Vehicles
work zone status
Maintenance and Construction Management
GDOT District 6 Construction and Maintenance
work zone information
Information Service Provider
GDOT Statewide Construction and Maintenance System
ISP coordination
Information Service Provider
Georgia NaviGAtor System
maint and constr administrative request
+
maint and constr work performance
Maintenance and Construction Administrative Systems
GDOT District 6 Engineer's Office
maint and constr administrative information
work zone information
Roadway
GDOT Smart Work Zone Equipment
roadway information system status
+
traffic images
video surveillance control
+
roadway information system data
Traffic Management
GDOT Atlanta TMC
Roadway
GDOT DMS
roadway information system status
roadway information system data
road network conditions
Information Service Provider
GDOT Public Information Office
planned/future flow
existing flow
user defined flow

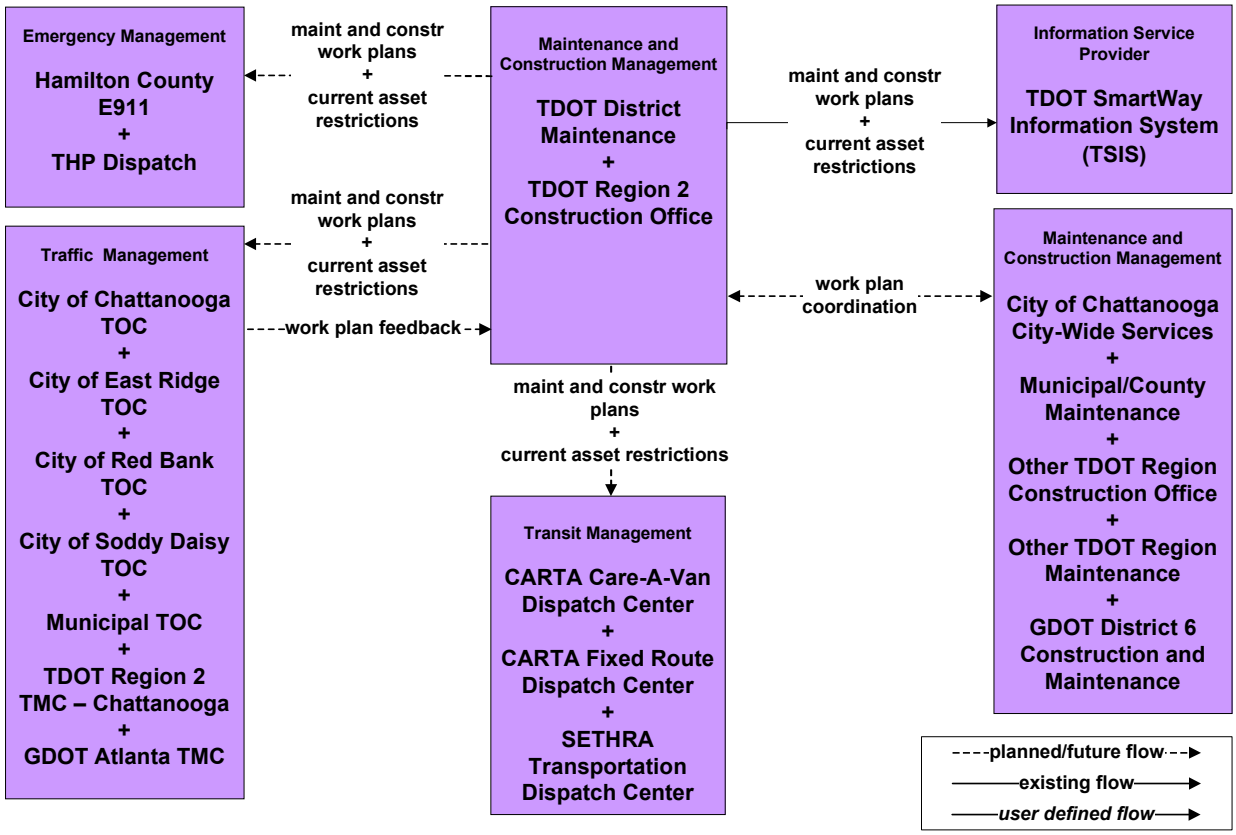
MC08 – Work Zone Management
City of Chattanooga



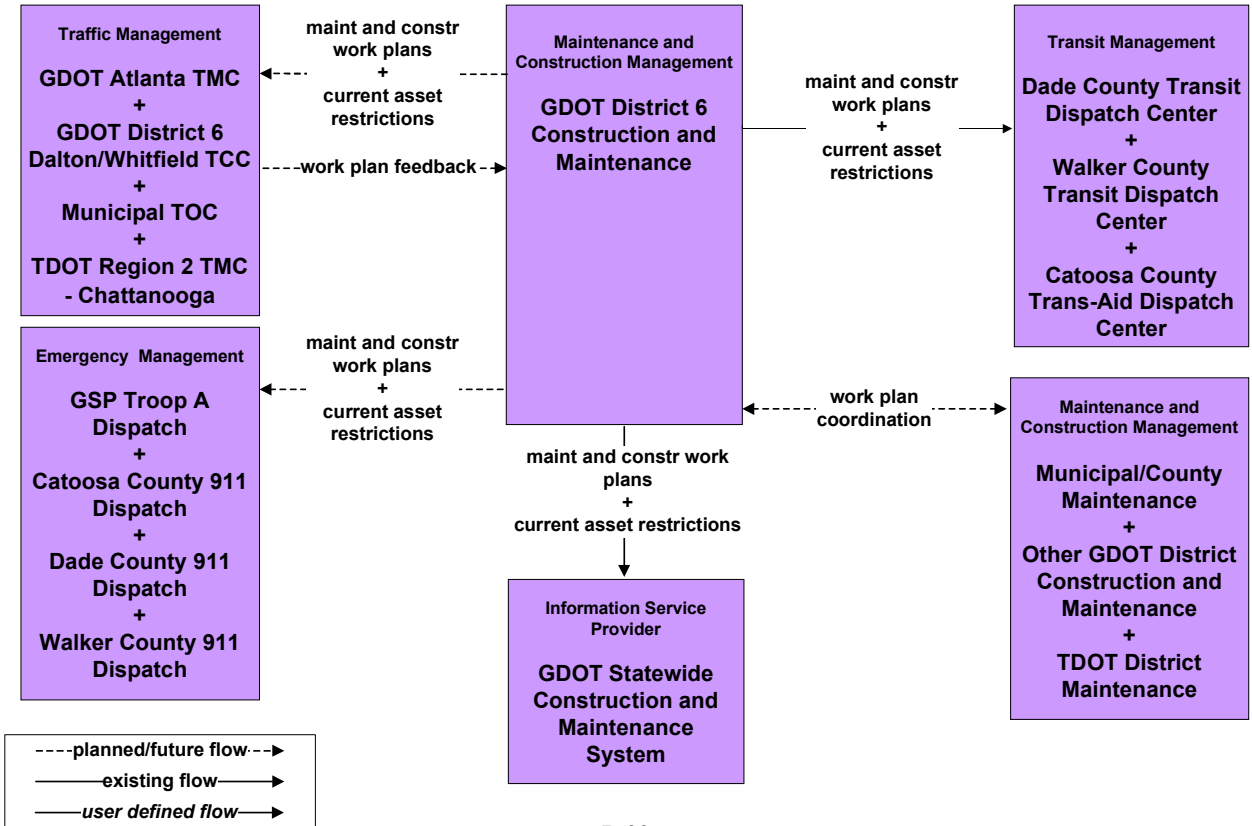
MC08 – Work Zone Management
Municipal/County



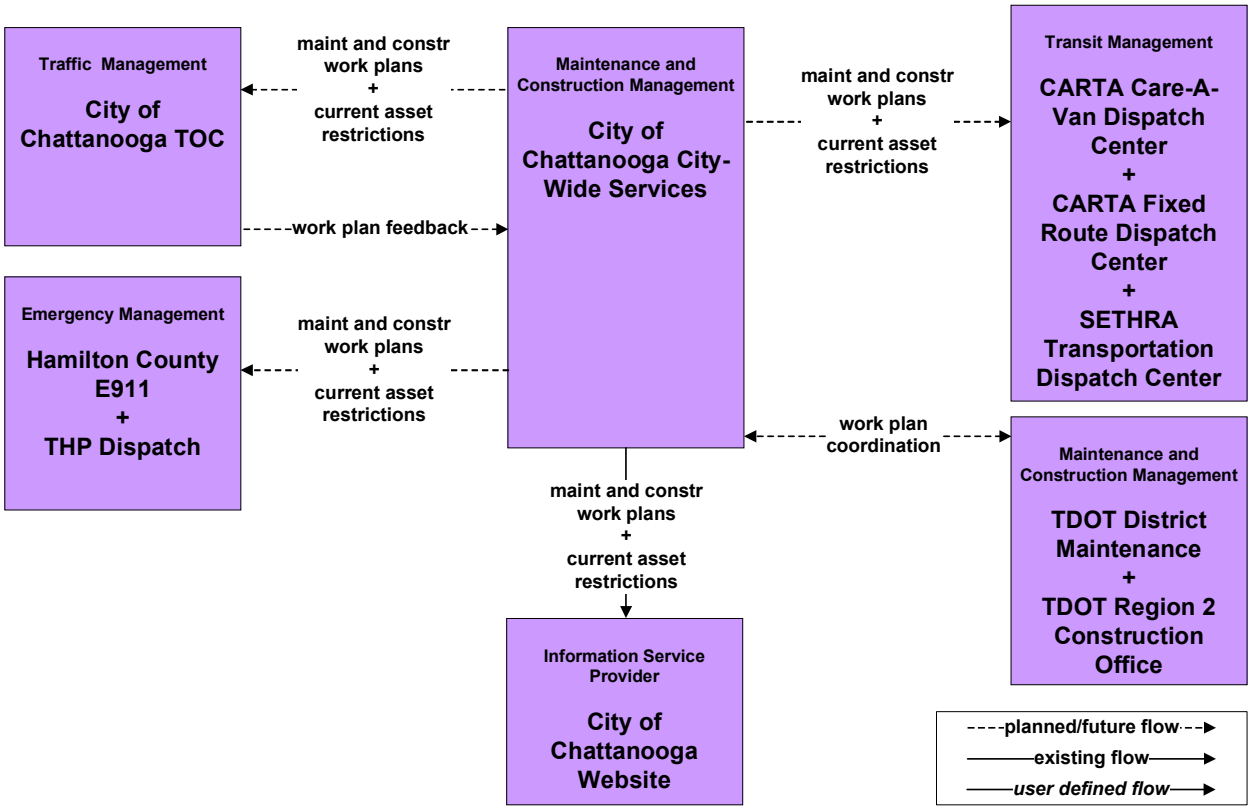
MC10 – Maintenance and Construction Activity Coordination
TDOT



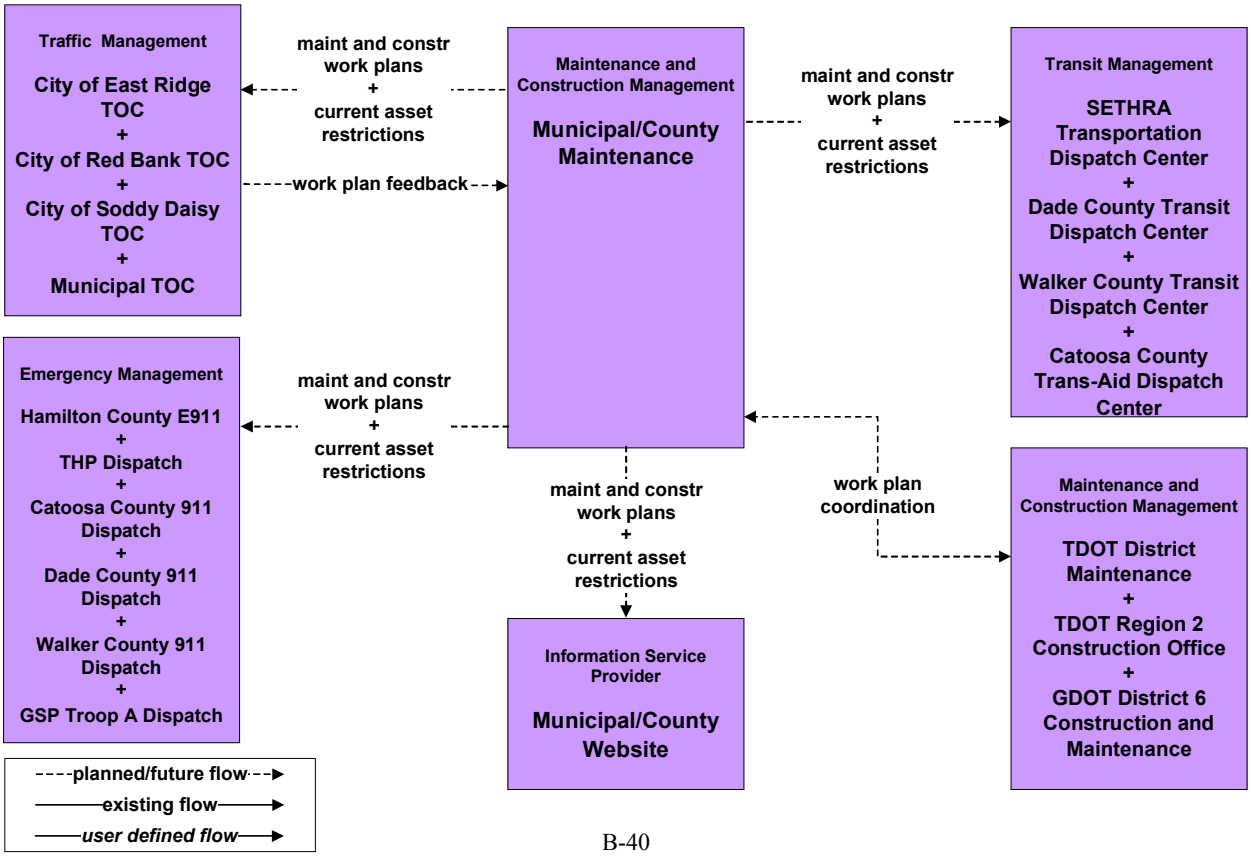
MC10 – Maintenance and Construction Activity Coordination
GDOT



MC10 – Maintenance and Construction Activity Coordination
City of Chattanooga

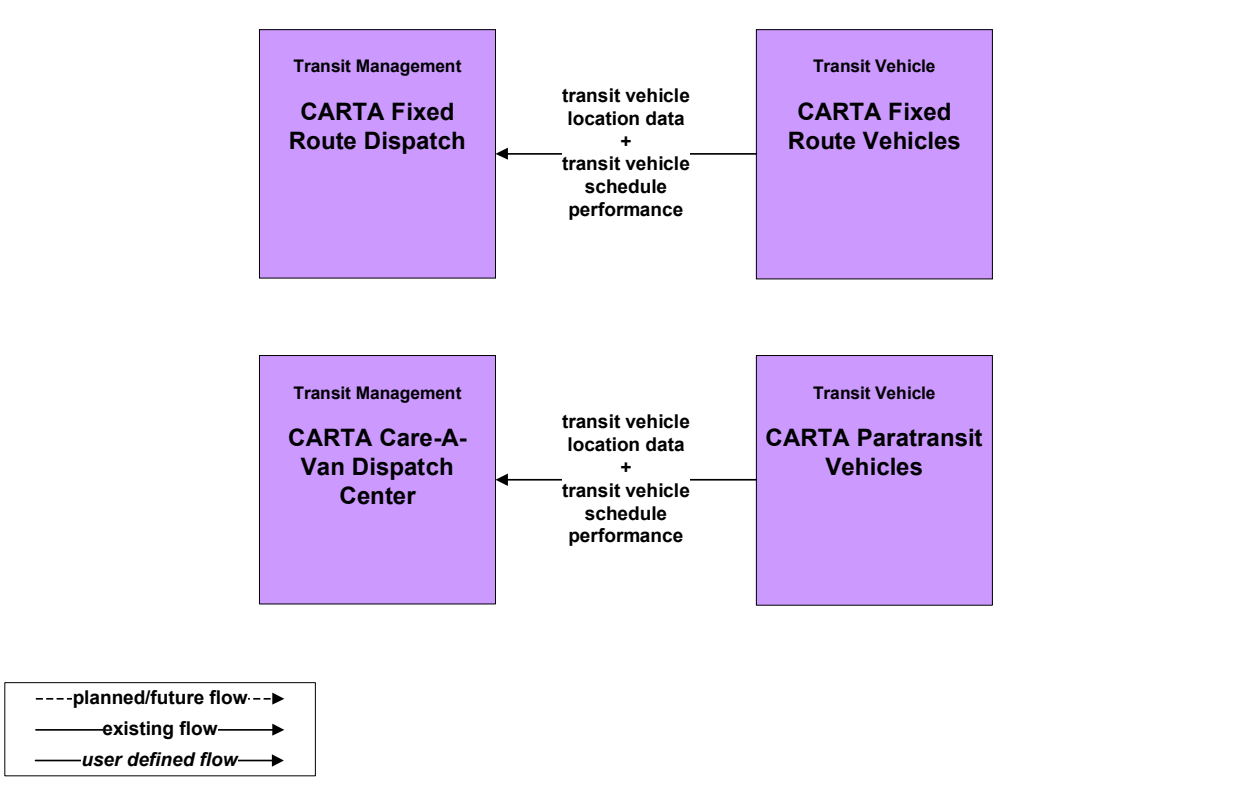


MC10 – Maintenance and Construction Activity Coordination
Municipal/County

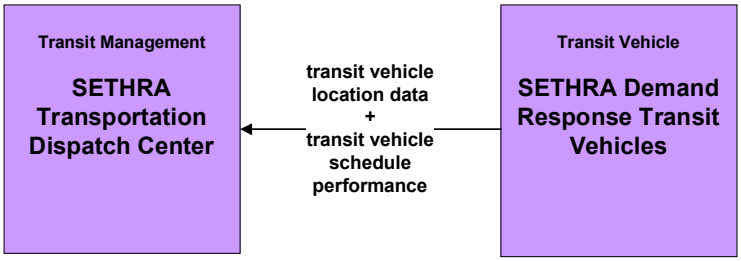


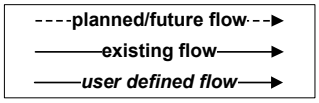
Advanced Public Transportation Systems

APTS01 – Transit Vehicle Tracking
Chattanooga Area Regional Transportation Authority

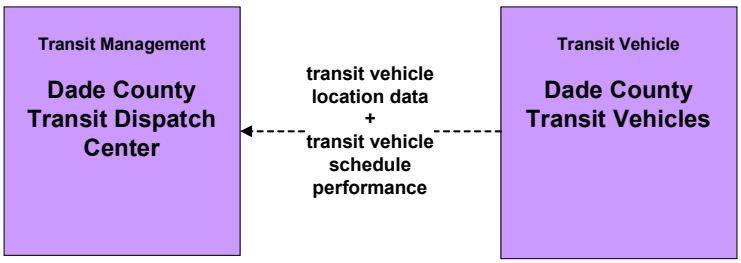


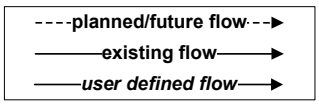
APTS01 – Transit Vehicle Tracking
Southeast Tennessee HRA Transportation



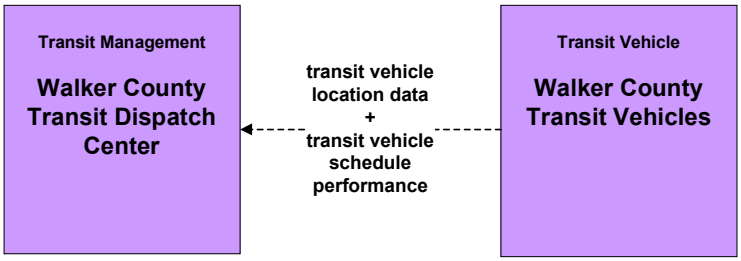


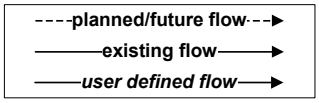
APTS01 – Transit Vehicle Tracking
Dade County Transit



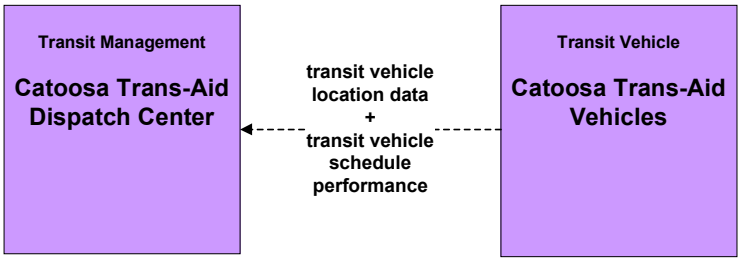


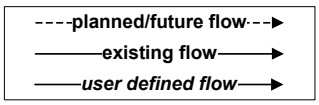
APTS01 – Transit Vehicle Tracking
Walker County Transit



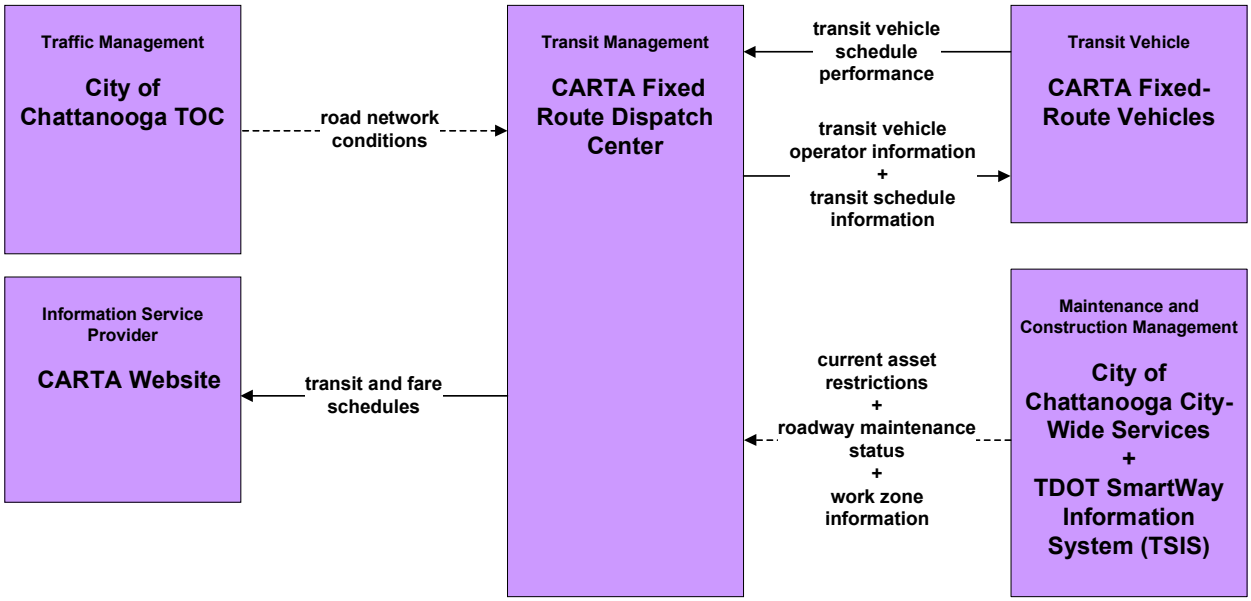


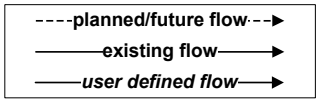
APTS01 – Transit Vehicle Tracking
Catoosa Trans-Aid



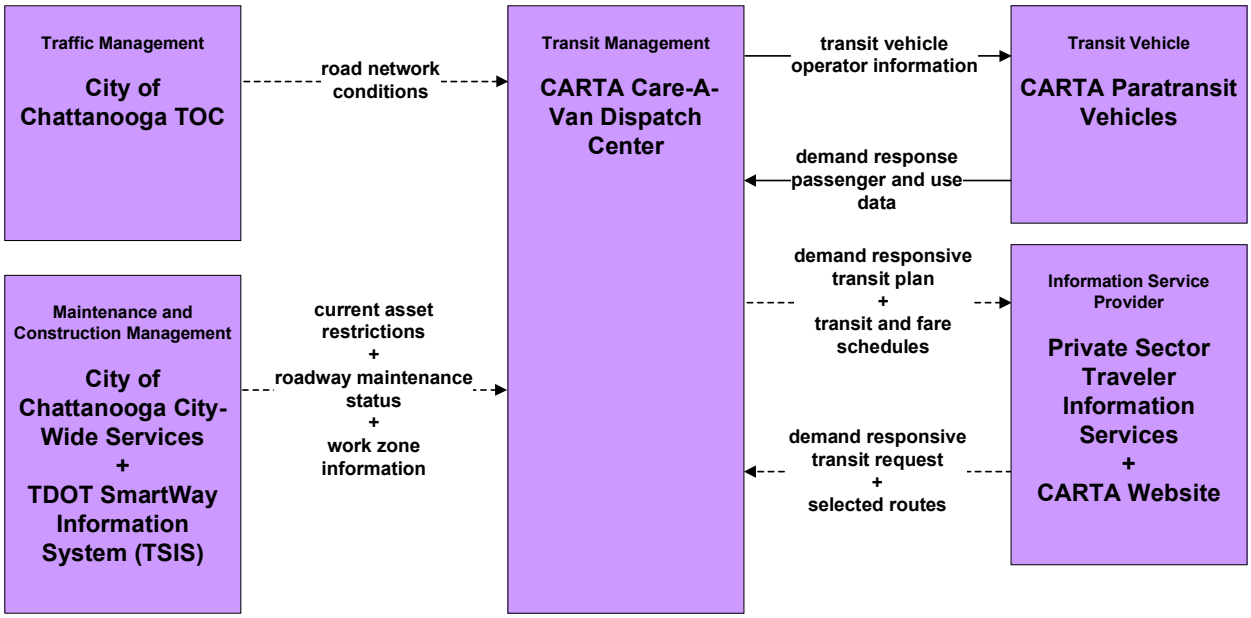


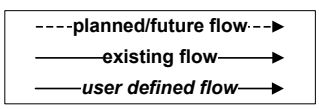
APTS02 – Transit Fixed-Route Operations
Chattanooga Area Regional Transportation Authority



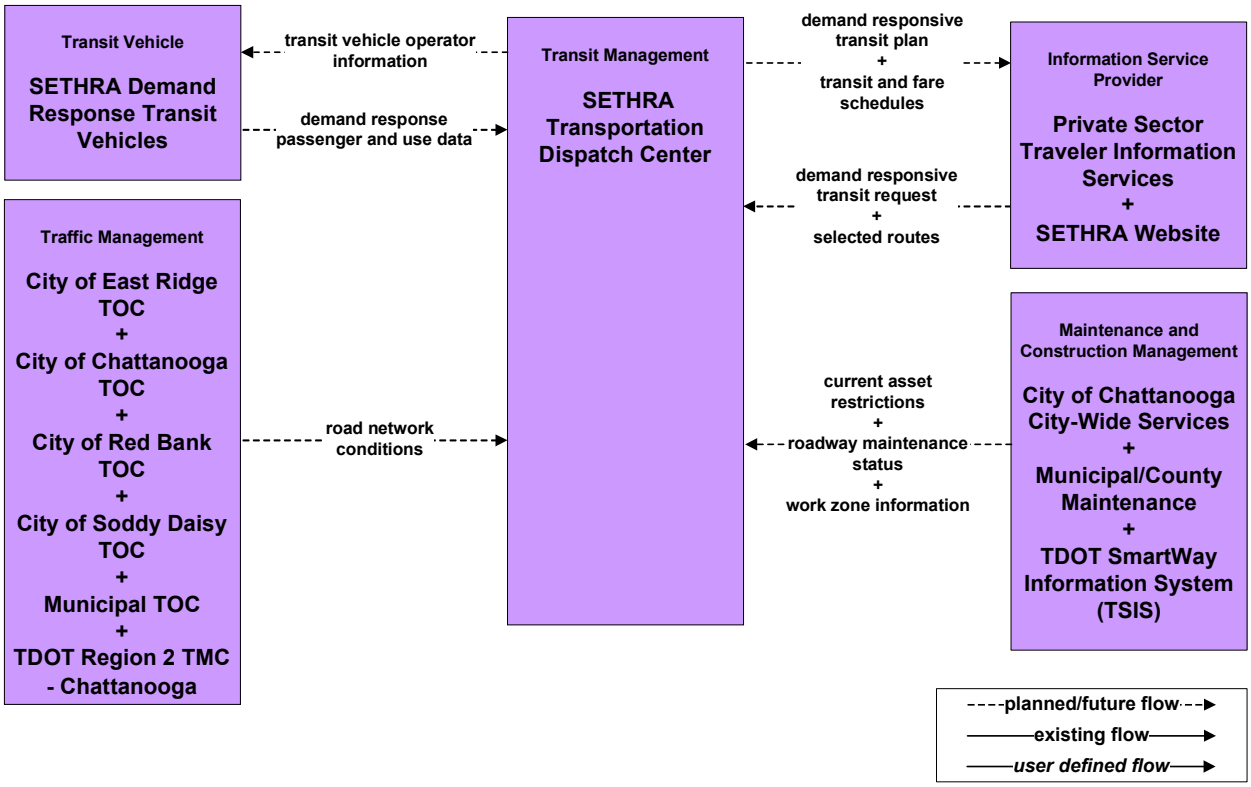


APTS03 – Demand Response Transit Operations
Chattanooga Area Regional Transportation Authority

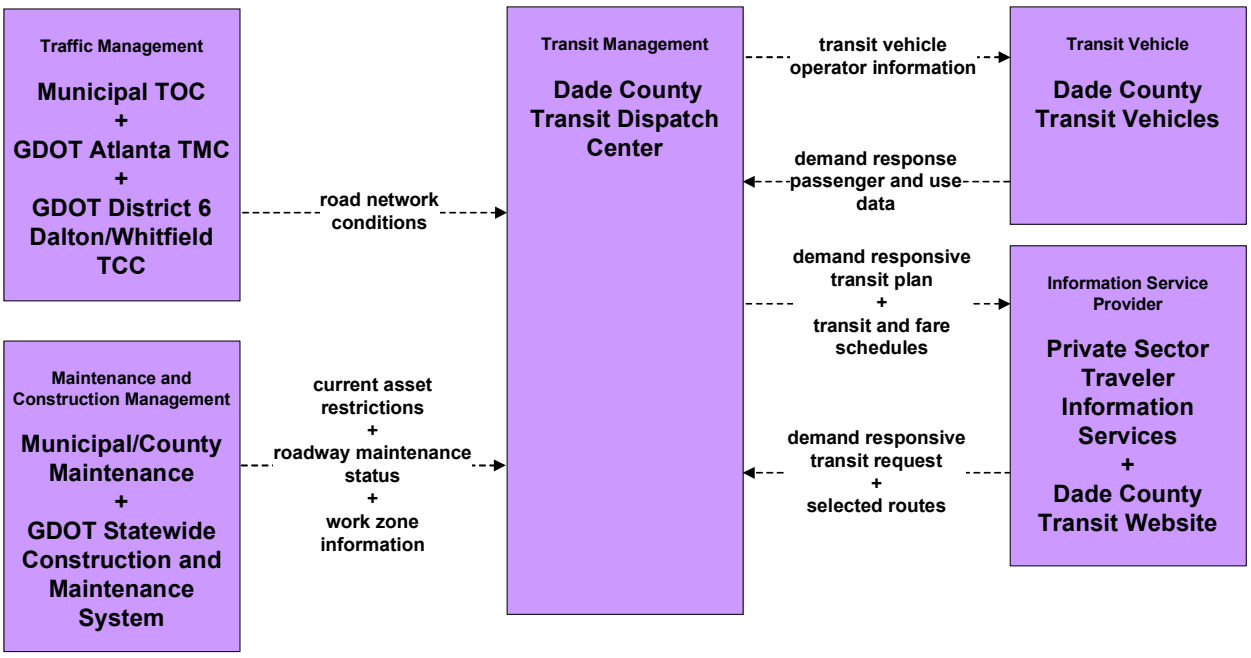


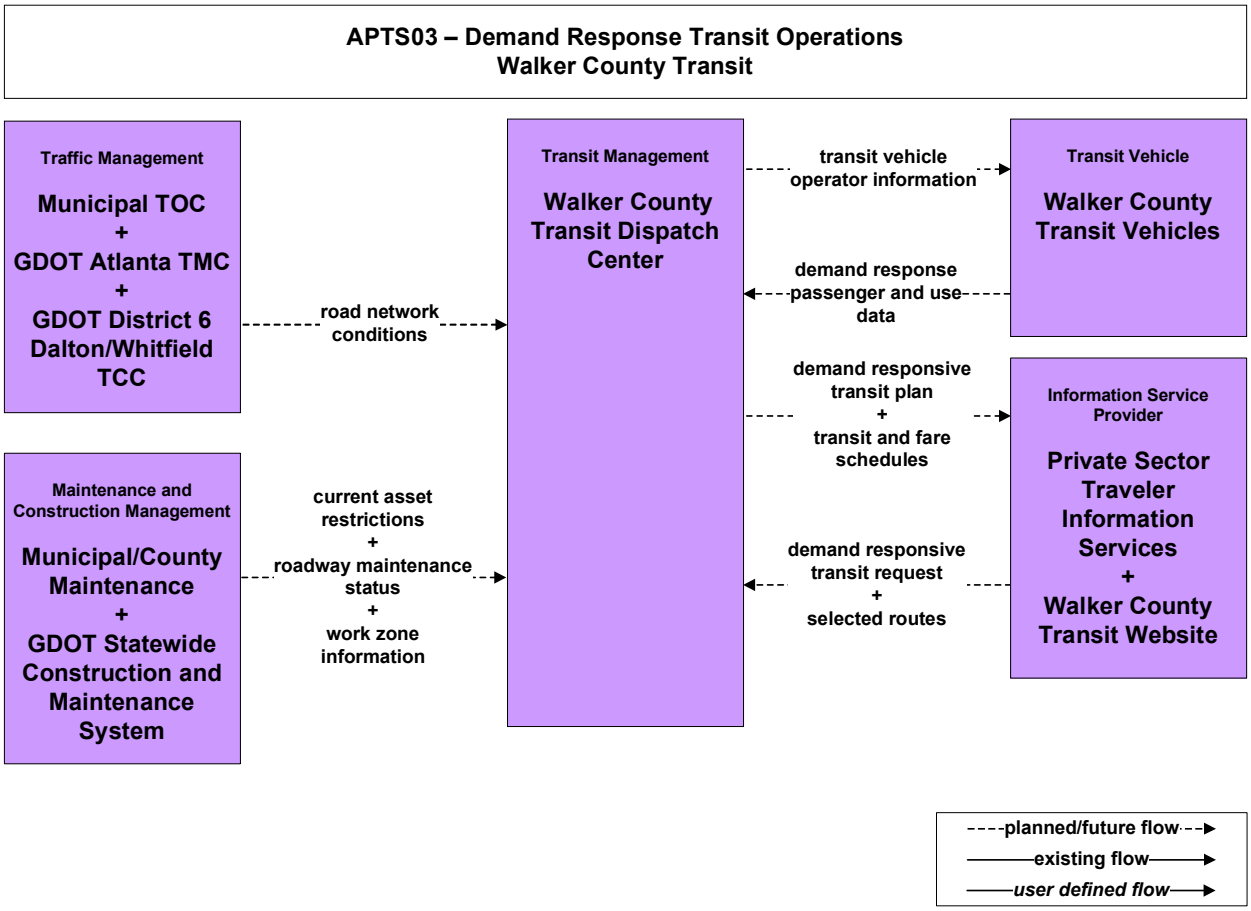


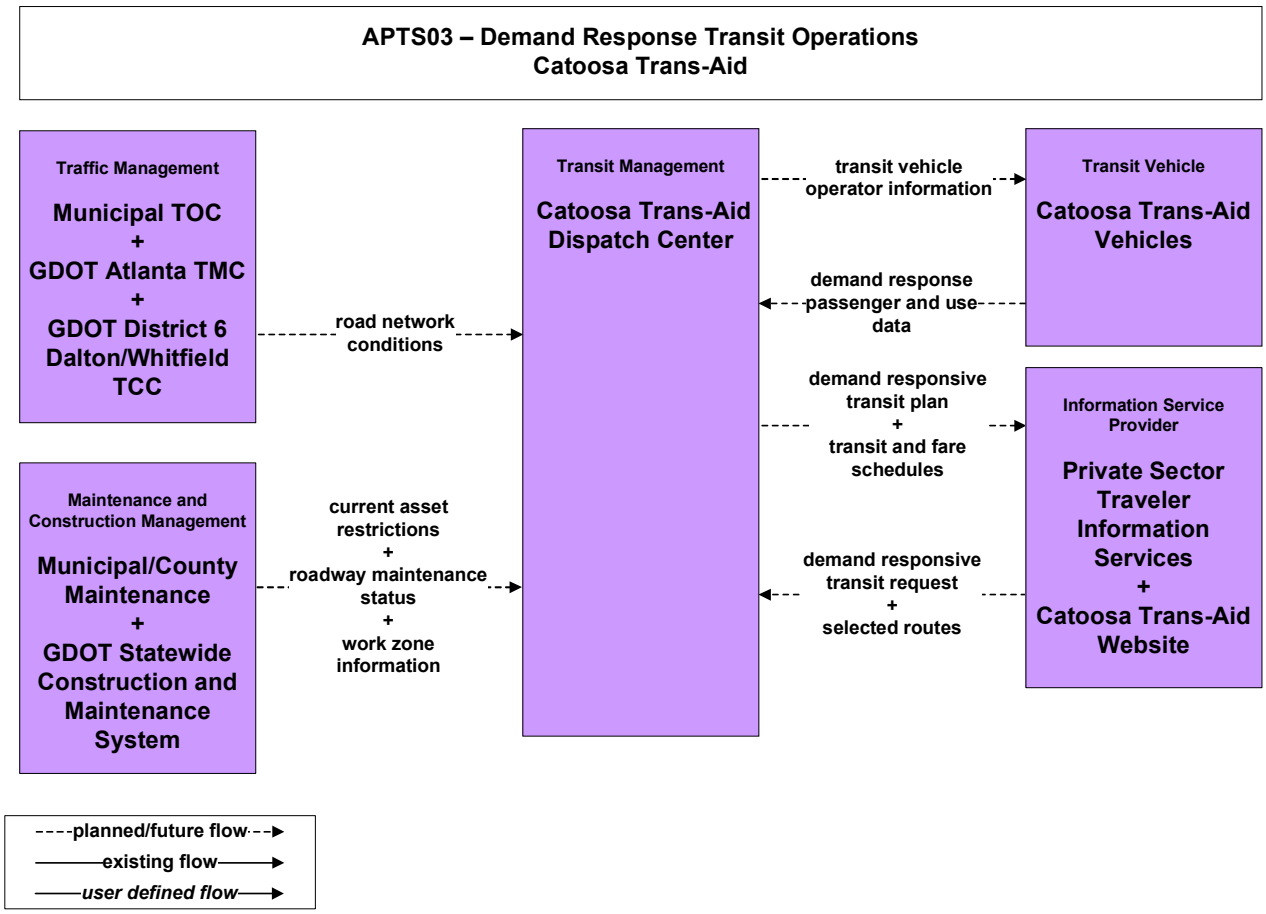
APTS03 – Demand Response Transit Operations
Southeast Tennessee HRA Transportation



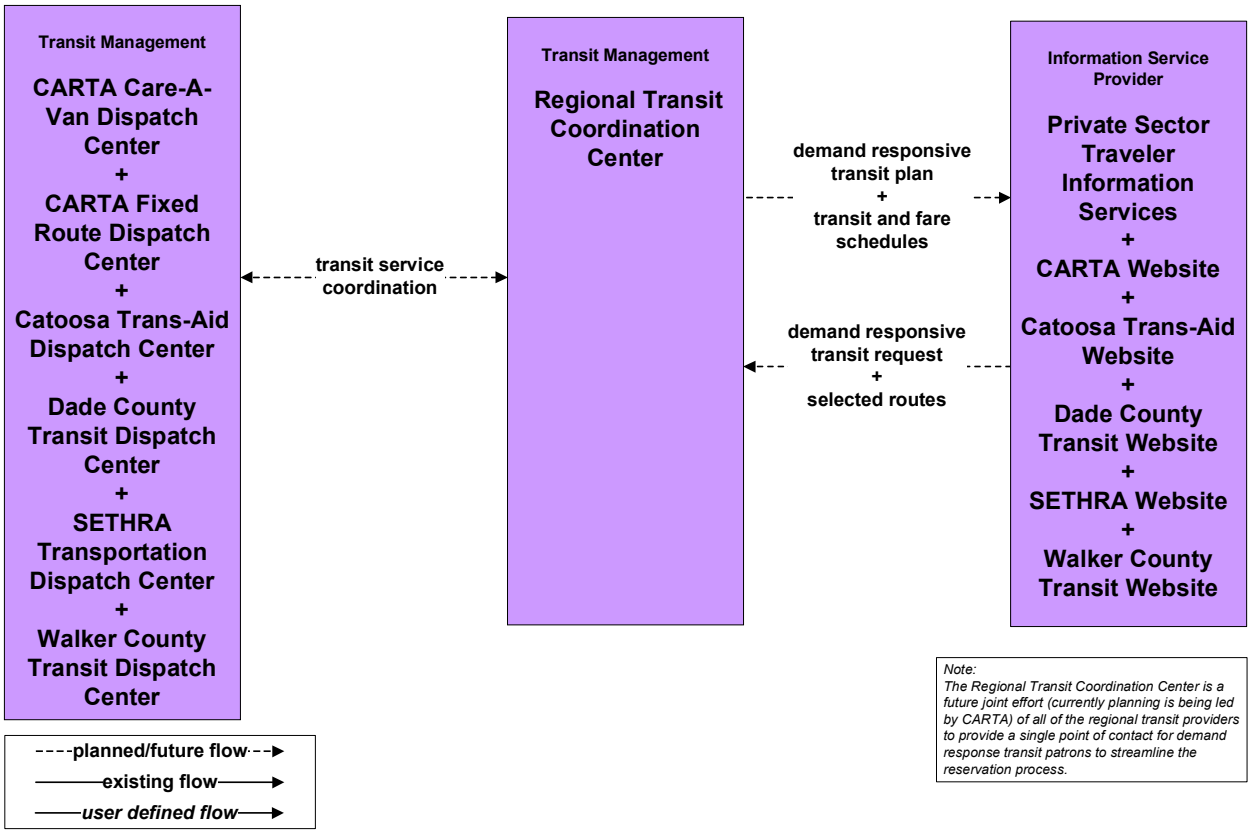
APTS03 – Demand Response Transit Operations
Dade County Transit



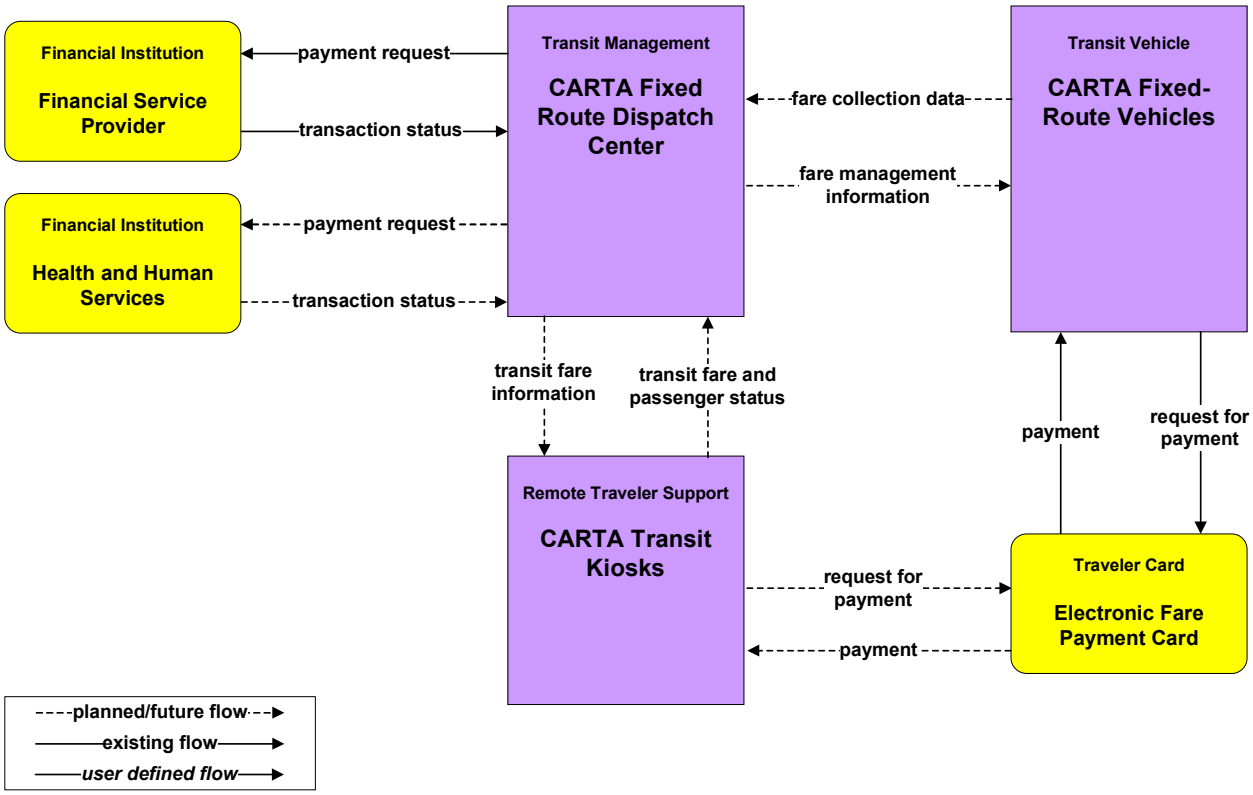

APTS03 – Demand Response Transit Operations
Walker County Transit
Traffic Management
Municipal TOC
+
GDOT Atlanta TMC
+
GDOT District 6
Dalton/Whitfield
TCC
road network conditions
Transit Management
Walker County Transit Dispatch Center
transit vehicle operator information
demand response passenger and use data
Transit Vehicle
Walker County Transit Vehicles
demand responsive transit plan
+
transit and fare schedules
Information Service Provider
Private Sector Traveler Information Services
+
Walker County Transit Website
demand responsive transit request
+
selected routes
Maintenance and Construction Management
Municipal/County Maintenance
+
GDOT Statewide Construction and Maintenance System
current asset restrictions
+
roadway maintenance status
+
work zone information
planned/future flow
existing flow
user defined flow


APTS03 – Demand Response Transit Operations
Catoosa Trans-Aid
Traffic Management
Municipal TOC
+
GDOT Atlanta TMC
+
GDOT District 6
Dalton/Whitfield
TCC
road network conditions
Transit Management
Catoosa Trans-Aid Dispatch Center
transit vehicle operator information
demand response passenger and use data
Transit Vehicle
Catoosa Trans-Aid Vehicles
demand responsive transit plan
+
transit and fare schedules
Information Service Provider
Private Sector Traveler Information Services
+
Catoosa Trans-Aid Website
demand responsive transit request
+
selected routes
Maintenance and Construction Management
Municipal/County Maintenance
+
GDOT Statewide Construction and Maintenance System
current asset restrictions
+
roadway maintenance status
+
work zone information
planned/future flow
existing flow
user defined flow

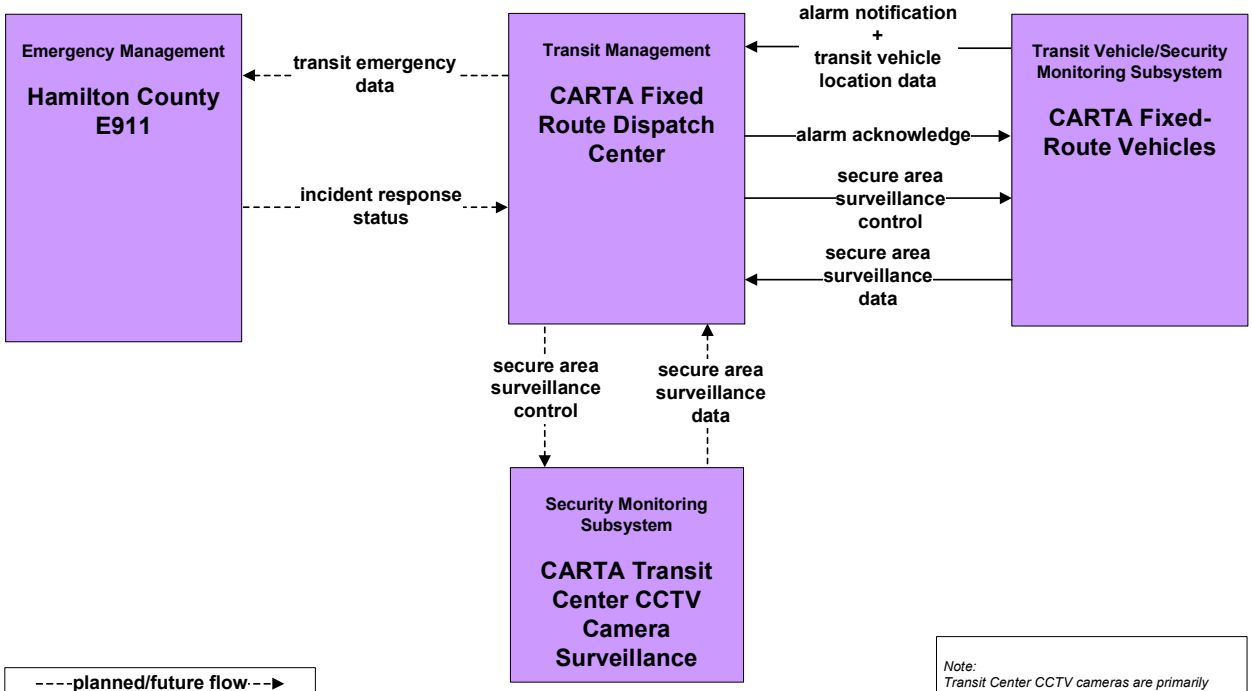
APTS03 – Demand Response Transit Operations
Regional Transit Coordination Center



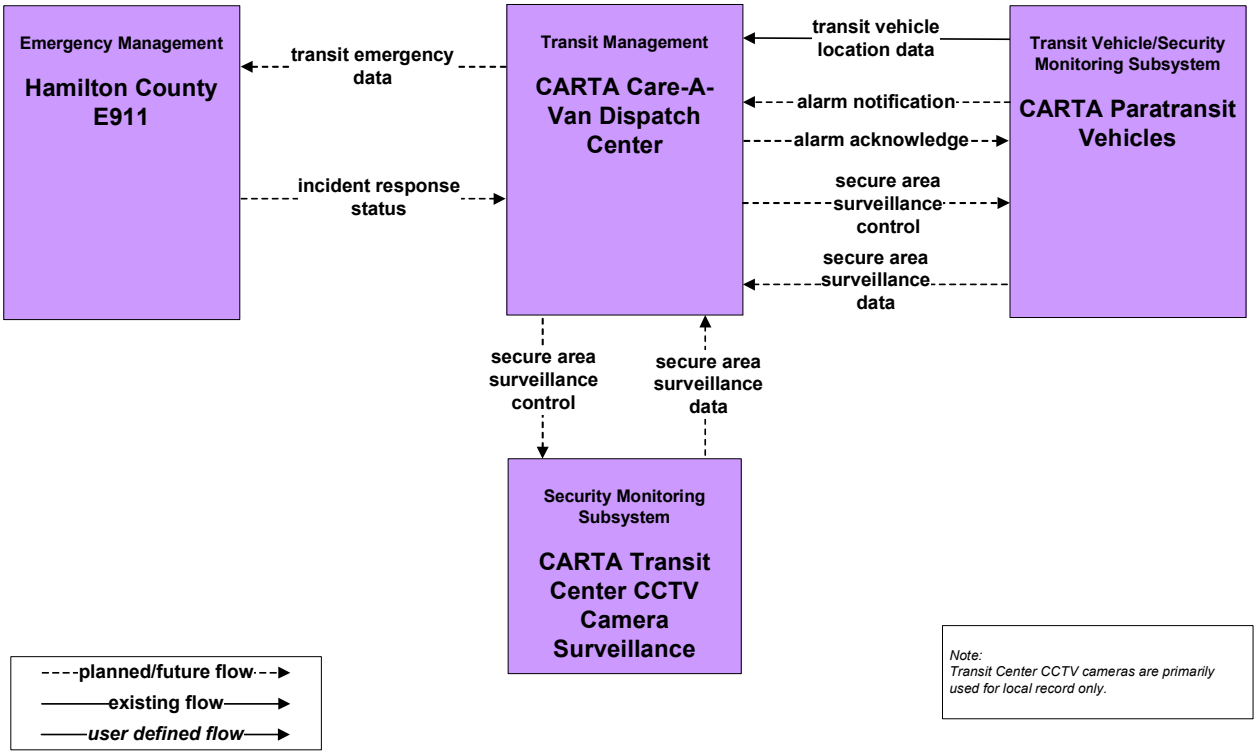
APTS04 – Transit Fare Collection Management
Chattanooga Area Regional Transportation Authority



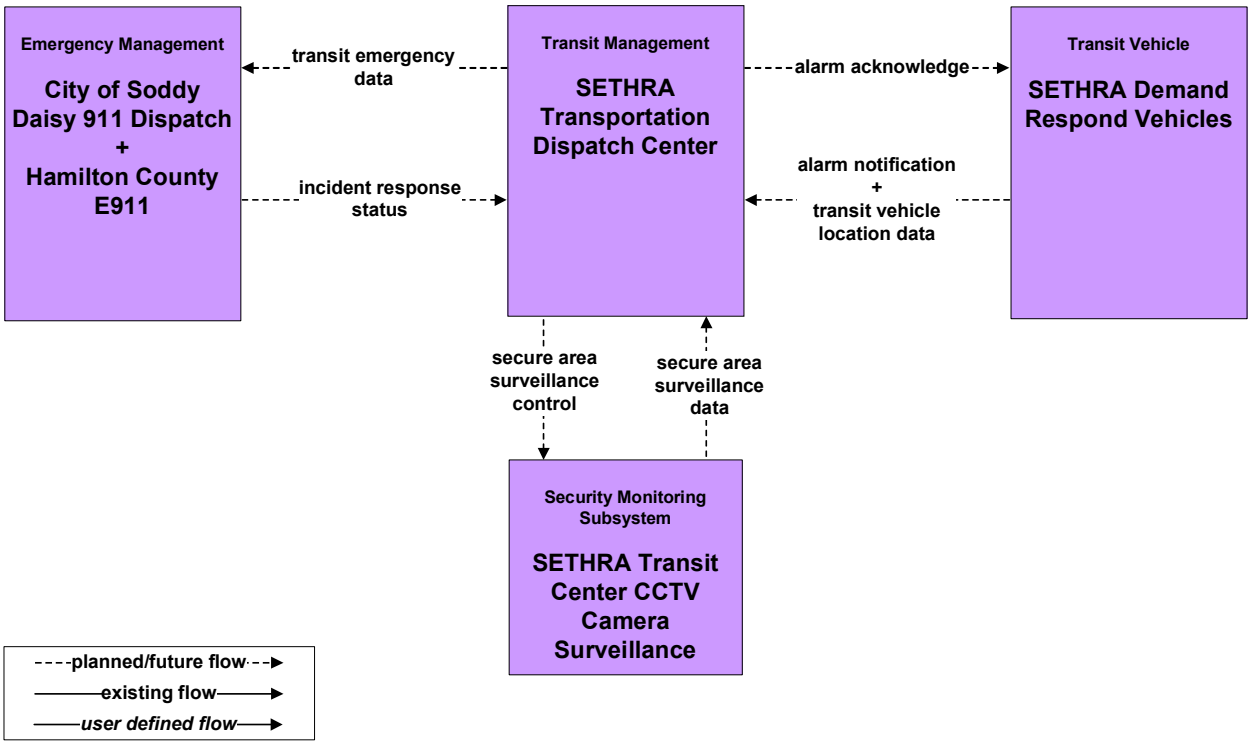
APTS05 – Transit Security
Chattanooga Area Regional Transportation Authority (Fixed Route)



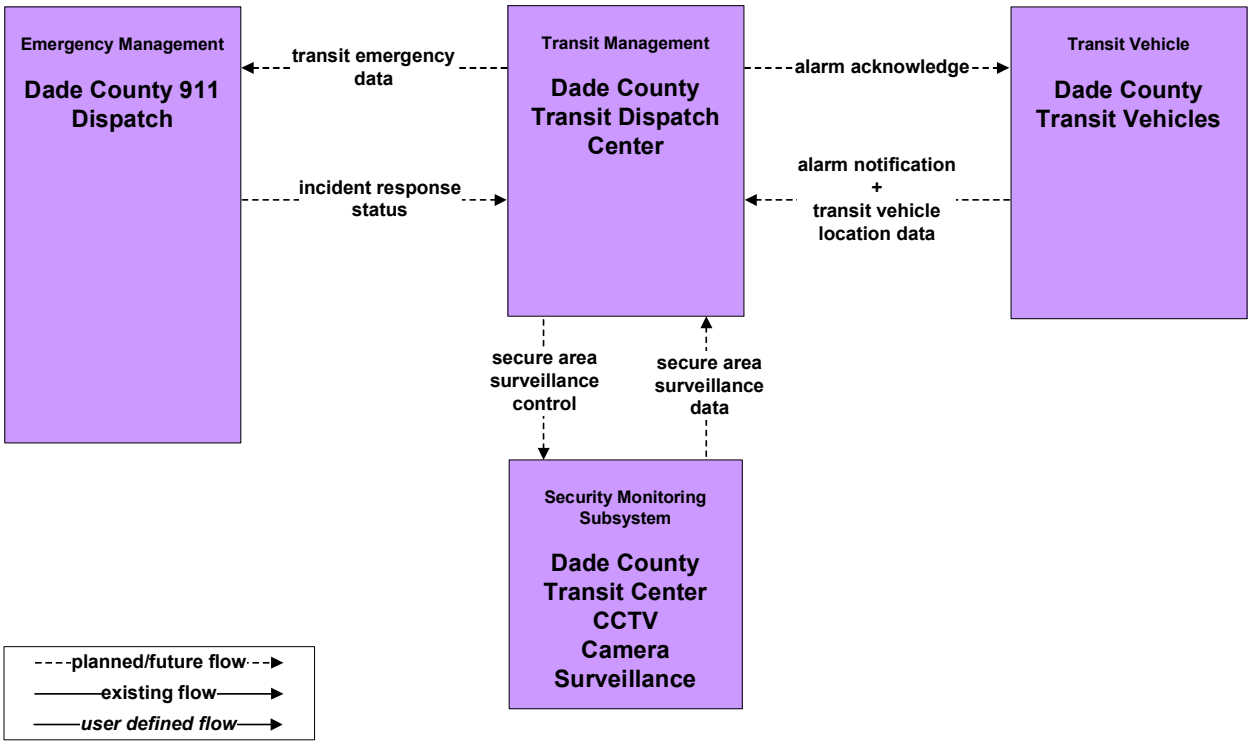
APTS05 – Transit Security
Chattanooga Area Regional Transportation Authority (Care-A-Van)



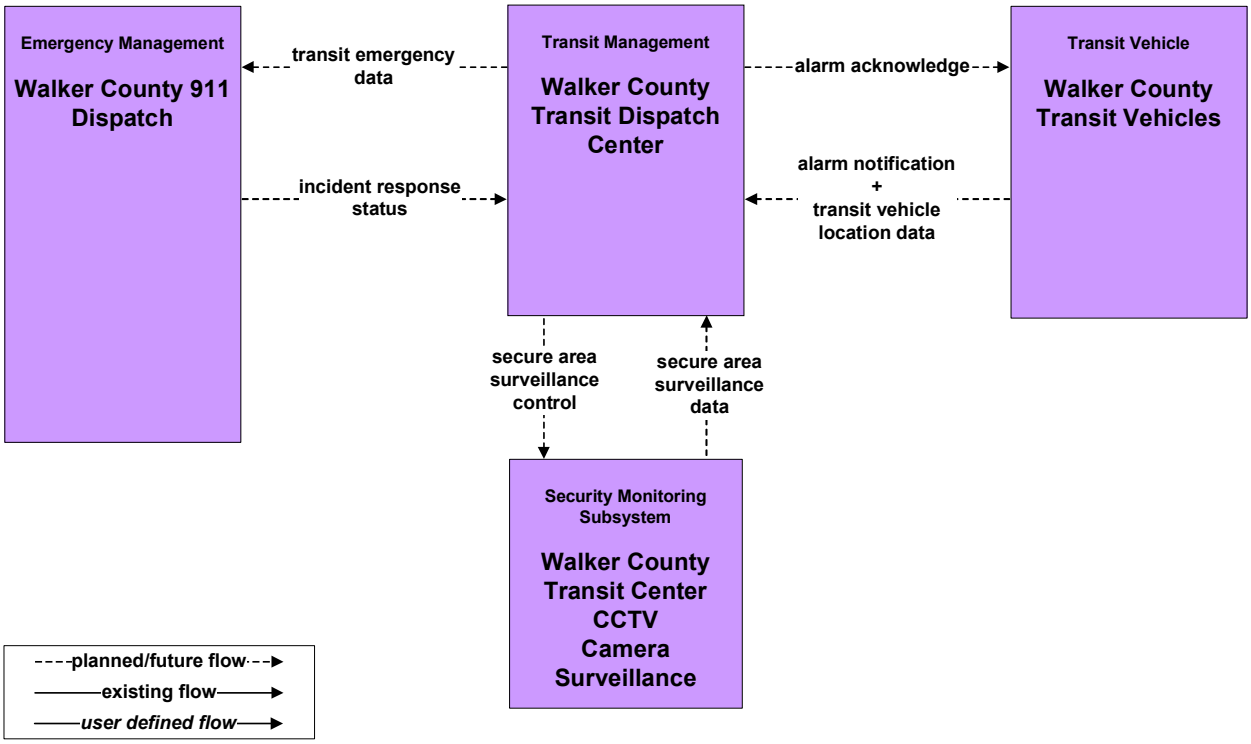
APTS05 – Transit Security
Southeast Tennessee HRA Transportation



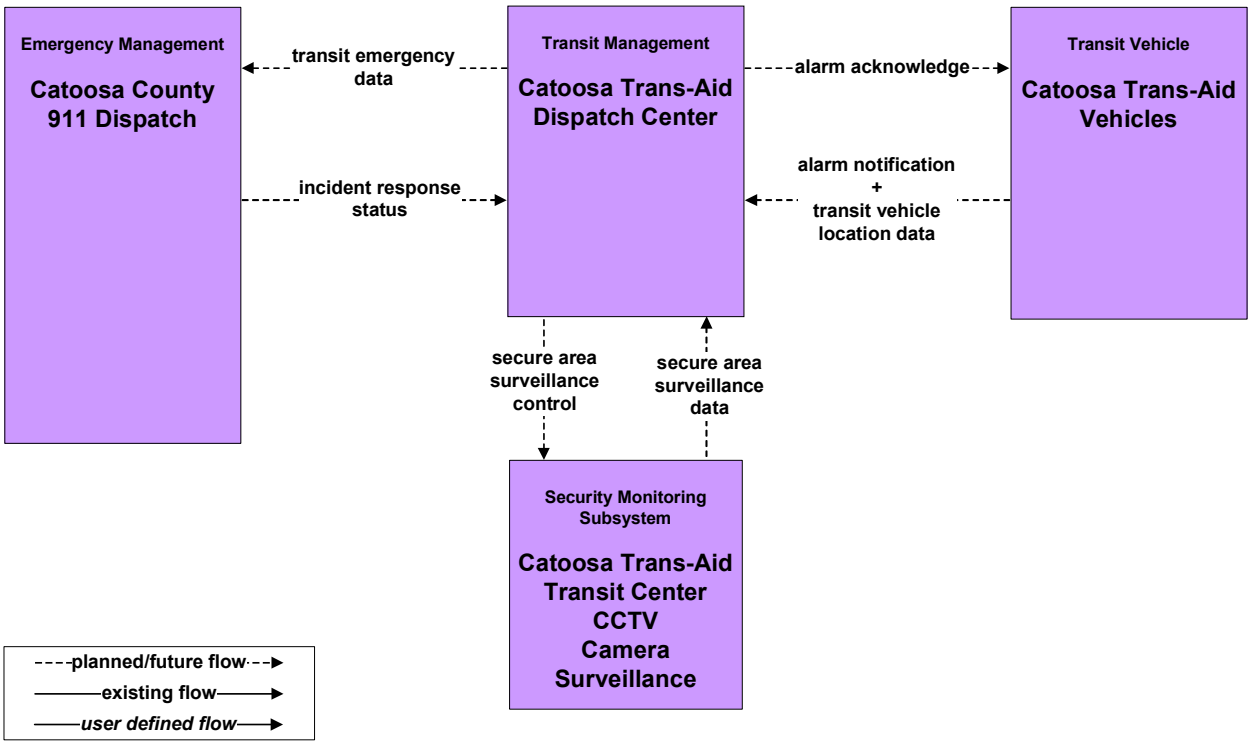
APTS05 – Transit Security
Dade County Transit



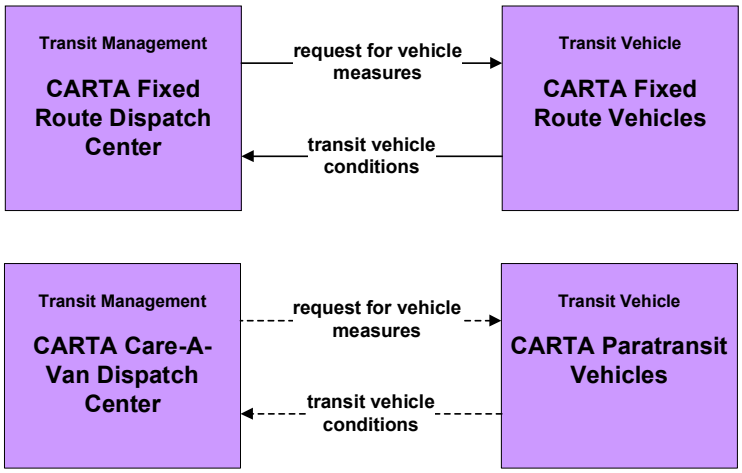
APTS05 – Transit Security
Walker County Transit

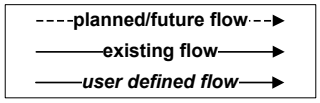


APTS05 – Transit Security
Catoosa Trans-Aid

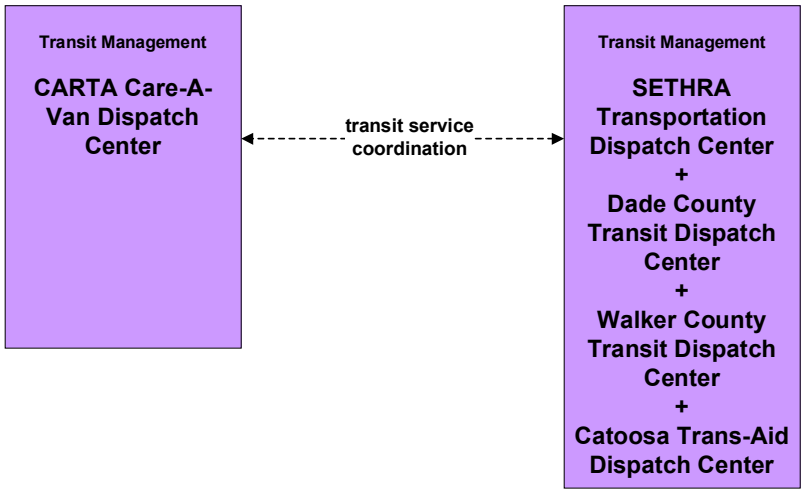


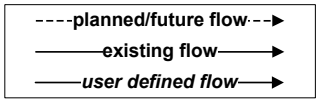
APTS06 – Transit Fleet Management
Chattanooga Area Regional Transportation Authority



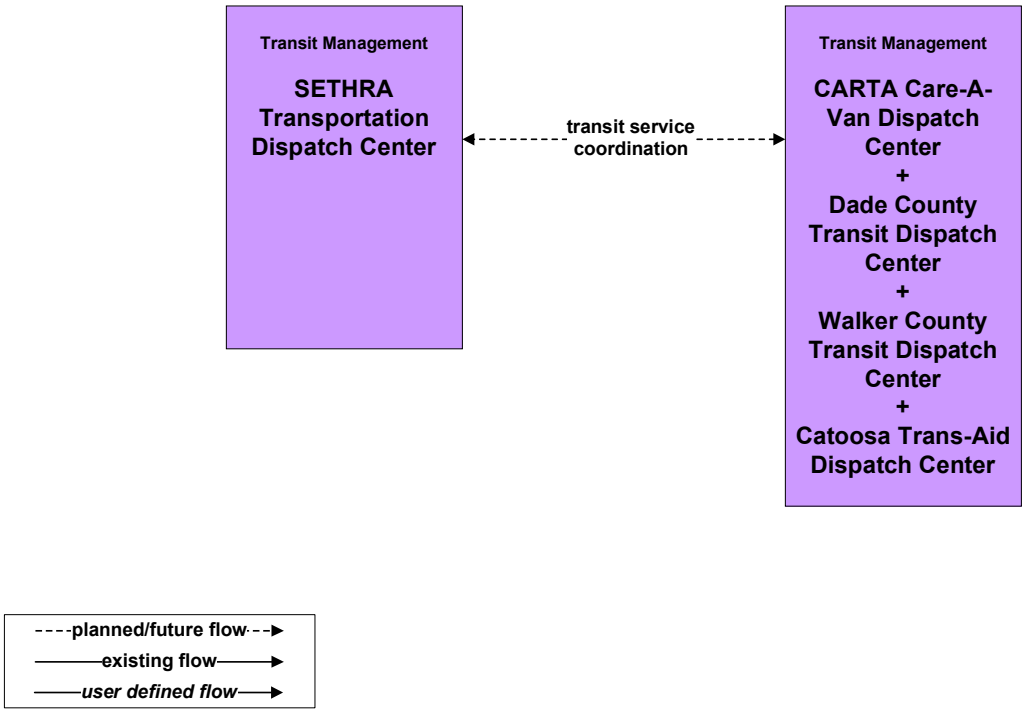


APTS07 – Multi-modal Coordination
Chattanooga Area Regional Transportation Authority

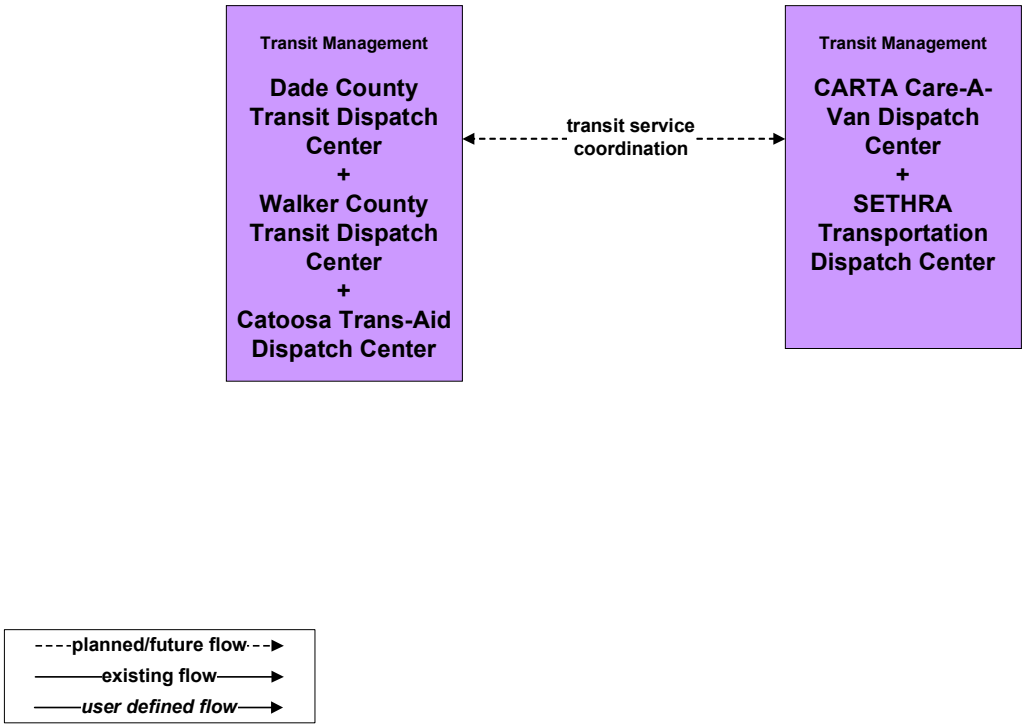




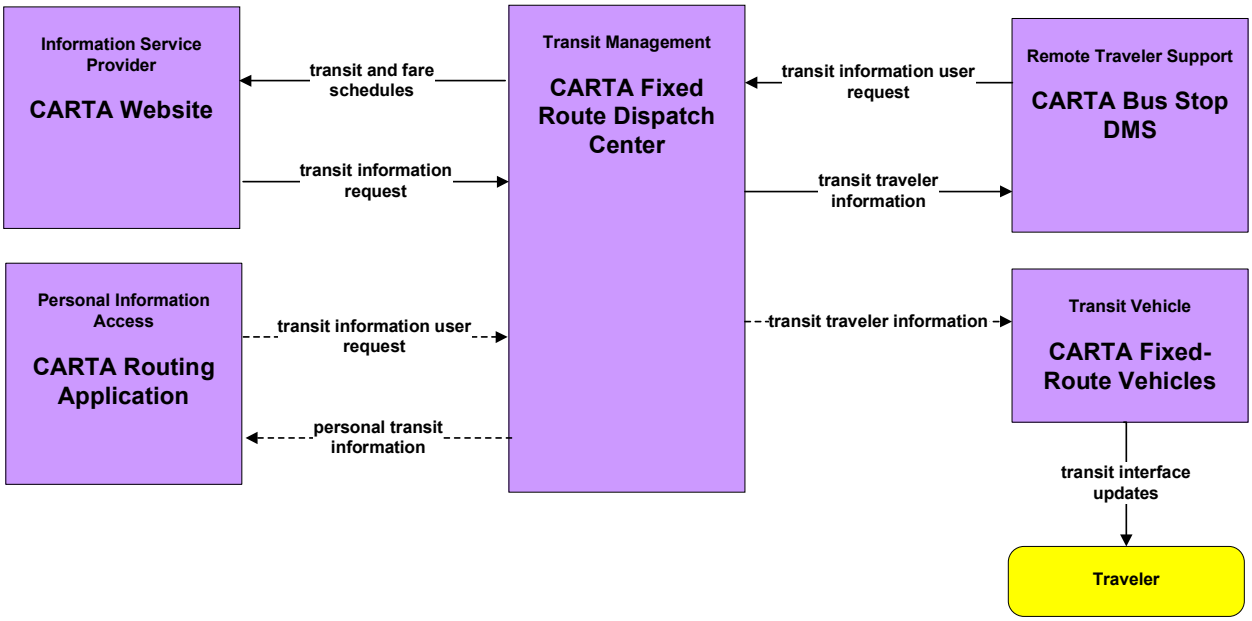
APTS07 – Multi-modal Coordination
Southeast Tennessee HRA Transportation

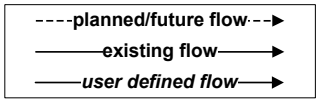


APTS07 – Multi-modal Coordination
Dade County Transit, Walker County Transit and Catoosa Trans-Aid

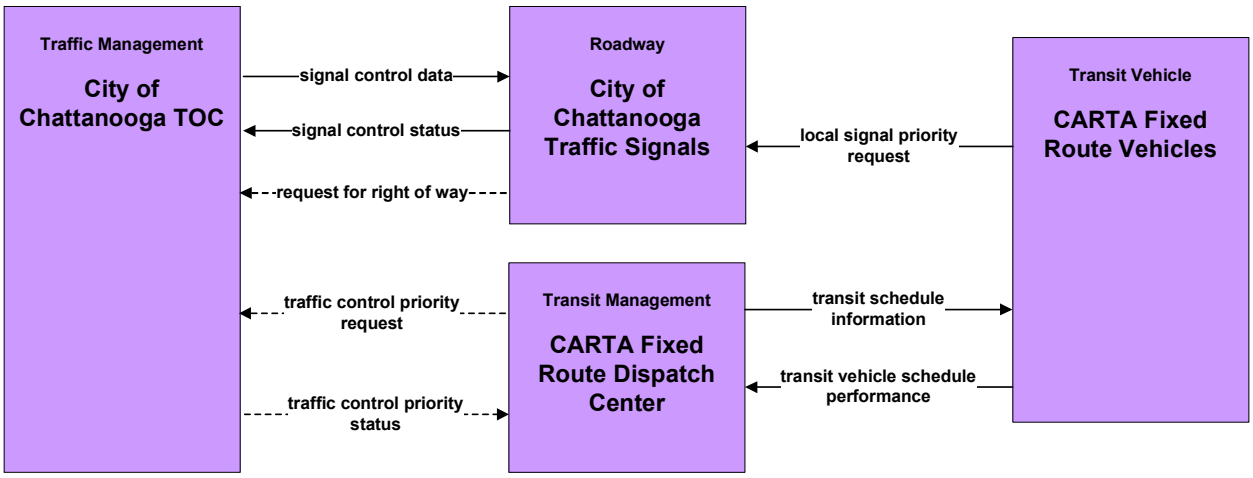


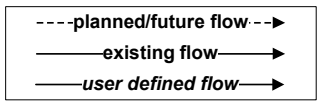
APTS08 – Transit Traveler Information
Chattanooga Area Regional Transportation Authority





APTS09 – Transit Signal Priority
CARTA Bus Rapid Transit



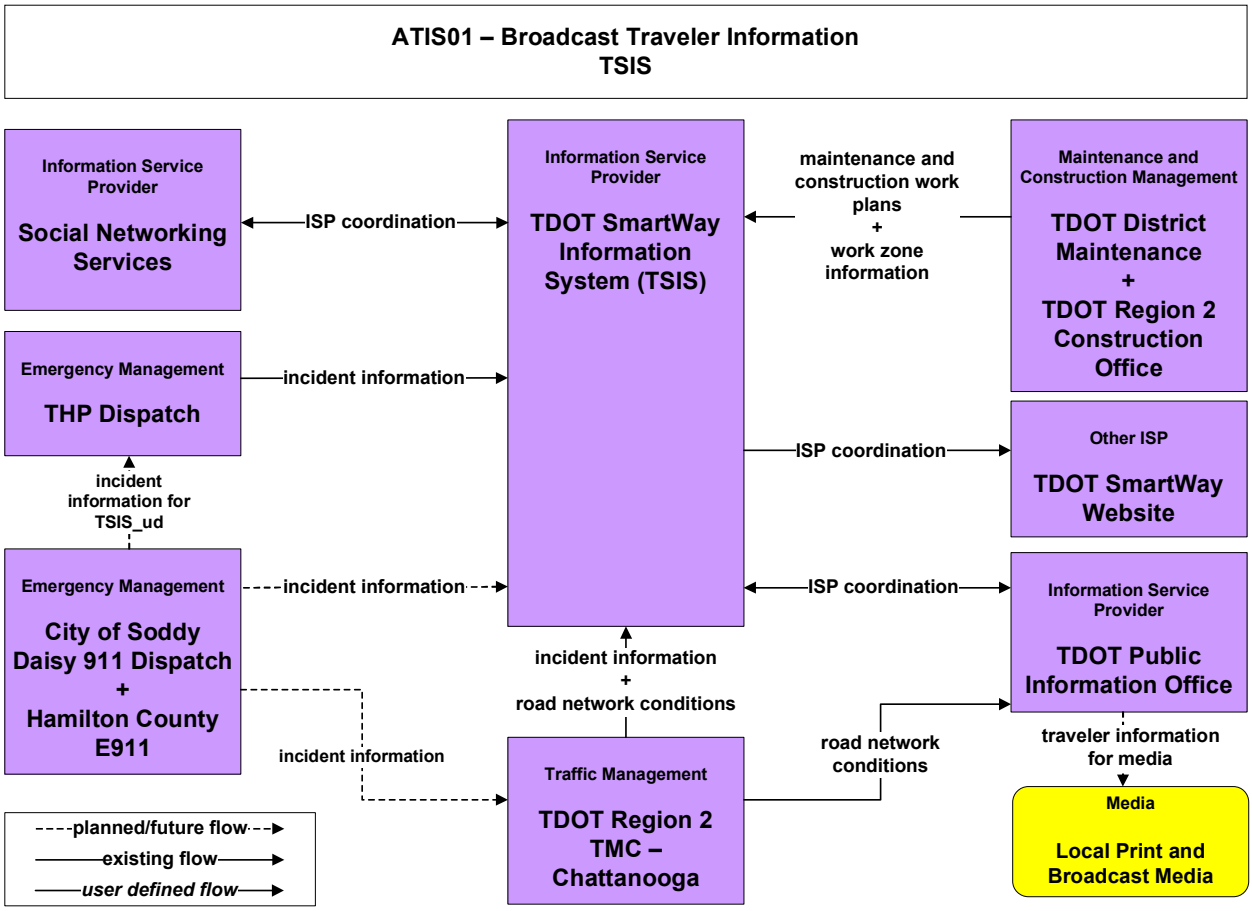


APTS10 – Transit Passenger Counting
Chattanooga Area Regional Transportation Authority

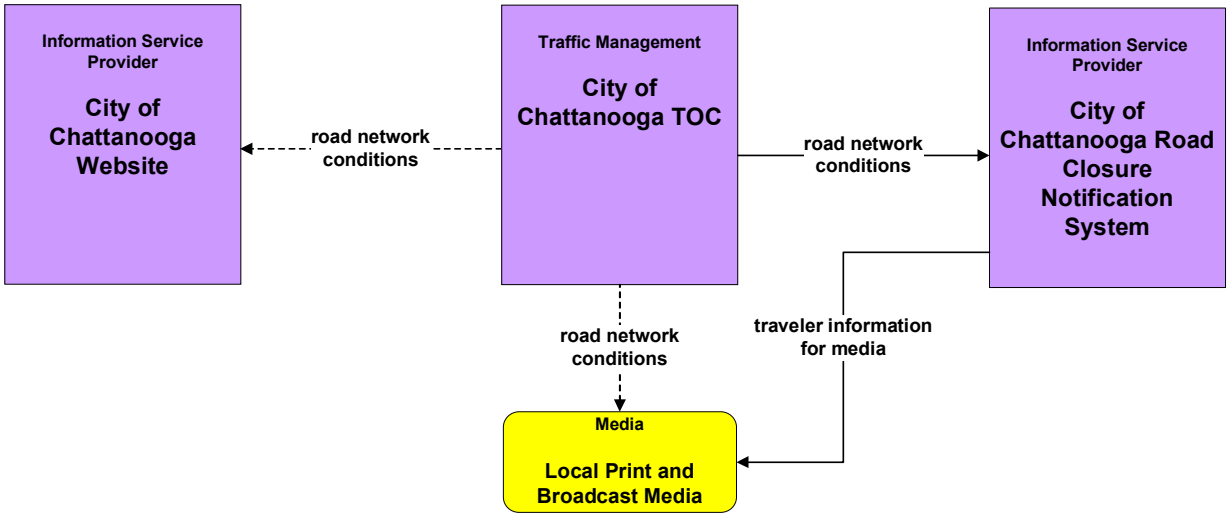
Note:
A separate count is taken for bike passengers, however that data is not location specific.

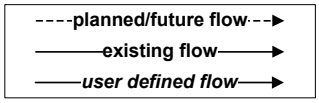
----planned/future flow---►
————existing flow————►
——*user defined flow*——►

Advanced Traveler Information System

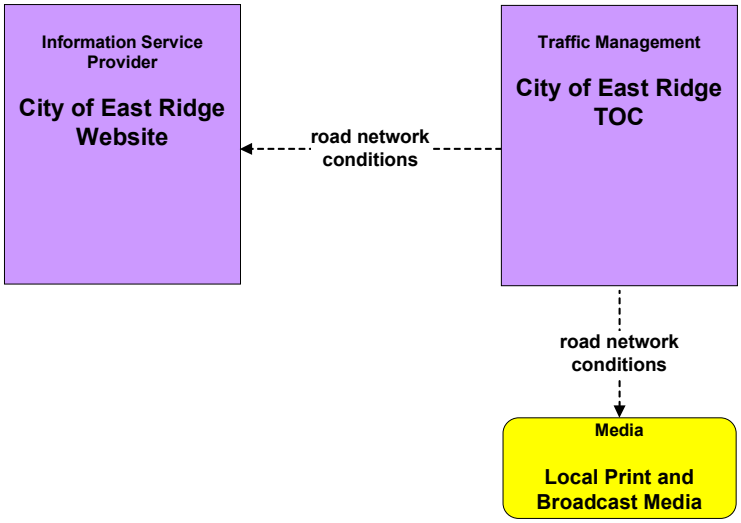


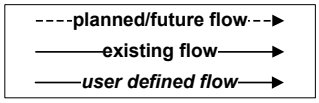
ATIS01 – Broadcast Traveler Information
City of Chattanooga



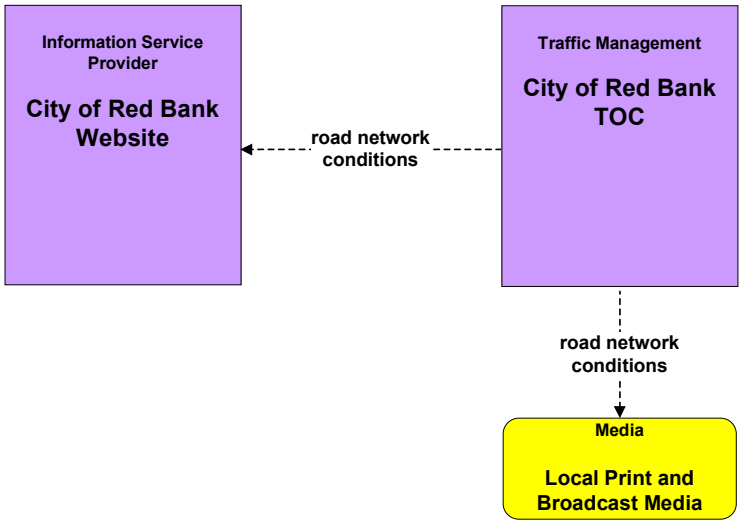


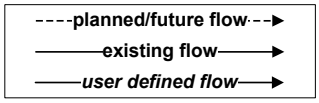
ATIS01 – Broadcast Traveler Information
City of East Ridge



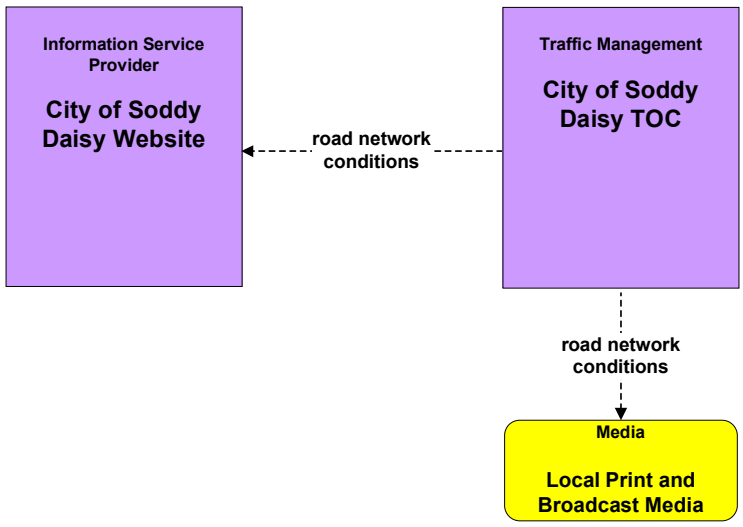


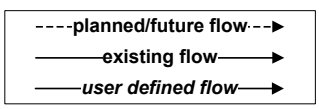
ATIS01 – Broadcast Traveler Information
City of Red Bank



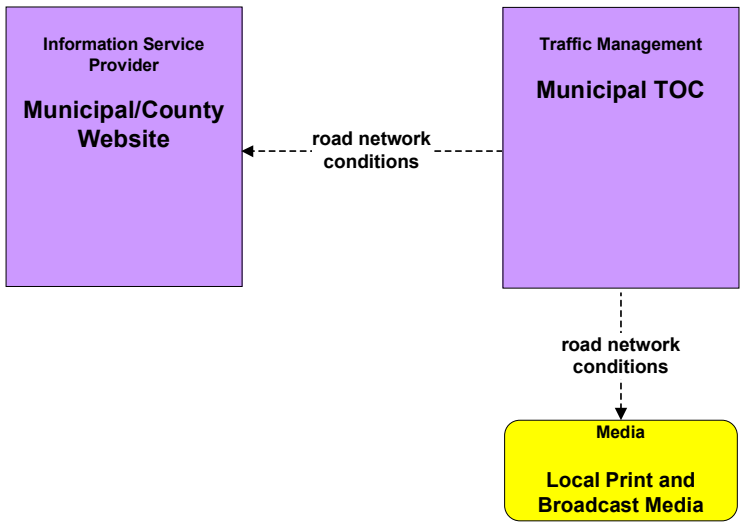


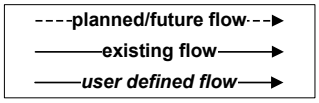
ATIS01 – Broadcast Traveler Information
City of Soddy Daisy



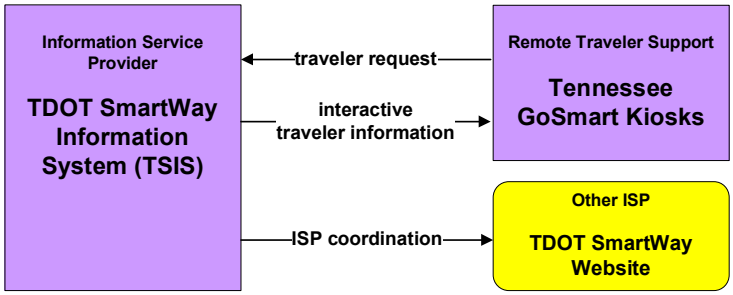


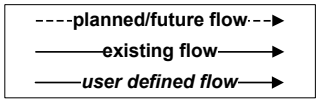
ATIS01 – Broadcast Traveler Information
Municipal



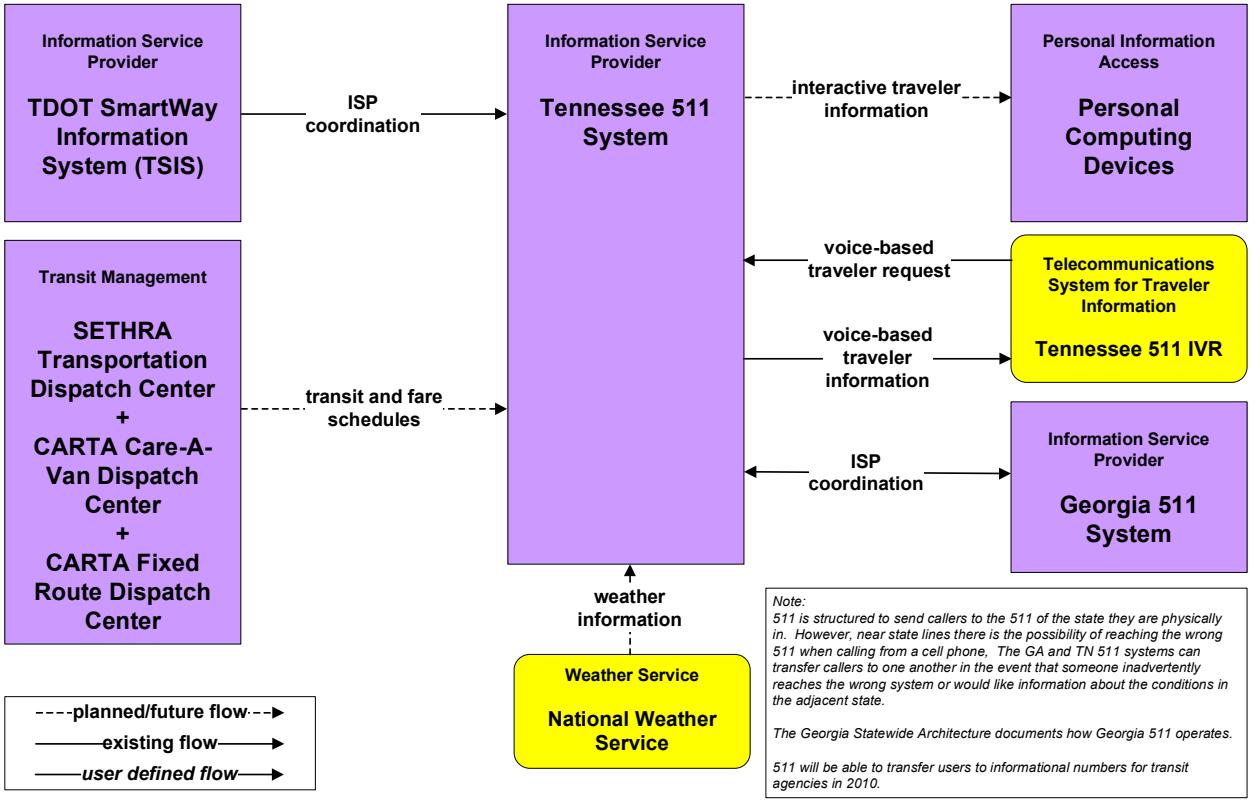


ATIS02 – Interactive Traveler Information
Tennessee GoSmart Kiosks and TDOT SmartWay Website





ATIS02 – Interactive Traveler Information
Tennessee 511

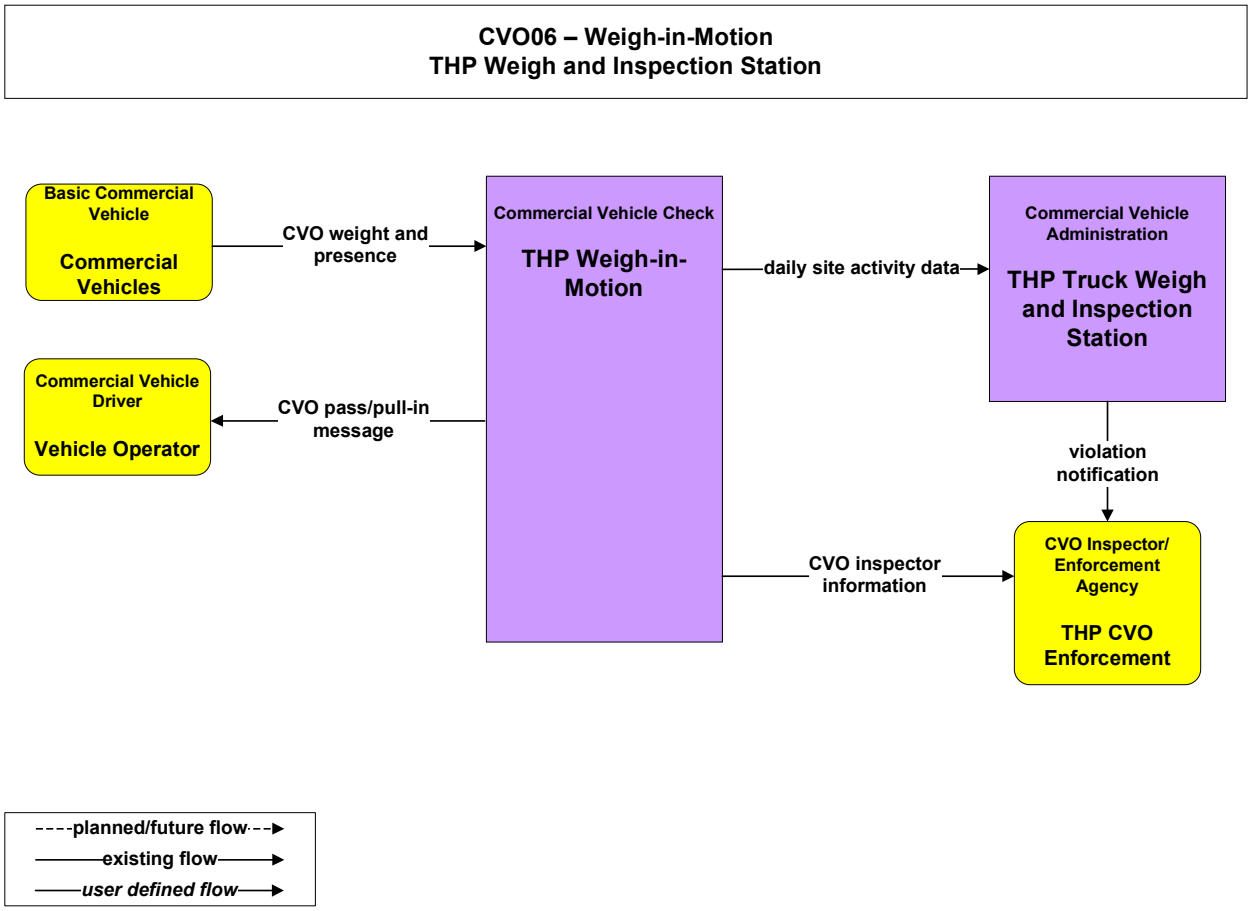


Note:
511 is structured to send callers to the 511 of the state they are physically in. However, near state lines there is the possibility of reaching the wrong 511 when calling from a cell phone, The GA and TN 511 systems can transfer callers to one another in the event that someone inadvertently reaches the wrong system or would like information about the conditions in the adjacent state.

The Georgia Statewide Architecture documents how Georgia 511 operates.

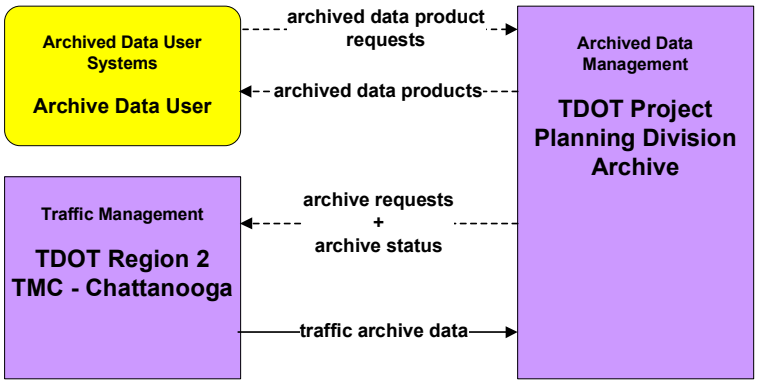
511 will be able to transfer users to informational numbers for transit agencies in 2010.

Commercial Vehicle Operations



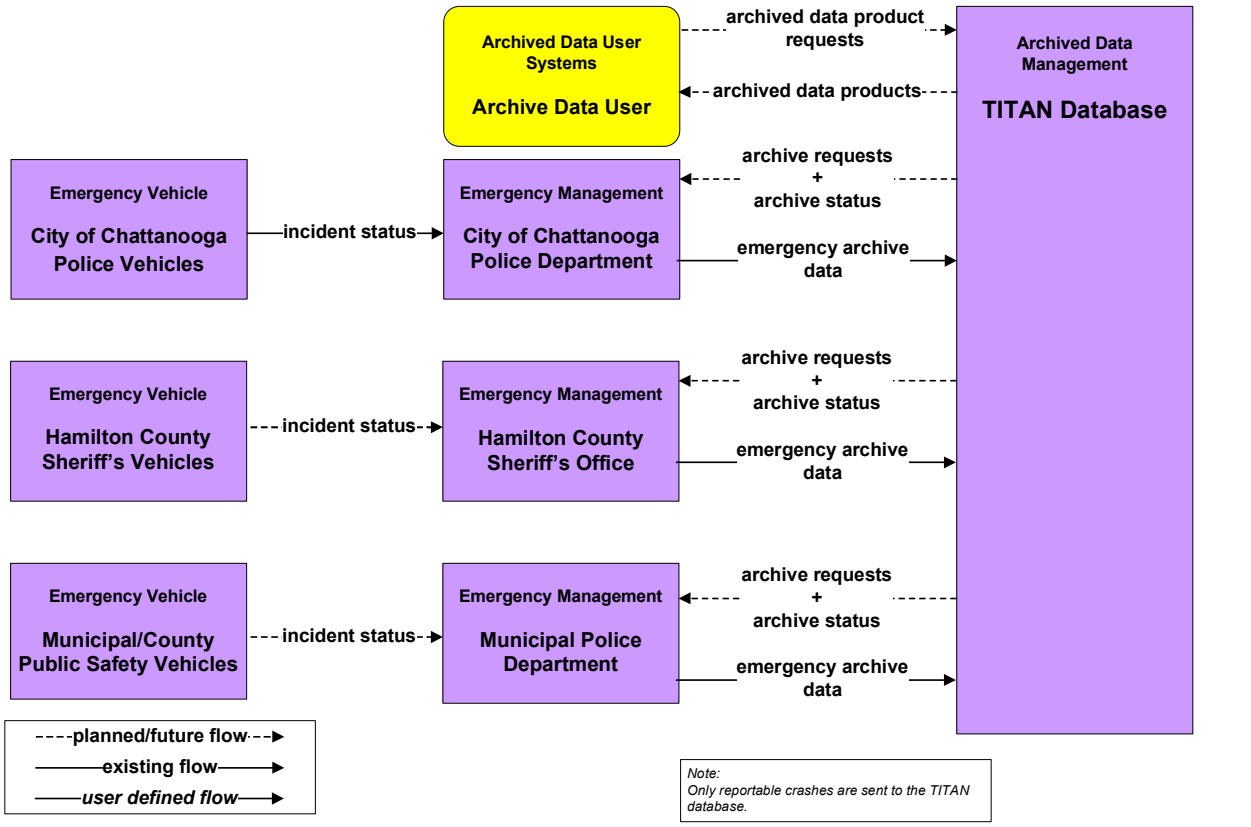
Archived Data

AD1 – ITS Data Mart
TDOT

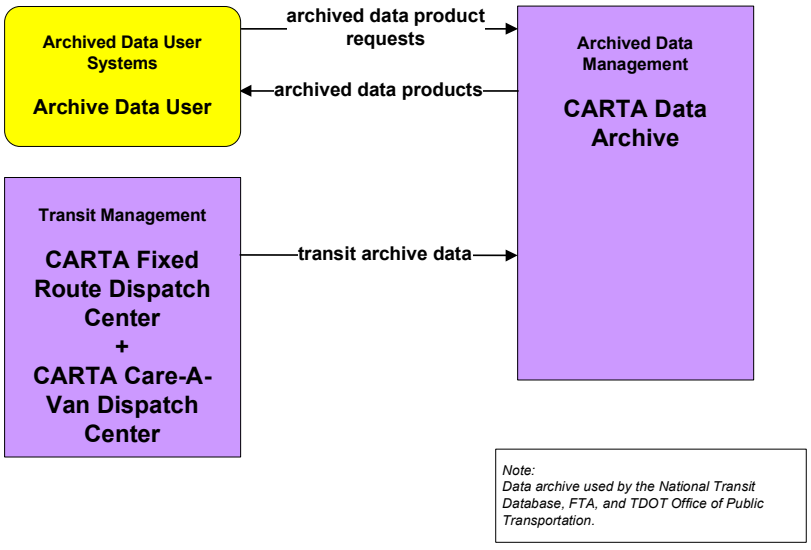


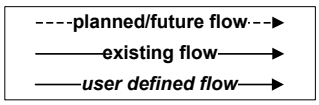
planned/future flow
existing flow
user defined flow

AD1 – ITS Data Mart
TITAN

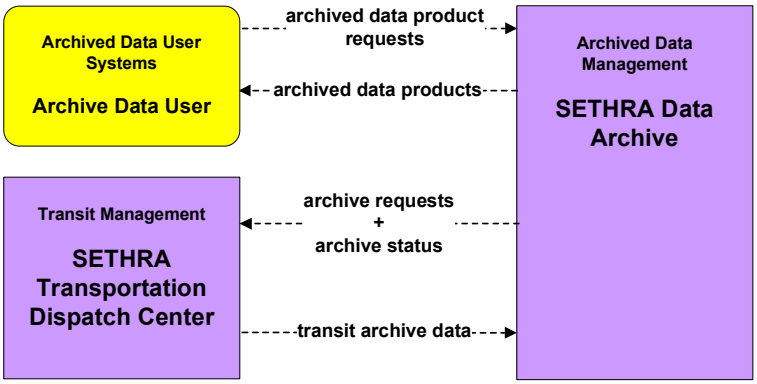


AD1 – ITS Data Mart
Chattanooga Area Regional Transportation Authority





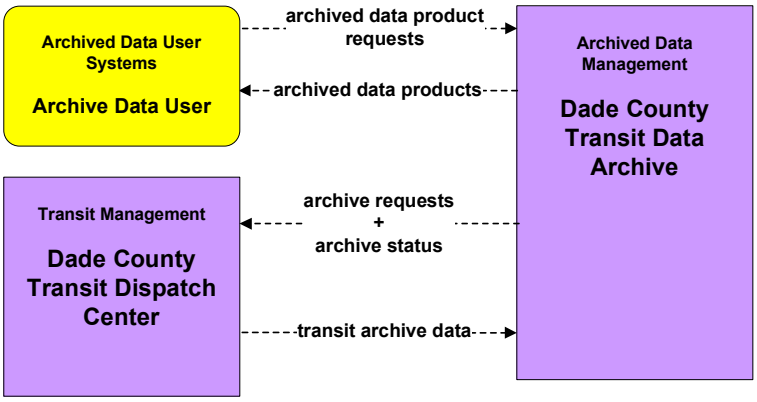
AD1 – ITS Data Mart
Southeast Tennessee HRA Transportation



Note:
Data archive used by the National Transit Database, FTA, and TDOT Office of Public Transportation.

planned/future flow
existing flow
user defined flow

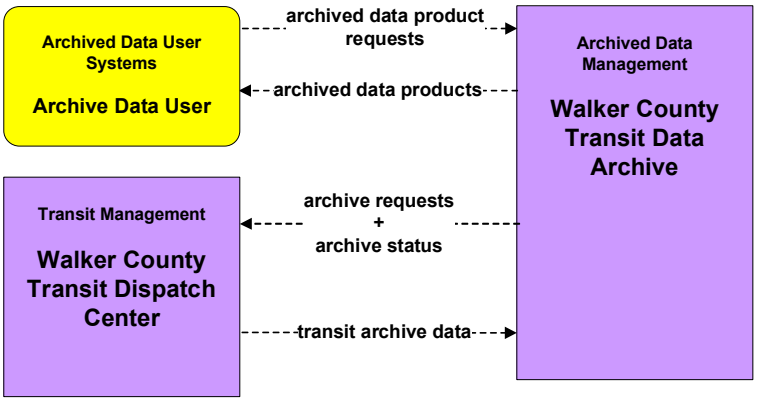
AD1 – ITS Data Mart
Dade County Transit



Note:
Data archive used by the National Transit Database, FTA, and GDOT

planned/future flow
existing flow
user defined flow

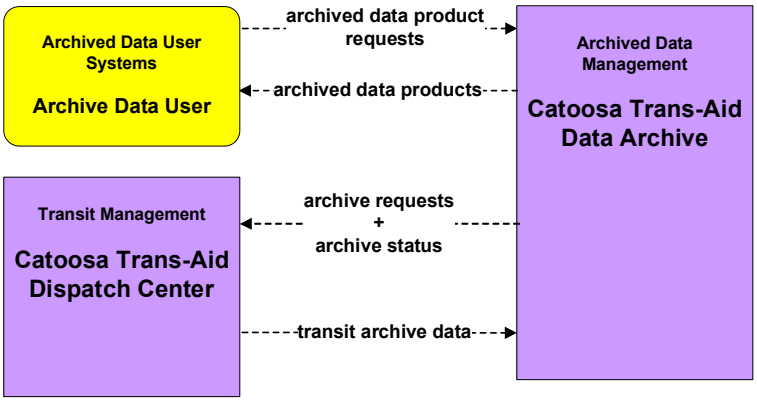
AD1 – ITS Data Mart
Walker County Transit



Note:
Data archive used by the National Transit Database, FTA, and GDOT

planned/future flow
existing flow
user defined flow

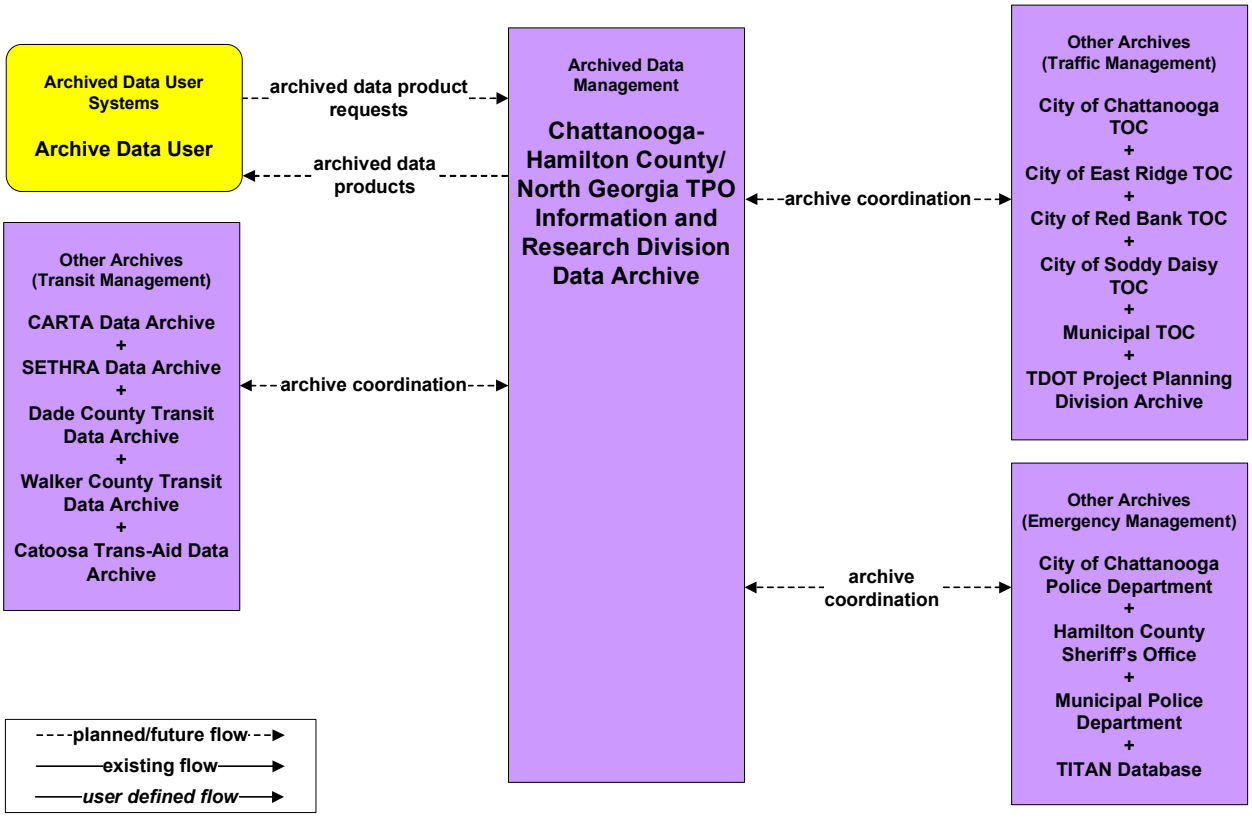
AD1 – ITS Data Mart
Catoosa Trans-Aid



Note:
Data archive used by the National Transit Database, FTA, and GDOT

planned/future flow
existing flow
user defined flow

AD3 – ITS Virtual Data Warehouse
Chattanooga-Hamilton County/North Georgia TPO



APPENDIX C – ELEMENT FUNCTIONS

Element Name	Equipment Package (Function)
CARTA Bus Stop DMS	Remote Transit Information Services
CARTA Care-A-Van Dispatch Center	Center Secure Area Surveillance
	Center Secure Area Sensor Management
	Center Secure Area Alarm Support
	Transit Center Vehicle Tracking
	Transit Center Paratransit Operations
	Transit Center Security
	Transit Vehicle Operator Assignment
	Transit Garage Maintenance
	Transit Vehicle Assignment
	Transit Center Multi-Modal Coordination
	Transit Evacuation Support
	Transit Data Collection
CARTA Data Archive	ITS Data Repository
	Government Reporting Systems Support
CARTA Fixed Route Dispatch Center	Center Secure Area Surveillance
	Center Secure Area Sensor Management
	Center Secure Area Alarm Support
	Transit Center Vehicle Tracking
	Transit Center Fixed-Route Operations
	Transit Center Paratransit Operations
	Transit Center Fare Management
	Transit Center Passenger Counting
	Transit Center Signal Priority
	Transit Center Security
	Transit Vehicle Operator Assignment
	Transit Garage Maintenance
	Transit Vehicle Assignment
	Transit Center Information Services
	Transit Center Multi-Modal Coordination
	Transit Evacuation Support
	Transit Data Collection
CARTA Fixed-Route Vehicles	Field Secure Area Surveillance
	On-board Transit Trip Monitoring
	On-board Schedule Management
	On-board Transit Fare Management
	On-board Passenger Counting
	On-board Transit Security
	On-board Maintenance

Element Name	Equipment Package (Function)
CARTA Fixed-Route Vehicles (continued)	On-board Transit Signal Priority
	On-board Transit Information Services
CARTA Paratransit Vehicles	On-board Transit Trip Monitoring
	On-board Schedule Management
	On-board Paratransit Operations
	On-board Transit Security
	On-board Maintenance
CARTA Routing Application	Personal Interactive Information Reception
CARTA Transit Center CCTV Camera Surveillance	Field Secure Area Sensor Monitoring
	Field Secure Area Surveillance
CARTA Transit Kiosks	Remote Transit Information Services
	Remote Transit Fare Management
CARTA Website	ISP Traveler Data Collection
	Infrastructure Provided Trip Planning
Catoosa County 911 Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Emergency Routing
	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Catoosa County EMA	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Catoosa Trans-Aid Data Archive	ITS Data Repository
	Government Reporting Systems Support
Catoosa Trans-Aid Dispatch Center	Center Secure Area Surveillance
	Center Secure Area Sensor Management
	Center Secure Area Alarm Support
	Transit Center Vehicle Tracking
	Transit Center Paratransit Operations
	Transit Vehicle Operator Assignment
	Transit Evacuation Support
	Transit Data Collection
Catoosa Trans-Aid Transit Center CCTV Camera Surveillance	Field Secure Area Sensor Monitoring
	Field Secure Area Surveillance
Catoosa Trans-Aid Vehicles	On-board Transit Trip Monitoring
	On-board Paratransit Operations
	On-board Transit Security

Element Name	Equipment Package (Function)
Chattanooga-Hamilton County Air Pollution Control Bureau	Emissions Data Management
Chattanooga-Hamilton County Air Quality Sensors	Roadway Emissions Monitoring
CHC/NG TPO Information Research Division Data Archive	ITS Data Repository
	Virtual Data Warehouse Services
City of Chattanooga CCTV Cameras	Roadway Basic Surveillance
City of Chattanooga City-Wide Services	MCM Vehicle Tracking
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Work Zone Management
	MCM Work Activity Coordination
City of Chattanooga City-Wide Services Vehicles	MCV Vehicle Location Tracking
	MCV Work Zone Support
City of Chattanooga DMS	Roadway Traffic Information Dissemination
	Roadway Equipment Coordination
City of Chattanooga Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
City of Chattanooga Fire Vehicles	On-board EV En Route Support
City of Chattanooga Police Department	Emergency Data Collection
City of Chattanooga Police Vehicles	On-board EV En Route Support
City of Chattanooga Portable DMS	Roadway Work Zone Traffic Control
City of Chattanooga Rail Notification System	Standard Rail Crossing
City of Chattanooga Road Closure Notification System	ISP Traveler Data Collection
	Basic Information Broadcast
City of Chattanooga RWIS	Roadway Environmental Monitoring
City of Chattanooga Speed Monitoring Equipment	Roadway Speed Monitoring
City of Chattanooga TOC	Collect Traffic Surveillance
	TMC Signal Control
	TMC Traffic Information Dissemination
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
	HRI Traffic Management
	TMC Speed Monitoring

Element Name	Equipment Package (Function)
City of Chattanooga TOC (continued)	Traffic Maintenance
	TMC Work Zone Traffic Management
	TMC Multimodal Coordination
City of Chattanooga Traffic Signals	Roadway Basic Surveillance
	Roadway Signal Controls
	Roadway Signal Priority
	Standard Rail Crossing
	Roadway Equipment Coordination
City of Chattanooga Website	ISP Traveler Data Collection
	Basic Information Broadcast
City of Cleveland TOC	TMC Signal Control
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
City of East Ridge CCTV Cameras	Roadway Basic Surveillance
City of East Ridge Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
City of East Ridge Public Safety Vehicles	On-board EV En Route Support
City of East Ridge TOC	Collect Traffic Surveillance
	TMC Signal Control
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
	Traffic Maintenance
	TMC Work Zone Traffic Management
City of East Ridge Traffic Signals	Roadway Basic Surveillance
	Roadway Signal Controls
	Roadway Equipment Coordination
City of East Ridge Website	Basic Information Broadcast
City of Red Bank CCTV Cameras	Roadway Basic Surveillance
City of Red Bank Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
City of Red Bank Public Safety Vehicles	On-board EV En Route Support

Element Name	Equipment Package (Function)
City of Red Bank TOC	Collect Traffic Surveillance
	TMC Signal Control
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
	Traffic Maintenance
	TMC Work Zone Traffic Management
City of Red Bank Traffic Signals	Roadway Basic Surveillance
	Roadway Signal Controls
	Roadway Equipment Coordination
City of Red Bank Website	Basic Information Broadcast
City of Soddy Daisy 911 Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Incident Command
	Emergency Early Warning System
	Emergency Response Management
	Emergency Evacuation Support
City of Soddy Daisy CCTV Cameras	Roadway Basic Surveillance
City of Soddy Daisy Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
City of Soddy Daisy Public Safety Vehicles	On-board EV En Route Support
City of Soddy Daisy TOC	Collect Traffic Surveillance
	TMC Signal Control
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
	Traffic Maintenance
	TMC Work Zone Traffic Management
City of Soddy Daisy Traffic Signals	Roadway Basic Surveillance
	Roadway Signal Controls
	Roadway Equipment Coordination
City of Soddy Daisy Website	Basic Information Broadcast

Element Name	Equipment Package (Function)
Dade County 911 Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Emergency Routing
	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Dade County EMA	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Dade County Transit Center CCTV Camera Surveillance	Field Secure Area Sensor Monitoring
	Field Secure Area Surveillance
Dade County Transit Data Archive	ITS Data Repository
	Government Reporting Systems Support
Dade County Transit Dispatch Center	Center Secure Area Surveillance
	Center Secure Area Sensor Management
	Center Secure Area Alarm Support
	Transit Center Vehicle Tracking
	Transit Center Paratransit Operations
	Transit Center Security
	Transit Vehicle Operator Assignment
	Transit Center Multi-Modal Coordination
	Transit Evacuation Support
	Transit Data Collection
Dade County Transit Vehicles	On-board Transit Trip Monitoring
	On-board Paratransit Operations
	On-board Transit Security
GDOT Atlanta TMC	Collect Traffic Surveillance
	TMC Signal Control
	TMC Freeway Management
	TMC Traffic Information Dissemination
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
	Traffic Maintenance
	TMC Work Zone Traffic Management
GDOT CCTV Cameras	Roadway Basic Surveillance

Element Name	Equipment Package (Function)
GDOT District 6 Construction and Maintenance	MCM Vehicle Tracking
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Work Zone Management
	MCM Work Activity Coordination
GDOT District 6 Dalton Area Office	Collect Traffic Surveillance
	TMC Signal Control
	Traffic Maintenance
GDOT District 6 Dalton/Whitfield TCC	Collect Traffic Surveillance
	TMC Signal Control
	TMC Freeway Management
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	Traffic Maintenance
	TMC Work Zone Traffic Management
GDOT DMS	Roadway Traffic Information Dissemination
	Roadway Equipment Coordination
	Roadway Work Zone Traffic Control
GDOT Emergency Services Coordinator	MCM Incident Management
	MCM Roadway Maintenance and Construction
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
GDOT Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
GDOT Maintenance Vehicles	MCV Vehicle Location Tracking
	MCV Work Zone Support
GDOT Smart Work Zone Equipment	Roadway Work Zone Traffic Control
GDOT Statewide Construction and Maintenance System	MCM Work Zone Management
	MCM Work Activity Coordination
GDOT Traffic Signals	Roadway Basic Surveillance
	Roadway Signal Controls
	Roadway Equipment Coordination
GEMA	Incident Command
	Emergency Response Management
	Emergency Evacuation Support

Element Name	Equipment Package (Function)
Georgia 511 System	ISP Traveler Data Collection
	ISP Traveler Information Alerts
	Interactive Infrastructure Information
	Traveler Telephone Information
Georgia NaviGAtor System	Collect Traffic Surveillance
	TMC Traffic Information Dissemination
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	Traffic Maintenance
	TMC Work Zone Traffic Management
GSP Troop A Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
GSP Vehicles	On-board EV En Route Support
Hamilton County E911	Emergency Call-Taking
	Emergency Dispatch
	Emergency Routing
	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
	Center Secure Area Alarm Support
Hamilton County EMA	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Hamilton County EMS	On-board EV En Route Support
Hamilton County Sheriff Vehicles	On-board EV En Route Support
Municipal CCTV Cameras	Roadway Basic Surveillance
Municipal Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
Municipal Police Department	Emergency Data Collection
Municipal Rail Notification System	Standard Rail Crossing
Municipal TOC	Collect Traffic Surveillance
	TMC Signal Control
	TMC Freeway Management
	TMC Regional Traffic Management
	TMC Incident Detection

Element Name	Equipment Package (Function)
Municipal TOC (continued)	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
	TMC Environmental Monitoring
	HRI Traffic Management
	Traffic Maintenance
	TMC Work Zone Traffic Management
Municipal Traffic Signals	Roadway Basic Surveillance
	Roadway Signal Controls
	Roadway Signal Priority
	Standard Rail Crossing
	Roadway Equipment Coordination
Municipal/County Maintenance	MCM Vehicle Tracking
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Work Zone Management
	MCM Work Activity Coordination
Municipal/County Maintenance Vehicles	MCV Vehicle Location Tracking
	MCV Work Zone Support
Municipal/County Portable DMS	Roadway Work Zone Traffic Control
Municipal/County Public Safety Vehicles	On-board EV En Route Support
Municipal/County RWIS	Roadway Environmental Monitoring
Municipal/County Website	ISP Traveler Data Collection
	Basic Information Broadcast
Other GDOT District Construction and Maintenance	MCM Work Activity Coordination
Other TDOT Region Construction Office	MCM Work Activity Coordination
Other TDOT Region Maintenance	MCM Work Activity Coordination
Private Vehicle	Vehicle Toll/Parking Interface
Regional Transit Coordination Center	Transit Center Paratransit Operations
SETHRA Data Archive	ITS Data Repository
	Government Reporting Systems Support
SETHRA Demand Response Transit Vehicles	On-board Transit Trip Monitoring
	On-board Paratransit Operations
	On-board Transit Security
SETHRA Transit Center CCTV Camera Surveillance	Field Secure Area Sensor Monitoring
	Field Secure Area Surveillance

Element Name	Equipment Package (Function)
SETHRA Transportation Dispatch Center	Center Secure Area Surveillance
	Center Secure Area Sensor Management
	Center Secure Area Alarm Support
	Transit Center Vehicle Tracking
	Transit Center Paratransit Operations
	Transit Center Security
	Transit Vehicle Operator Assignment
	Transit Center Multi-Modal Coordination
	Transit Evacuation Support
	Transit Data Collection
Social Networking Services	Basic Information Broadcast
TDOT CCTV Cameras	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Work Zone Traffic Control
TDOT Changeable Speed Limit Signs	Roadway Equipment Coordination
	Roadway Speed Monitoring
TDOT District Maintenance	MCM Vehicle Tracking
	MCM Incident Management
	MCM Work Zone Management
	MCM Work Activity Coordination
TDOT DMS	Roadway Traffic Information Dissemination
	Roadway Equipment Coordination
	Roadway Work Zone Traffic Control
TDOT Emergency Services Coordinator	MCM Incident Management
	MCM Roadway Maintenance and Construction
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
TDOT Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
TDOT Fog Sensors	Roadway Environmental Monitoring
TDOT Fog Zone Speed Detection	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Speed Monitoring
TDOT HAR	Roadway Traffic Information Dissemination
	Roadway Equipment Coordination
	Roadway Work Zone Traffic Control
TDOT HELP Vehicles	On-board EV En Route Support
	On-board EV Incident Management Communication

Element Name	Equipment Package (Function)
TDOT Maintenance Headquarters	MCM Environmental Information Collection
	MCM Environmental Information Processing
TDOT Maintenance Vehicles	MCV Vehicle Location Tracking
	MCV Work Zone Support
TDOT On-Ramp Closure Gates	Roadway Equipment Coordination
	Field Barrier System Control
TDOT Project Planning Division Archive	ITS Data Repository
	Government Reporting Systems Support
	Traffic Data Collection
TDOT Public Information Office	ISP Traveler Data Collection
	Basic Information Broadcast
TDOT Ramp Metering Equipment	Roadway Basic Surveillance
	Roadway Freeway Control
	Roadway Traffic Information Dissemination
	Roadway Equipment Coordination
TDOT Region 2	Toll Administration
TDOT Region 2 Construction Office	MCM Work Activity Coordination
TDOT Region 2 HELP Dispatch	Service Patrol Management
TDOT Region 2 Maintenance	MCM Incident Management
	MCM Roadway Maintenance and Construction
TDOT Region 2 TMC - Chattanooga	Collect Traffic Surveillance
	TMC Freeway Management
	TMC Traffic Information Dissemination
	TMC Regional Traffic Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Evacuation Support
	TMC Environmental Monitoring
	TMC Speed Monitoring
	Barrier System Management
	Traffic Maintenance
	TMC Work Zone Traffic Management
TDOT RWIS Sensors	Roadway Environmental Monitoring
TDOT Smart Work Zone Equipment	Roadway Work Zone Traffic Control

Element Name	Equipment Package (Function)
TDOT SmartWay Information System (TSIS)	ISP Traveler Data Collection
	Basic Information Broadcast
	ISP Traveler Information Alerts
	Interactive Infrastructure Information
	ISP Emergency Traveler Information
	MCM Environmental Information Processing
	MCM Incident Management
TDOT SmartWay Website	ISP Traveler Data Collection
	Basic Information Broadcast
	ISP Traveler Information Alerts
	Interactive Infrastructure Information
	ISP Emergency Traveler Information
TDOT Toll Plazas	Toll Plaza Toll Collection
TEMA	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Tennessee 511 System	ISP Traveler Data Collection
	ISP Traveler Information Alerts
	Interactive Infrastructure Information
	Traveler Telephone Information
	ISP Emergency Traveler Information
Tennessee Bureau of Investigation	Incident Command
	Emergency Response Management
Tennessee GoSmart Kiosks	Remote Interactive Information Reception
THP Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
THP District 2 Office Mississippi EMA	Emergency Response Management
	Emergency Environmental Monitoring
	Collect Traffic Surveillance
	TMC Traffic Information Dissemination
	TMC Environmental Monitoring
	TMC Speed Monitoring
	Barrier System Management
	Traffic Maintenance
THP Vehicles	On-board EV En Route Support

Element Name	Equipment Package (Function)
THP Weigh-in-Motion	Roadside WIM
TITAN Database	ITS Data Repository
	Government Reporting Systems Support
Walker County 911 Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Emergency Routing
	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Walker County EMA	Incident Command
	Emergency Response Management
	Emergency Evacuation Support
Walker County Transit Center CCTV Camera Surveillance	Field Secure Area Sensor Monitoring
	Field Secure Area Surveillance
Walker County Transit Data Archive	ITS Data Repository
	Government Reporting Systems Support
	Virtual Data Warehouse Services
Walker County Transit Dispatch Center	Center Secure Area Surveillance
	Center Secure Area Sensor Management
	Center Secure Area Alarm Support
	Transit Center Vehicle Tracking
	Transit Center Paratransit Operations
	Transit Center Security
	Transit Vehicle Operator Assignment
	Transit Center Multi-Modal Coordination
	Transit Evacuation Support
	Transit Data Collection
Walker County Transit Vehicles	On-board Transit Trip Monitoring
	On-board Paratransit Operations
	On-board Transit Security
	MCM Work Activity Coordination

APPENDIX D – STAKEHOLDER DATABASE

Chattanooga Regional ITS Architecture Stakeholder Attendance Record

	Invitees		Workshop Attendance		
Organization	**First Name**	**Last Name**	**Kick-Off**	**ITS Architecture**	**ITS Deployment Plan**
CARTA Chattanooga Area Regional Transportation Authority	Annie	Powell	☑	☑	☐
CARTA Chattanooga Area Regional Transportation Authority	Jill	Veron	☐	☐	☐
Catoosa County E 911	Joyce	Williams	☐	☐	☐
Catoosa County E 911	Rhonda	Bass	☐	☐	☐
Catoosa County Fire Department	Chuck	Nichols	☐	☐	☐
Catoosa County Road Department	Charles	Taylor	☐	☐	☐
Catoosa County Sheriff	Phil	Summers	☐	☐	☐
Catoosa County Trans-aid	Jean	Altman	☐	☐	☐
Chattanooga Metropolitan Airport Authority	Michael	Landguth	☑	☐	☐
Chattanooga-Hamilton County Health Department	Dawn	Ford	☑	☐	☐
Chattanooga-Hamilton County Regional Planning Agency	Melissa	Taylor	☑	☑	☑
Chattanooga-Hamilton County Regional Planning Agency	Karen	Rennich	☐	☐	☐
Chattanooga-Hamilton County Regional Planning Agency	Patrick	Hall	☑	☑	☑
City of Chattanooga City Attorney's Office	Ken	Fritz	☐	☐	☑
City of Chattanooga Fire Department	Daniel	Hague	☐	☑	☐
City of Chattanooga Fire Department	Phil	Hyman	☐	☑	☐
City of Chattanooga Fire Department	William	Knox	☐	☑	☐
City of Chattanooga Fire Department	Randy	Parker	☐	☐	☐

Organization	First Name	Last Name	Kick-Off	ITS Architecture	ITS Deployment Plan
City of Chattanooga Police Department	Steve	Jones	☐	☑	☐
City of Chattanooga Police Department	Freeman	Cooper	☐	☐	☐
City of Chattanooga Police Department	Stan	Maffett	☐	☑	☐
City of Chattanooga Police Department	John	Collins	☐	☑	☐
City of Chattanooga Police Department	Jeff	Francis	☐	☑	☐
City of Chattanooga Public Works	Steve	Leach	☐	☐	☑
City of Chattanooga Traffic Engineering and Operations	John	Wall	☐	☑	☐
City of Chattanooga Traffic Engineering and Operations	Tommy	Trotter	☐	☑	☑
City of Chattanooga Traffic Engineering and Operations	John	Van Winkle	☑	☑	☐
City of Collegedale Police Department	Brian	Hickman	☐	☐	☐
City of Collegedale Public Works	Rodney	Keeton	☐	☐	☐
City of Dalton Public Works Department	Benny	Dunn	☐	☐	☐
City of East Ridge Department of Public Safety	Tim	Mullinax	☐	☐	☐
City of East Ridge Fire and Police	Eddie	Phillips	☐	☐	☐
City of East Ridge Fire and Rescue	Mike	Flynn	☐	☐	☐
City of East Ridge Traffic Control Division	Mark	Visage	☐	☐	☐
City of East Ridge Traffic Control Division	Bill	Middleton	☐	☑	☑
City of Ft. Oglethorpe	Ron	Goulart	☐	☐	☐
City of Ft. Oglethorpe Fire & Rescue	Bruce	Ballew	☐	☐	☐
City of Ft. Oglethorpe Police Department	David	Eubanks	☐	☐	☐
City of Lookout Mountain GA	Jeff	Hilkert	☐	☐	☐
City of Lookout Mountain GA	Wallace	Taylor	☐	☐	☐
City of Lookout Mountain GA Public Works	Daniel	Cates	☐	☐	☐

Organization	First Name	Last Name	Kick-Off	ITS Architecture	ITS Deployment Plan
City of Red Bank Fire Department	Mark	Mathews	☐	☐	☐
City of Red Bank Police Department	Larry	Sneed	☐	☐	☐
City of Red Bank Public Works	Wayne	Hamill	☐	☐	☐
City of Rossville Public Safety Department	Sid	Adams	☐	☐	☐
City of Soddy-Daisy Building Code Enforcement	Steve	Grant	☐	☐	☐
City of Soddy-Daisy Fire Department	Hardie	Stulce	☐	☐	☐
City of Soddy-Daisy Police Department	Philip	Hamrick	☐	☐	☐
Dade County EMA	Alex	Case	☐	☐	☐
Dade County Sheriff	Patrick	Cannon	☐	☐	☐
FHWA Georgia Division	Lokesh	Hebbani	☑	☐	☐
FHWA Tennessee Division	Don	Gedge	☐	☑	☑
FTA Region IV	Brandy	Smith	☐	☐	☐
FTA Region IV	Abigail	Rivera	☐	☐	☐
FTA Region IV	David	Schilling	☐	☐	☐
GDOT	Hugh	Colton	☐	☑	☑
GDOT	Ronald	Boodhoo	☐	☑	☐
GDOT District 6	Greg	Hood	☐	☐	☐
GDOT Division of Transportation Data and Planning	Angela	Alexander	☐	☐	☐
GDOT State Traffic Operations	Keith	Golden	☐	☐	☐
GEMA Operations Center	Charley	English	☐	☐	☐
Georgia Department of Public Safety	Joe	Hamby	☑	☐	☐
Hamilton County EMA	Bill	Tittle	☐	☐	☐
Hamilton County EMA	Don	Allen	☐	☐	☐

Organization	First Name	Last Name	Kick-Off	ITS Architecture	ITS Deployment Plan
Hamilton County Sheriff's Office	Jim	Hammond	☐	☐	☐
Hamilton County Sheriff's Office	Allen	Branum	☐	☐	☐
Lookout Mountain Community Service	Gary	Rymer	☐	☐	☐
Marion County Sheriff's Office	Bo	Burnett	☐	☐	☐
North Georgia Regional Commission	Matthew	Tucker	☐	☐	☐
NWGRC Northwest Georgia Regional Commission	David	Kenemer	☑	☐	☑
NWGRC Northwest Georgia Regional Commission	Dean	Clemmer	☐	☐	☐
Sequatchie County Sheriff	Ronnie	Hitchcock	☐	☐	☐
SETHRA Southeast Tennessee Human Resource Agency	Mary Lynn	Hickey	☐	☐	☐
SETHRA Southeast Tennessee Human Resource Agency	Chris	Kleehammer	☐	☐	☐
SETHRA Southeast Tennessee Human Resource Agency	Mary	Cookston	☐	☐	☐
SETHRA Southeast Tennessee Human Resource Agency	Wayne	Owens	☐	☐	☐
TDOT Long Range Planning Division	Angela	Midgett	☐	☐	☐
TDOT Long Range Planning Division	Mike	Presley	☑	☑	☐
TDOT Long Range Planning Division	Terry	Gladden	☐	☐	☑
TDOT Office of Incident Management	Frank	Horne	☐	☐	☑
TDOT Region 2	Bob	VanHorn	☑	☑	☑
TDOT Region 2	Landon	Castleberry	☐	☐	☑
TDOT Region 2	James	Ball	☐	☑	☐
TDOT Region 2	Bob	Brown	☐	☐	☐

Organization	First Name	Last Name	Kick-Off	ITS Architecture	ITS Deployment Plan
TDOT Region 2	Jennifer	Flynn	☐	☐	☐
TDOT Region 2	Ray	Rucker	☐	☐	☐
TDOT Region 2	Alan	Wolfe	☐	☑	☑
TDOT Region 2	Holly	Crittenden	☑	☑	☑
TDOT Region 2	Scott	Medlin	☐	☐	☐
TEMA East Region	Gary	Ellis	☐	☐	☐
Tennessee Highway Patrol	Vance	Pitts	☐	☐	☐
Tennessee Highway Patrol	Patricia	Maines-Riggs	☐	☑	☐
Town of Kimball Fire	Jeff	Keef	☐	☐	☐
Town of Kimball Police	Tommy	Jordan	☐	☐	☐
Town of Lookout Mountain Fire & Police	Randall	Bowden	☐	☐	☐
Town of Lookout Mountain Public Works	Jeff	Buffington	☐	☐	☐
Town of Signal Mountain Fire Department	John	Vlasis	☐	☐	☐
Town of Signal Mountain Police Department	Boyd	Veal	☐	☐	☐
Town of Signal Mountain Public Works Department	Loretta	Hopper	☐	☐	☐
Tri-Community Volunteer Fire Department	D.	Pitts	☐	☐	☐
Walker County Sheriff's Office	Steve	Wilson	☐	☐	☐

APPENDIX E – ARCHITECTURE MAINTENANCE DOCUMENTATION FORM

Chattanooga Regional ITS Architecture

ITS Architecture Maintenance Documentation Form

Please complete the following form to document changes to the 2010 Chattanooga Regional ITS Architecture. Forms should be submitted to the Chattanooga Regional Planning Agency (RPA) for review and acceptance. All accepted changes will be kept on file by the RPA and shared with the TDOT Long Range Planning Division. Changes will be incorporated into the 2010 Chattanooga Regional ITS Architecture during the next scheduled update.

Contact Information

Agency	
Agency Contact Person	
Street Address	
City	
State, Zip Code	
Telephone	
Fax	
E-Mail	

Change Information

Please indicate the type of change to the Regional ITS Architecture or Deployment Plan:

- ☐ Administrative Change: Basic changes that do not affect the structure of the ITS market packages in the Regional ITS Architecture.
  Examples include: Changes to stakeholder or element name, element status, or data flow status.
- ☐ Functional Change – Single Agency: Structural changes to the ITS market packages that impact only one agency in the Regional ITS Architecture.
  Examples include: Addition of a new ITS market package or changes to data flow connections of an existing ITS market package. The addition or changes would only impact a single agency.
- ☐ Functional Change – Multiple Agencies: Structural changes to the ITS market packages that have the potential to impact multiple agencies in the Regional ITS Architecture.
  Examples include: Addition of a new ITS market package or changes to data flow connections of an existing ITS market 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.
- ☐ Other: _____
  _____

Submittal

Please submit ITS Architecture Maintenance Documentation form to:

Chattanooga Regional Planning Agency
1250 Market Street
Suite 2000, Development Resource Center
Chattanooga, Tennessee 37402
Phone: 423-757-5216
Fax: 423-757-5532

Form Submittal Date: _____

Chattanooga-Hamilton County RPA Regional Planning Agency

Chattanooga Regional ITS Architecture

ITS Architecture Maintenance Documentation Form

Question 1 Describe the requested change to the Regional ITS Architecture or Deployment Plan.	*Example: City A is planning to deploy CCTV cameras for network surveillance on arterial streets. In the Regional ITS Architecture, the City A Traffic Operations Center (TOC) is shown as the only center controlling the CCTV cameras. The City A TOC is now planning to provide images and control of the CCTV cameras to the City A Police Department for use during incidents.*
Question 2 Are any of the Regional ITS Architecture market packages impacted by the proposed change?	☐ Yes: Please complete Questions 2A and 2B ☐ No: Please proceed to Question 3 ☐ Unknown: Please coordinate with the Chattanooga RPA to determine impacts of the change to the Regional ITS Architecture
Question 2A List all of the ITS market packages impacted by the proposed change.	*Example: ATMS08 – Traffic Incident Management System* *ATMS01 – Network Surveillance*
Question 2B Include a copy of the ITS market packages impacted by the proposed change and mark any proposed modifications to the ITS market packages. Add any additional notes on proposed changes in this section.	*Example: A sketch of the ATMS08 – Traffic Incident Management System market package diagram for City A is attached. Changes have been marked by hand to indicate the new data connections that will be established to allow the City A TOC to send traffic images to the City A Police Department and for the City A Police Department to control the CCTV cameras. The deployment of the CCTV cameras will also result in several of the data flows in ATMS01 – Network Surveillance being changed from planned to existing. These have also been marked on the market package diagram. (Note: The ITS market package diagrams can be found in Appendix B of the Regional ITS Architecture.)*
Question 3 Does the proposed change impact any stakeholder agencies other than the agency completing this form?	☐ Yes: Please complete Questions 3A and 3B ☐ No: Form is complete ☐ Unknown: Please coordinate with the Chattanooga RPA to determine impacts of change to other agencies in the Regional ITS Architecture
Question 3A Identify the stakeholder agencies impacted by the change and a contact person for each agency.	*Example: The City A TOC and City A Police Department are the two agencies impacted by this change. (Note: Assuming the City A TOC representative is completing this form, the contact person from the City A Police Department working on this project should be listed.)*
Question 3B Describe the coordination that has occurred with the stakeholder agencies and the results of the coordination?	*Example: The City A TOC and City A Police Department have had several meetings in the last year to discuss the operations of the arterial CCTV cameras. An operational agreement for the joint operations of the CCTV cameras is currently being developed.*