Kimley»Horn

Clarksville Regional
Intelligent Transportation System Architecture and Deployment Plan Update

FEBRUARY 2015

Clarksville

Regional Intelligent Transportation System Architecture and Deployment Plan

Final Report

Prepared by:

Kimley»Horn

February 2015
118072001

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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
CTS	Clarksville Transit System
CUAMPO	Clarksville Urbanized Area Metropolitan 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
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
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
KYTC	Kentucky Transportation Cabinet
MAP-21	Moving Ahead for Progress in the 21st Century
MC	Maintenance and Construction
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding

LIST OF ACRONYMS

MTP	Metropolitan Transportation Plan
MCHRA	Mid-Cumberland Human Resource Agency
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
RTA	Regional Transportation Authority of Middle Tennessee
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
SWIFT	Statewide Information for Travelers
TDOSHS	Tennessee Department of Safety and Homeland Security
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 (or Traffic Management Center)
TOC	Traffic Operations Center
TraCS	Traffic and Criminal Software
USDOT	United States Department of Transportation
VIVDS	Video Image Vehicle Detection Systems
WAVE	Wireless Access in Vehicular Environments

1. INTRODUCTION

1.1 Project Overview

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

The Clarksville Regional Intelligent Transportation System (ITS) Architecture was first developed in 2006. Since that time, a number of ITS programs and projects have been implemented in the Clarksville Region, such as the City of Clarksville closed circuit television (CCTV) cameras and the Clarksville Transit System automated vehicle location (AVL) system. Additionally, the National ITS Architecture, which served as the basis for the Clarksville Regional ITS Architecture, has been updated. Regional ITS architectures are living documents, and in order to reflect these changes, the Tennessee Department of Transportation completed an update of the Regional ITS Architecture in 2015.

The Regional ITS Architecture consists of several key components:

- ITS Needs – The needs describe the transportation related needs in the Region that could possibly be addressed by ITS.
- ITS Inventory – The inventory describes all of the ITS related elements that either exist or are planned for the Region.
- ITS Service Packages – The ITS service packages describe the services that stakeholders in the region want ITS to provide. ITS service package diagrams have been developed to illustrate how each service will be deployed and operated by each agency in the Region that expressed interest in a particular service. In the previous version of the Clarksville Regional ITS Architecture, ITS service packages were referred to as ITS market packages. The name change has been made to be consistent with the terminology that is now used in Version 7.0 of the National ITS Architecture.
- Use and Maintenance Plan – The use and maintenance plan describes how to use the Regional ITS Architecture for ITS planning and design efforts, such as the development of a Systems Engineering Analysis. It also describes how the Regional ITS Architecture should be maintained in the future.

A regional ITS architecture is 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 and the Moving Ahead for Progress in the 21st Century (MAP-21) bill passed in 2012. 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 Clarksville Regional ITS Architecture update includes the same geographic boundaries as the Clarksville Urbanized Area Metropolitan Planning Organization's (CUAMPO) planning boundaries which include the Fort Campbell Military Installation. The stakeholders developed the Regional ITS Architecture based on a vision of how they wanted to implement and operate ITS through the year 2040 in the Clarksville Region. In addition, the Regional ITS Architecture includes an ITS Deployment Plan. The ITS Deployment Plan identifies projects that have been recommended by the stakeholders as priority projects for their agency that will help achieve the vision of the Regional ITS Architecture.

The Clarksville Regional ITS Architecture was developed with significant input from local, state, and federal officials. Individual interviews were conducted with many of the stakeholders to solicit input 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 developed reflects an up-to-date snapshot of existing ITS deployments and future ITS plans in the Region at the time the plan was completed. Needs and priorities of the Region will change over time and in order to remain effective the Regional ITS Architecture should be periodically reviewed and updated.

1.2 Clarksville Region

1.2.1 Geographic Boundaries

The Clarksville Region is comprised of Montgomery County in Tennessee and the southeast portion of Christian County in Kentucky, which includes the City of Oak Grove and a small portion of the City of Hopkinsville. These boundaries correspond with the regional and planning boundaries of the Clarksville Urbanized Area MPO, which are shown in **Figure 1**. Also within the CUAMPO regional and planning boundaries are the sections of the Fort Campbell Military Installation that are located in Montgomery and Christian Counties.

When developing the stakeholder group, the project team coordinated with the Clarksville Urbanized Area MPO to include the appropriate city, county, regional, state and federal agencies. Stakeholders included both local representatives as well as representatives from TDOT headquarters and Region 3 in Nashville, the Kentucky Transportation Cabinet in Madisonville, and FHWA from the Tennessee Division Office in Nashville.

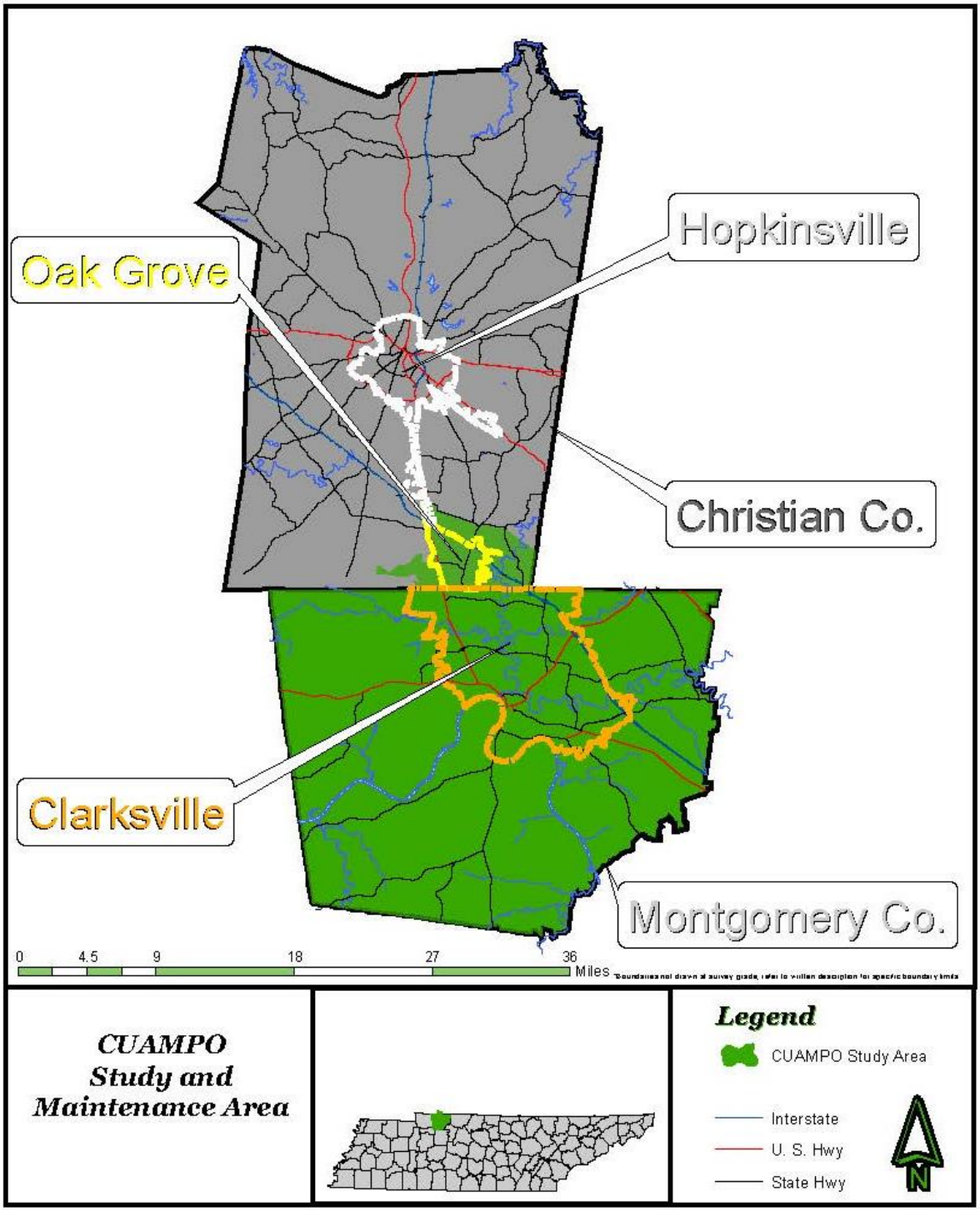


Figure 1 – CUAMPO Regional Boundaries

1.2.2 Transportation Infrastructure

The Clarksville Region is served by a number of significant State and Federal highways. The primary access controlled facility is I-24. There are presently no toll facilities operating or planned within the Clarksville Region. However, TDOT completed a feasibility study in 2009 that examined an extension of SR 374 from its current terminus at US 79/SR 76 (Dover Road) to SR 149. The study identified a proposed toll bridge along the extension across the Cumberland River, but it was determined that the facility was not feasible.

I-24 is the principal highway corridor for the Clarksville Region. I-24 is the principal east-west corridor linking the Clarksville Region to Central Tennessee and Western Kentucky. Additionally, the Edward T. Breathitt Pennyrile Parkway is an access controlled facility located in Christian County just outside the MPO boundaries that serves as a connection to Southern Indiana.

US 41A is the primary north-south route through the Region that facilitates Clarksville commuter traffic. It links the Clarksville urban area to communities to the north including the cities of Hopkinsville, Oak Grove, and the Fort Campbell Military Installation. US 41A parallels I-24 as they both extend southward to Nashville. Other major arterial routes include US 79/SR 13 (Wilma Rudolph Boulevard), SR 236 (Tiny Town Road) and US 79/SR 76 (Dover Road). SR 374 is a semi circumferential route that serves as a link for many of these principal corridors.

Fixed-route and paratransit services are provided in the City of Clarksville and portions of Fort Campbell by the Clarksville Transit System (CTS). Demand response service in the Clarksville Region is provided by several different agencies depending on the County. Within Tennessee, the Mid-Cumberland Human Resource Agency (MCHRA) provides demand response in Montgomery County. In Kentucky, demand response service is provided by Pennyrile Allied Community Services (PACS) in Christian County. Commuter rail and light rail service does not exist within the Region; however a Regional Express Bus service to Nashville is operated by the Regional Transportation Authority of Middle Tennessee (RTA).

The Clarksville 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 Clarksville Region:

- **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). Although those elements are not currently within the Clarksville Region, TDOT's SmartWay website provides congestion, incident, and construction information in the Clarksville Region. TDOT is also updating their SmartWay system to allow municipalities to view live video feeds and potentially allow municipalities to share their CCTV camera feeds with TDOT and other municipalities statewide.
- **Kentucky SAFE Patrol** – KYTC's Kentucky Safety Assistance for Freeway Emergencies (SAFE) program has been in operation since 2004 on a limited number of interstates. In 2006, the program expanded to cover all interstates and parkways statewide in addition to US 23 and SR 80 in eastern Kentucky. SAFE operators assist

motorists with minor vehicle repairs, change flat tires, and provide gas or oil and they also assist with traffic control and detours during major incidents.

- **City of Clarksville Traffic Management –** The City of Clarksville has installed CCTV cameras supporting real time monitoring of the roadway network with plans to install additional cameras in the future. Live video feeds of the CCTV cameras are available to the general public on the City's website. Approximately 70 percent of the traffic signals are connected through fiber optic cables and run on a software program that allows for remote changes to timing plans. The City also operates approximately half a mile of a reversible lane along US 41A/SR 76 (Madison Street).
- **CTS ITS** – CTS continues to expand their ITS program that includes a number of different programs that are either fully implemented or in the process of being implemented. All CTS fixed-route and demand response vehicles include automated vehicle location (AVL) systems and on-board security cameras. Fixed-route vehicles also include electronic fare payment. Transit trip planning services are currently being developed for Google Maps.
- **Fort Campbell** – Fort Campbell has received federal funding for the implementation of various ITS elements within and adjacent to the base. Possible improvements could include the installation of CCTV cameras, dynamic message signs (DMS), and highway advisory radio (HAR).

1.2.3 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.

Table 1 contains a listing of stakeholders for the Clarksville Region who provided input through in-person or telephone interviews to the study team as to the needs and issues that should be considered as part of the Regional ITS Architecture. A complete listing of additional stakeholders who were asked to review the draft documents is included in the stakeholder database in **Appendix D**.

Table 1 – Clarksville Regional Stakeholder Agencies and Contacts

Stakeholder Agency	Address	Contact
City of Clarksville Street Department	199 10th Street Clarksville, TN 37040	Chris Cowan Traffic Engineer
City of Hopkinsville (Hopkinsville/Christian County Community Development Services)	710 South Main Street Hopkinsville, KY 42241	Steve Bourne Director
Clarksville Transit System	430 Boillin Lane Clarksville, TN 37040	Arthur Bing Deputy Transit Director
Clarksville Transit System	430 Boillin Lane Clarksville, TN 37040	Paul Nelson Transportation Planner
Clarksville Urbanized Are MPO	329 Main Street Clarksville, TN 37040	Stan Williams Director
FHWA – Tennessee Division	404 BNA Drive - Building 200, Suite 508 Nashville, TN 37217	Nick Renna Operations Program Manager
Fort Campbell Directorate of Public Works	Building 865 Bastogne Avenue Fort Campbell, KY 42223	Christopher Brown Community Planner
Fort Campbell Directorate of Public Works	Building 865 Bastogne Avenue Fort Campbell, KY 42223	Wally Crow Consultant
Kentucky Transportation Cabinet District 2 Traffic	1840 North Main Street Madisonville, KY 42431	Kenny Potts Transportation Engineering Branch Manager
Mid-Cumberland HRA	1101 Kermit Drive, Suite 300 Nashville, TN 37217	Jeff Simpson Transportation Director
TDOT Long Range Planning Division	505 Deaderick Street Suite 900, James K Polk Building Nashville, Tennessee 37243	Lia Prince Transportation Project Specialist
TDOT Region 3 Traffic	6603 Centennial Boulevard Nashville, TN 37243	Adam Perez TMC Supervisor 2
TDOT Region 3 Traffic	6603 Centennial Boulevard Nashville, TN 37243	Phil Trammel Region 3 Traffic Engineer
TDOT Traffic Operations Division	505 Deaderick Street Suite 300, James K Polk Building Nashville, TN 37243	Robert Benshoof ITS Deployments Manager
TDOT Traffic Operations Division	505 Deaderick Street Suite 300, James K Polk Building Nashville, TN 37243	Said El Said ITS Program Manager

1.3 Document Overview

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

Section 1 – Introduction

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

Section 2 – Regional ITS Architecture Development Process

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

Section 3 – Regional ITS Needs

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

Section 4 – Regional ITS Inventory

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

Section 5 – Regional ITS Architecture

This section describes how the National ITS Architecture was customized to meet the ITS needs, plans, and visions for the Clarksville Region. The ITS service 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 also presented. Operational concepts identifying stakeholder roles and responsibilities have been prepared and potential agreements to support the sharing of data and resources have been identified.

Section 6 – Regional ITS Deployment Plan

This section describes the ITS projects that regional stakeholders expressed a need to deploy in order to deliver the ITS services identified in the regional ITS architecture. Project descriptions include a target deployment timeframe, responsible agency, an opinion of probable cost, funding status, and applicable ITS service packages.

Section 7 – Use and Maintenance of the Regional ITS Architecture

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

The Clarksville Regional ITS Architecture also contains six appendices:

- Appendix A – Service Package Definitions
- Appendix B – Customized ITS Service Packages
- Appendix C – Element Functions
- Appendix D – Stakeholder Database

- Appendix E – Agreements
- Appendix F – Architecture Maintenance Documentation Form

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

http://www.kimley-horn.com/Projects/TennesseeITSArchitecture/clarksville.html

2. REGIONAL ITS ARCHITECTURE UPDATE PROCESS

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

The process followed for the Clarksville 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.

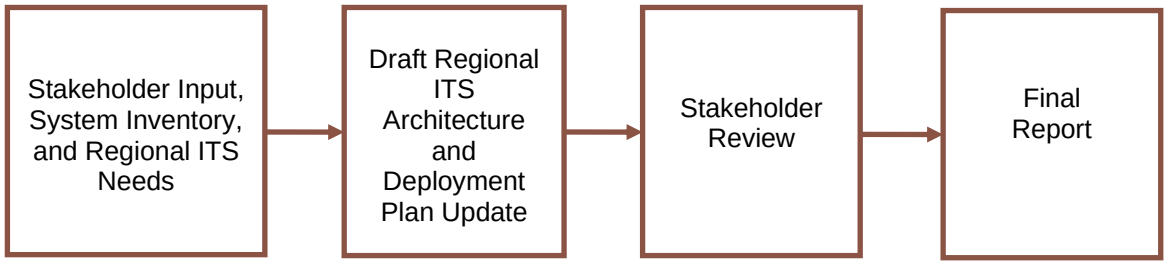


Figure 2 – Clarksville Regional ITS Architecture and Deployment Plan Development Process

Stakeholder Input and System Inventory: Stakeholder input was gathered through a series of interviews that were conducted with stakeholder agencies. The interviews were used to complete the system inventory for the region, define how ITS services are currently being operated, define how ITS services could be operated in the future, and identify potential ITS projects for the region.

Develop Draft Regional ITS Architecture and Deployment Plan Update: Following the stakeholder input, a draft report was developed which identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the ITS system, identifies projects for deployment, and establishes a maintenance plan. Additionally, a website was created to allow stakeholders access to an interactive version of the ITS architecture and documents such as reports, meeting minutes, presentations, and the Turbo Architecture database.

Stakeholder Review: Once the draft Regional ITS Architecture report was completed, stakeholders were sent the draft report to review. Comments and suggestions from the stakeholders were incorporated into the final documents.

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

Turbo Architecture Software

Turbo Architecture Version 7.0 was used to develop the Clarksville Regional ITS Architecture. Turbo Architecture is a software application that was developed by the United States Department of Transportation (USDOT) to be used as a tool for documenting and maintaining ITS architectures. Version 7.0 of Turbo Architecture was released in February 2012 and was developed to support Version

7.0 of the National ITS Architecture. Use of the Turbo Architecture software in development of the regional ITS architectures is recommended by both the FHWA and FTA.

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

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. The USDOT provides the Turbo Architecture free of charge to those that wish to download the software. It is available on the National ITS Architecture website located at http://www.iteris.com/itsarch/. At the time this report was written Turbo Architecture Version 7.0 was the most recent version available.

Table 2 – Turbo Architecture Report and Diagrams

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

3. REGIONAL ITS NEEDS

Regional needs that could be addressed by ITS were identified by stakeholders during the interviews conducted in September 2014. In addition, the Clarksville Urbanized Area MPO's 2040 Metropolitan Transportation Plan (MTP) was reviewed to determine other regional needs that could possibly be addressed in some way through ITS.

Within the 2040 MTP, there were seven local goals that were identified to help direct decisions regarding transportation for the Clarksville Region. Of the seven local goals, ITS can directly support four as described below:

Enhance and Maintain an Efficient, Safe, and Secure Highway and Street Network: ITS can be used to monitor infrastructure, improve incident detection time, and provide advanced warning of incidents or other potential safety issues that might impact travelers.

Manage Local Thoroughfare System to Minimize Congestion: ITS can be used to provide real-time information about current conditions allowing travelers to make more informed decisions, and adaptive traffic signal systems can respond to changing traffic patterns in real-time. ITS is also a critical part of incident management, such as the use of the TDOT HELP trucks to manage traffic during an incident. Incidents make up a large part of the congestion experienced in most urban areas, and improved incident management can reduce non-recurring congestion.

Improve Transit Service Accessibility for All Citizens: ITS in transit operations can assist riders by providing accurate information for trip planning, real-time transit vehicle location information, and transit signal priority to help keep transit vehicles on schedule.

Develop an Integrated Multi-modal Transportation System that Serves the Needs of Both Passengers and Freight Traffic: ITS can be used to optimize the travel times of transit users through vehicle tracking and improve multimodal coordination as transit users transfer between modes. Additionally, for the movement of freight, ITS can be used to track commercial vehicles, provide HAZMAT management, manage the administration of commercial vehicles, and support the highway-rail intersection coordination.

The investment needs identified through the Regional ITS Architecture development process as well as the 2040 MTP goals provided guidance for determining which service packages should be included in the architecture. Stakeholders identified ITS needs for the Clarksville Region in the following areas:

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

In Section 5.1.4 a complete list of regional needs is presented along with the ITS service packages that have been recommended for the Region to consider implementing or expanding (if the service package currently exists) in order to address the needs.

4. REGIONAL ITS INVENTORY

The inventory and needs documented during the individual interviews were 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 Clarksville Region.

The Clarksville stakeholder group agreed to create individual traffic, maintenance, and emergency management elements for the City of Clarksville and individual traffic and emergency management elements for Fort Campbell. The other smaller cities and towns in the Region were documented as part of the municipal elements. This documentation allows the smaller cities and towns to be included in the Regional ITS Architecture, and therefore eligible to use federal funds for future ITS deployments, even if there are no specific plans for ITS implementation at this time.

4.1 Stakeholders

Each element included in the Clarksville Regional ITS Architecture is associated with a stakeholder agency. A listing of stakeholders agencies identified in the Clarksville Regional ITS Architecture can be found in **Table 3** along with a description of each stakeholder. Most stakeholder agencies are called out by name with exception of smaller municipalities. In the Regional ITS Architecture the City of Clarksville is called out by name, but all other municipalities are covered under the general stakeholder name municipal government.

Table 3 – Clarksville Regional Stakeholder Descriptions

Stakeholder	Stakeholder Description
Christian County	County government for Christian County. Includes all county departments such as the Sheriff's Office, Road Department and Christian County Emergency Management.
City of Clarksville	Municipal government for the City of Clarksville. Covers all city departments including those that deal with traffic and public safety.
CTS	Clarksville Transit System. Responsible for fixed route transit and paratransit service in the City of Clarksville.
CUAMPO	Clarksville Urbanized Area Metropolitan Planning Organization
Financial Institution	Institution that handles exchange of money for transit electronic fare collection.
Fort Campbell	Fort Campbell Military Installation responsible for all departments including those related to traffic and public safety within the boundaries of the military base.
KYDMA	Kentucky Department of Military Affairs. Responsible for emergency operations during a disaster or large scale incident.
KYEEC	Kentucky Energy and Environment Cabinet. State agency that operates air quality monitors.
KYJPSC	Justice and Public Safety Cabinet. Responsible for statewide enforcement of traffic safety laws.
KYTC	Kentucky Transportation Cabinet. Responsible for the construction, maintenance, and operation of state roadways in Kentucky as well as commercial vehicle regulations.
MCHRA	Mid-Cumberland Human Resource Agency. Responsible for demand response transportation services in Montgomery County and other counties in Tennessee.
Media	Local media outlets including television stations, newspapers, radio stations and their associated websites.
Montgomery County	County government for Montgomery County. Includes all county departments such as the Sheriff's Office, Highway Department, Emergency Management Agency, and Emergency Medical Services.
Municipal Government	Municipalities within the Region that are not specifically called out. Covers all departments including those that manage traffic, public safety, maintenance, and construction.
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.
PACS	Pennyrile Allied Community Services. Responsible for demand response transportation services in Christian County and other counties in Kentucky.
Private Information Provider	Private sector business responsible for the gathering and distribution of traveler information. This service is typically provided on a subscription basis.
Rail Operators	Companies that operate rail systems including the dispatch and control of trains and the maintenance and operations of railroad tracks.
System Users	All of the users of the transportation system.

Table 3 – Clarksville Regional Stakeholder Descriptions (continued)

Stakeholder	Stakeholder Description
TDEC	Tennessee Department of Environment and Conservation. State agency that monitors air quality stations in Montgomery County.
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.
THP	Tennessee Highway Patrol. Responsible for statewide enforcement of traffic safety laws as well as commercial vehicle regulations.
Transit Operations Personnel	Transit personnel responsible for fleet management, maintenance, and operations of the transit system.

4.2 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 Clarksville Regional ITS Architecture is consistent with the naming convention used in the Tennessee Statewide ITS Architecture. This consistency provides seamless connections between the Regional and Statewide ITS Architectures within Tennessee. Additionally, the Kentucky Statewide ITS Architecture was reviewed in order to include applicable elements in the Clarksville Regional ITS Architecture.

Table 4 – Clarksville Regional Inventory of ITS Elements

Stakeholder	Element Name	Element Description	Status
Christian County	Christian County Emergency Management	Agency responsible for disaster planning for Christian County and managing the emergency operations center (EOC).	Existing
	Hopkinsville-Christian County Emergency Communications Center	911 Public Safety Answering Point (PSAP) responsible for answering all 911 calls made within Christian County and dispatching emergency responders.	Existing
City of Clarksville	City of Clarksville CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Existing
	City of Clarksville Changeable Speed Limit Signs	City of Clarksville roadway equipment that can change the speed limit depending on roadway and traffic conditions.	Planned
	City of Clarksville City Engineers Office	City Engineer's Office responsible for the administration of maintenance and construction projects within the City.	Existing
	City of Clarksville DMS	Dynamic message signs for traffic information dissemination.	Planned
	City of Clarksville 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), Bluetooth devices, or traditional loops.	Existing
	City of Clarksville Fire Dispatch	Emergency dispatch functions for the Fire Department.	Existing
	City of Clarksville Fire Vehicles	City of Clarksville Fire Department vehicles.	Existing
	City of Clarksville Flood Detectors	Flood warning systems for the City of Clarksville that detect flood events at low water crossings throughout the city.	Planned
	City of Clarksville Flood Warning Beacons	Flashing beacons that are activated to warn motorists that water may be on a section of the roadway.	Planned
	City of Clarksville Gas and Water	Department that provides utility services including gas, water, and sewer for Clarksville, Montgomery County, and several counties in Tennessee and Kentucky.	Existing
	City of Clarksville On-Street Parking Meters	On-street parking meters that allow for electronic payment and use sensors in the pavement to detect the presence of vehicles.	Existing
	City of Clarksville Parking Authority	Parking Authority for the City of Clarksville that maintains and operates on-street and surface parking facilities and parking structures.	Existing
	City of Clarksville Police Department	Police department for the City of Clarksville. Non-emergency functions include the collection of crash data and enforcement of speed limits and commercial vehicles.	Existing
	City of Clarksville Police Vehicles	City of Clarksville Police Department vehicles.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
City of Clarksville (continued)	City of Clarksville Portable DMS	Portable dynamic message signs used for traffic information dissemination during maintenance and construction activities, special events, or incidents.	Existing
	City of Clarksville Programmable School Flashing Beacons	School zone warning system that would be installed in the City of Clarksville school zones to warn drivers and allow for remote activation or deactivation the flashers.	Planned
	City of Clarksville Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Planned
	City of Clarksville Reversible Lane Equipment	Lane control signals, dynamic lane control signs, or other devices used in the operation of reversible lanes.	Existing
	City of Clarksville RWIS	Road weather information system sensors to monitor weather conditions at the roadway.	Planned
	City of Clarksville Speed Monitoring Equipment	Equipment used to monitor vehicle speeds for use in targeting locations for police enforcement.	Planned
	City of Clarksville Street Department	Responsible for providing roadway construction and maintenance, drainage maintenance, and traffic control and engineering.	Existing
	City of Clarksville Street Department Vehicles	Vehicles used for street construction, street maintenance, and emergency maintenance response.	Existing
	City of Clarksville TOC	Traffic operations center for the City of Clarksville. 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 Clarksville.	Existing
	City of Clarksville Traffic Signals	Traffic signal system operated by the City of Clarksville.	Existing
	City of Clarksville Variable LED Streetlights	Energy efficient streetlights in the City of Clarksville that allow for variable lighting based on traffic, weather, and roadway conditions.	Planned
	City of Clarksville Website	Website for the City of Clarksville. Includes information on City departments including traffic images.	Existing
CTS	CTS Bus Stop DMS	Clarksville Transit System real-time next bus arrival information boards at select bus stops.	Planned
	CTS Data Archive	Clarksville Transit System data archive for transit data.	Existing
	CTS Demand Response Dispatch Center	Clarksville Transit System paratransit dispatch center.	Existing
	CTS Demand Response Vehicles	Clarksville Transit System paratransit vehicles.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
CTS (continued)	CTS Fixed-Route Dispatch Center	Clarksville Transit System fixed-route dispatch center.	Existing
	CTS Fixed-Route Vehicles	Clarksville Transit System fixed-route vehicles. Includes neighborhood and downtown routes, express buses and any other fixed-route service.	Existing
	CTS Mobile Phone App	Clarksville Transit System mobile phone application that allows users to view transit service information, real-time bus location, and create a transit trip plan.	Planned
	CTS Routing Application	Clarksville Transit System online routing application to assist travelers in developing a customized transit plan for an upcoming trip.	Planned
	CTS Transit Center CCTV Camera Surveillance	Clarksville Transit System closed circuit television camera surveillance at the transit transfer center, on transit vehicles, or at other transit facilities.	Existing
	CTS Transit Kiosks	Clarksville Transit System kiosks for dissemination of transit traveler information. Kiosks can also be used for the purchase and recharging of electronic fare payment cards.	Planned
	CTS Website	Clarksville Transit System website. Provides route and fare information.	Existing
	Electronic Fare Payment Card	Medium for collection of transit fares electronically obtained on all fixed-route buses.	Existing
CUAMPO	CUAMPO Data Archive	Data archive for the transportation related data in Clarksville Urbanized Area Metropolitan Planning Organization.	Planned
	CUAMPO Website	Clarksville Urbanized Area MPO website that displays daily air quality measurements and forecasts and other Regional information.	Existing
	Electronic Fare Payment Card	Medium for collection of transit fares electronically obtained on all fixed-route buses.	Existing
Financial Institution	Financial Service Provider	Handles exchange of money for transit electronic payment collection.	Existing
Fort Campbell	Blanchfield Army Community Hospital EMS Vehicles	Emergency Medical Services vehicles that serve Fort Campbell.	Existing
	Fort Campbell CCTV Cameras	Closed circuit television cameras for traffic surveillance, incident management and security.	Planned
	Fort Campbell Directorate of Emergency Services	Provide emergency and non-emergency services for Fort Campbell including fire, police, 911 dispatch, and gate security.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Fort Campbell (continued)	Fort Campbell Entry Gate Closure Barriers	Equipment that is used to secure the gates on Fort Campbell and control ingress and egress of vehicles.	Existing
	Fort Campbell 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
	Fort Campbell Public Affairs Office	Fort Campbell office responsible for the dissemination of traffic information to the media and the public.	Existing
	Fort Campbell Public Safety Vehicles	Fire and Military Police vehicles on Fort Campbell.	Existing
	Fort Campbell Rail Notification System	Roadway equipment used to alert motorists that a crossing is currently blocked by a train.	Planned
	Fort Campbell TOC	Traffic operations center Fort Campbell. Responsible for the operation of the traffic signal system, closed circuit television (CCTV) cameras, and any other ITS infrastructure deployed within Fort Campbell.	Planned
	Fort Campbell Traffic Signals	Traffic signal system operated by Fort Campbell.	Existing
	Fort Campbell Website	Website for Fort Campbell. Includes information on various departments and in the future it is envisioned that the website will have real-time information about roadway conditions.	Existing
KYDMA	KYEM	Kentucky Emergency Management. Responsible for managing emergency operations during a disaster or large scale incident.	Existing
KYEEC	KYEEC Air Quality Sensors	Kentucky Energy and Environment Cabinet air quality sensors that monitor ozone and particulate matter levels.	Existing
	KYEEC Division for Air Quality	Kentucky Energy and Environment Cabinet responsible for maintaining air quality monitoring stations.	Existing
KYJPSC	KSP Post 2 Dispatch	Kentucky State Police Post 2 dispatch that includes Christian County.	Existing
	KSP Vehicles	Kentucky State Police vehicles.	Existing
KYTC	Cincinnati / Northern Kentucky (ARTIMIS) TMC	Traffic management center operated by both KYTC and the Ohio Department of Transportation that covers the Cincinnati metro area.	Existing
	Condition Acquisition and Reporting System (CARS)	CARS is a statewide roadway conditions database. Authorized users of CARS can submit and view information statewide. Information dissemination through multiple media outlets is supported by CARS.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
KYTC (continued)	Kentucky 511 IVR	Kentucky 511 Interactive Voice Response. The IVR accepts callers' requests and provides responses to specific traveler information needs.	Existing
	Kentucky 511 System	Statewide 511 traveler information system that includes the customer interface component of the 511 phone system, smartphone application, and website.	Existing
	Kentucky SAFE Patrol Dispatch	Kentucky Safety Assistance for Freeway Emergencies (SAFE) dispatch for roadway service patrols.	Existing
	Kentucky SAFE Patrol Vehicles	KYTC roadway service patrol vehicles that serve all interstates and parkways in the state in addition to US 23 and KY 80.	Existing
	KYTC CCTV Cameras	KYTC closed circuit television cameras for traffic surveillance and incident management.	Existing
	KYTC DataMart	KYTC data archive for the Kentucky Transportation Cabinet.	Existing
	KYTC District 2 Engineers Office	KYTC 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
	KYTC District 2 Maintenance and Construction	KYTC entity responsible for the oversight of construction and maintenance in District 2.	Existing
	KYTC District 2 TMC	KYTC District 2 Transportation Management Center (TMC) located in Madisonville. Operate and maintain traffic signals on state routes and CCTV cameras.	Existing
	KYTC DMS	KYTC dynamic message signs used for traffic information dissemination.	Existing
	KYTC Emergency Services Coordinator	KYTC coordinator responsible for managing the KYTC response in a large scale incident or disaster in which the Kentucky Emergency Management (KYEM) division activates the state emergency operations center (EOC).	Existing
	KYTC Field Sensors	KYTC roadway equipment used to detect vehicle volumes and/or speeds. Includes equipment such as VIVDS, RTMS, or traditional loops.	Existing
	KYTC HAR	KYTC highway advisory radio for traffic information dissemination.	Planned
	KYTC Maintenance Vehicles	KYTC vehicles used in maintenance operations.	Existing
	KYTC Public Affairs Office	KYTC Office responsible for the dissemination of traffic information to the media and the public.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
KYTC (continued)	KYTC RWIS Sensors	KYTC road weather information system sensors to monitor weather conditions at the roadway.	Existing
	KYTC Smart Work Zone Equipment	KYTC 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
	KYTC Statewide IMOC	KYTC Incident Management Operations Center (IMOC) in Frankfort that serves as the statewide traffic management center. The IMOC has operates all DMS in the region.	Existing
	KYTC Traffic Signals	KYTC traffic signal system operated on state highways.	Existing
	Louisville (TRIMARC) TMC	Traffic management center operated by KYTC that covers the Louisville metro area.	Existing
MCHRA	MCHRA Data Archive	Mid-Cumberland Human Resource Agency data archive for transit data.	Planned
	MCHRA Public Transit Demand Response Vehicles	Mid-Cumberland Human Resource Agency demand response vehicle fleet.	Existing
	MCHRA Public Transit Dispatch Center	Mid-Cumberland Human Resource Agency dispatch center responsible for the tracking, scheduling and dispatching of MCHRA demand response services. MCHRA operates in Cheatham, Davidson, Dickson, Houston, Humphreys, Montgomery, Robertson, Rutherford, Stewart, Sumner, Trousdale, Williamson, and Wilson Counties.	Existing
	MCHRA Public Transit IVR System	Mid-Cumberland Human Resource Agency Interactive Voice Response. This is a customer interface component that calls transit riders and reminds them of their transit trip and provides approximate next-stop arrival times of the transit vehicle.	Existing
	MCHRA Public Transit Passes	Mid-Cumberland Human Resource Agency passes for MCHRA Public Transit that can be purchased on the MCHRA Public Transit website.	Existing
	MCHRA Public Transit Website	Mid-Cumberland Human Resource Agency website with information about fares and schedules.	Existing
Media	Local Print and Broadcast Media	Local media that provide traffic or incident information to the public.	Existing
Montgomery County	Montgomery County E-911 Center Dispatch	911 Public Safety Answering Point (PSAP) responsible for answering all 911 calls made within the county and dispatching emergency responders.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Montgomery County (continued)	Montgomery County EMA	Montgomery County Emergency Management Agency. Responsible for disaster planning for the County and operating the emergency operations center (EOC).	Existing
	Montgomery County EMS Vehicles	Montgomery County Emergency Medical Services.	Existing
	Montgomery County Sheriff Vehicles	Montgomery County Sheriff's Office vehicles.	Existing
	Montgomery County Sheriff's Office	Law enforcement agency for Montgomery County. The emergency dispatch functions for the Sheriff's Office are included in the Montgomery County E-911 Center. Non-emergency functions include the collection of crash data.	Existing
Municipal Government	Municipal CCTV Cameras	Municipal closed circuit television cameras for traffic surveillance and incident management.	Planned
	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 Montgomery County E-911 Center or the Hopkinsville-Christian County Emergency Communications Center. 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 Clarksville 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

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Municipal Government (continued)	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
Other Agencies	Other KYTC District Maintenance and Construction	Other KYTC District Maintenance and Construction Offices.	Existing
	Other KYTC District TMCs	KYTC traffic management centers in adjacent districts with which information is shared for coordination in an emergency situation or for regional traffic management.	Existing
	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 TDOT Region District Operations	Other TDOT regional district operations offices.	Existing
	Other Traffic Management Agencies	Additional traffic management agencies with which information is shared for coordination in an emergency situation.	Existing
PACS	PACS Data Archive	Data archive for Pennyrile Allied Community Services data.	Planned
	PACS Transportation Demand Response Vehicles	Vehicles used by Pennyrile Allied Community Services to provide demand response transit service in Christian County. The fleet includes vehicles equipped with wheelchair lifts and lowered floor wheelchair vans.	Existing
	PACS Transportation Dispatch Center	Dispatch center for Pennyrile Allied Community Services vehicles.	Existing
	PACS Transportation Website	Pennyrile Allied Community Services website that contains information about fares and schedules.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
Private Information Provider	Private Sector Traveler Information Services	Traveler information service operated by a private entity.	Existing
	Social 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
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
	Public/Private Vehicles	Public or private vehicles that traverse the region.	Existing
	Traveler	Users of the transportation system.	Existing
TDEC	TDEC Air Quality Sensors	Air quality sensors that monitor ozone and particulate matter levels.	Existing
	TDEC Division of Air Pollution Control	Tennessee Department of Environment and Conservation division responsible for establishing emission standards and procedures for industries and maintaining air quality monitoring stations.	Existing
TDOT	TDOT CCTV Cameras	Closed circuit television cameras for traffic surveillance and incident management.	Planned
	TDOT Changeable Speed Limit Signs	TDOT roadway equipment that can change the speed limit depending on roadway and traffic conditions.	Planned
	TDOT Community Relations Division	TDOT Division responsible for the dissemination of traffic information to the media and the public.	Existing
	TDOT DMS	TDOT dynamic message signs for traffic information dissemination.	Planned
	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.	Planned

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT (continued)	TDOT HAR	TDOT highway advisory radio for traffic information dissemination.	Planned
	TDOT HELP Vehicles	TDOT roadway service patrol vehicles. Currently operate in and are dispatched elsewhere in the Region for large incidents.	Planned
	TDOT Long Range Planning Division Archive	Data archive for the Long Range Planning Division. The Division is responsible for traffic data collection and analysis.	Existing
	TDOT Maintenance Headquarters	TDOT maintenance headquarters.	Existing
	TDOT Maintenance Vehicles	TDOT vehicles used in maintenance operations.	Existing
	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 TMC - Chattanooga	TDOT transportation management center for Region 2, located in Chattanooga. Responsible for the operation of the ITS equipment located in Region 2. This includes the freeway management system in Chattanooga as well as rural ITS deployments.	Existing
	TDOT Region 3 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 3 HELP Dispatch	TDOT roadway service patrol dispatch. Currently service is limited to the Nashville area except in the case of a large scale incident.	Existing
	TDOT Region 3 District Operations	TDOT office that manages roadway maintenance and construction projects and responds to incidents when services are requested by local emergency management in Region 3.	Existing

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
TDOT (continued)	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.	Planned
	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
	TDOT SmartWay Mobile App	Mobile phone application that allows users to view traffic images, receive incident information, and monitor traffic speeds.	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 SWIFT.	Existing
	TDOT Statewide Information for Travelers (SWIFT)	SWIFT 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). SWIFT feeds the Statewide 511 system and SmartWay website.	Existing
	TDOT Wrong-Way Detection and Warning Equipment	Electronic warning signs, field sensors, or other devices used in the operation of wrong-way vehicle detection and warning.	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
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

Table 4 – Clarksville Regional Inventory of ITS Elements (continued)

Stakeholder	Element Name	Element Description	Status
THP	THP Dispatch	Tennessee Highway Patrol dispatch center. There are several THP dispatch centers around the state of Tennessee.	Existing
	THP Vehicles	Tennessee Highway Patrol vehicles.	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
Transit Operations Personnel	Transit Operations Personnel	Transit personnel responsible for fleet management, maintenance, and operations of the transit system.	Existing

5. 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 Clarksville Region. The National ITS Architecture has the following eight groups of ITS service areas:

- ***Traffic Management*** – includes the TDOT SmartWay TMC in Nashville 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 the Commercial Vehicle Information Systems and Networks (CVISN) effort.
- ***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 Clarksville Regional ITS Architecture because implementation of those service packages would primarily be by private sector automobile manufacturers and information service providers. Additionally, Commercial Vehicle Operations was not included as it is viewed as more of a statewide effort and there was no expressed need by stakeholders to include this service on a regional level at this time.

5.1 ITS Service Packages

In the National ITS Architecture, services that are provided by ITS are referred to as ITS service packages. ITS service packages can include several stakeholders and elements that work together to provide a service in the Region. Examples of ITS service packages from the National ITS Architecture include Network Surveillance, Traffic Information Dissemination, and Transit Vehicle Tracking. There are currently a total of 97 ITS service packages identified in the National ITS Architecture Version 7.0, which was the most recent version available of the National ITS Architecture at the time of the 2015 Clarksville Regional ITS Architecture update. As noted in Section 1.1, in the previous version of the Clarksville Regional ITS Architecture, ITS service packages were referred to as ITS market packages. The name change has been made to be consistent with the terminology that is now used in Version 7.0 of the National ITS Architecture.

5.1.1 Overview of ITS Service Package Structure

An ITS service package is made up of elements and data flows. Each identified system or component in the Clarksville regional ITS inventory, which is documented in the previous

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

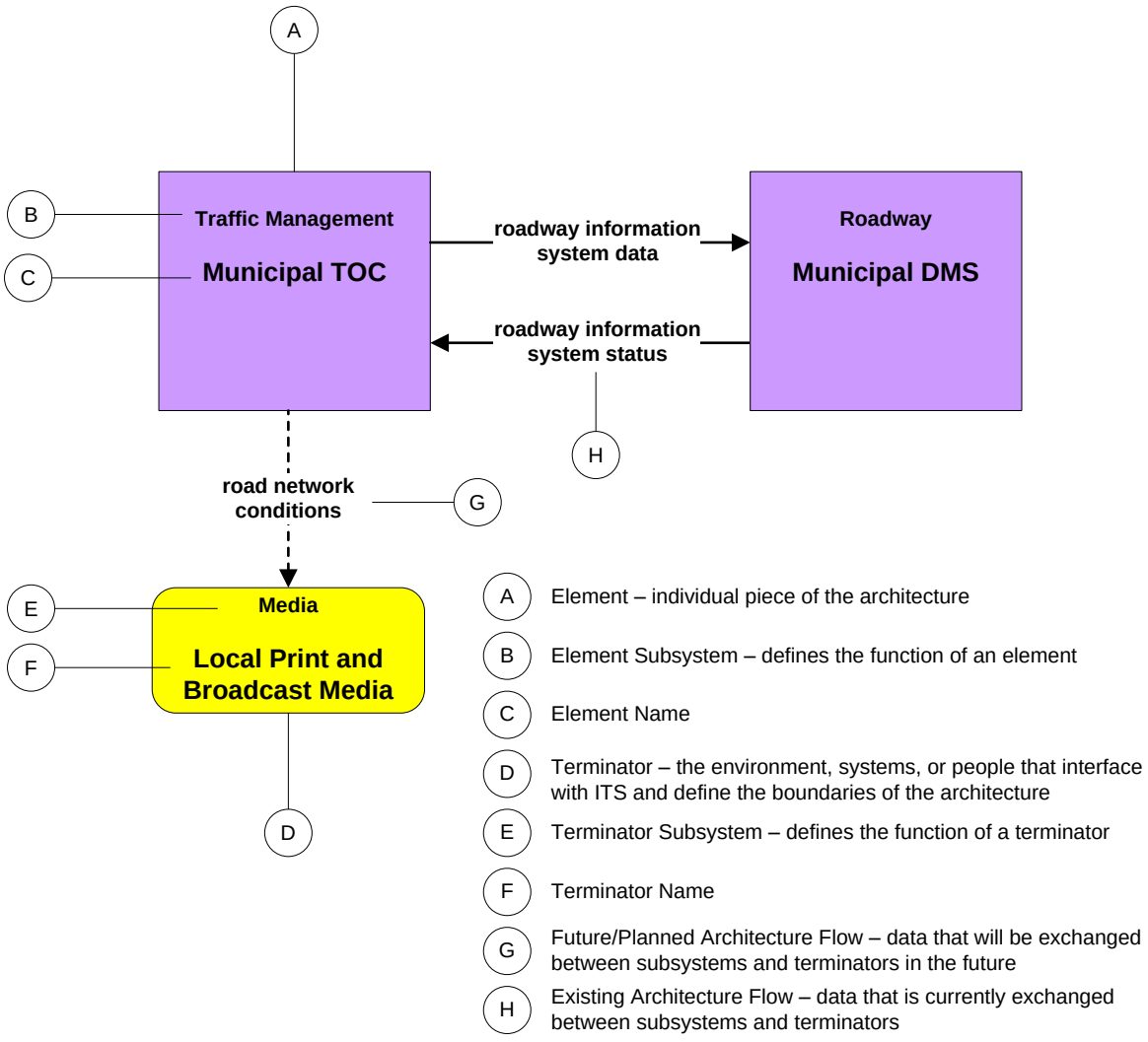


Figure 3 – Overview of ITS Service Package Structure

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

Subsystems are the highest level building blocks of the physical architecture, and the National ITS Architecture groups them into four major classes: Centers, 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 transfer 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 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.

5.1.2 Selection and Prioritization of Regional ITS Service Packages

In the Clarksville Region, the National ITS Architecture service packages were reviewed by the stakeholders and selected based on the relevance of the functionality that the ITS service package could provide to the Region. Stakeholders selected 45 ITS service packages for implementation in the Region, and they are identified in **Table 5**. Stakeholders prioritized the selected service packages during the workshop, and the table organizes the service 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 Clarksville Region that could be addressed locally, the commercial vehicle operations service packages were not selected and instead will be covered in the CVISN effort to ensure consistency.

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

Table 5 – Clarksville Regional ITS Service Package Prioritization by Functional Area

High Priority ITS Service Packages		Medium Priority ITS Service Packages		Low Priority ITS Service Packages	
Traffic Management					
ATMS01	Network Surveillance	ATMS02	Traffic Probe Surveillance	ATMS04	Traffic Metering
ATMS03	Traffic Signal Control	ATMS13	Standard Railroad Grade Crossing	ATMS11	Emissions Monitoring and Management
ATMS06	Traffic Information Dissemination	ATMS17	Regional Parking Management	ATMS12	Roadside Lighting System Control
ATMS07	Regional Traffic Management	ATMS18	Reversible Lane Management		
ATMS08	Traffic Incident Management System	ATMS19	Speed Warning and Enforcement		
ATMS16	Parking Facility Management	ATMS24	Dynamic Roadway Warning		
ATMS21	Roadway Closure Management				
ATMS22	Variable Speed Limits				
Emergency Management					
EM01	Emergency Call-Taking and Dispatch	EM06	Wide-Area Alert	EM07	Early Warning System
EM02	Emergency Routing	EM08	Disaster Response and Recovery		
EM04	Roadway Service Patrols	EM09	Evacuation and Reentry Management		
		EM10	Disaster Traveler Information		
Maintenance and Construction Management					
MC03	Road Weather Data Collection	MC01	Maintenance and Construction Vehicle and Equipment Tracking		
MC08	Work Zone Management	MC04	Weather Information Processing and Distribution		
MC10	Maintenance and Construction Activity Coordination				
Public Transportation Management					
APTS01	Transit Vehicle Tracking	APTS07	Multi-modal Coordination		
APTS02	Transit Fixed-Route Operations	APTS09	Transit Signal Priority		
APTS03	Demand Response Transit Operations	APTS11	Multimodal Connection Protection		
APTS04	Transit Fare Collection Management				
APTS05	Transit Security				
APTS06	Transit Fleet Management				
APTS08	Transit Traveler Information				
APTS10	Transit Passenger Counting				
Traveler Information					
ATIS01	Broadcast Traveler Information				
ATIS02	Interactive Traveler Information				
Archived Data Management					
		AD1	ITS Data Mart		
		AD3	ITS Virtual Data Warehouse		

5.1.3 Customization of Regional ITS Service Packages

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

Figure 4 is an example of an Advanced Traffic Management System (ATMS) service package for traffic information dissemination that has been customized for the Region. This instance focuses on the activities of TDOT. The ITS service package shows the distribution of traffic information from the TDOT Region 3 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 SWIFT for inclusion on the SmartWay website and mobile phone app as well as 511. Data flows between the subsystems indicate what information is being shared. The remainder of the ITS service packages that were customized for the Clarksville Region are shown in **Appendix B**.

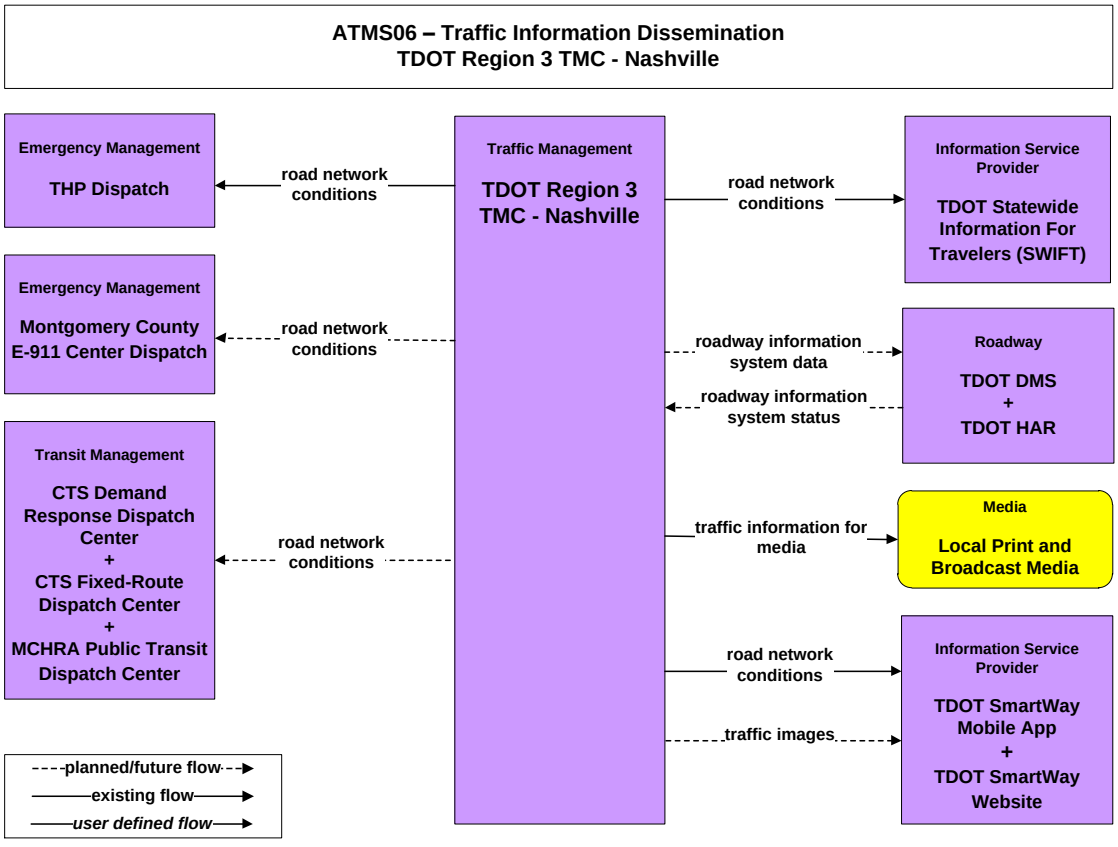


Figure 4 – Example ITS Service Package Diagram: ATMS06 – Traffic Information Dissemination (TDOT Region 3 TMC)

5.1.4 Regional Needs and Corresponding ITS Service Packages

Input received from stakeholders during the in-person interviews provided valuable input for the ITS service package customization process. The needs identified in the Regional ITS Architecture interviews, as well as needs from the Clarksville Urbanized Area MPO's 2040 Metropolitan Transportation Plan (MTP) are identified in **Table 6**. The table also identifies which ITS service packages could be implemented to address the need.

Table 6 – Clarksville Regional ITS Needs and Corresponding ITS Service Packages

ITS Need	Corresponding ITS Service Packages
Traffic Management and Traveler Information	
Need to enhance and maintain an efficient, safe, and secure highway and street network	ATMS01 – Network Surveillance ATMS04 – Traffic Metering ATMS06 – Traffic Information Dissemination ATMS08 – Traffic Incident Management System ATMS13 - Standard Railroad Grade Crossing ATMS19 – Speed Warning and Enforcement ATMS21 – Roadway Closure Management ATMS22 – Variable Speed Limits ATMS24 – Dynamic Roadway Warning EM02 – Emergency Routing EM04 – Roadway Service Patrols MC03 – Road Weather Data Collection MC04 – Weather Info Processing and Distribution MC08 – Work Zone Management MC10 – Maintenance and Construction Coordination
Need to improve coordination between TDOT and KYTC	ATMS07 – Regional Traffic Management ATMS08 – Traffic Incident Management System
Need to utilize various strategies along major corridors to maintain design capacity and overall level of service	ATMS03 – Traffic Signal Control ATMS04 – Traffic Metering ATMS06 – Traffic Information Dissemination ATMS18 – Reversible Lane Management ATMS22 – Variable Speed Limits
Need to expand the interconnected traffic signal system network and system detection capabilities	ATMS01 – Network Surveillance ATMS03 – Traffic Signal Control
Need to expand CCTV camera coverage areas throughout the Region	ATMS01 – Network Surveillance
Need to remotely control warning beacons for school zones	ATMS03 – Traffic Signal Control
Need to create and expand fiber optic connections between traffic management agencies for better coordination	ATMS07 – Regional Traffic Management
Need to convey information to drivers through dynamic message signs, highway advisory radio, or other devices	ATMS06 – Traffic Information Dissemination ATMS24 – Dynamic Roadway Warning
Need to provide alternate route information when incidents occur on the interstate	ATMS01 – Network Surveillance ATMS02 – Traffic Probe Surveillance ATMS06 – Traffic Information Dissemination ATIS01 – Broadcast Traveler Information ATIS02 – Interactive Traveler Information
Need to expand parking facility management and provide information on parking availability	ATIS02 – Interactive Traveler Information ATMS06 – Traffic Information Dissemination ATMS16 – Parking facility Management ATMS17 – Regional Parking Management

Table 6 – Clarksville Regional ITS Needs and Corresponding ITS Service Packages (continued)

ITS Need	Corresponding ITS Service Packages
Traffic Management and Traveler Information (continued)	
Need to monitor rail crossing and convey blockages to drivers	ATMS13 – Standard Railroad Grade Crossing
Need to develop an ITS master plan for the deployment of ITS projects	ATMS07 – Regional Traffic Management
Need to improve Fort Campbell entrance traffic flow and barrier gates	ATMS21 – Roadway Closure Management
Emergency Management	
Need to assist emergency vehicle movement with traffic signal preemption and monitoring	ATMS03 – Traffic Signal Control EM01 – Emergency Call-Taking and Dispatch EM02 – Emergency Routing
Need to expand roadway service patrols for motorist assistance and incident management	ATMS08 – Traffic Incident Management System EM04 – Roadway Service Patrols
Maintenance and Construction Management	
Need to monitor roadway weather conditions through the installation of additional road weather data collection stations and warn drivers of hazardous conditions	ATMS06 – Traffic Information Dissemination ATMS24 – Dynamic Roadway Warning EM07 – Early Warning System MC03 – Road Weather Data Collection MC04 – Weather Information Processing and Distribution
Need to provide real-time construction and maintenance information for traffic, transit and emergency operations	MC08 – Work Zone Management MC10 – Maintenance and Construction Coordination
Public Transportation Management	
Need to improve coordination among transit agencies	APTS02 – Transit Fixed-Route Operations APTS03 – Demand Response Transit Operations APTS07 – Multi-modal Coordination APTS11 – Multimodal Connection Protection
Need to implement bus priority along specific corridors	APTS09 – Transit Signal Priority ATMS03 – Traffic Signal Control
Need to monitor bus passenger boarding and alighting	APTS10 – Transit Passenger Counting
Need to provide real-time information to transit riders through DMS, a smartphone application, or QR codes	APTS01 – Transit Vehicle Tracking APTS08 – Transit Traveler Information
Need to improve transit vehicle safety and security	APTS02 – Transit Fixed Route Operations APTS03 – Demand Response Transit Operations APTS05 – Transit Security APTS06 – Transit Fleet Management
Need to implement smart card system for both fixed-route and demand response vehicles	APTS04 – Transit Fare Collection Management
Need to implement a transit trip planning system that is accessed by transit users through the web	APTS08 – Transit Traveler Information ATIS02 – Interactive Traveler Information

Table 6 – Clarksville Regional ITS Needs and Corresponding ITS Service Packages (continued)

ITS Need	Corresponding ITS Service Packages
Archived Data Management	
Need to archive data gathered through ITS to make it more accessible to regional stakeholders	AD1 – ITS Data Warehouse AD2 – ITS Virtual Data Warehouse

5.2 Architecture Interfaces

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

5.2.1 Top Level Regional System Interconnect Diagram

A system interconnect diagram, or "sausage diagram", shows the systems and primary interconnects in the Region. The National ITS Architecture interconnect diagram has been customized for the Clarksville Region based on the system inventory and information gathered from the stakeholders. **Figure 5** summarizes the existing and planned ITS elements for the Clarksville 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.

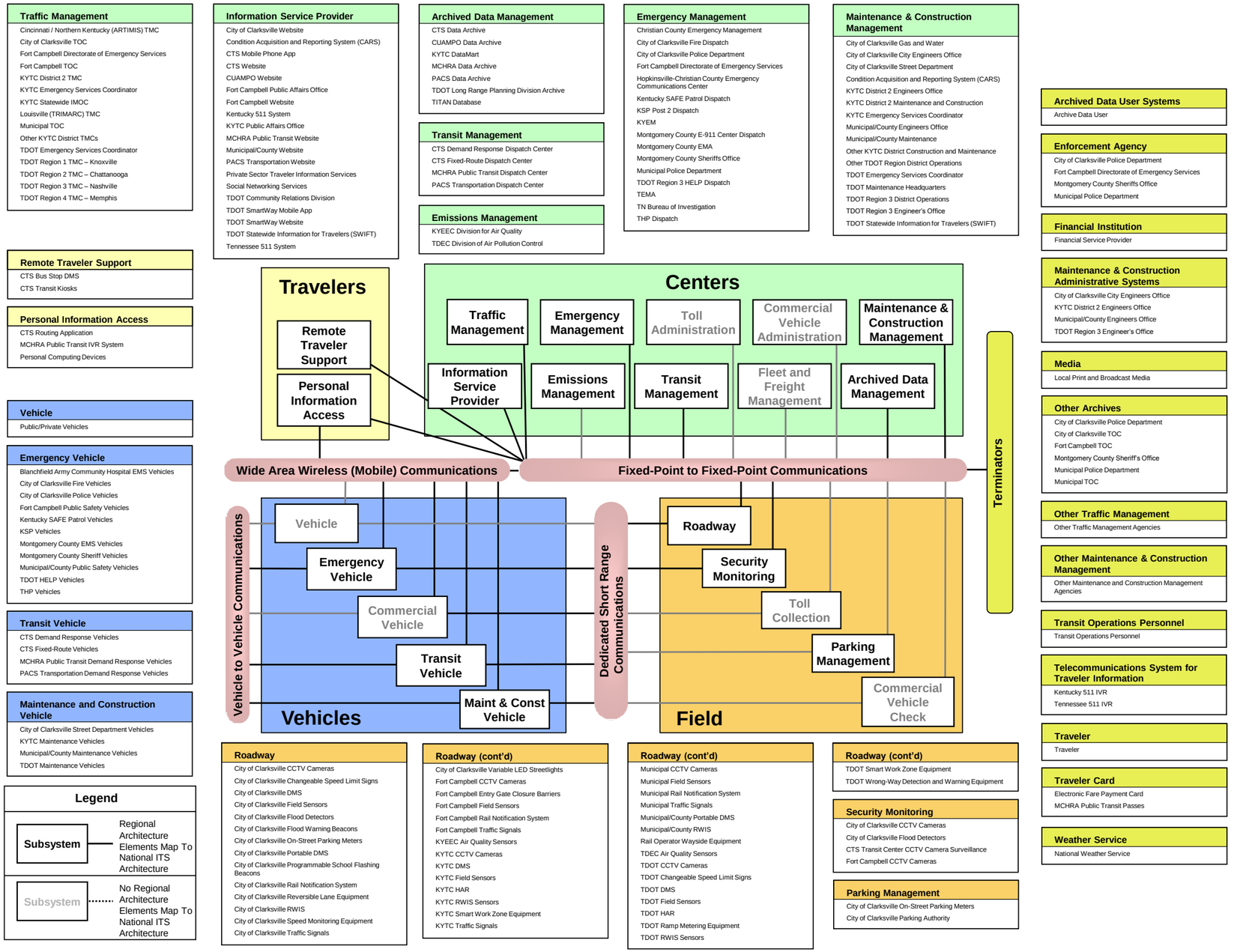


Figure 5 – Clarksville Regional System Interconnect Diagram

5.2.2 Element Connections

A number of different elements are identified as part of the Clarksville 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 Clarksville 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 Fort Campbell Traffic Signals, which shows connections that could be made in the future.

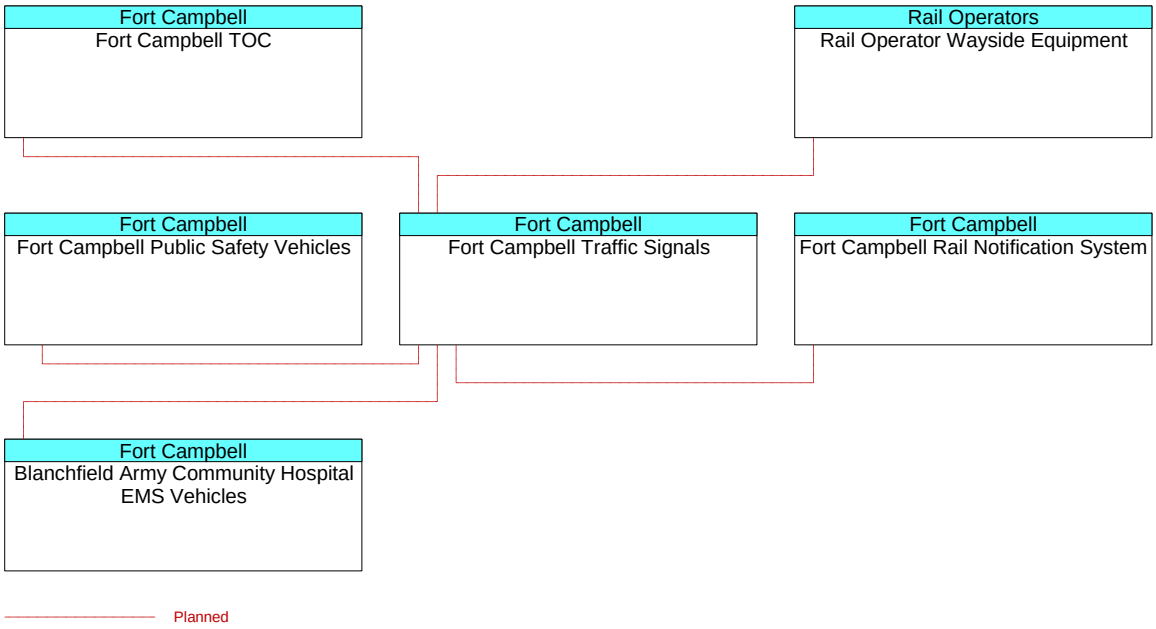


Figure 6 – Example Interconnect Diagram: Fort Campbell Traffic Signals

5.2.3 Data Flows Between Elements

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

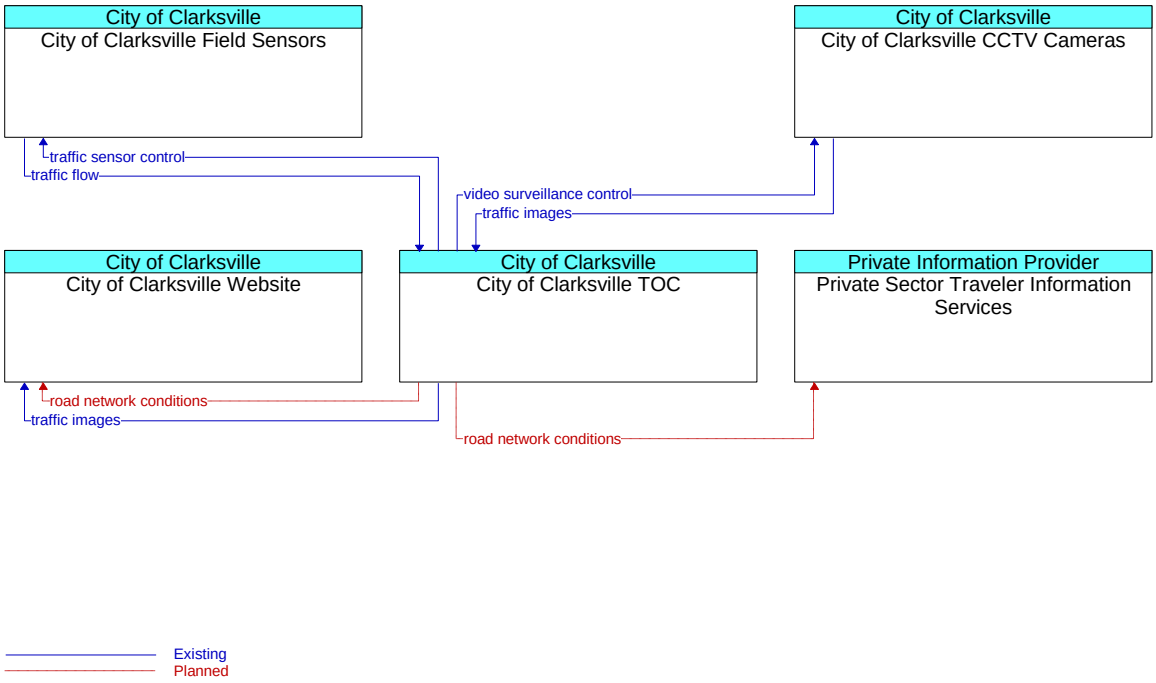


Figure 7 – Example Flow Diagram: ATMS01 – Network Surveillance

5.3 Functional Requirements

Functions are a description of what the system should 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 Clarksville 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 Clarksville Regional ITS Architecture, functional requirements have been identified at two levels. The customized service packages, discussed previously in Section 5.1.3, describe the services that ITS needs to provide in the Region and the architecture flows between the elements. These service packages and data flows describe what ITS in the Clarksville Region should do and the data that needs to be shared among elements.

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

5.4 Standards

Standards are an important tool that will allow efficient implementation of the elements in the Clarksville 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 currently apply to the Clarksville Regional ITS Architecture. These standards are based on the physical subsystem architecture flows previously identified in Section 5.2.3 and shown in the service package diagrams in **Appendix B**.

While **Table 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 at the top select the tab for Architecture;
- Select the link to Physical Architecture;
- Select the Architecture Flows link embedded in the descriptive paragraph about the Physical Architecture;
- From the alphabetical list of flows that appears locate and select the desired flow;
- Architecture flows are often used between multiple subsystems so scrolling may be required to find the appropriate information associated with the particular use of the flow, in the descriptive information any applicable standards will be identified; and
- For additional information on the applicable standards the standard name is a link that when selected leads to a more detailed description of the standard.

Table 7 – Clarksville Regional ITS Standards

SDO	Document ID	Title
AASHTO/ITE	ITE TMDD	Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)
AASHTO/ITE/NEMA	NTCIP 1201	Global Object Definitions
	NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller (ASC) Units
	NTCIP 1203	Object Definitions for Dynamic Message Signs (DMS)
	NTCIP 1204	Object Definitions for Environmental Sensor Stations (ESS)
	NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control
	NTCIP 1206	Object Definitions for Data Collection and Monitoring (DCM) Devices
	NTCIP 1207	Object Definitions for Ramp Meter Control (RMC) Units
	NTCIP 1208	Object Definitions for Closed Circuit Television (CCTV) Switching
	NTCIP 1209	Data Element Definitions for Transportation Sensor Systems (TSS)
	NTCIP 1210	Field Management Stations (FMS) - Part 1: Object Definitions for Signal System Masters
	NTCIP 1211	Object Definitions for Signal Control and Prioritization (SCP)
	NTCIP 1213	Object Definitions for Electrical and Lighting Management Systems (ELMS)
	NTCIP 1214	Object Definitions for Conflict Monitor Units (CMU)
		NTCIP Center-to-Center Standards Group
	NTCIP 1102	Octet Encoding Rules (OER) Base Protocol
	NTCIP 1104	Center-to-Center Naming Convention Specification
	NTCIP 2104	Ethernet Subnetwork Profile
	NTCIP 2202	Internet (TCP/IP and UDP/IP) Transport Profile
	NTCIP 2303	File Transfer Protocol (FTP) Application Profile
	NTCIP 2304	Application Profile for DATEX-ASN (AP-DATEX)
	NTCIP 2306	Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications (C2C XML)
		NTCIP Center-to-Field Standards Group
	NTCIP 1102	Octet Encoding Rules (OER) Base Protocol
	NTCIP 1103	Transportation Management Protocols (TMP)
	NTCIP 2101	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile
	NTCIP 2102	Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile
	NTCIP 2103	Point-to-Point Protocol Over RS-232 Subnetwork Profile
	NTCIP 2104	Ethernet Subnetwork Profile
	NTCIP 2201	Transportation Transport Profile
	NTCIP 2202	Internet (TCP/IP and UDP/IP) Transport Profile
	NTCIP 2301	Simple Transportation Management Framework (STMF) Application Profile
	NTCIP 2302	Trivial File Transfer Protocol (TFTP) Application Profile
	NTCIP 2303	File Transfer Protocol (FTP) Application Profile

Table 7 – Clarksville Regional ITS Standards (continued)

SDO	Document ID	Title
APTA	APTA TCIP-S-001 3.0.4	Standard for Transit Communications Interface Profiles
ASTM	ASTM E2468-05	Standard Practice for Metadata to Support Archived Data Management Systems
	ASTM E2665-08	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data
	Dedicated Short Range Communication at 915 MHz Standards Group	
	ASTM E2158-01	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band
ASTM/IEEE/SAE	Dedicated Short Range Communication at 5.9 GHz Standards Group	
	ASTM E2213-03	Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems - 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications
	IEEE 1609.1-2006	Standard for Wireless Access in Vehicular Environments (WAVE) - Resource Manager
	IEEE 1609.2-2006	Standard for Wireless Access in Vehicular Environments (WAVE) - Security Services for Applications and Management Messages
	IEEE 1609.3	Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services
	IEEE 1609.4-2006	Standard for Wireless Access in Vehicular Environments (WAVE) - Multi-Channel Operation
	IEEE 802.11p	Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part II: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification
	IEEE P1609.0	Standard for Wireless Access in Vehicular Environments (WAVE) - Architecture
IEEE	IEEE 1455-1999	Standard Message Sets for Vehicle/Roadside Communications
	IEEE 1570-2002	Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection
	IEEE P1609.11	Standard for Wireless Access in Vehicular Environments (WAVE) - Over- the-Air Data Exchange Protocol for Intelligent Transportation Systems (ITS)
	Incident Management Standards Group	
	IEEE 1512 -2006	Standard for Common Incident Management Message Sets for use by Emergency Management Centers
	IEEE 1512.1-2006	Standard for Traffic Incident Management Message Sets for Use by Emergency Management Centers
	IEEE 1512.2-2004	Standard for Public Safety Traffic Incident Management Message Sets for Use by Emergency Management Centers
	IEEE 1512.3-2006	Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers
	IEEE P1512.4	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers

Table 7 – Clarksville Regional ITS Standards (continued)

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

5.5 Operational Concepts

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

- ***Traffic Signal Control*** – 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 Traffic Metering 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.
- ***Parking Management*** – The development of systems to monitor and manage parking facilities. Includes the dissemination of parking information to motorists and the electronic collection of fees.
- ***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 – Clarksville Regional Stakeholder Roles and Responsibilities

Transportation Service	Stakeholder	Roles/Responsibilities
Traffic Signal Control	City of Clarksville	Operate and maintain traffic signal systems within the City.
		Operate DMS for the distribution of traffic information and roadway conditions to travelers on the roadway.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City to facilitate traffic signal operations.
		Provide traffic signal preemption for emergency vehicles.
		Provide traffic signal priority for transit vehicles.
		Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, and emergency vehicle preemptions.
	Fort Campbell	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.
		Provide traffic signal preemption for emergency vehicles.
		Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, and emergency vehicle preemptions.
	KYTC	Operate and maintain traffic signal systems on State Routes.
		Operate DMS for the distribution of traffic information and roadway conditions to travelers on the roadway.
		Operate network surveillance equipment including CCTV cameras and vehicle detection on roadways within the City to facilitate traffic signal operations.
		Provide traffic signal preemption for emergency vehicles.
		Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, and emergency vehicle preemptions.
	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.
		Provide traffic signal preemption for emergency vehicles.
		Remotely operate traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, and emergency vehicle preemption requests.

Table 8 – Clarksville Regional Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Freeway Traffic Metering Management	KYTC	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.
Incident Management (Traffic)	City of Clarksville	Coordinate maintenance resources for incident response.
		Operate DMS to distribute incident information to travelers on the roadway.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.
	Fort Campbell	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.
	KYTC	Operate DMS and HAR to distribute incident information to travelers on the roadway.
		Remotely control traffic and video sensors from KYTC District 2 TMC in Madisonville or KYTC Statewide IMOC in Frankfurt to support incident detection and verification.
		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.
		Responsible for the dissemination of traffic related data to other centers and the media.
	Municipal Government	Coordinate maintenance resources for incident response.
		Remotely control traffic and video sensors to support incident detection and verification.
		Responsible for coordination with other traffic operations centers and emergency management agencies for coordinated incident management.
		Responsible for the dissemination of traffic related data to other centers and the media.

Table 8 – Clarksville Regional Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Incident Management (Traffic) (continued)	TDOT	Operate DMS and HAR to distribute incident information to travelers on the roadway.
		Remotely control traffic and video sensors from the SmartWay TMC to support incident detection and verification.
		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.
		Responsible for the dissemination of traffic related data to other centers and the media.
Incident Management (Emergency)	Christian County	Coordinate incident response with emergency dispatch agencies, any municipal TOCs, and the KYTC District 2 TMC in Madisonville for incidents on state facilities.
		Dispatch public safety vehicles to incidents.
	KYJPSC (KSP)	Coordinate incident response with other public safety and traffic management agencies as well as the KYTC District 2 TMC in Madisonville for incidents on state facilities.
		Dispatch public safety vehicles to incidents.
	Montgomery County	Coordinate incident response with emergency dispatch agencies, the City of Clarksville TOC, as well as the TDOT Region 3 TMC - Nashville for incidents on state facilities.
		Dispatch public safety vehicles to incidents.
	THP	Coordinate incident response with other public safety and traffic management agencies as well as the TDOT Region 3 TMC - Nashville for incidents on state facilities.
		Dispatch public safety vehicles to incidents.
Emergency Management	Christian County	911 Dispatch - Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		911 Dispatch - Participate in regional emergency planning to support large-scale incidents and disasters.
		911 Dispatch - Responsible for emergency call-taking for Christian County as the 911 PSAP.
		911 Dispatch - Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		911 Dispatch - Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		EMA - Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		EMA - Lead regional efforts for emergency planning to support large-scale incidents and disasters.
		EMA - Operates the EOC for Christian County in the event of a disaster or other large-scale emergency situation.

Table 8 – Clarksville Regional Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Christian County (continued)	EMA - Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the County.
	Fort Campbell	911 Dispatch - Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		911 Dispatch - Participate in regional emergency planning to support large-scale incidents and disasters.
		911 Dispatch - Responsible for emergency call-taking for Fort Campbell as the 911 PSAP.
		911 Dispatch - Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		911 Dispatch - Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		EMA - Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		EMA - Lead regional efforts for emergency planning to support large-scale incidents and disasters.
		EMA - Operates the EOC for Fort Campbell in the event of a disaster or other large-scale emergency situation.
		EMA - Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in Fort Campbell.
	KYDMA (KYEM)	Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		Lead statewide efforts for emergency planning to support large-scale incidents and disasters.
		Operates the EOC for the State of Kentucky in the event of a disaster or other large-scale emergency situation.
		Responsible for coordination with adjacent states, including the State of Tennessee, as needed to support emergency management.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the State.
	KYJPSC (KSP)	Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		Responsible for the initiation of AMBER Alerts.
		Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.

Table 8 – Clarksville Regional Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Emergency Management (continued)	Montgomery County	E911 - Participate in regional emergency planning to support large-scale incidents and disasters.
		E911 - Responsible for emergency call-taking for all of Montgomery County.
		E911 - Responsible for the dispatch of emergency vehicles to incidents and tracking of their location and status.
		E911 - Responsible for the routing of emergency vehicles to facilitate the safest/quickest arrival at an incident.
		E911- Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		EMA - Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		EMA - Lead regional efforts for emergency planning to support large-scale incidents and disasters.
		EMA - Operates the EOC for Montgomery County in the event of a disaster or other large-scale emergency situation.
		EMA - Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the County.
	TEMA	Lead evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		Lead statewide efforts for emergency planning to support large-scale incidents and disasters.
		Operates the EOC for the State of Tennessee in the event of a disaster or other large-scale emergency situation.
		Responsible for coordination with adjacent states, including the State of Kentucky, as needed to support emergency management.
		Responsible for tactical decision support, resource coordination, and communications integration among emergency management agencies in the State.
	Tennessee Bureau of Investigation	Responsible for the initiation of AMBER Alerts.
	THP	Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		Participate in regional emergency planning to support large-scale incidents and disasters.
		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.

Table 8 – Clarksville Regional Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management	City of Clarksville	Disseminates work zone activity schedules and current asset restrictions to other agencies.
		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 and sharing of information with other groups.
	KYTC	Disseminates work activity schedules and current asset restrictions to other agencies.
		Monitors environmental sensors and distributes information about road weather conditions.
		Operates work zone traffic control equipment including portable surveillance equipment, DMS, and HAR transmitters.
		Responsible for entering and updating work zone information in CARS.
		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.
	Municipal/County Maintenance	Disseminates work zone activity schedules and current asset restrictions to other agencies.
		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 and sharing of information with other groups.
	TDOT	Disseminates work activity schedules and current asset restrictions to other agencies.
		Monitors environmental sensors and distributes information about road weather conditions.
		Operates work zone traffic control equipment including portable surveillance equipment, DMS, and HAR transmitters.
		Responsible for entering and updating work zone information in SWIFT.
		Responsible for the tracking and dispatch of maintenance vehicles.
		Supports coordinated response to incidents.

Table 8 – Clarksville Regional Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Maintenance and Construction Management (continued)	TDOT (Continued)	Supports work zone activities including the dissemination of work zone information through portable DMS, HAR, and sharing of information with other groups.
Transit Management	CTS	Coordinate with the Streets Department on transit signal priority.
		Operate on-board systems to provide next stop annunciation.
		Operate real-time arrival information boards at transit stops and at transfer stations.
		Operates fixed route and paratransit services from central dispatch facilities responsible for tracking their location and status.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		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.
		Provide transit traveler information to the agency website, local private sector traveler information services, and the Tennessee 511 system.
	MCHRA	Operates demand response transit services from a central dispatch facility responsible for tracking vehicle location and status.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		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.
	PACS	Operates demand response transit services from a central dispatch facility responsible for tracking vehicle location and status.
		Participate in evacuation planning and coordination to manage evacuation and reentry in the vicinity of a disaster or other emergency situation.
		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 Kentucky 511 Traveler Information System.
Traveler Information	City of Clarksville	Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.

Table 8 – Clarksville Regional Stakeholder Roles and Responsibilities (continued)

Transportation Service	Stakeholder	Roles/Responsibilities
Traveler Information	City of Clarksville (continued)	Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
	Fort Campbell	Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.
		Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
	KYTC	Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event and weather information to travelers via the Kentucky 511 system.
		Operate DMS and HAR to distribute incident information to travelers on the roadway.
		Provide transportation network condition data to private sector information service providers.
	Municipal Government	Responsible for the collection and distribution of emergency information to the traveling public, including evacuation information and wide-area alerts.
		Responsible for the collection and distribution of traveler information including incident information and maintenance and construction closure information.
	TDOT	Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event and weather information to travelers via the SmartWay Website and Mobile Phone App and the Tennessee 511 system.
		Operate DMS and HAR to distribute traffic information and roadway conditions to travelers on the roadway.
		Provide transportation network condition data to private sector information service providers.
Parking Management	City of Clarksville	Monitor parking lots and on-street spaces to determine the availability of parking spaces.
		Provide electronic parking payment through field parking meters.
		Provide parking lot information through website and DMS to motorist.
Archived Data Management	CTS	Collect and maintain transit archive data.
	CUAMPO	Collect and maintain data from regional traffic, transit, and emergency management agencies.
	KYTC	Collect and maintain traffic archive data.
	MCHRA	Collect and maintain transit archive data.
	PACS	Collect and maintain transit archive data.
	TDOT	Collect and maintain traffic archive data.
	THP	Collect and maintain crash record information from regional emergency management agencies.

5.6 Potential Agreements

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

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

- Agreement developed by TDOT for live CCTV video access for private entity users;
- Agreement developed by TDOT for live CCTV video access for governmental agency users;
- Memorandum of Understanding among TDOT, TDOSHS, and local governments for the quick clearance of incidents along the State Highway System; and

Table 9 – Clarksville Regional Agreements

Status	Agreement and Agencies	Agreement Description
Existing	**Data Sharing and Usage (Public-Private)** –TDOT and Media	Agreement to 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 is also part of the agreement.
Existing	**Data Sharing and Usage (Public-Public)** –TDOT and Municipalities	Agreement to 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.
Existing	**Open Roads Policy (Public-Public)** – TDOT, THP (TDOSHS), and municipalities/counties	Memorandum of Understanding among TDOT, THP (TDOSHS), and local governments that establishes guidelines to accelerate the removal of vehicles or debris on the State Highway System to restore the flow of traffic following an incident.
Future	**Data Sharing and Usage (Public-Private)** – City of Clarksville and Media	Agreement to 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, KYTC, City of Clarksville, Fort Campbell	Agreement to 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 or limit data sharing if a situation warrants such action.
Future	**Incident Data Sharing and Usage (Public-Public)** – Christian County, TDOT, KYJPSC, KYTC, Montgomery County, 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.

5.7 Phases of Implementation

The Clarksville Regional ITS Architecture will be implemented over time through a series of projects. 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 Regional ITS Deployment Plan presented in Section 6. These projects have been sequenced over a time period that coincides with the 2040 Metropolitan Transportation Plan, with projects identified for deployment in the short-term (0 to 5 years), mid-term (5 to 10 years), and long-term (beyond 10 years.)

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

- ATMS01 – Network Surveillance;
- ATMS03 – Traffic Signal Control;
- ATMS06 – Traffic Information Dissemination;
- ATMS07 – Regional Traffic Management;
- ATMS08 – Traffic Incident Management System;
- ATMS12 – Roadside Lighting System Control;
- ATMS21 – Road Closure Management;
- EM04 – Roadway Service Patrols;
- EM07 – Early Warning System;
- MC03 – Road Weather Data Collection;
- MC04 – Weather Information Processing and Distribution;
- APTS01 – Transit Vehicle Tracking;
- APTS06 – Transit Fleet Management;
- APTS07 – Multimodal Coordination;
- APTS09 – Transit Signal Priority;
- ATIS02 – Interactive Traveler Information; and
- AD1 – ITS Data Mart.

6. REGIONAL ITS DEPLOYMENT PLAN

The Regional ITS Deployment Plan serves as a tool for the Clarksville Region to identify specific projects that should be deployed in order to achieve the desired functionality identified in the Regional ITS Architecture. The Regional ITS Deployment Plan builds on the Regional ITS Architecture by outlining specific ITS project recommendations and strategies for the Region and identifying deployment timeframes so that the recommended projects and strategies can be implemented over time.

The Regional ITS Deployment Plan also shows the correlation between each project and the Regional ITS Architecture by identifying the ITS service packages that correspond to each project. If projects were identified that did not correspond to an ITS service package, the ITS service packages in the Regional ITS Architecture were revised while the Regional ITS Architecture was still in draft format; therefore, the resulting ITS deployment projects are supported by the Regional ITS Architecture.

The Clarksville Regional ITS Deployment Plan provides stakeholders with a list of regionally significant ITS projects that are consistent with the Regional ITS Architecture and assists with addressing transportation needs in the Region. It is important to note that the Regional ITS Deployment Plan is not fiscally constrained. The projects in the plan represent those projects that stakeholders would like to implement; however, funding will still be needed in order for these projects to actually be implemented.

6.1 Project Development and Selection

An overview of the process used to develop the Regional ITS Deployment Plan is provided in **Figure 8**. This figure demonstrates that a variety of inputs were used to gather information and develop a set of ITS projects for selection by stakeholders, including a review of the regional needs, ITS service package priorities, and regional and local plans.

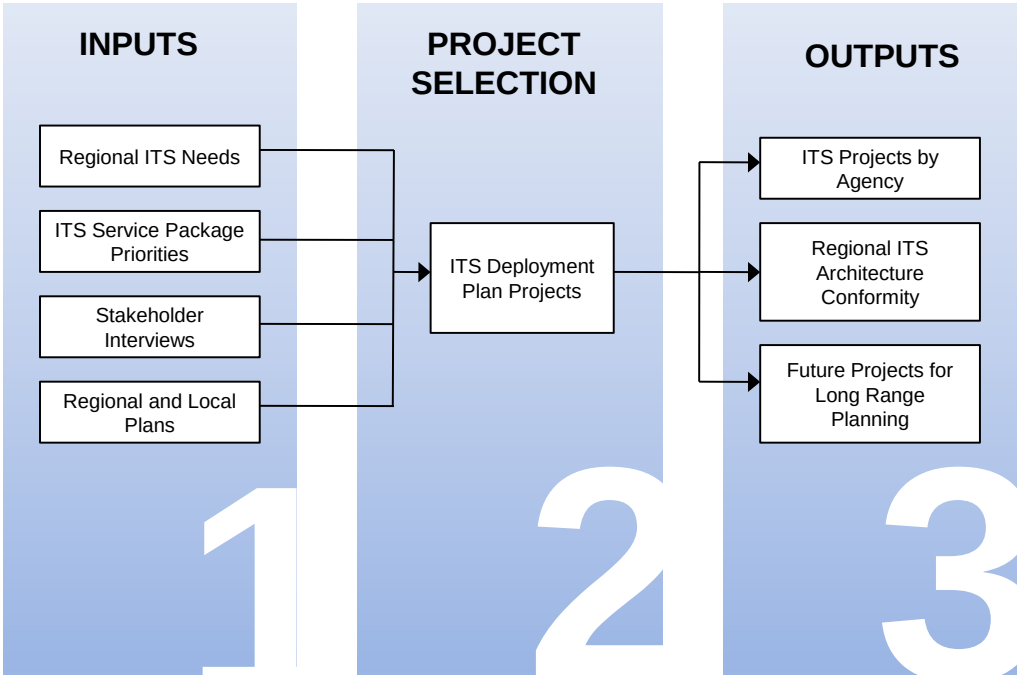


Figure 8 – Project Development and Selection Process

Stakeholder input in Step 1 was gathered through a series of in-person stakeholder interviews that were held in September 2014 where regional ITS needs, ITS service package priorities, and planned ITS projects were discussed in detail. A review of regional and local plans was also conducted to identify potential project ideas.

The inputs in Step 1 led to the project selection in Step 2 and the development of the ITS Deployment Plan section of the Regional ITS Architecture.

The outputs of the plan, shown in Step 3, will provide stakeholders and the Clarksville Urbanized Area MPO with a list of priority ITS projects for the Clarksville Region. Each of the projects recommended in the plan has been checked against the Clarksville Regional ITS Architecture to ensure they are in conformance. This should assist agencies deploying these projects in the future with meeting FHWA and FTA requirements for ITS architecture conformity. The projects in the plan could also feed into the long-range planning process and provide agencies with a list of priority ITS projects for consideration during future calls for projects from the MPO.

6.2 ITS Project Recommendations

In order to achieve the ITS deployment levels outlined in their Regional ITS Architecture, a region must deploy carefully developed projects that provide the functionality and interoperability identified in their Regional ITS Architecture. A key step toward achieving the Clarksville Region's ITS vision, as established in the Regional ITS Architecture, is the development of an ITS Deployment Plan that identifies specific projects, timeframes, and responsible agencies.

Input from all stakeholders is required for stakeholders to have ownership of the ITS Deployment Plan and to ensure that the plan has realistically identified projects and timeframes for deployment. Cost is another important factor—cost can vary a great deal for many ITS elements, depending on the level of deployment, maturity of the technology, type of communications, etc. For example, freeway network surveillance could be adequately achieved for one region by the deployment of still frame CCTV cameras only at freeway interchanges. In another region, full motion cameras may be deployed at one-mile intervals to provide complete coverage of the freeway. The infrastructure and telecommunications costs for these two projects would vary a great deal, yet either one could be suitable for a particular region.

Regional projects are identified in **Table 10** through **Table 13**. The tables are divided by the primary responsible agency as follows:

- **Table 10** – State ITS Deployment Plan Projects
- **Table 11** – Local ITS Deployment Plan Projects
- **Table 12** – Transit ITS Deployment Plan Projects
- **Table 13** – Other ITS Deployment Plan Projects

The projects identified in the tables represent priority projects for each agency that are needed in order to implement the ITS services that were identified as part of the Regional ITS Architecture development. Many of the projects identified are not funded, and identification of a funding source will likely be the most significant challenge in getting the projects implemented.

For each project, the following categories are discussed:

- **Project** – Identifies the project name including the agency responsible for implementation where applicable.

- **Description** – Provides a description of the project including notes on time-frames for deployment and costs if applicable. The level of detail in the project descriptions varies depending on the implementing agency and how much detail they wanted to include regarding a project. In some cases, projects had not been discussed beyond a very high conceptual level and there was limited or no information available on cost and scale of the potential project.
- **Deployment Timeframe and Responsible Agency** – Provides a recommended timeframe for deployment for each project. Timeframes have been identified as short-term (deployment recommended in 0-5 years), mid-term (deployment recommended in 5-10 years), and long-term (deployment recommended beyond 10 years). Recommendations for deployment timeframes were based on input from each agency and considered the project priority, possibility of funding, and dependency on other project deployments.
- **Funding Status** – Indicates whether funding has been identified or is still needed for the project.
- **Applicable ITS Service Packages** – Identifies the ITS service packages from the Regional ITS Architecture that each project will assist in implementing. Knowing which ITS service packages each project identifies is an important part of an ITS architecture conformance review.

Table 10 – State ITS Deployment Plan Projects

Project	Project Description	Deployment Timeframe and Responsible Agency[1]	Funding Status	Applicable ITS Service Packages
TDOT/KYTC Coordination	Improve coordination between TDOT and KYTC, including the exchange of future CCTV camera feeds and improved coordination during incidents.	Short-Term: TDOT & KYTC	Funding Identified: No	ATMS07 – Regional Traffic Management ATMS08 – Traffic Incident Management System MC10 – Maintenance and Construction Activity Coordination ATIS02 – Interactive Traveler Information
TDOT SmartWay Installation	Install CCTV camera, DMS, and HAR equipment along I-24 in Tennessee.	Mid to Long -Term: TDOT	Funding Identified: No	ATMS01 – Network Surveillance ATMS07 – Regional Traffic Management ATMS06 – Traffic Information Dissemination
KYTC Traffic Signal System Communications Improvements	Upgrade traffic signal communications on State owned signals through the replacement of serial radios with internet protocol (IP) radios. Estimated project cost is $1,000,000 and funding is through FHWA's Surface Transportation Program (STP).	Short-Term: KYTC	Funding Identified: Yes	ATMS03 – Traffic Signal Control

[1]Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

Table 11 – Local ITS Deployment Plan Projects

Project	Project Description	Deployment Timeframe and Responsible Agency[1]	Funding Status	Applicable ITS Service Packages
TDOT SmartWay Region 3 TMC and City of Clarksville Coordination	Implement coordination between the TDOT SmartWay Region 3 TMC and the City of Clarksville to allow for video and data sharing between agencies as needed. TDOT plans to complete and begin distributing software to share CCTV video feeds to municipalities in 2015. Estimated project cost for the SmartView video distribution software and a five year support contract is $3,300,000. The project is funded through State funds.	Short to Mid-Term: TDOT and Municipalities	Funding Identified: Yes	ATMS06 – Traffic Information Dissemination ATMS07 – Regional Traffic Management
City of Clarksville CCTV Cameras	Install additional pan/tilt/zoom CCTV cameras along major arterials in Clarksville for incident management and traveler information.	Short-Term: City of Clarksville	Funding Identified: No	ATMS01 – Network Surveillance ATMS06 – Traffic Information Dissemination
City of Clarksville Fiber Optic Expansion	Install additional fiber optic cable for traffic signal communications. Approximately 1/3 of the City's traffic signals are not currently connected.	Short to Mid-Term: City of Clarksville	Funding Identified: No	ATMS03 – Traffic Signal Control
City of Clarksville Flood Detection and Warning System	Implement a system to provide automated flood detection, road closure, and advanced warning on roads with low water crossings that frequently flood.	Mid to Long-Term: City of Clarksville	Funding Identified: No	ATMS06 – Traffic Information Dissemination EM07 – Early Warning System MC03 – Road Weather Data Collection MC04 – Weather Information Processing and Distribution
City of Clarksville Programmable School Zone Flashing Beacons	Establish communications with school zone flashing beacons to remotely control the time of day in which the flashers are activated or deactivated.	Mid to Long-Term: City of Clarksville	Funding Identified: No	ATMS03 – Traffic Signal Control

Table 11 – Local ITS Deployment Plan Projects (continued)

Project	Project Description	Deployment Timeframe and Responsible Agency[1]	Funding Status	Applicable ITS Service Packages
City of Clarksville RWIS	Install road weather information system that includes field sensors to monitor road weather conditions including ice, snow, and rain.	Long-Term: City of Clarksville	Funding Identified: No	MC03 – Road Weather Data Collection MC04 – Weather Information Processing and Distribution
City of Clarksville Street Lighting Control	Install new streetlights or retrofit existing streetlights to include remote variable lighting control to adjust brightness.	Long-Term: City of Clarksville	Funding Identified: No	ATMS12 – Roadside Lighting System Control
City of Clarksville/Fort Campbell ITS Deployment	Install CCTV cameras, DMS, and other ITS elements deemed appropriate within and adjacent to the Fort Campbell Military Instillation. The managing agency has yet to be determined, but coordination between Fort Campbell, City of Clarksville, KYTC, and TDOT will be required. Estimated project cost is $2,475,000 ($1,980,000 of federal funding is available through the National Highway Performance Program, but funds for the $495,000 local match have not been identified).	Short-Term: City of Clarksville, Fort Campbell, KYTC and TDOT	Funding Identified: Partial	ATMS01 – Network Surveillance ATMS06 – Traffic Information Dissemination
Fort Campbell Traffic Signal Communications	Connect all traffic signals within Fort Campbell to a centralized TOC for operations.	Short to Mid-Term: Fort Campbell	Funding Identified: No	ATMS03 – Traffic Signal Control
Fort Campbell Gate Security	Improve operations and security at all entry points to Fort Campbell including geometric reconfiguration, gate closure information dissemination, barrier gates, traffic signal coordination, CCTV cameras, and other ITS measure.	Short-Mid-Term: Fort Campbell	Funding Identified: No	ATMS01 – Network Surveillance ATMS03 – Traffic Signal Control ATMS06 – Traffic Information Dissemination ATMS21 – Road Closure Management

[1]Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

Table 12 – Transit ITS Deployment Plan Projects

Project	Project Description	Deployment Timeframe and Responsible Agency[1]	Funding Status	Applicable ITS Service Packages
CTS Trip Route Planner (Google) Implementation	Continue to work with Google to provide information for trip route planning. CTS is coordinating with City of Clarksville GIS personnel to provide Google with transit data. No additional funds have been established for this on-going effort.	Short-Term: CTS	Funding Identified: Yes	APTS08 – Transit Traveler Information ATIS02 – Interactive Traveler Information
CTS Mobile Phone Application	Develop a mobile phone application that allows users to view transit service information, real-time bus location, and create a transit trip plan.	Short-Term: CTS	Funding Identified: No	APTS08 – Transit Traveler Information
CTS SmartCard Implementation	Implement a Smart Card system to pay for CTS transit fares. Card could be expanded to coordinate with other City services.	Short to Mid-Term: CTS	Funding Identified: No	APTS04 – Transit Fare Collection Management
CTS Real-time Bus Location and Arrival Information	Install next-bus arrival DMS at the CTS Transit Center, provide next-stop announcements on buses, allow transit rides to see bus location on the CTS website or mobile phone app.	Mid to Long-Term: CTS	Funding Identified: No	APTS01 – Transit Vehicle Tracking APTS08 – Transit Traveler Information
CTS Transit Signal Priority Deployment	Implement a transit signal priority system on select routes for CTS fixed-vehicle bus routes including Wilma Rudolph Boulevard, Fort Campbell Boulevard Madison Street, and Riverside Drive.	Mid to Long-Term: CTS and City of Clarksville	Funding Identified: No	ATMS03 – Traffic Signal Control APTS09 – Transit Signal Priority

Table 12 – Transit ITS Deployment Plan Projects (continued)

Project	Project Description	Deployment Timeframe and Responsible Agency[1]	Funding Status	Applicable ITS Service Packages
Regional Transit Coordination	Improve coordination within and among transit agencies to optimize transit travel times.	Short to Mid-Term: CTS, MDHRA, and PACS	Funding Identified: No	APTS07 – Multimodal Coordination APTS11 – Multimodal Connection Protection
MCHRA Transit Fleet Management	Implement an automated process for drivers to perform pre- and post-trip safety inspections of transit vehicles. Estimated project cost is $50,400 with funding available through the FTA's 5309 Grant.	Short-Term: MCHRA	Funding Identified: Yes	APTS06 – Transit Fleet Management

[1]Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

Table 13 – Other ITS Deployment Plan Projects

Project	Project Description	Deployment Timeframe and Responsible Agency[1]	Opinion of Probable Cost and Funding Status	Applicable ITS Service Packages
Clarksville Urbanized Are MPO Data Warehouse Implementation	Develop a transportation data warehouse that includes region-wide transportation data gathered from the ITS network.	Long-Term: CUAMPO	Funding Identified: No	AD1 – ITS Data Mart AD3 – ITS Virtual Data Warehouse

[1]Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years).

7. USE AND MAINTENANCE PLAN

The Regional ITS Architecture developed for the Clarksville 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 Clarksville Regional ITS Architecture be updated periodically to remain a useful resource for the Region. As projects are developed and deployed, it will be important that those projects conform to the Regional ITS Architecture so that they are consistent with both the Region's vision for ITS as well as the National standards described in the Regional ITS Architecture. In some cases, if projects do not conform, it may be necessary to modify the Regional ITS Architecture to reflect changes in the Region's vision for ITS rather than modify the project. In this Section, a process for determining architecture conformity of projects is presented and a plan for how to maintain and update the Regional ITS Architecture is described.

In 2001 the FHWA issued Final Rule 23 CFR 940, which required that ITS projects using federal funds (or ITS projects that integrate with systems that were deployed with federal funds) conform to a regional ITS architecture and also be developed using a systems engineering process. The purpose of Section 7 of this report is to discuss how the Clarksville Regional ITS Architecture can be used to support meeting the ITS architecture conformity and systems engineering requirements. A process for maintaining the Regional ITS Architecture, including the Regional ITS Deployment Plan, which has been incorporated as Section 6 of the Regional ITS Architecture, is also presented. In Section 7.2 the systems engineering analysis requirements and the guidance provided by TDOT and the FHWA Tennessee Division are discussed. In Section 7.3, the process for determining ITS architecture conformity of an ITS project is presented.

The Regional ITS Architecture is considered a living document. Shifts in regional focus and priorities, changes and new developments in technology, and changes to the National ITS Architecture will necessitate that the Clarksville Regional ITS Architecture be updated to remain a useful resource for the Region. In the Regional ITS Architecture, a process for maintaining the plan was developed in coordination with stakeholders. The process covers both major updates to the Regional ITS Architecture as well as minor changes that may be needed between major updates of the documents. These processes have been included in this document in Sections 7.3 and 7.4.

7.1 Incorporation into the Regional Planning Process

Stakeholders invested a considerable amount of effort in the development of the Regional ITS Architecture for the Clarksville Region. The plan needs to be incorporated into the regional planning process so that the ITS vision for the Region is considered when implementing ITS projects 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 Clarksville 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 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 7.3, and the Clarksville Urbanized Area MPO will review each project to confirm it does conform to the Regional ITS Architecture.

7.2 Systems Engineering Analysis

The TDOT Traffic Operations Division and the FHWA Tennessee Division have developed a guidance document to assist agencies with meeting the systems engineering requirement for ITS projects. The guidance states that a systems engineering analysis must be performed for all Federal Aid ITS projects unless the project is categorically excluded. Projects may be categorically excluded because they do not use federal funding or they are an ITS system expansion that do not add new functionality. For example, installation of an isolated traffic signal or expansion of a freeway management system through the deployment of additional CCTV cameras would be categorically excluded and not require a systems engineering analysis.

The goal of performing a systems engineering analysis is to systematically think through the project deployment process. Thorough upfront planning has been shown to help control costs and ensure schedule adherence. The Tennessee procedures indicate that the following should be included in a systems engineering analysis:

- Identification of portions of the Regional ITS Architecture being implemented;
- Identification of participating agencies roles and responsibilities;
- Definition of system requirements;
- Analysis of alternative system configurations and technology options that meet the system requirements;
- Identification of various procurement options;
- Identification of applicable ITS standards and testing procedures; and
- Documentation of the procedures and resources necessary for operations and management of the system.

The Clarksville Regional ITS Architecture and associated Turbo Architecture database can supply information for many of the required components for a systems engineering analysis. These include:

- Portions of the Regional ITS Architecture being implemented (discussed in Section 7.3);
- Participating agencies roles and responsibilities;
- Definition of system requirements (identified in the Clarksville Regional ITS Architecture Turbo Architecture database equipment packages); and
- Applicable ITS standards (identified using the ITS service package data flows from the Clarksville Regional ITS Architecture document and the National standards associated with the ITS service package data flows).

The Vee Diagram, shown as **Figure 9**, is frequently used in systems engineering discussions to demonstrate where the Regional ITS Architecture and systems engineering process fits into the life cycle of an ITS project. The Regional ITS Architecture is shown unattached from the rest of the diagram because it is not specifically project related, and an undetermined amount of time can pass between the architecture development and the beginning of project implementation. Traveling along the diagram, the systems engineering process addresses concept exploration, the systems engineering management plan framework, concept of operations, and systems requirements.

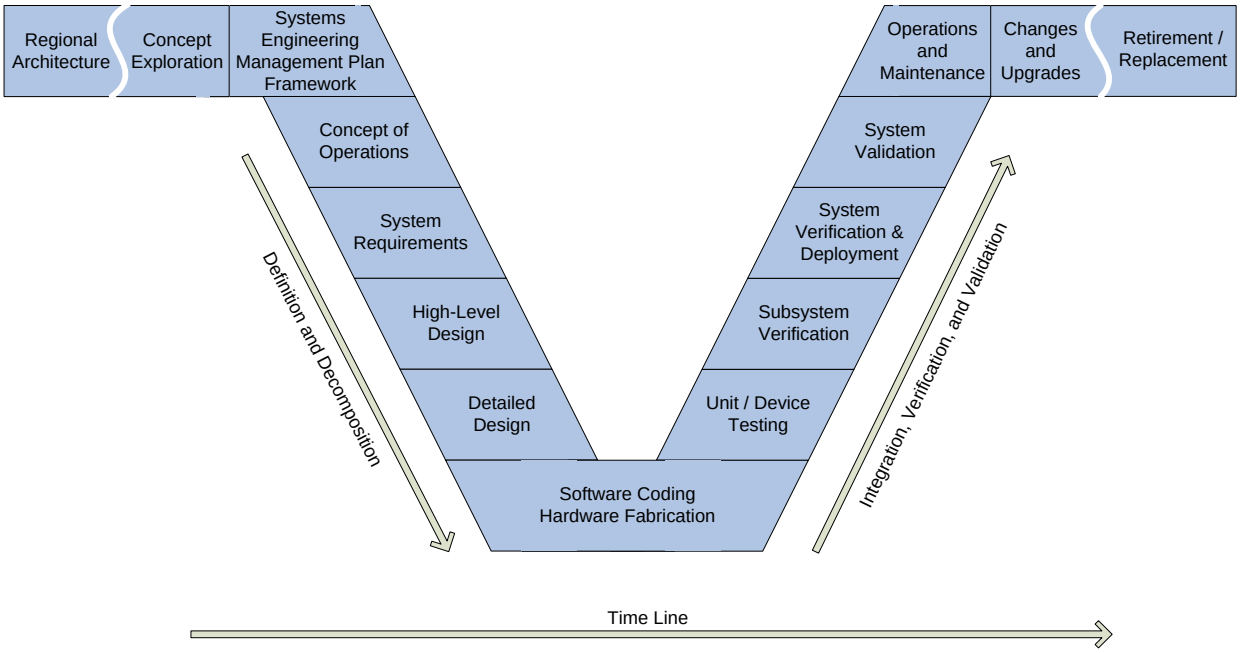


Figure 9 – Systems Engineering Vee Diagram

The Tennessee guidance document contains an example worksheet to aid in the preparation of a systems engineering analysis. During the process, if it is determined that a project is not adequately addressed in the Regional ITS Architecture, the Regional ITS Architecture maintenance process should be used to document the necessary changes.

7.3 Process for Determining ITS Architecture Conformity

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

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

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

Step 1 – Identify the ITS Components

ITS components can be fairly apparent in an ITS focused project such as CCTV 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 Service Packages

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

Step 3 – Identify the Component within the Service Package

The customized service packages for the Clarksville Region are located in **Appendix B**. Once the element is located within the appropriate service package, the evaluator should determine if the element name used in the service package is accurate or if a change to the name is needed. For example, a future element called the Fort Campbell TOC was included in the Clarksville Regional ITS Architecture. Detailed planning for this center has not begun and it would not be unusual for the Fort 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 7.5.

Step 4 – Evaluate the Connections and Flows

The connections and architecture flows documented in the service package diagrams were selected based on the information available at the time the Regional ITS Architecture was developed. As the projects are designed, decisions will be made on the system layout that might differ from what is shown in the service package. These changes in the project should be documented in the ITS service packages using the process outlined in Section 7.5.

Step 5 – Document Required Changes

If any changes are needed to accommodate the project under review, Section 7.5 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 service package(s) should be modified so that the connections and data flows are consistent with the project.

7.4 Regional ITS Architecture Maintenance Process

The Clarksville Urbanized Area MPO will be responsible for leading the process to update the Clarksville Regional ITS Architecture in coordination with the TDOT Traffic Operations Division. **Table 14** summarizes the maintenance process agreed upon by stakeholders in the Region.

Table 14 – Clarksville Regional ITS Architecture Maintenance Summary

Maintenance Details	Regional ITS Architecture and Deployment Plan	
	Minor Update	**Full Update**
Timeframe for Updates	As needed	Review every 4 years in the year preceding the Metropolitan Transportation Plan update to determine if a full update is required
Scope of Update	Review and update service packages to satisfy architecture compliance requirements of projects or to document other changes that impact the Regional ITS Architecture.	Entire Regional ITS Architecture and Deployment Plan
Lead Agency	CUAMPO in Coordination with TDOT	
Participants	Stakeholders impacted by service package modifications	Entire stakeholder group
Results	ITS service package or other change(s) documented for next complete update	Updated Regional ITS Architecture and Deployment Plan document, Appendices, and Turbo Architecture database

It was agreed that a review of the Regional ITS Architecture should occur approximately every four years in the year preceding the Metropolitan Transportation Plan (MTP) update to determine if a full update of the Regional ITS Architecture is necessary. The need for an update will depend on the level of ITS implemented in the region since the previous update as well as changes that may have occurred in the National ITS Architecture. The Clarksville Urbanized Area MPO will coordinate with TDOT to determine if an update is required.

By completing a full update of the Regional ITS Architecture in the year prior to the MTP update (if an update is needed), 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 MTP. The Clarksville Urbanized Area MPO, in coordination with the TDOT Traffic Operations Division, will be responsible for completing the full update. 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 and Deployment Plan should occur as needed between full updates of the plan. In Section 7.5 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.

7.5 Procedure for Submitting ITS Architecture Changes Between Major Updates

Updates to the Clarksville Regional ITS Architecture will occur on a regular basis as described in Section 7.4 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 7.3 contains step by step guidance for determining whether or not a project requires architecture modifications to the Regional ITS Architecture.

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

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

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

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

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

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

The Clarksville Urbanized Area MPO will review and accept the proposed changes and forward the form to the TDOT Traffic Operations 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 – SERVICE PACKAGE DEFINITIONS

Service Package	Service 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	Traffic Signal Control	Provides the central control and monitoring equipment, communication links, and the signal control equipment that support traffic control at signalized intersections. This service package is consistent with typical traffic signal control systems.
ATMS04	Traffic Metering	Includes central monitoring and control, communications, and field equipment that support metering of traffic. It supports the complete range of metering strategies including ramp, interchange, and mainline metering.
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 service 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 Decision Support and Demand Management	Recommends courses of action to traffic operations personnel based on an assessment of current and forecast road network performance. All recommendations are based on historical evaluation, real-time assessment, and forecast of the roadway network performance based on predicted travel demand patterns. This service package also collects air quality, parking availability, transit usage, and vehicle occupancy data to support TDM, where applicable.
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 service 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.

Service Package	Service Package Name	Description
Traffic Management Service Area (continued)		
ATMS16	Parking Facility Management	Provides enhanced monitoring and management of parking facilities. Service 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 Warning and Enforcement	Monitors vehicle speeds and supports warning drivers when their speed is excessive. Also the service includes notifications to an enforcement agency to enforce the speed limit of the roadway.
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. Service package covers general road closures applications; specific closure systems that are used at railroad grade crossings, drawbridges, reversible lanes, etc. are covered by other service packages.
ATMS22	Variable Speed Limits	Sets variable speed limits along a roadway to create more uniform speeds, to promote safer driving during adverse conditions (such as fog), and/or to reduce air pollution. Also known as speed harmonization, this service monitors traffic and environmental conditions along the roadway.
ATMS23	Dynamic Lane Management and Shoulder Use	Includes the field equipment, physical overhead lane signs and associated control electronics that are used to manage and control specific lanes and/or the shoulders along a roadway. This equipment can be used to change the lane configuration on the roadway according to traffic demand and lane destination along a typical roadway section or on approach to or access from a border crossing, multimodal crossing or intermodal freight depot. This package can be used to allow temporary or interim use of shoulders as travel lanes.
ATMS24	Dynamic Roadway Warning	Includes systems that dynamically warn drivers approaching hazards on a roadway. These dynamic roadway warning systems can alert approaching drivers via warning signs, flashing lights, in-vehicle messages, etc. Such systems can increase the safety of a roadway by reducing the occurrence of incidents.
ATMS25	VMT Road User Payment	Facilitates charging fees to roadway vehicle owners for using specific roadways with potentially differential payment rates based on time-of-day, which specific roadway is used, and class of vehicle (a local policy decision by each roadway owner).
ATMS26	Mixed Use Warning Systems	Supports the sensing and warning systems used to interact with pedestrians, bicyclists, and other vehicles that operate on the main vehicle roadways, or on pathways which intersect the main vehicle roadways. These systems could allow automated warning or active protection for this class of users.
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.

Service Package	Service Package Name	Description
Emergency Management Service Area (continued)		
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 service 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.
EM09	Evacuation and Reentry Management	Supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. This service 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 service package. This service 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.

Service Package	Service Package Name	Description
Maintenance and Construction Management Service Area (continued)		
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.
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 service package.
APTS09	Transit Signal Priority	Determines the need for transit priority on routes 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.
APTS11	Multi-modal Connection Protection	Supports the coordination of multimodal services to optimize the travel time of travelers as they move from mode to mode (or to different routes within a single mode).

Service Package	Service Package Name	Description
Commercial Vehicle Operations Service Area		
CVO01	Carrier Operations and Fleet Management	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 service 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 Safety	Provides for on-board commercial vehicle safety monitoring and reporting, and includes support for collecting on-board safety data via transceivers or other means. The on-board safety data are assessed by an off-board system. In some cases the monitoring and safety assessment may occur remotely (i.e., not at a roadside site).
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.
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 service 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.

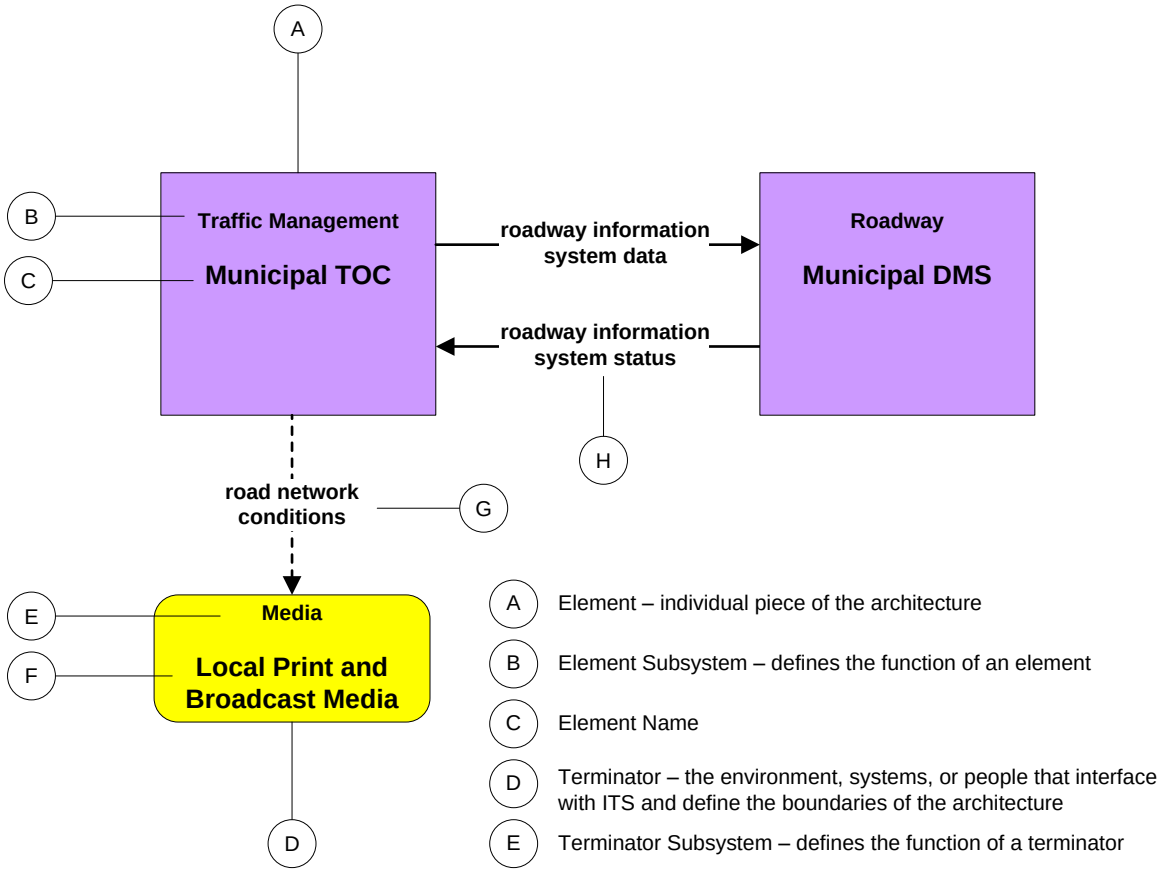
Service Package	Service Package Name	Description
Traveler Information Service Area		
ATIS06	Transportation Operations Data Sharing	Collects, processes, and stores current information on traffic and travel conditions and other information about the current state of the transportation network and makes the information available to transportation system operators.
ATIS07	Travel Service Information and Reservation	Provides travel information and reservation services to the user. This service package provides multiple ways for accessing information either while en route in a vehicle using wide-area wireless communications or pre-trip via fixed-point to fixed-point connections.
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	Short Range Communications Traveler Information	Provides location-specific or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications (DSRC) infrastructure supporting mobility applications for connected vehicles. Delivers real-time traveler information including travel times, incident information, road conditions, and emergency traveler information to vehicles as they pass DSRC roadside equipment along their route.
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 Service Package, but provides this access using enhanced interoperability between physically distributed ITS archives that are each locally managed.
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 service 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.

Service Package	Service Package Name	Description
Vehicle Safety Service Area (continued)		
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 service 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 Vehicle Operations	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.

APPENDIX B – CUSTOMIZED ITS SERVICE PACKAGES

APPENDIX B

ITS SERVICE 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

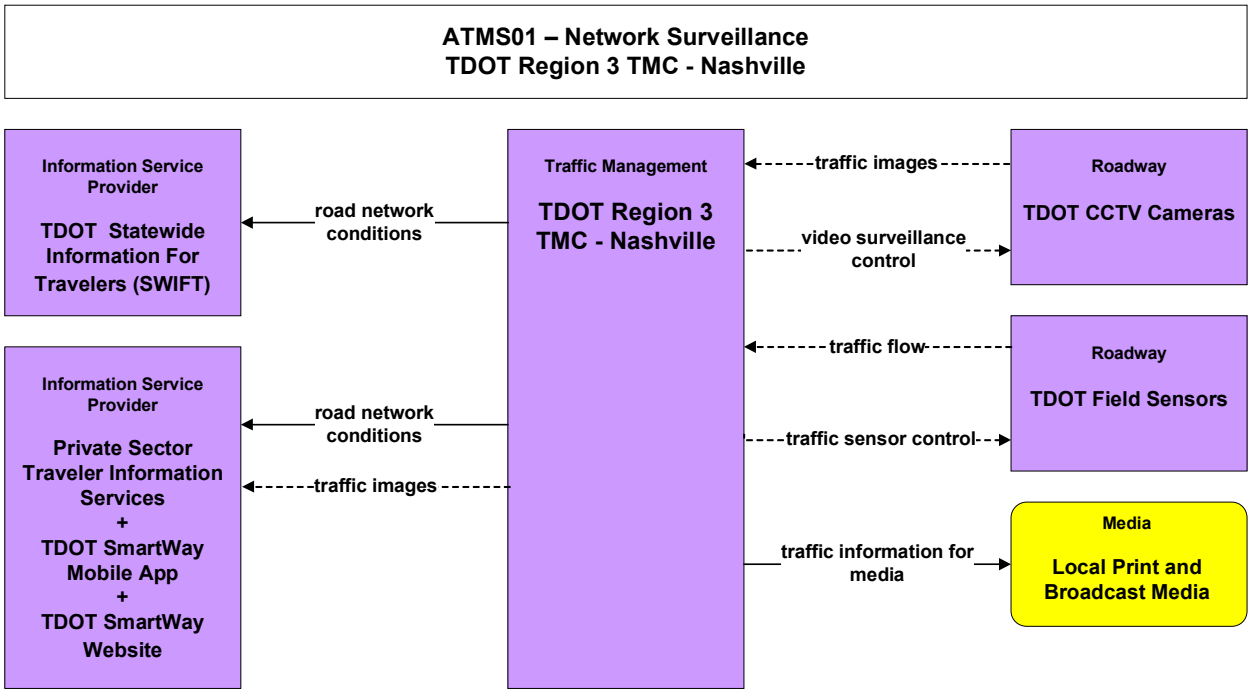
G – Future/Planned Architecture Flow – data that will be exchanged between subsystems and terminators in the future

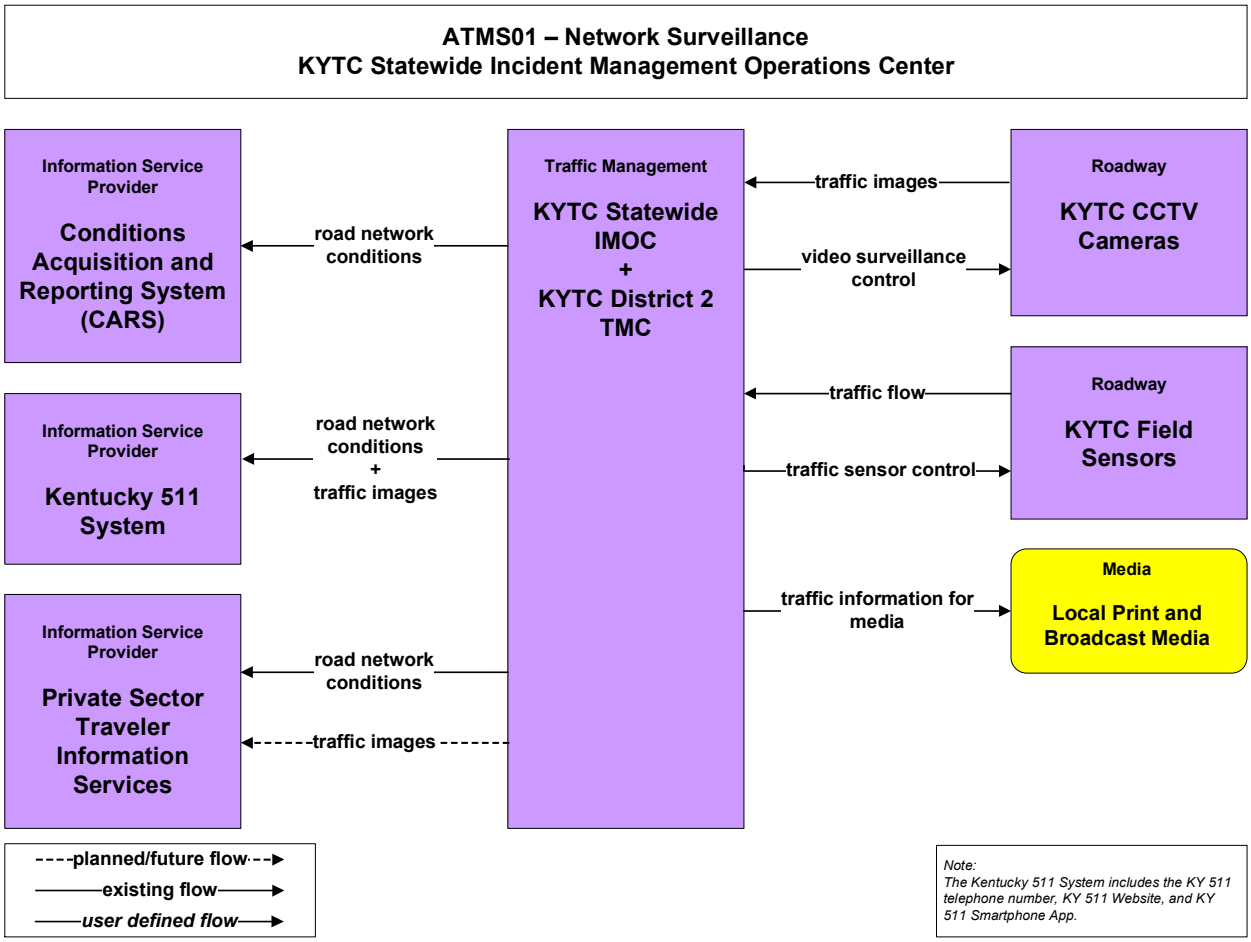
H – Existing Architecture Flow – data that is currently exchanged between subsystems and terminators

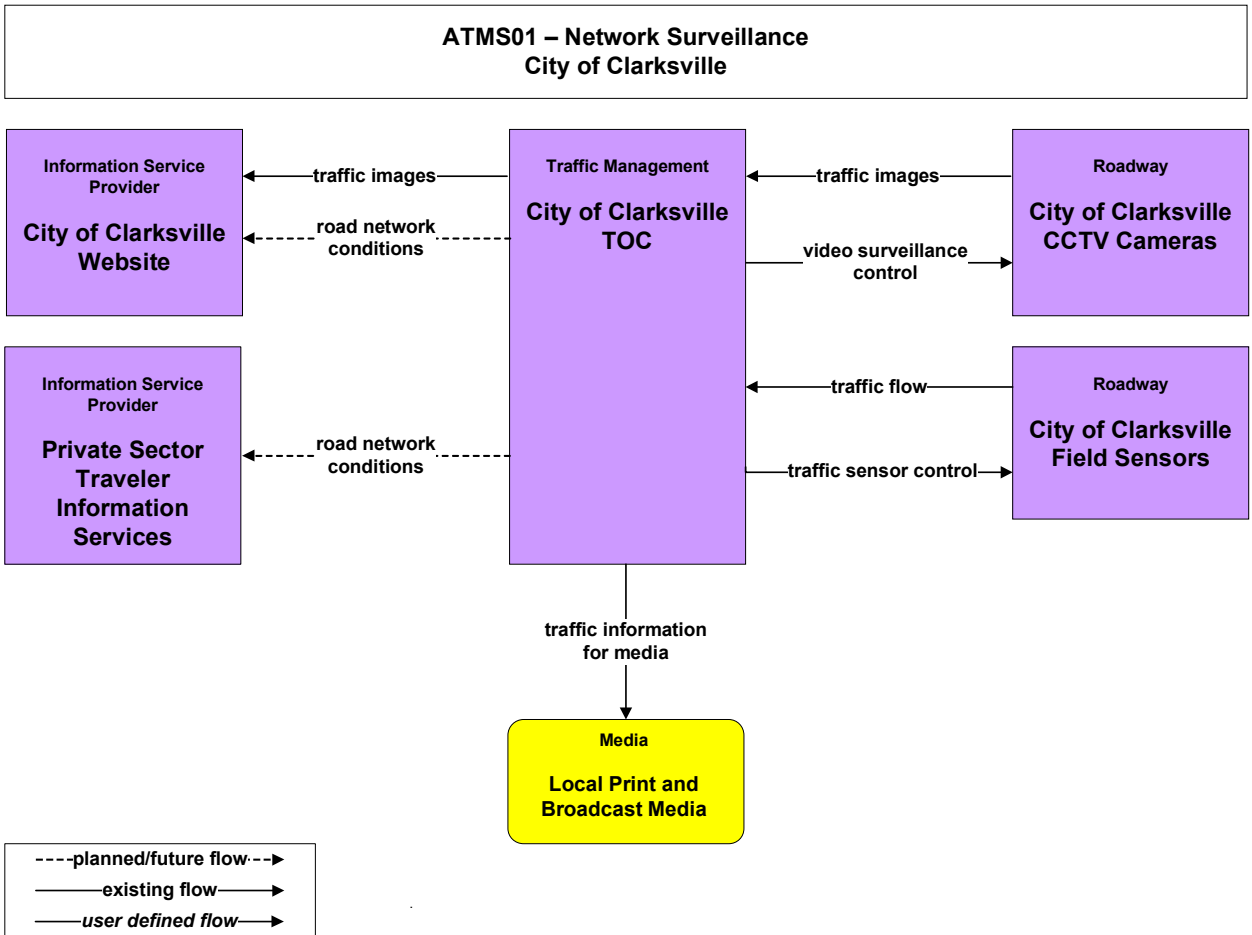
Clarksville Regional ITS Architecture
Service Packages

February 2015

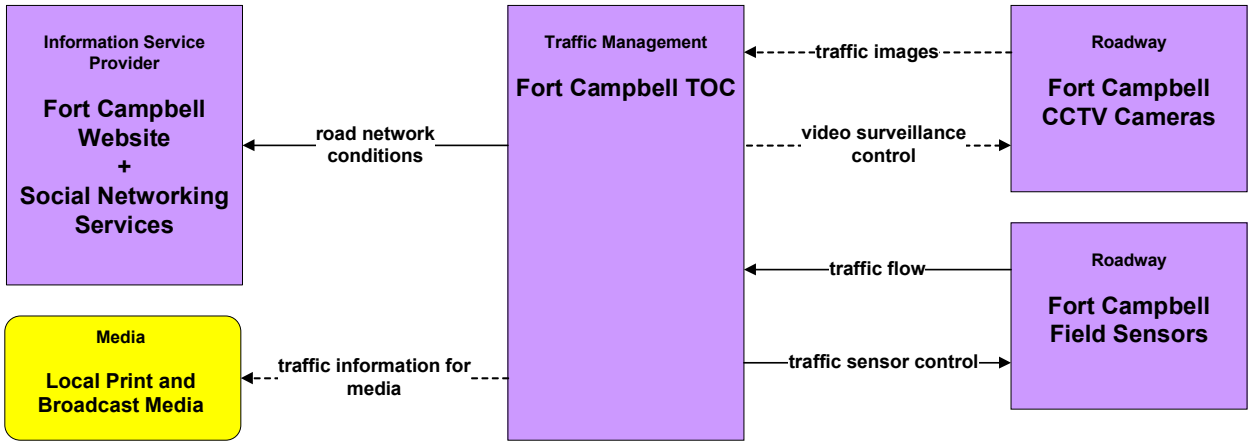
Advanced Traffic Management System

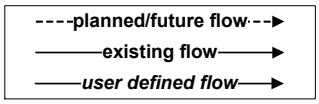



ATMS01 – Network Surveillance
KYTC Statewide Incident Management Operations Center
Information Service Provider
Conditions Acquisition and Reporting System (CARS)
road network conditions
Traffic Management
KYTC Statewide IMOC + KYTC District 2 TMC
traffic images
video surveillance control
Roadway
KYTC CCTV Cameras
Information Service Provider
Kentucky 511 System
road network conditions + traffic images
traffic flow
traffic sensor control
Roadway
KYTC Field Sensors
Information Service Provider
Private Sector Traveler Information Services
road network conditions
traffic images
traffic information for media
Media
Local Print and Broadcast Media
planned/future flow
existing flow
user defined flow
Note:
The Kentucky 511 System includes the KY 511 telephone number, KY 511 Website, and KY 511 Smartphone App.

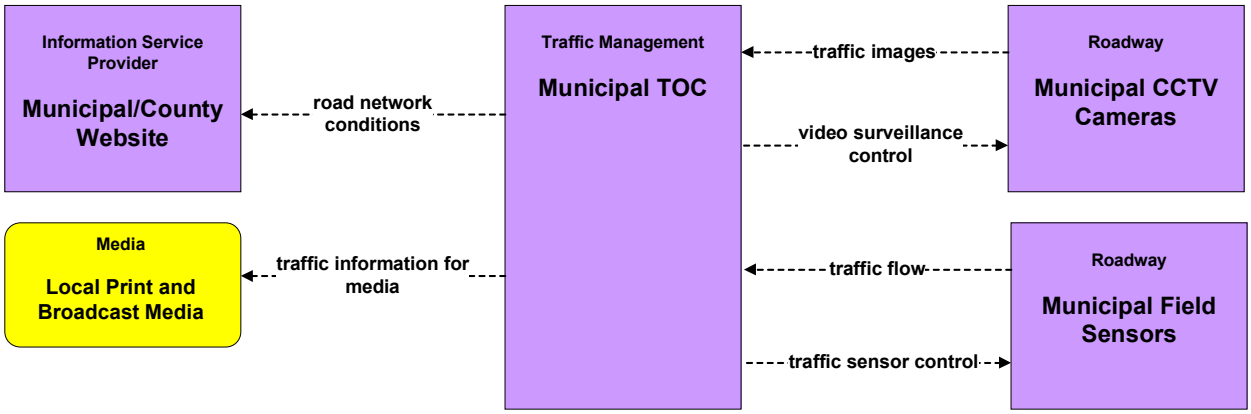

ATMS01 – Network Surveillance
City of Clarksville
Information Service Provider
City of Clarksville Website
traffic images
road network conditions
Traffic Management
City of Clarksville TOC
traffic images
video surveillance control
Roadway
City of Clarksville CCTV Cameras
Information Service Provider
Private Sector Traveler Information Services
road network conditions
traffic flow
traffic sensor control
Roadway
City of Clarksville Field Sensors
traffic information for media
Media
Local Print and Broadcast Media
planned/future flow
existing flow
user defined flow

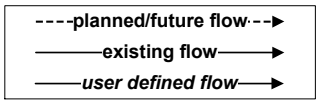
ATMS01 – Network Surveillance
Fort Campbell

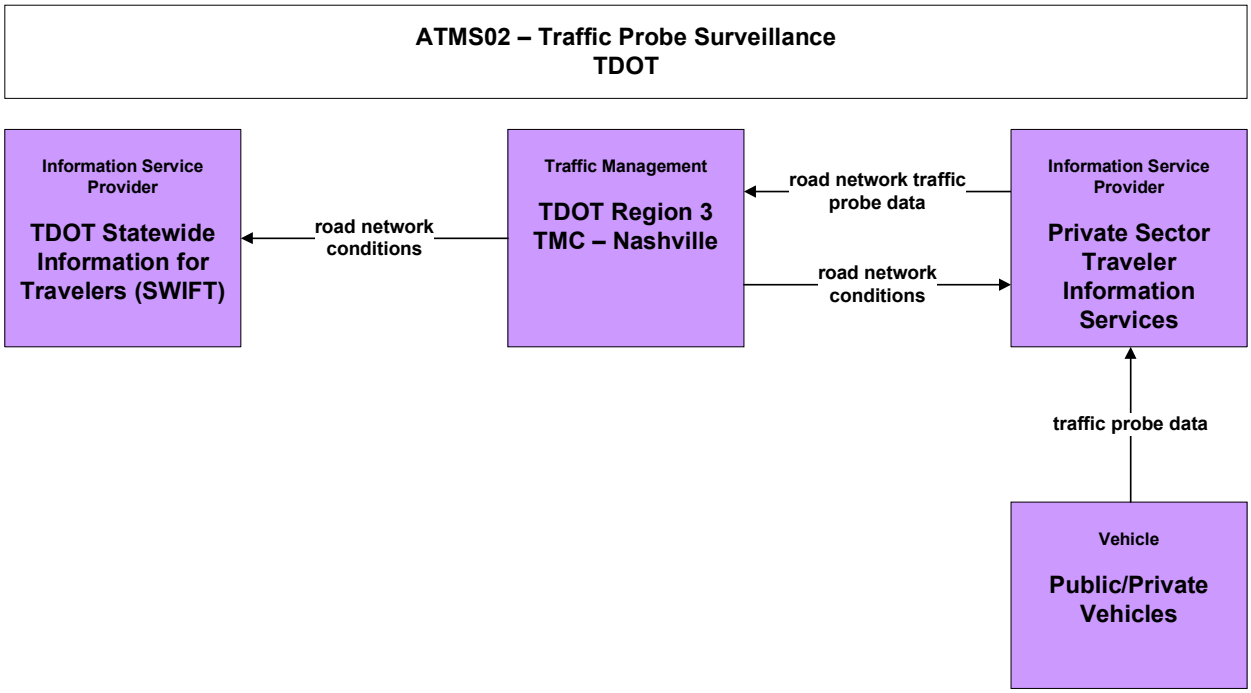


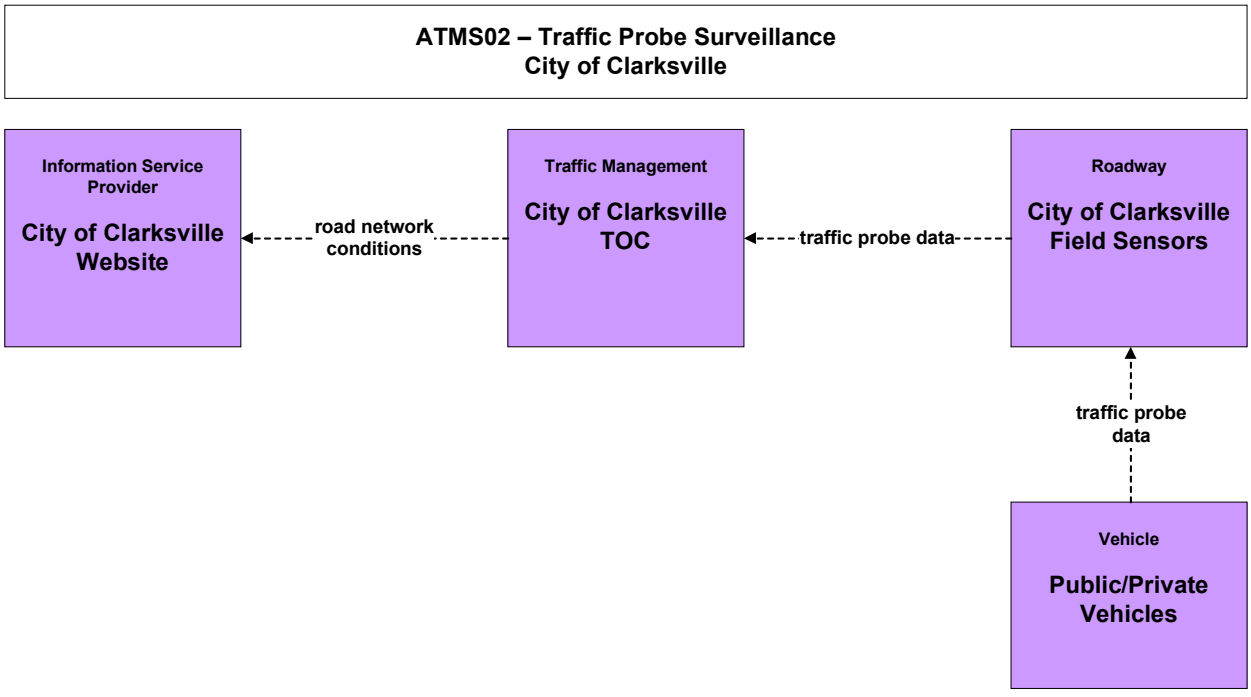


ATMS01 – Network Surveillance
Municipal

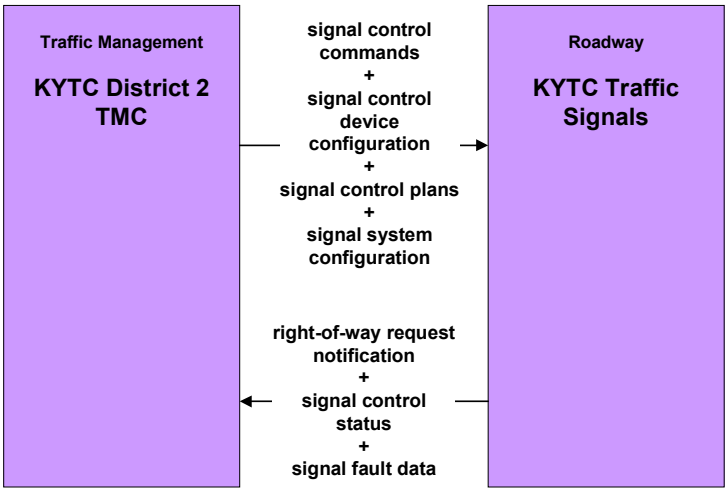





ATMS02 – Traffic Probe Surveillance
TDOT
Information Service Provider
TDOT Statewide Information for Travelers (SWIFT)
road network conditions
Traffic Management
TDOT Region 3 TMC – Nashville
road network traffic probe data
road network conditions
Information Service Provider
Private Sector Traveler Information Services
traffic probe data
Vehicle
Public/Private Vehicles
planned/future flow
existing flow
user defined flow
Note:
Private Sector Traveler Information Services includes traffic data from INRIX and Google Traffic


ATMS02 – Traffic Probe Surveillance
City of Clarksville
Information Service Provider
City of Clarksville Website
road network conditions
Traffic Management
City of Clarksville TOC
traffic probe data
Roadway
City of Clarksville Field Sensors
traffic probe data
Vehicle
Public/Private Vehicles
planned/future flow
existing flow
user defined flow

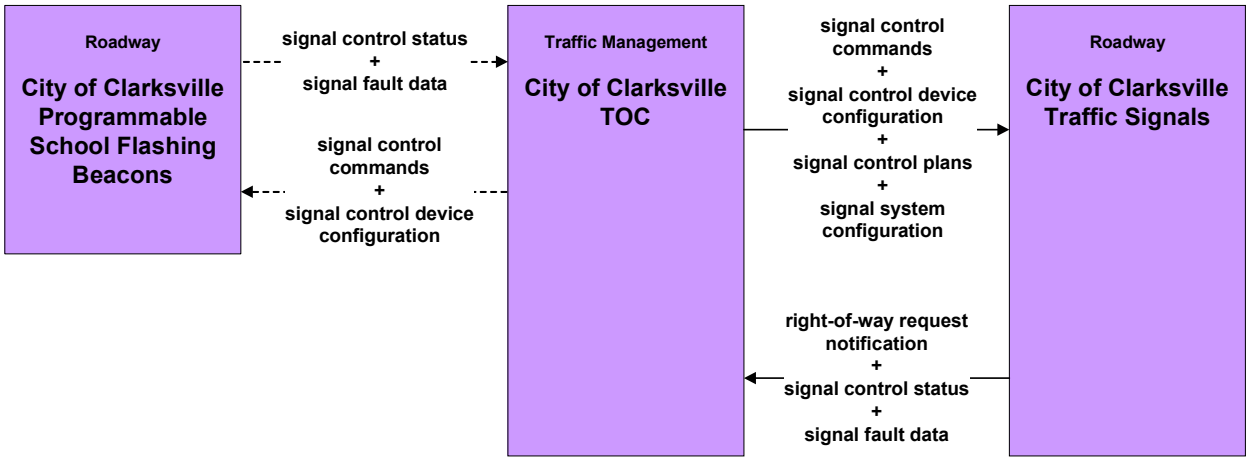
ATMS03 – Traffic Signal Control
KYTC



Note:
KYTC operates and maintains traffic signals for the City of Hopkinsville and the City of Oak Grove.

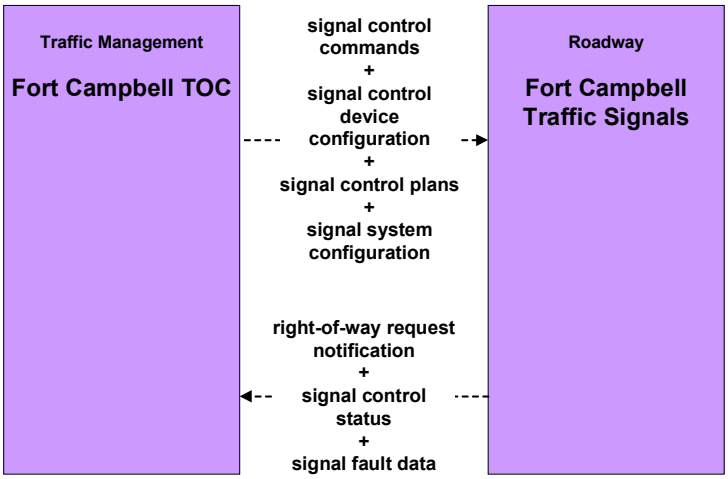
----planned/future flow-->
————existing flow————>
——*user defined flow*——>

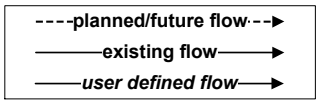
ATMS03 – Traffic Signal Control
City of Clarksville



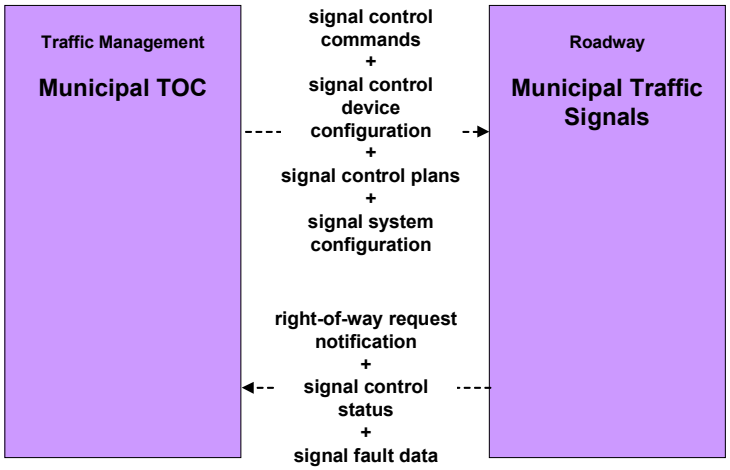
----planned/future flow-->
————existing flow————>
——*user defined flow*——>

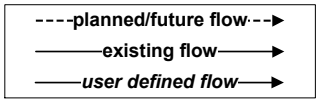
ATMS03 – Traffic Signal Control
Fort Campbell



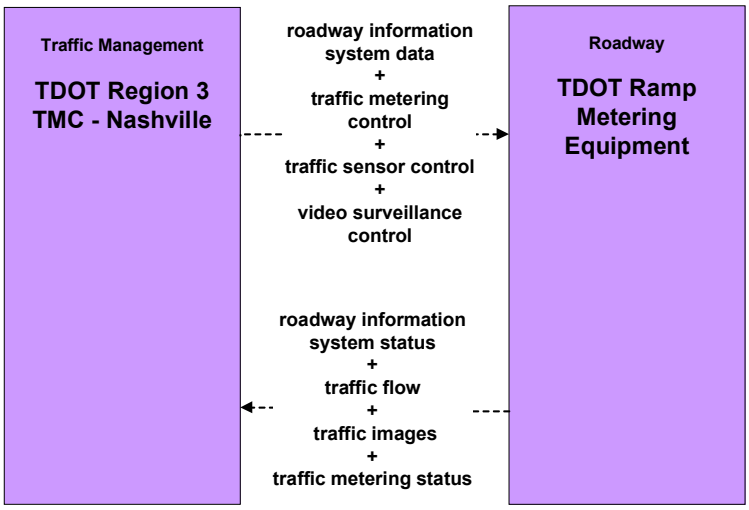


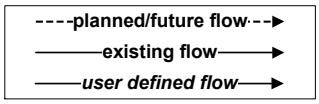
ATMS03 – Traffic Signal Control
Municipal



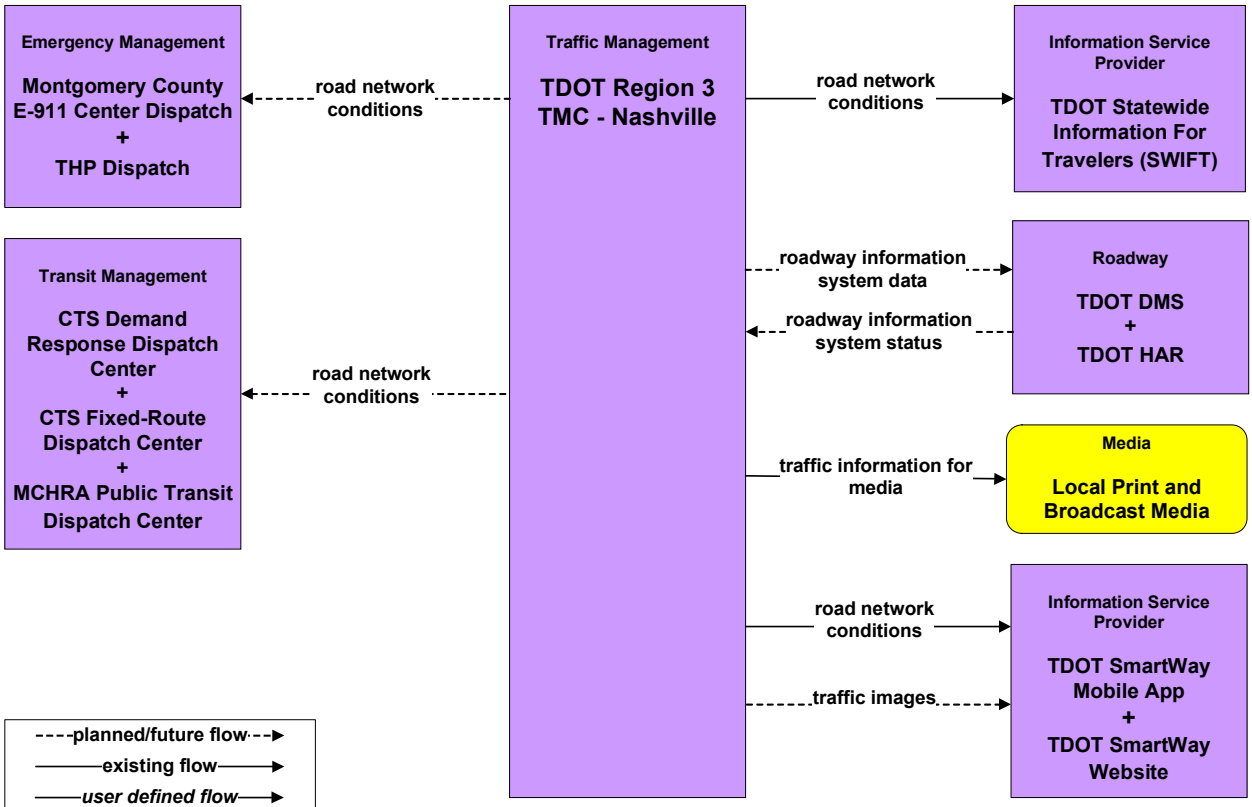


ATMS04 – Traffic Metering
TDOT

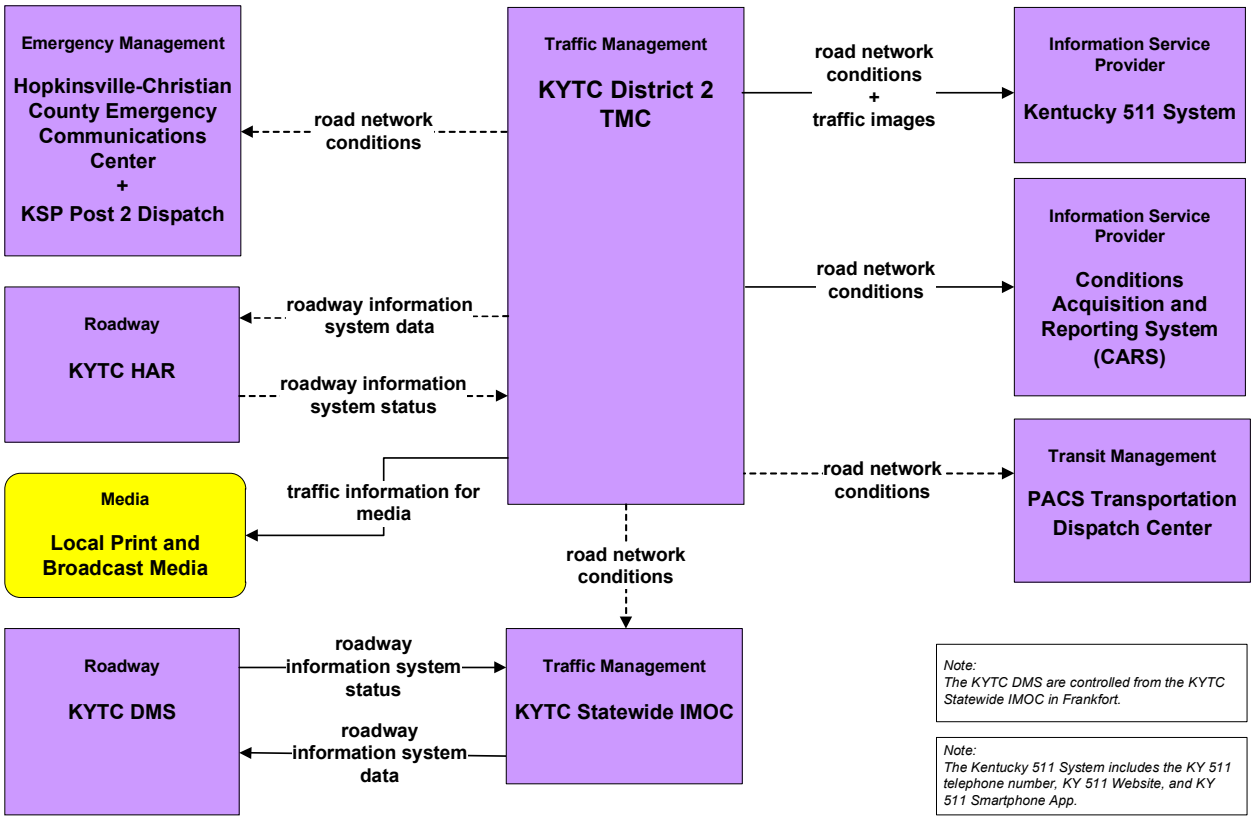




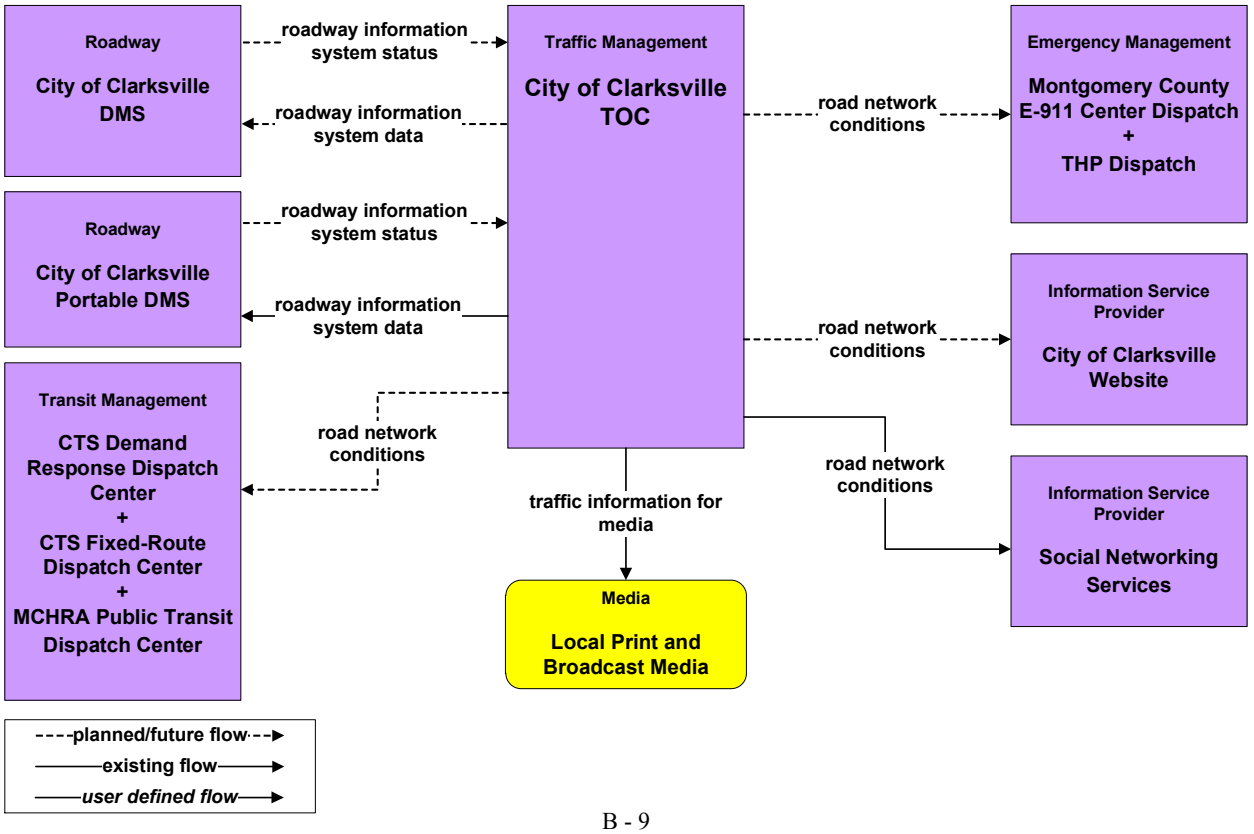
ATMS06 – Traffic Information Dissemination
TDOT Region 3 TMC - Nashville



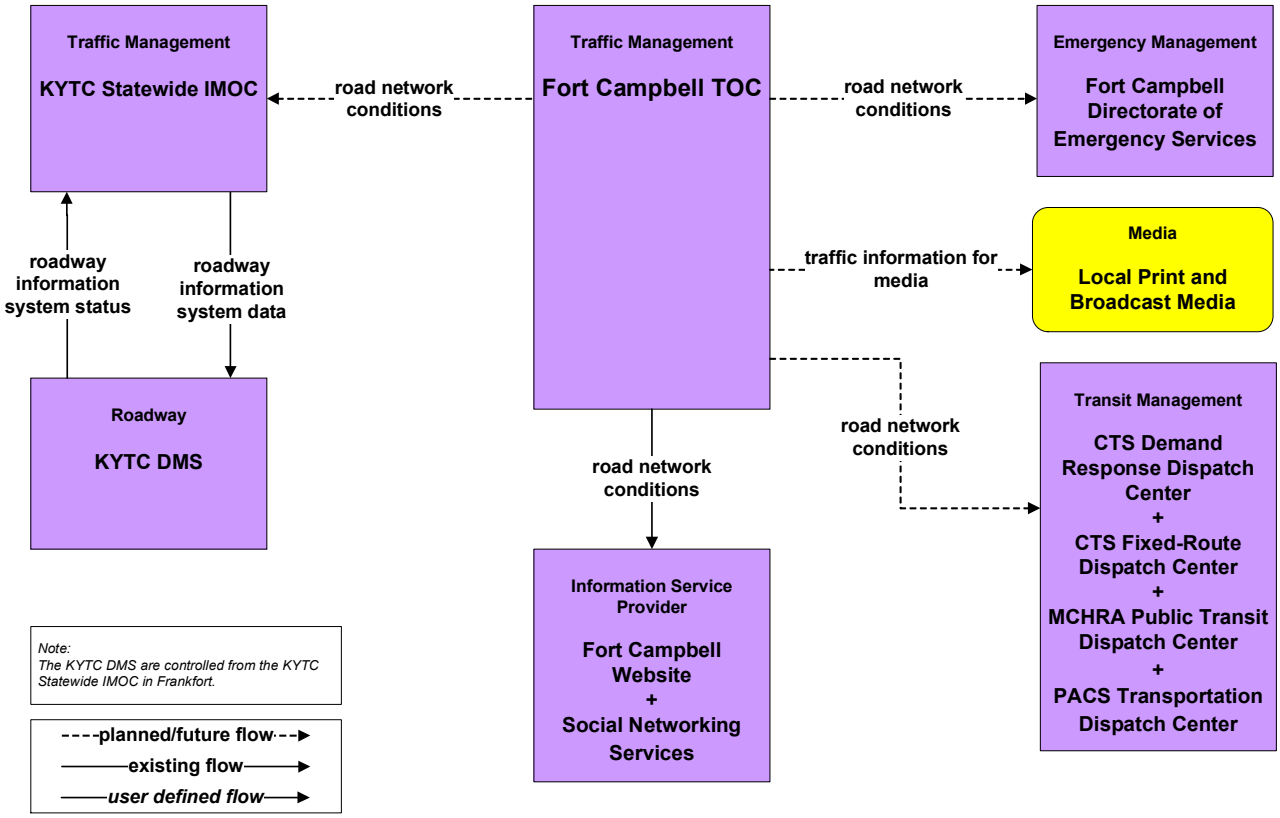
ATMS06 – Traffic Information Dissemination
KYTC



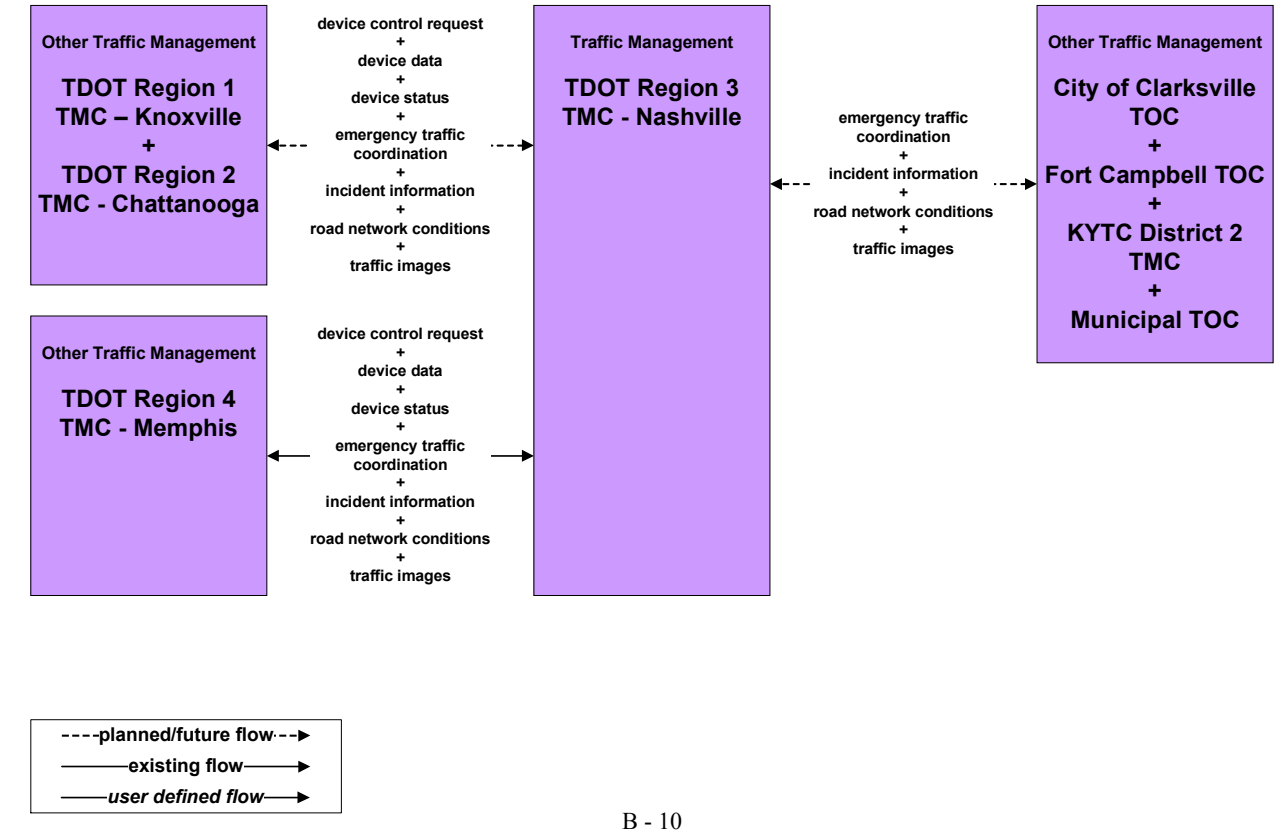
ATMS06 – Traffic Information Dissemination
City of Clarksville

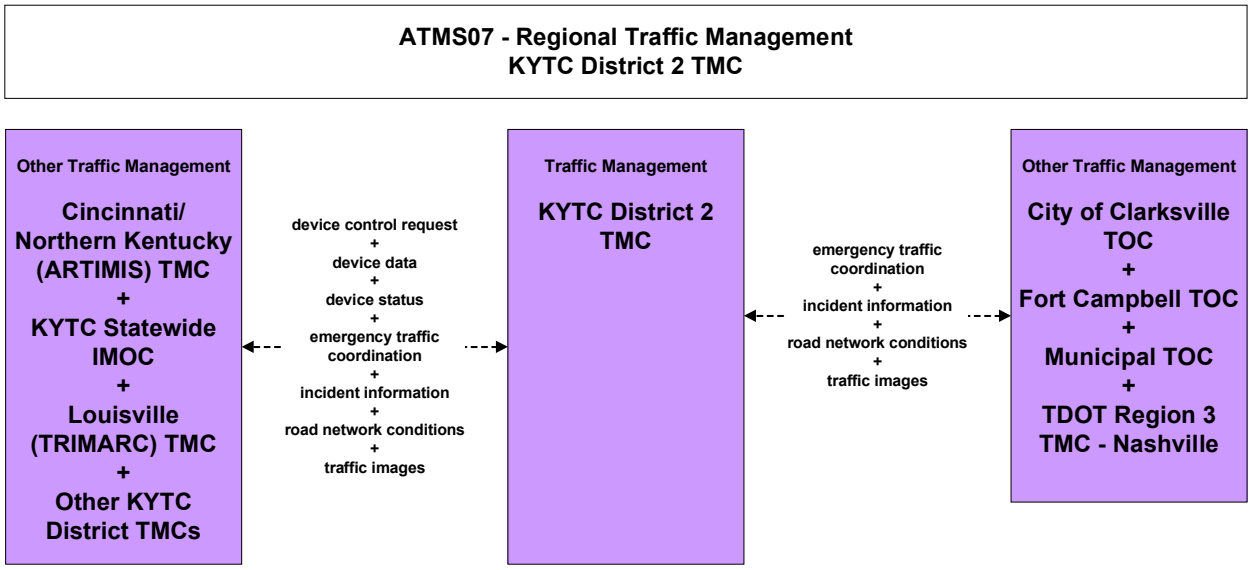


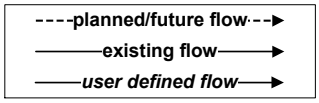
ATMS06 – Traffic Information Dissemination
Fort Campbell

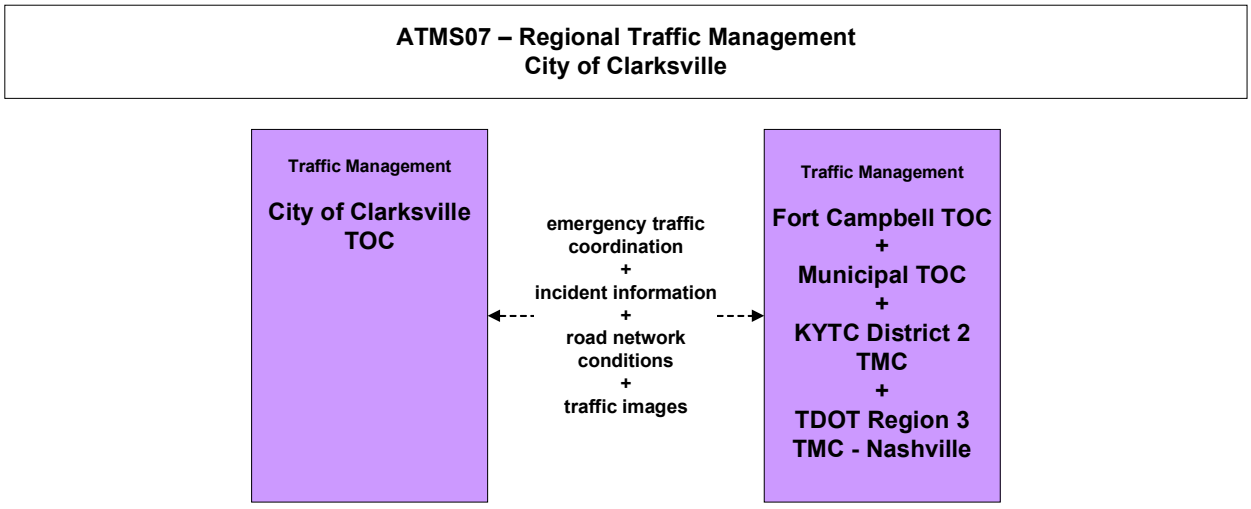


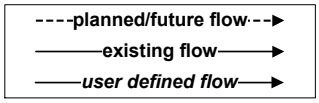
ATMS07 - Regional Traffic Management
TDOT Region 3 TMC - Nashville



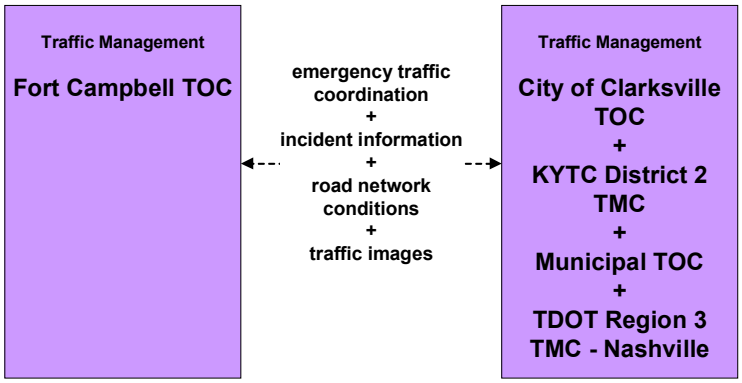

ATMS07 - Regional Traffic Management
KYTC District 2 TMC
Other Traffic Management
Cincinnati/ Northern Kentucky (ARTIMIS) TMC
+
KYTC Statewide IMOC
+
Louisville (TRIMARC) TMC
+
Other KYTC District TMCs
device control request
+
device data
+
device status
+
emergency traffic coordination
+
incident information
+
road network conditions
+
traffic images
Traffic Management
KYTC District 2 TMC
emergency traffic coordination
+
incident information
+
road network conditions
+
traffic images
Other Traffic Management
City of Clarksville TOC
+
Fort Campbell TOC
+
Municipal TOC
+
TDOT Region 3 TMC - Nashville

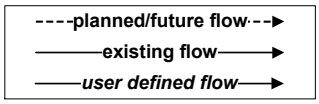

planned/future flow
existing flow
user defined flow


ATMS07 – Regional Traffic Management
City of Clarksville
Traffic Management
City of Clarksville TOC
emergency traffic coordination
+
incident information
+
road network conditions
+
traffic images
Traffic Management
Fort Campbell TOC
+
Municipal TOC
+
KYTC District 2 TMC
+
TDOT Region 3 TMC - Nashville

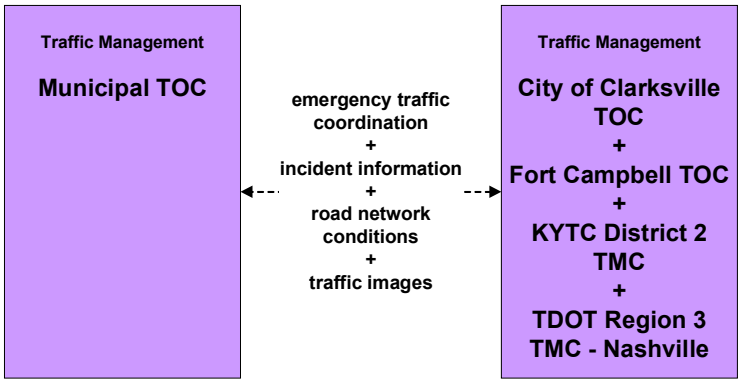

planned/future flow
existing flow
user defined flow

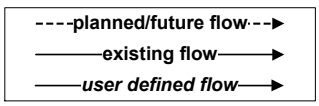
ATMS07 – Regional Traffic Management
Fort Campbell



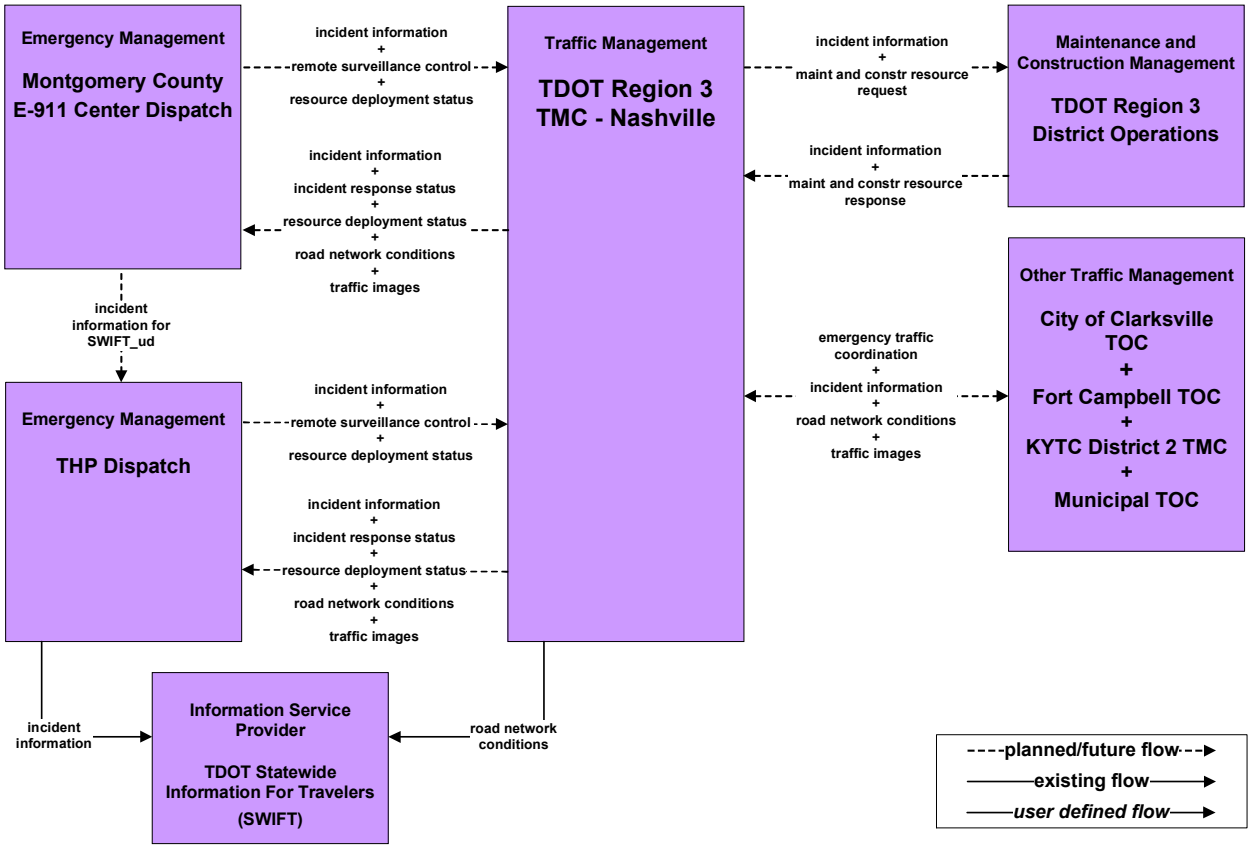


ATMS07 – Regional Traffic Management
Municipal

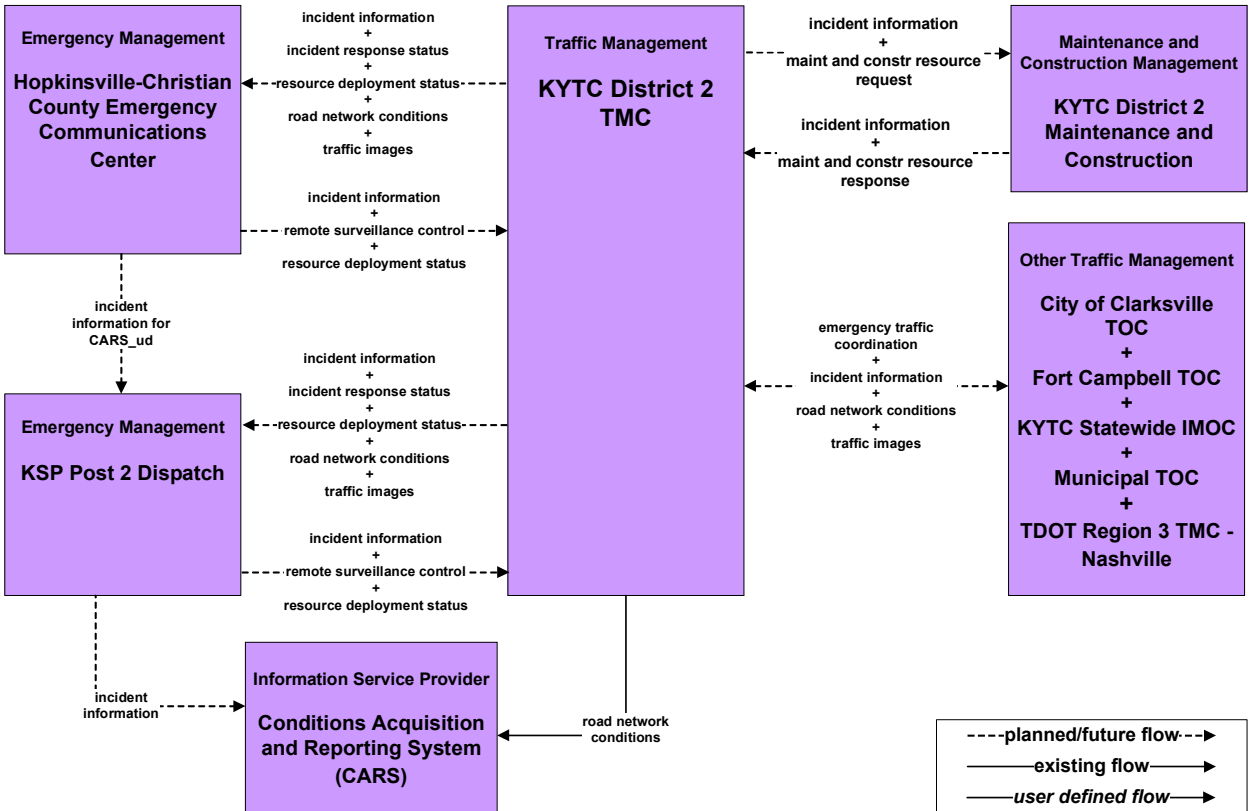




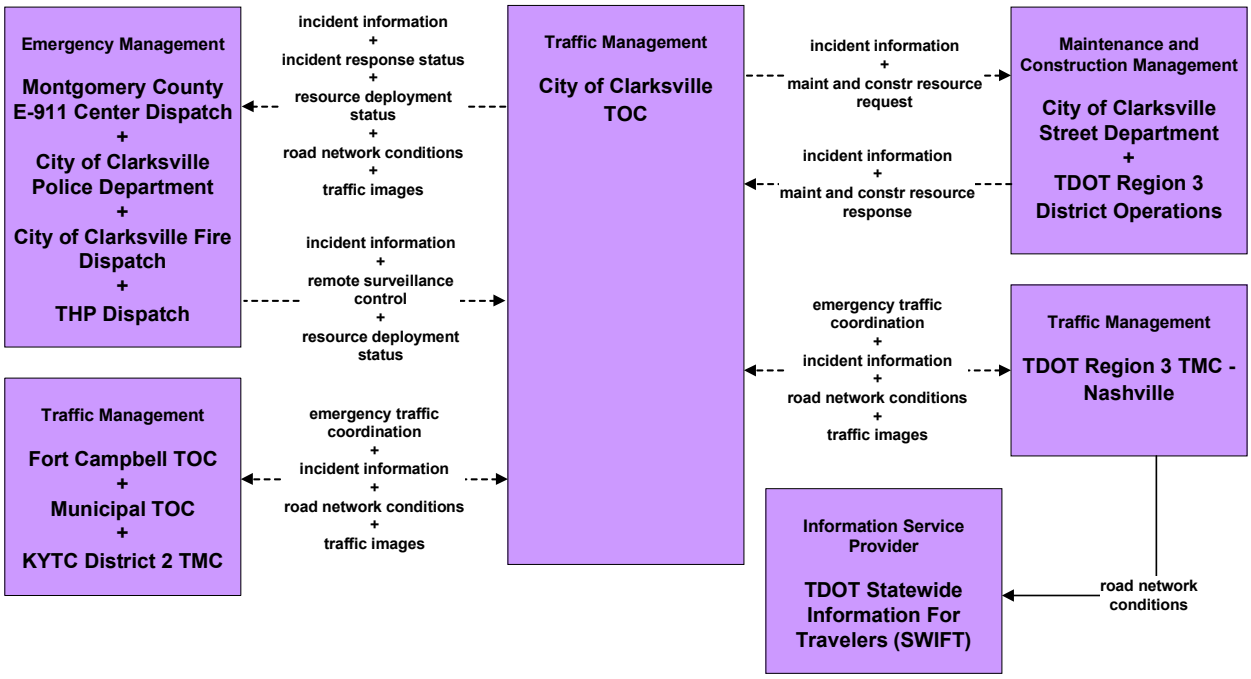
ATMS08 - Traffic Incident Management System
TDOT Region 3 TMC - Nashville



ATMS08 - Traffic Incident Management System
KYTC District 2 TMC



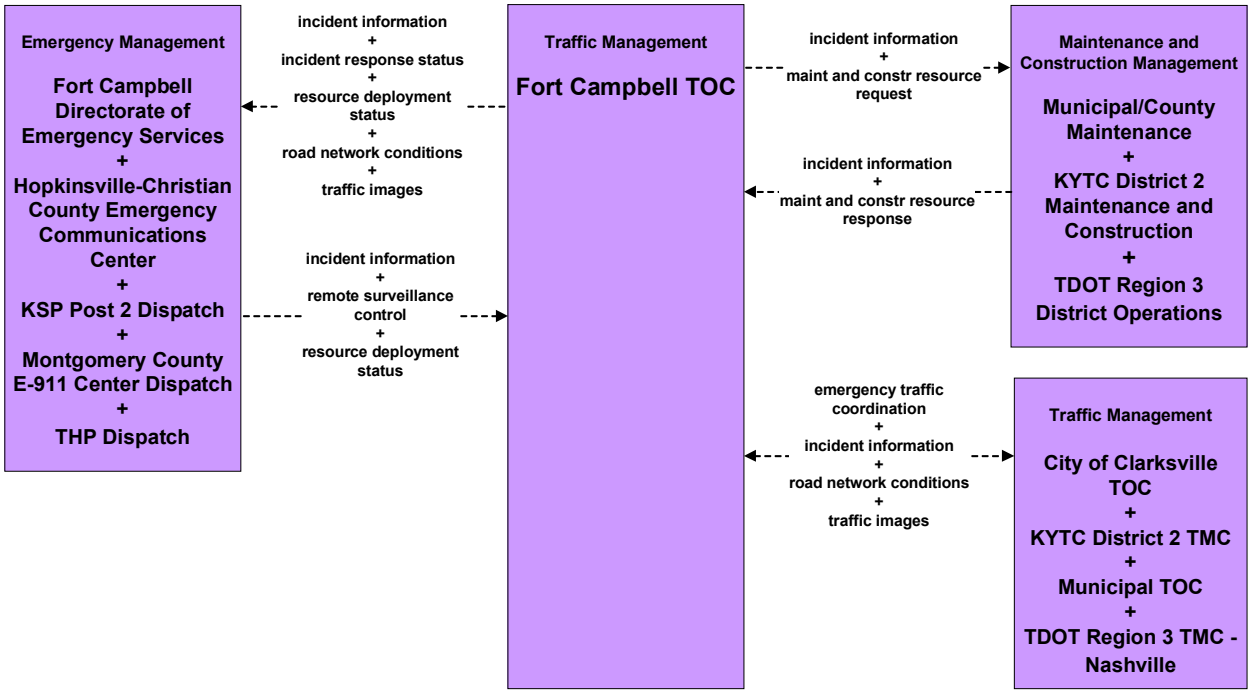
ATMS08 - Traffic Incident Management System
City of Clarksville



Note:
When a road closure occurs either as a result of an incident or maintenance, the City of Clarksville contacts the TDOT Region 3 TMC and the TMC puts the information into SWIFT. Currently this is done by telephone, email, or news release but is planned to be electronic in the future.

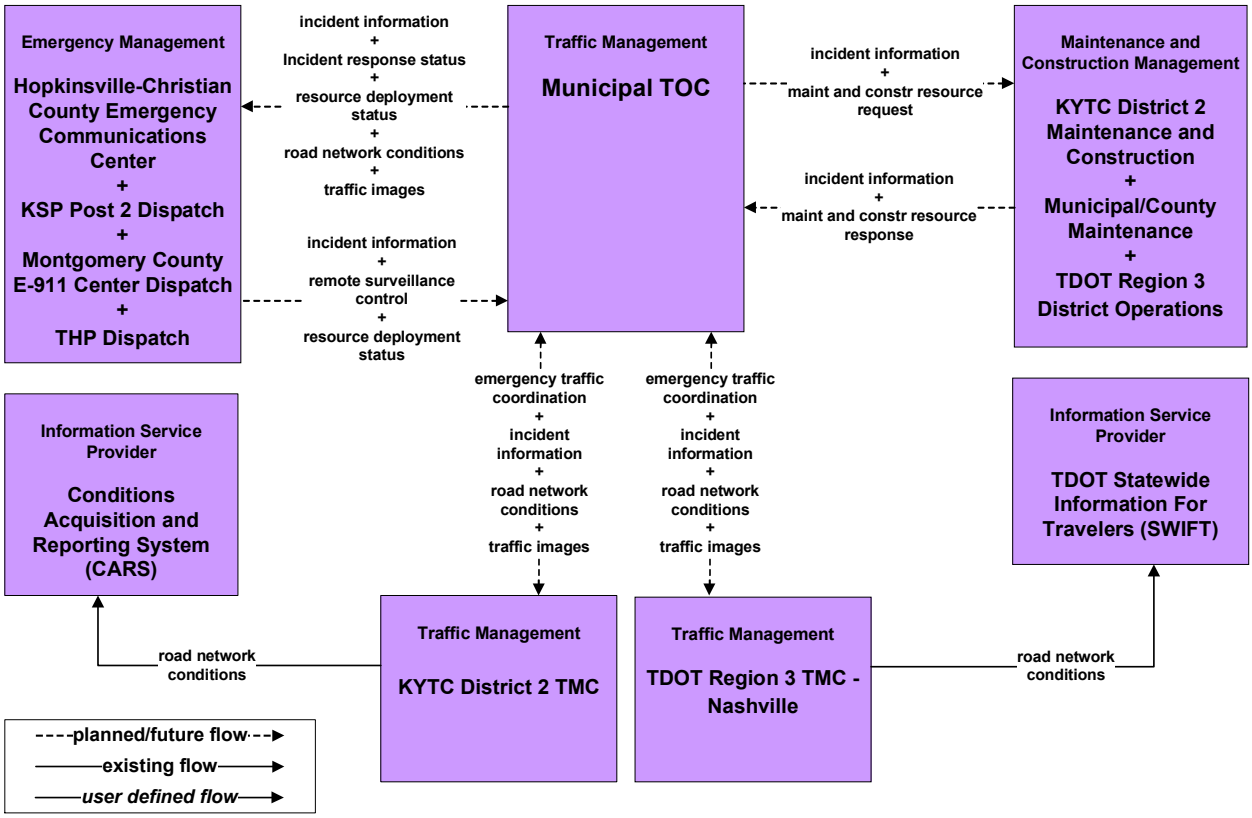
----planned/future flow-->
——existing flow——>
——*user defined flow*——>

ATMS08 - Traffic Incident Management System
Fort Campbell

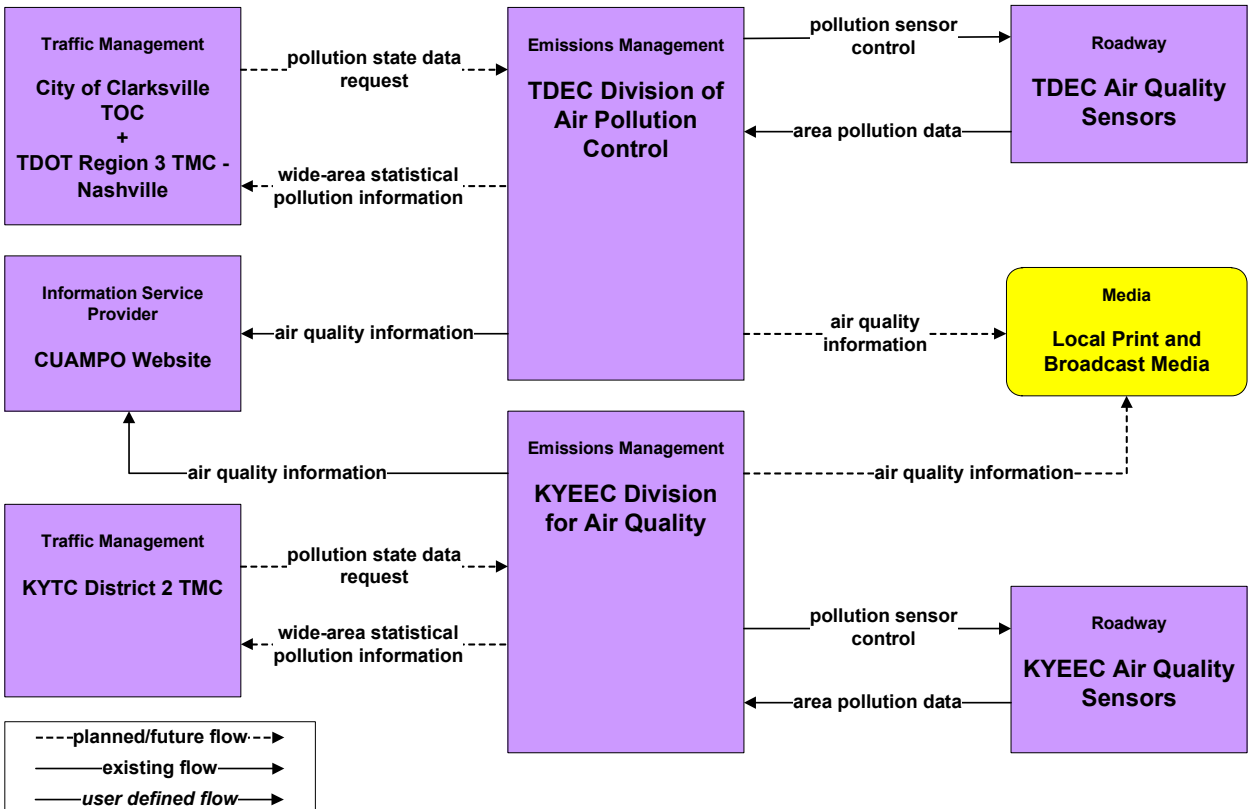


----planned/future flow-->
——existing flow——>
——*user defined flow*——>

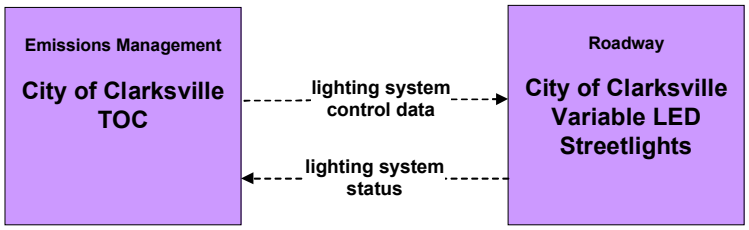
ATMS08 - Traffic Incident Management System
Municipal

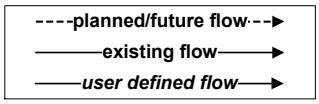


ATMS11 – Emissions Monitoring and Management
TDEC and KYEEC

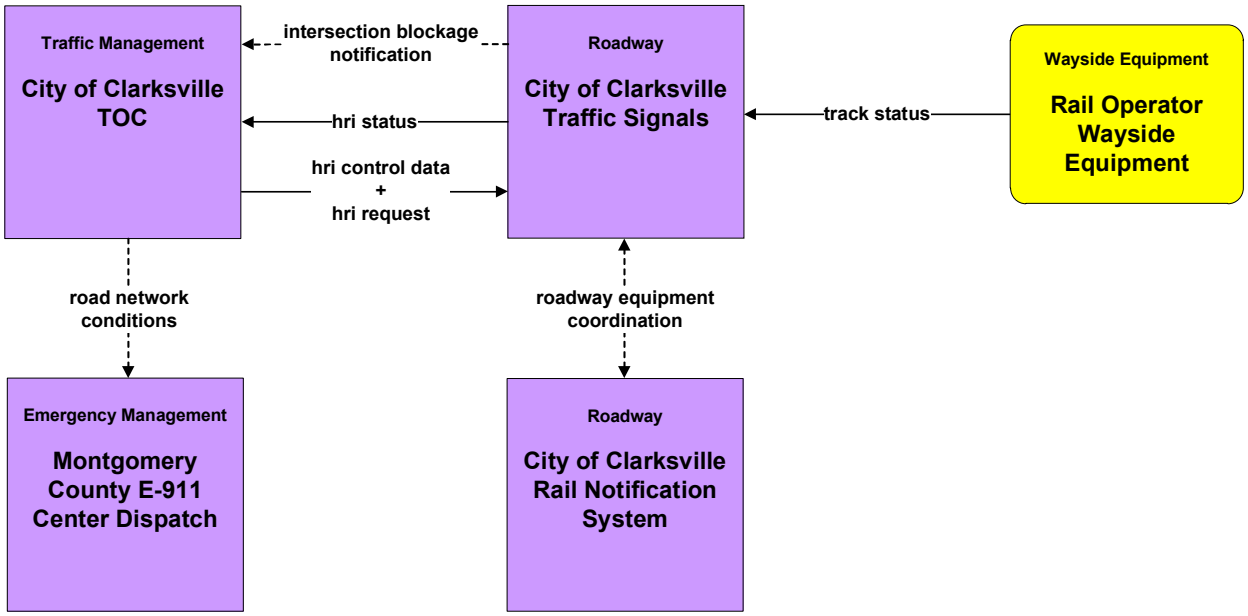


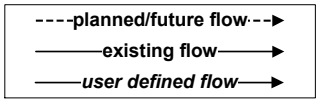
ATMS12 – Roadside Lighting System Control
City of Clarksville



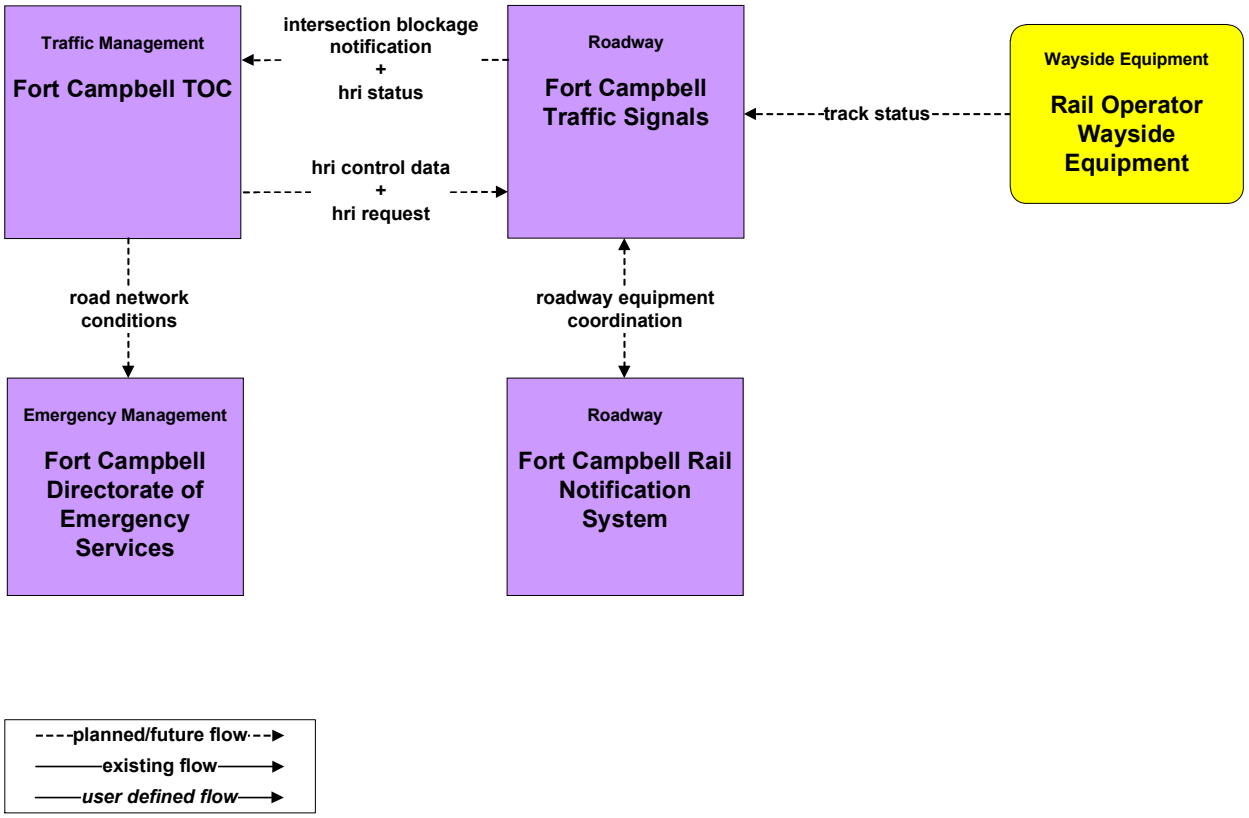


ATMS13 – Standard Railroad Grade Crossing
City of Clarksville

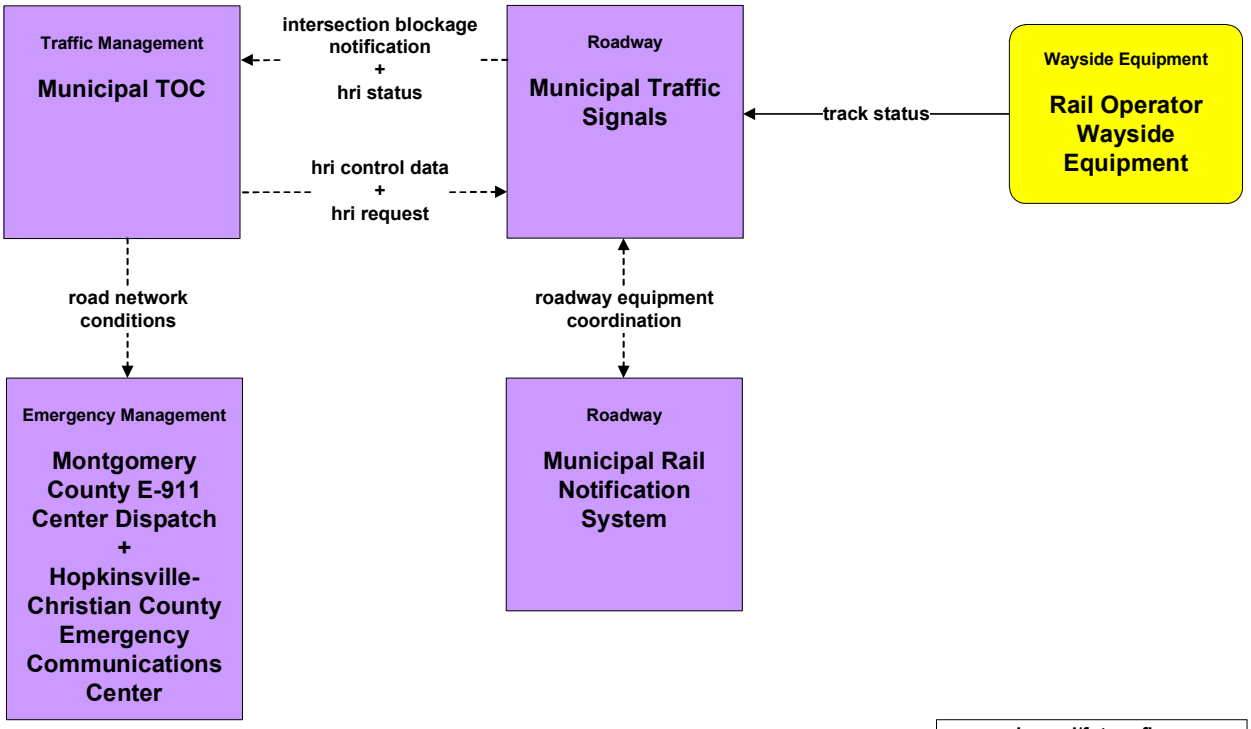


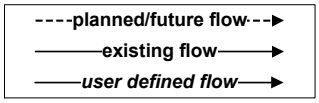


ATMS13 – Standard Railroad Grade Crossing
Fort Campbell

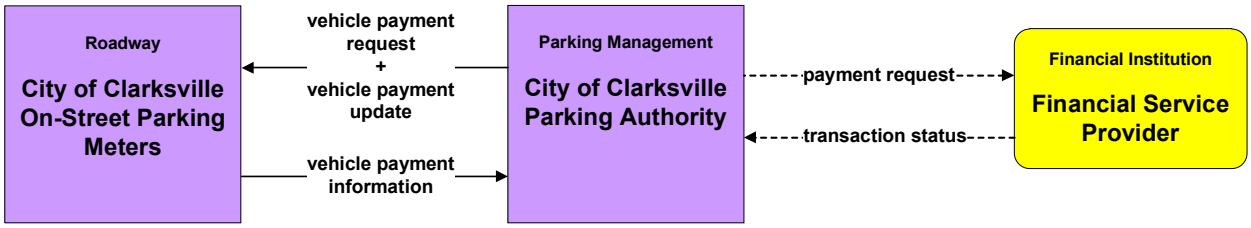


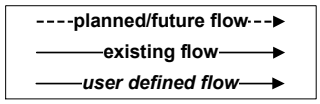
ATMS13 – Standard Railroad Grade Crossing
Municipal



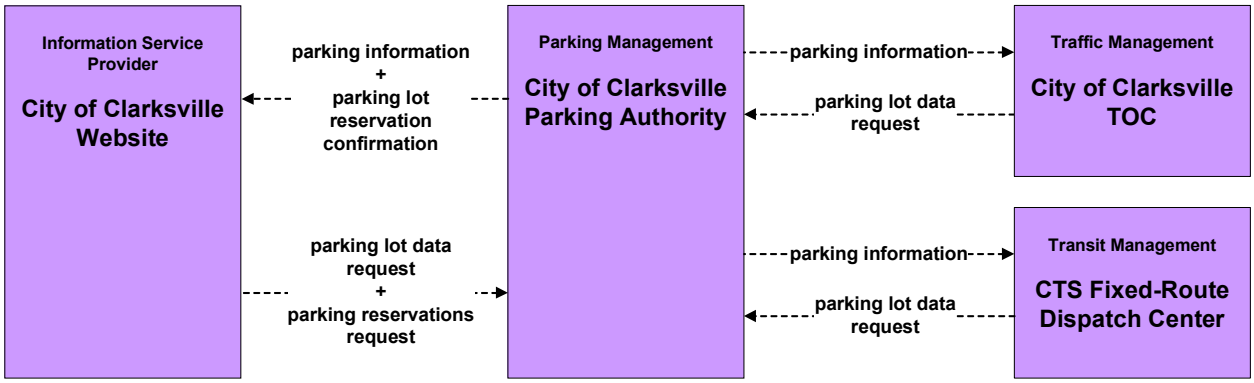


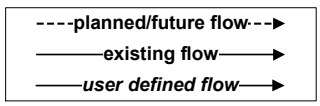
ATMS16 – Parking Facility Management
City of Clarksville



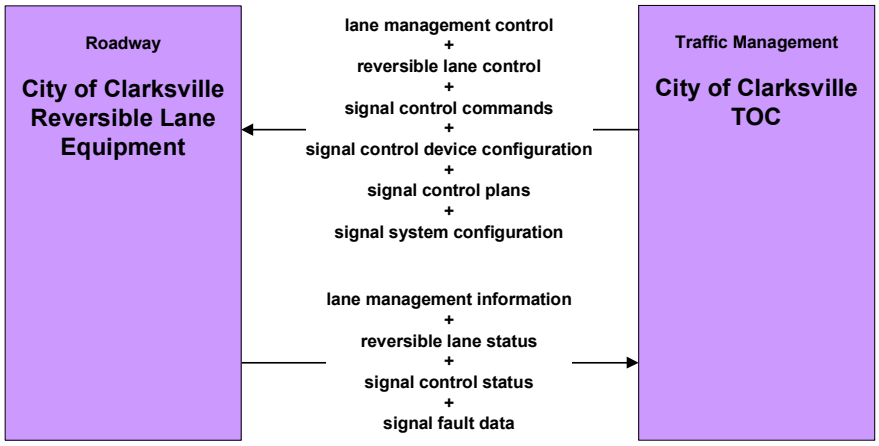


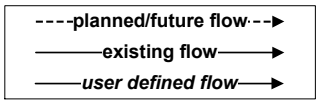
ATMS17 – Regional Parking Management
City of Clarksville



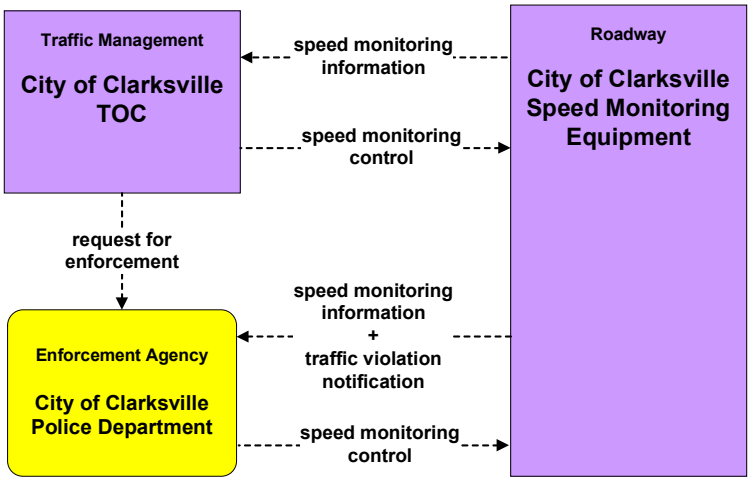


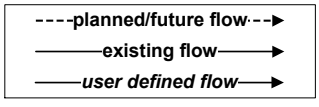
ATMS18 – Reversible Lane Management
City of Clarksville





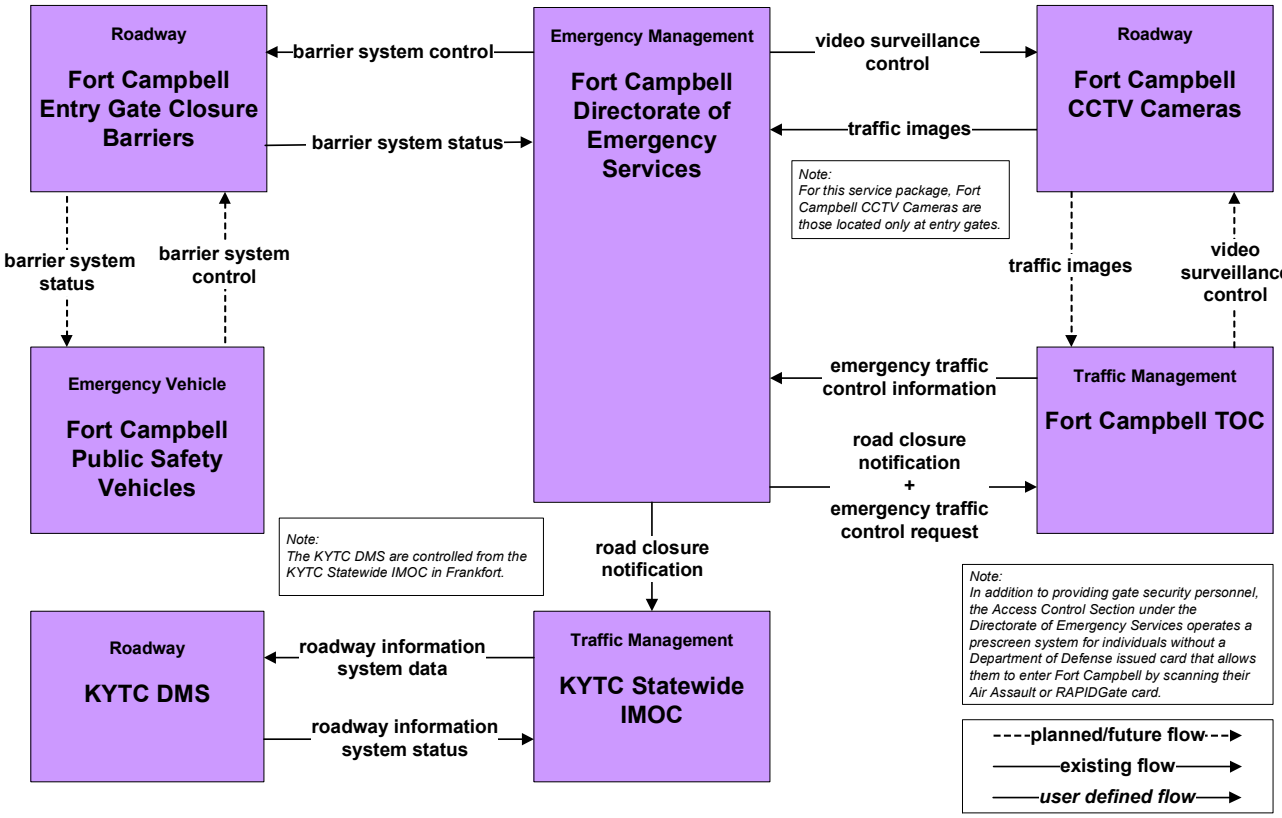
ATMS19 – Speed Warning and Enforcement
City of Clarksville



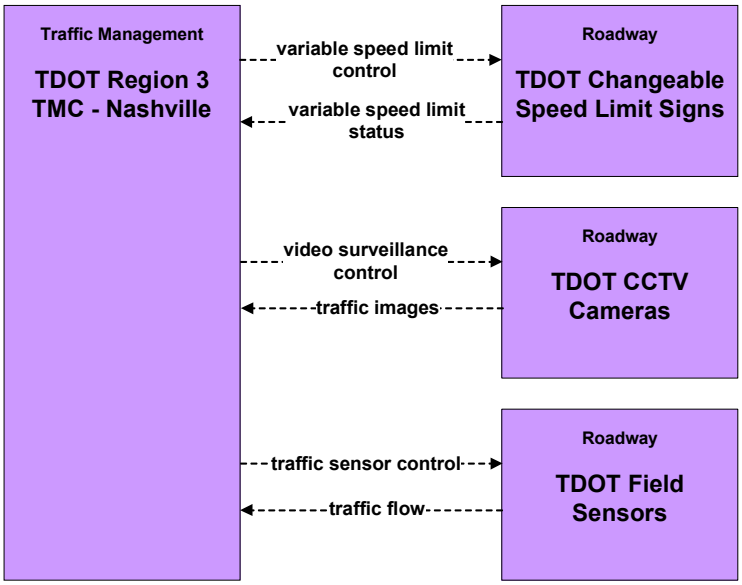


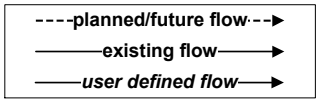
Note:
The City of Clarksville has installed feedback school zone speed limit signs; however, those signs are not connected to the TOC. The City of Clarksville also has portable feedback speed limit signs.

ATMS21 – Roadway Closure Management
Fort Campbell

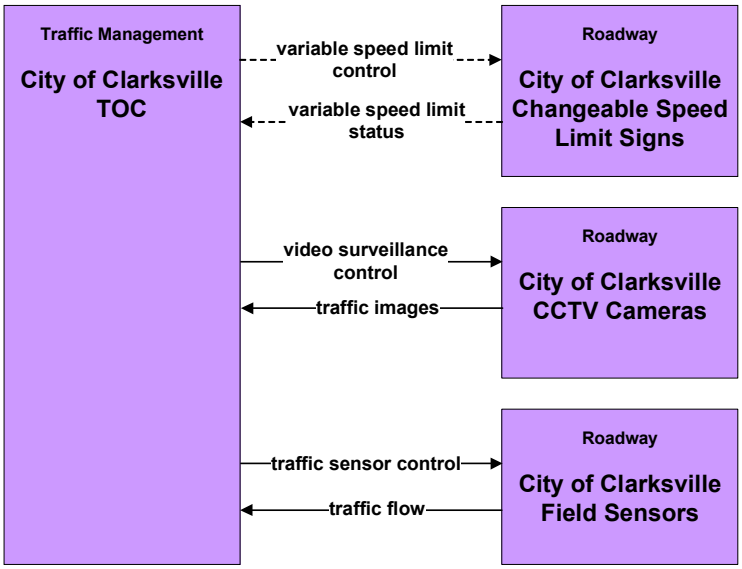


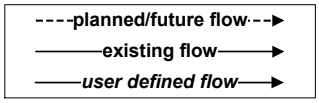
ATMS22 – Variable Speed Limits
TDOT Region 3 TMC - Nashville



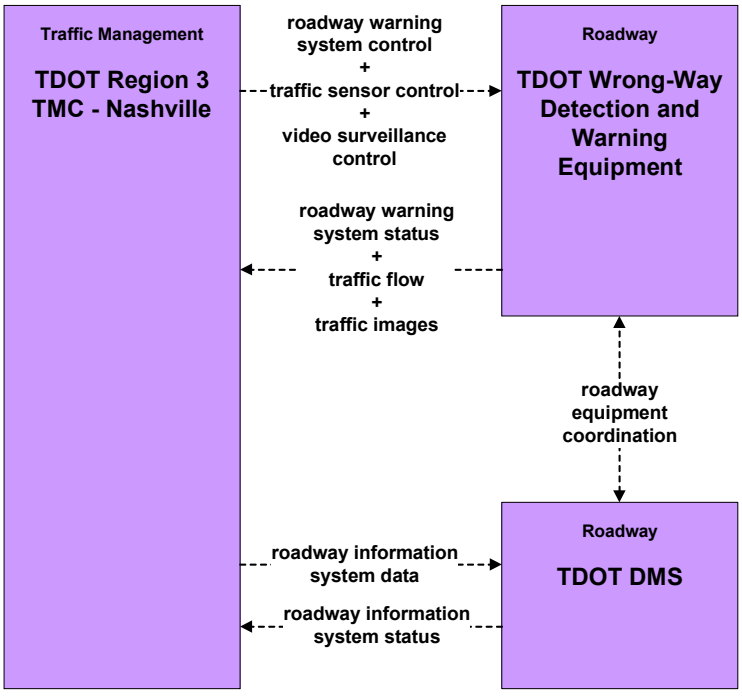


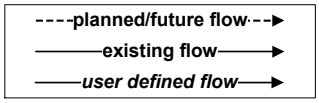
ATMS22 – Variable Speed Limits
City of Clarksville



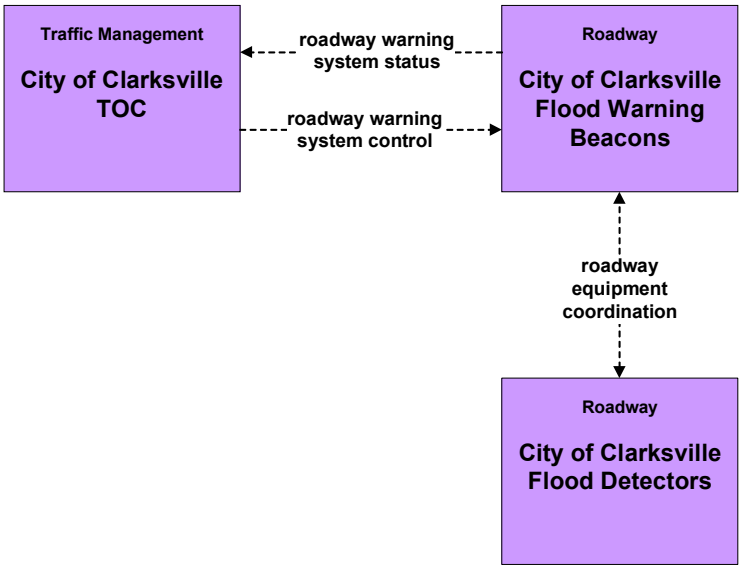


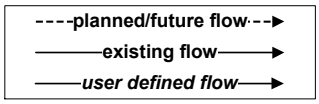
ATMS24 – Dynamic Roadway Warning
TDOT



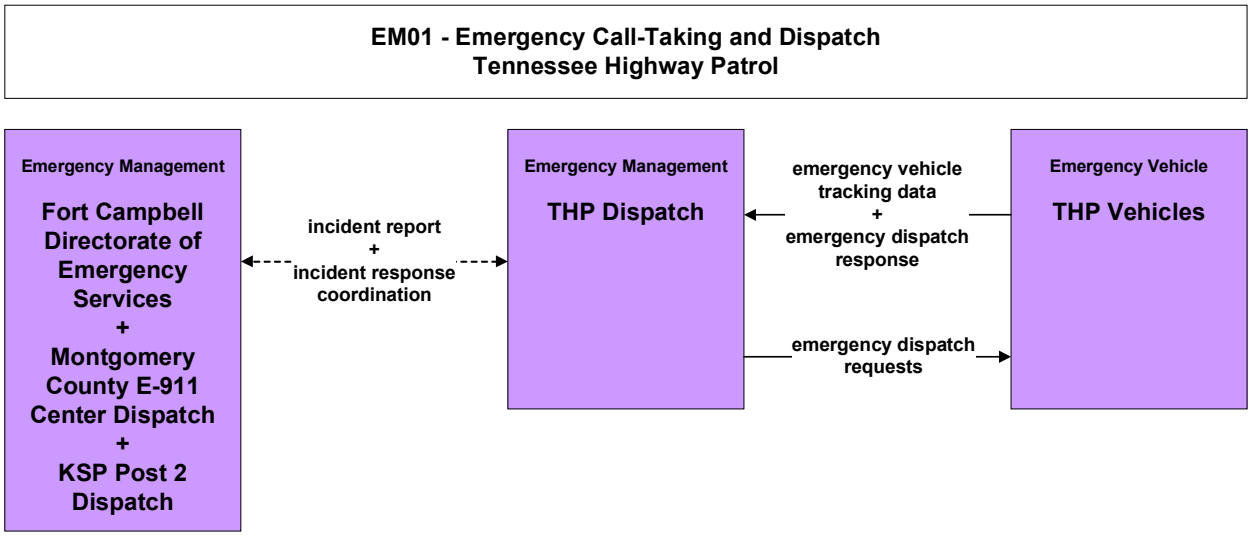


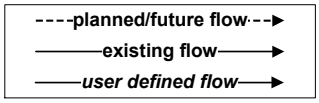
ATMS24 – Dynamic Roadway Warning
City of Clarksville



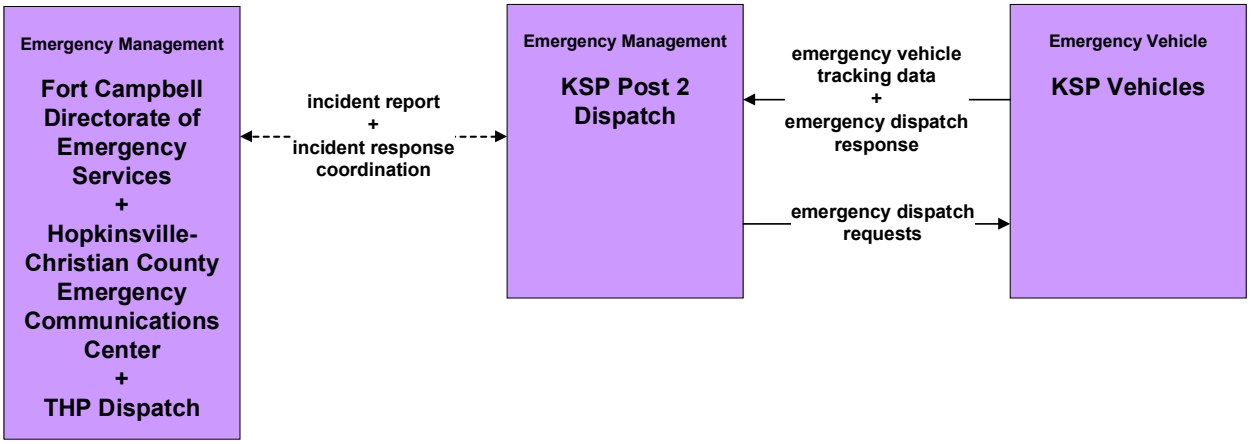


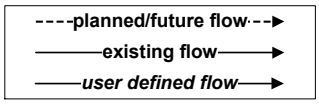
Emergency Management



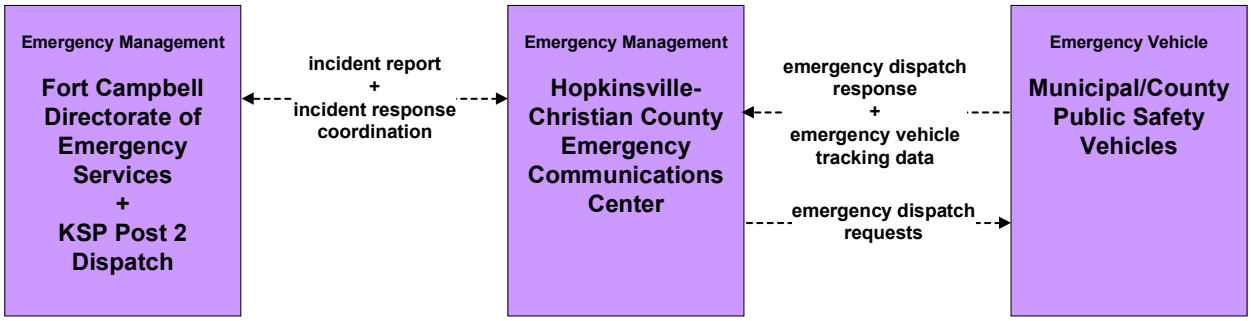


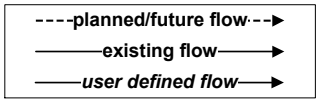
EM01 - Emergency Call-Taking and Dispatch
Kentucky State Police



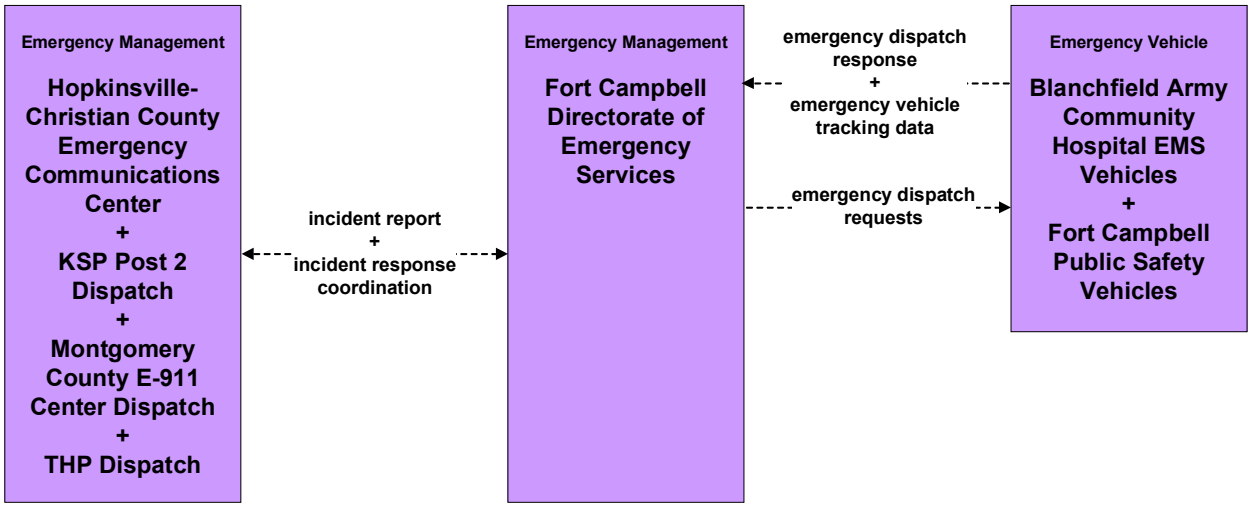


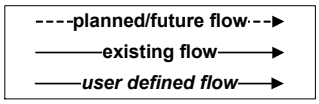
EM01 - Emergency Call-Taking and Dispatch
Hopkinsville-Christian County Emergency Communications Center



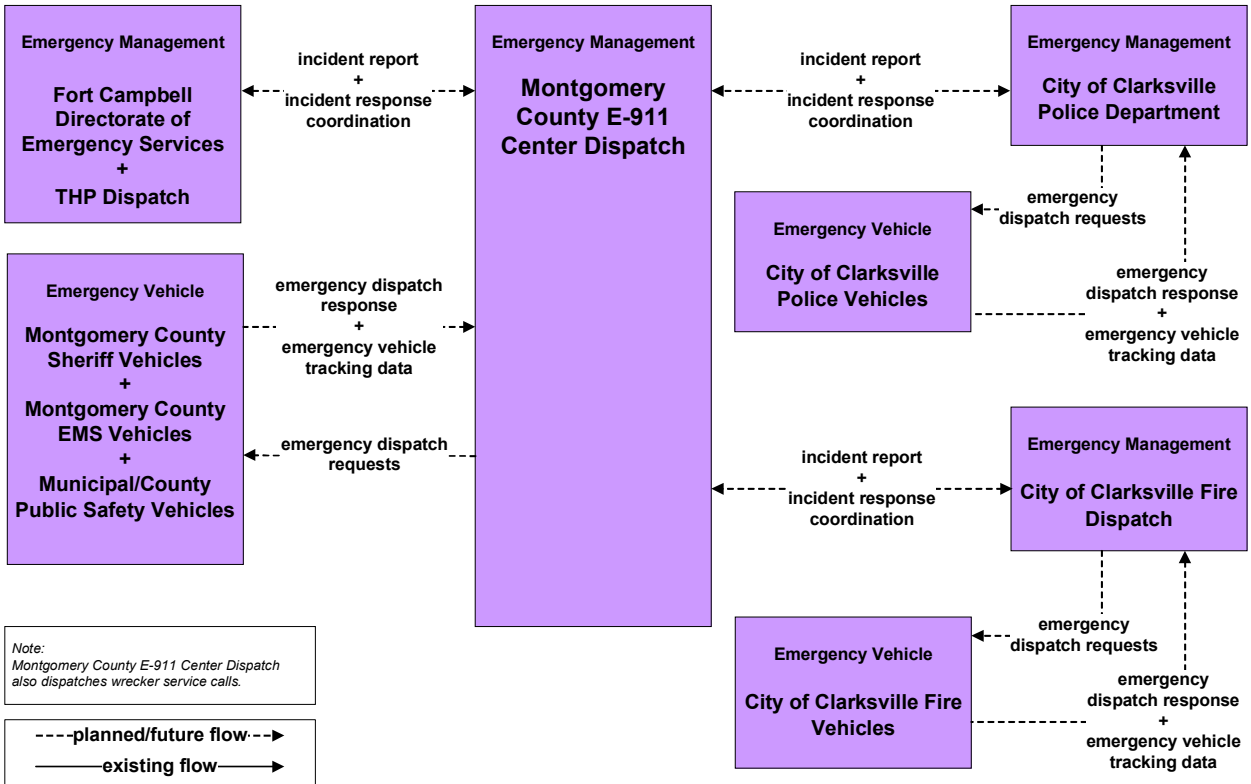


EM01 - Emergency Call-Taking and Dispatch
Fort Campbell



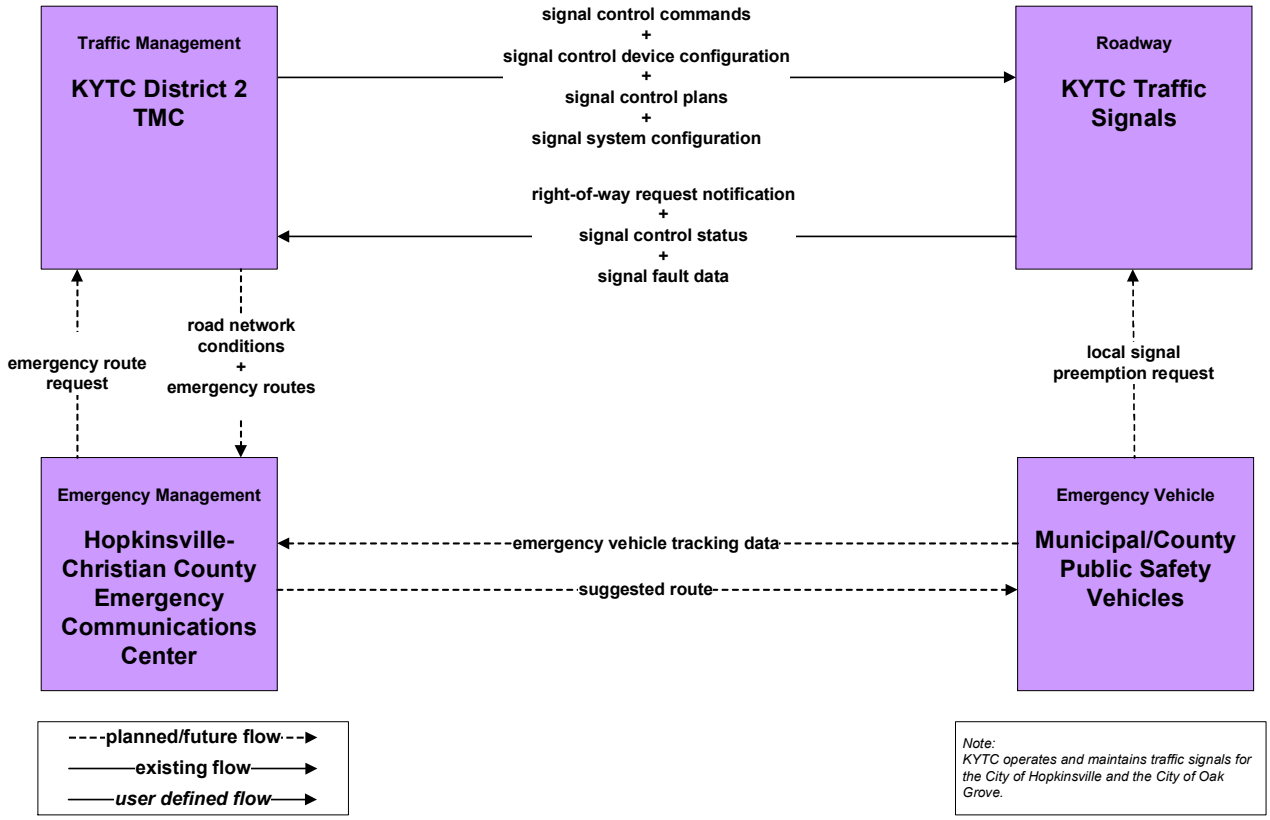


EM01 - Emergency Call-Taking and Dispatch
Montgomery County E-911 Center

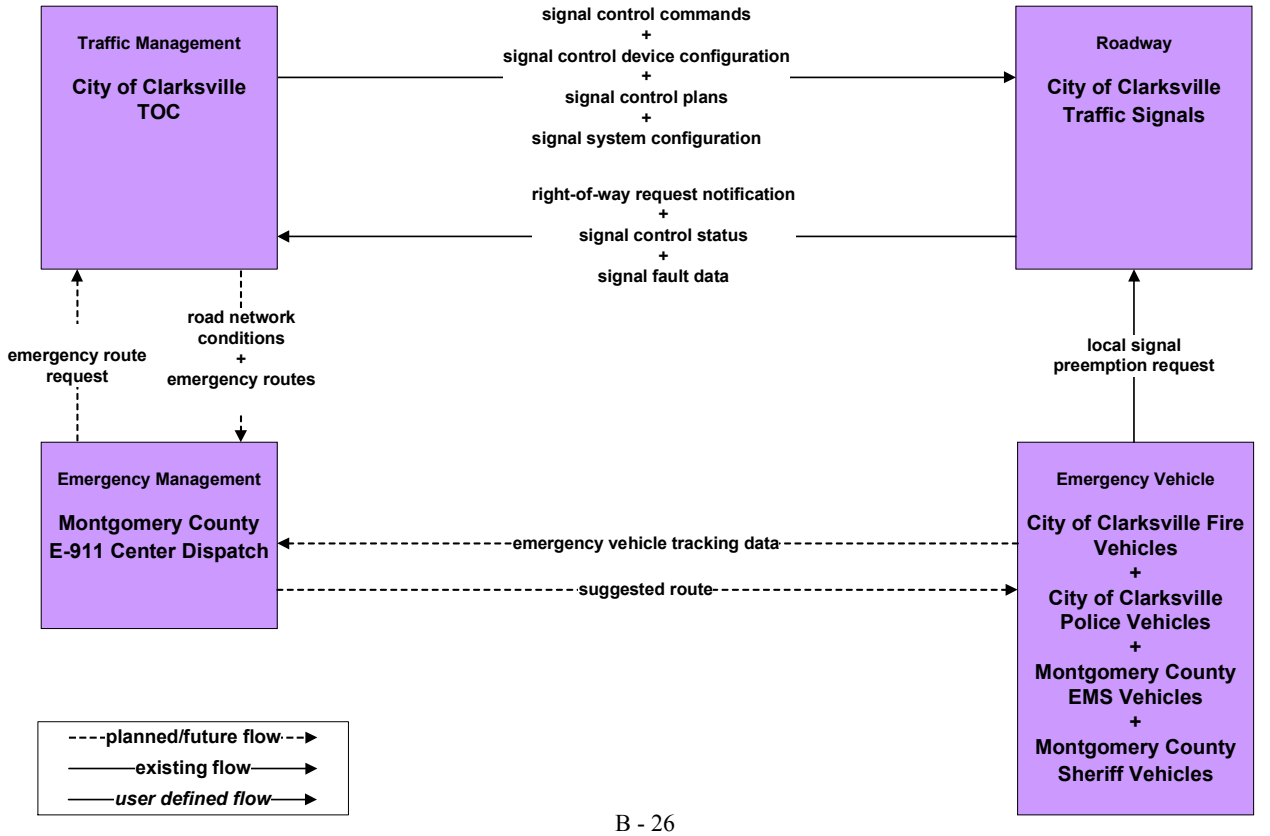


Note:
Montgomery County E-911 Center Dispatch also dispatches wrecker service calls.

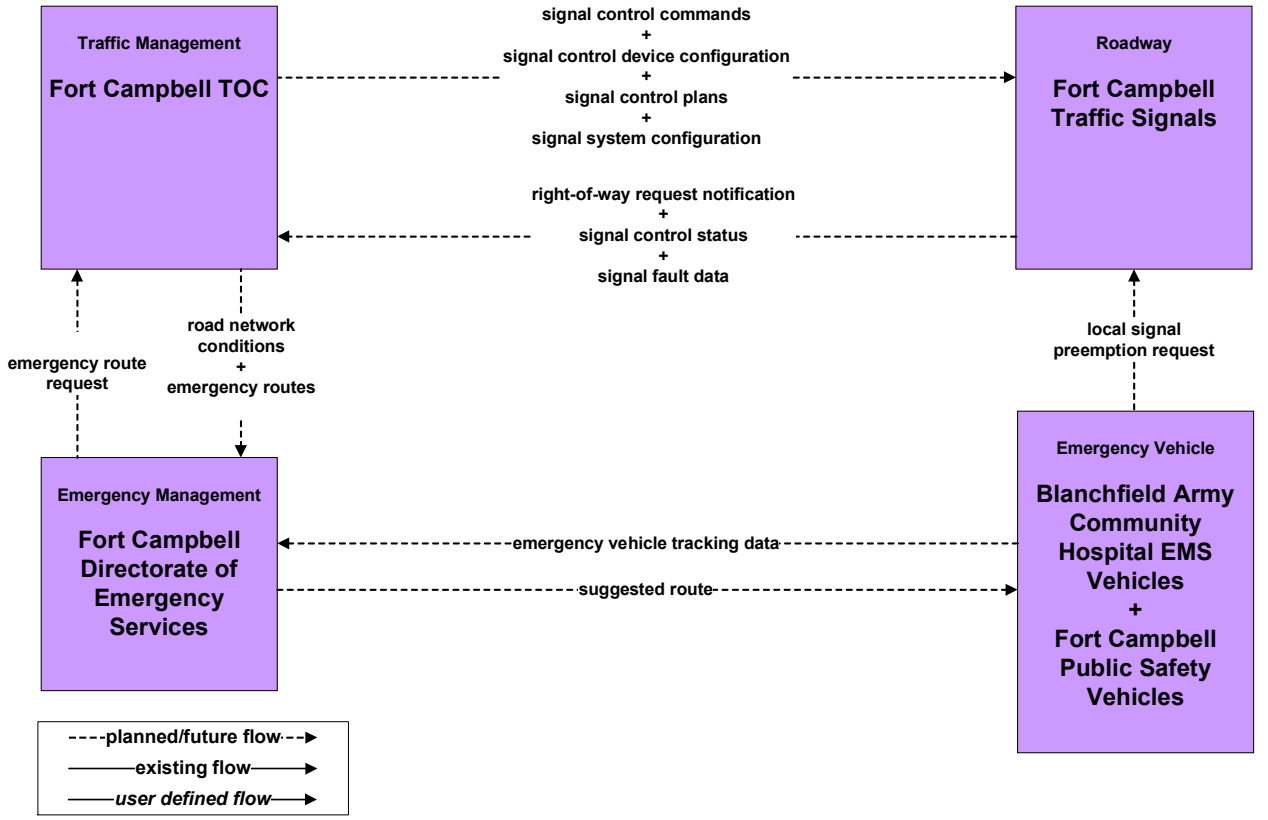
EM02 – Emergency Routing
KYTC



EM02 – Emergency Routing
City of Clarksville

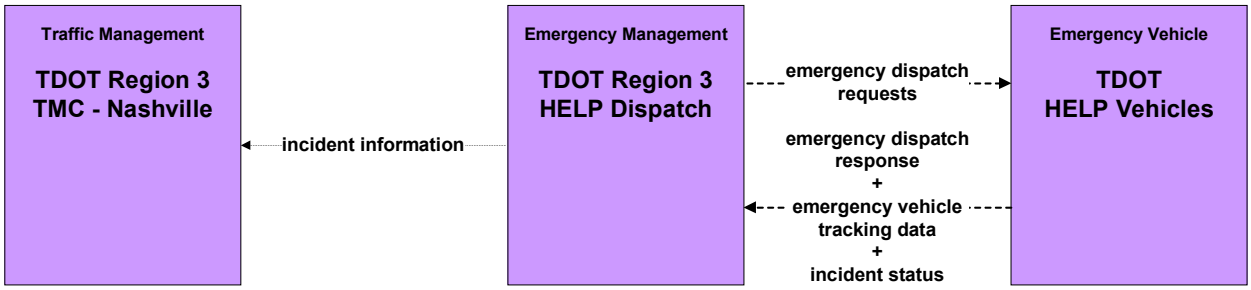


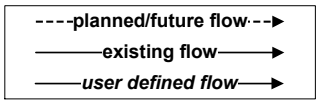
EM02 – Emergency Routing
Fort Campbell



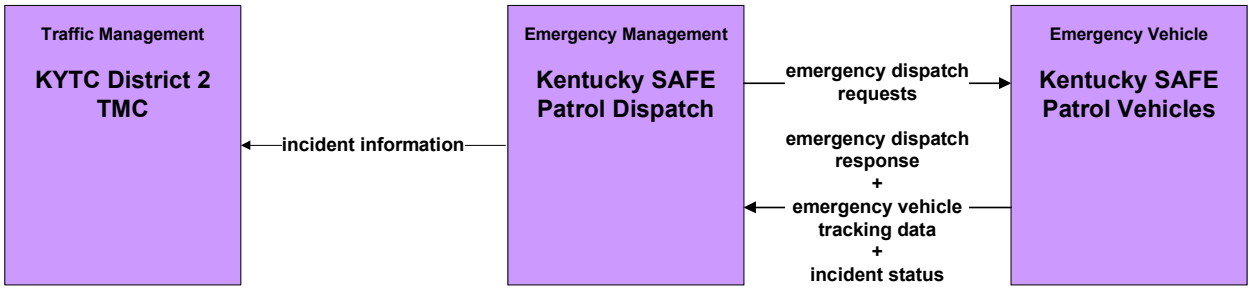
EM02 – Emergency Routing
Municipal

EM04 – Roadway Service Patrols
HELP

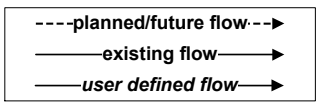


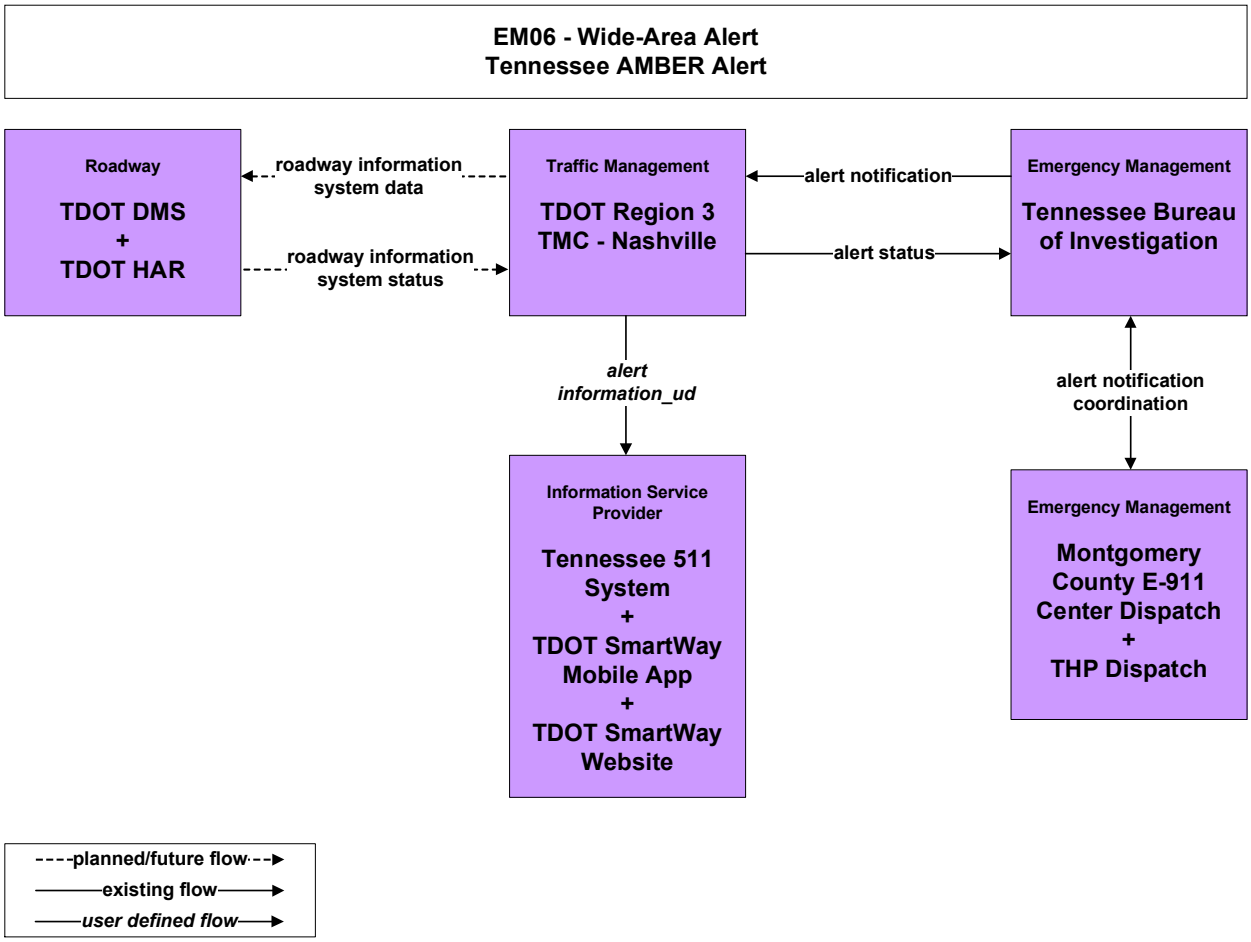


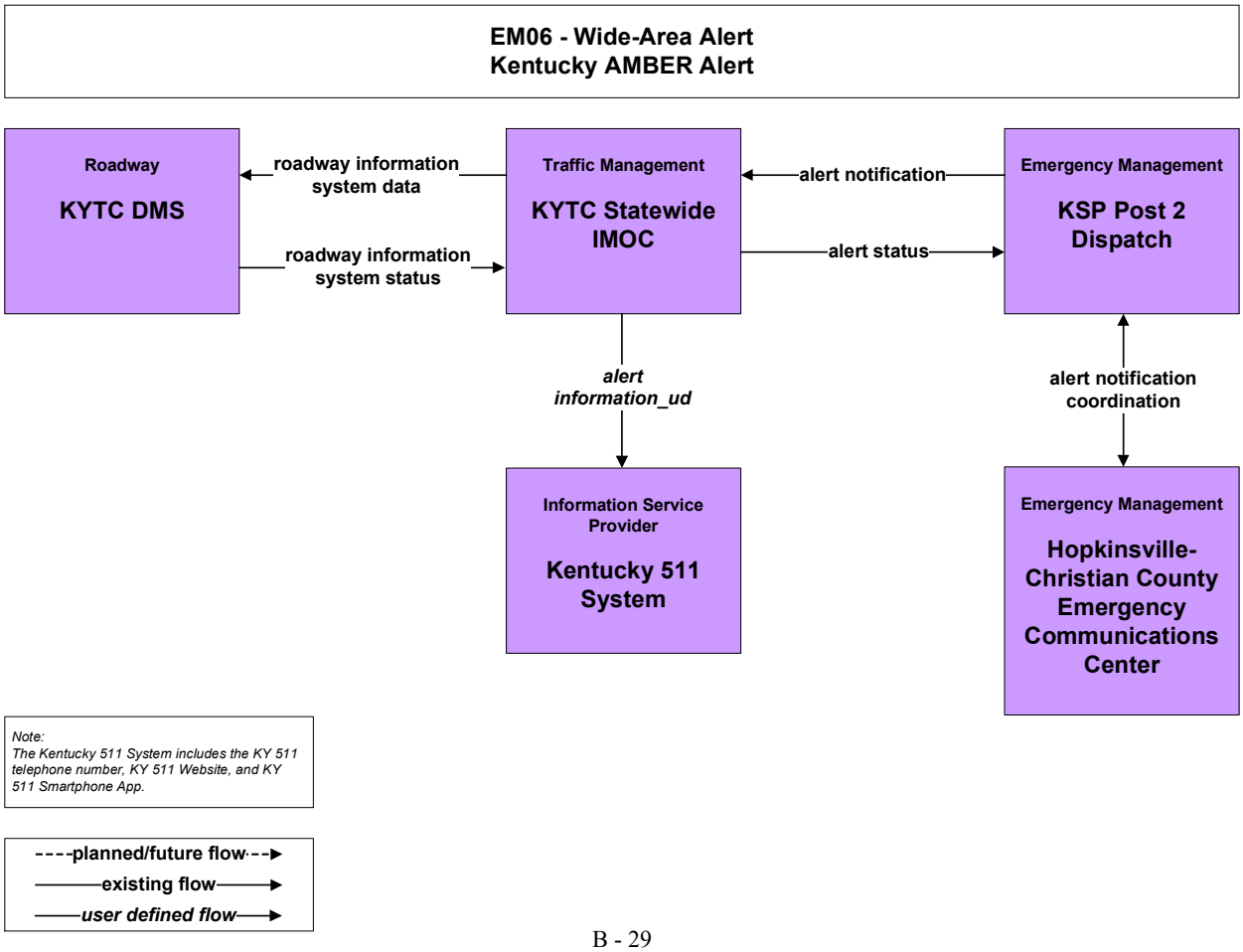
EM04 – Roadway Service Patrols
Kentucky Safe Patrol



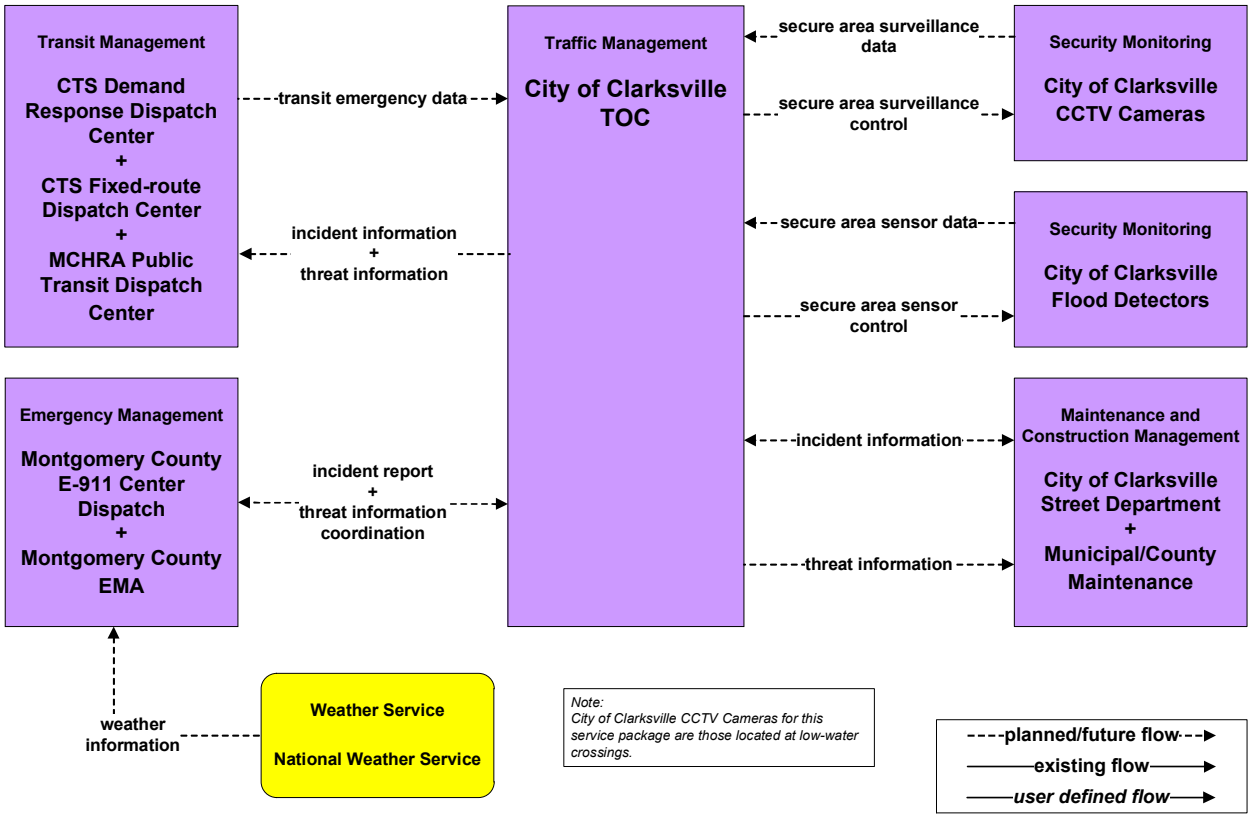
Note:
The Kentucky SAFE Patrol Vehicles serve all interstates and parkways in the state in addition to US 23 and KY 80.



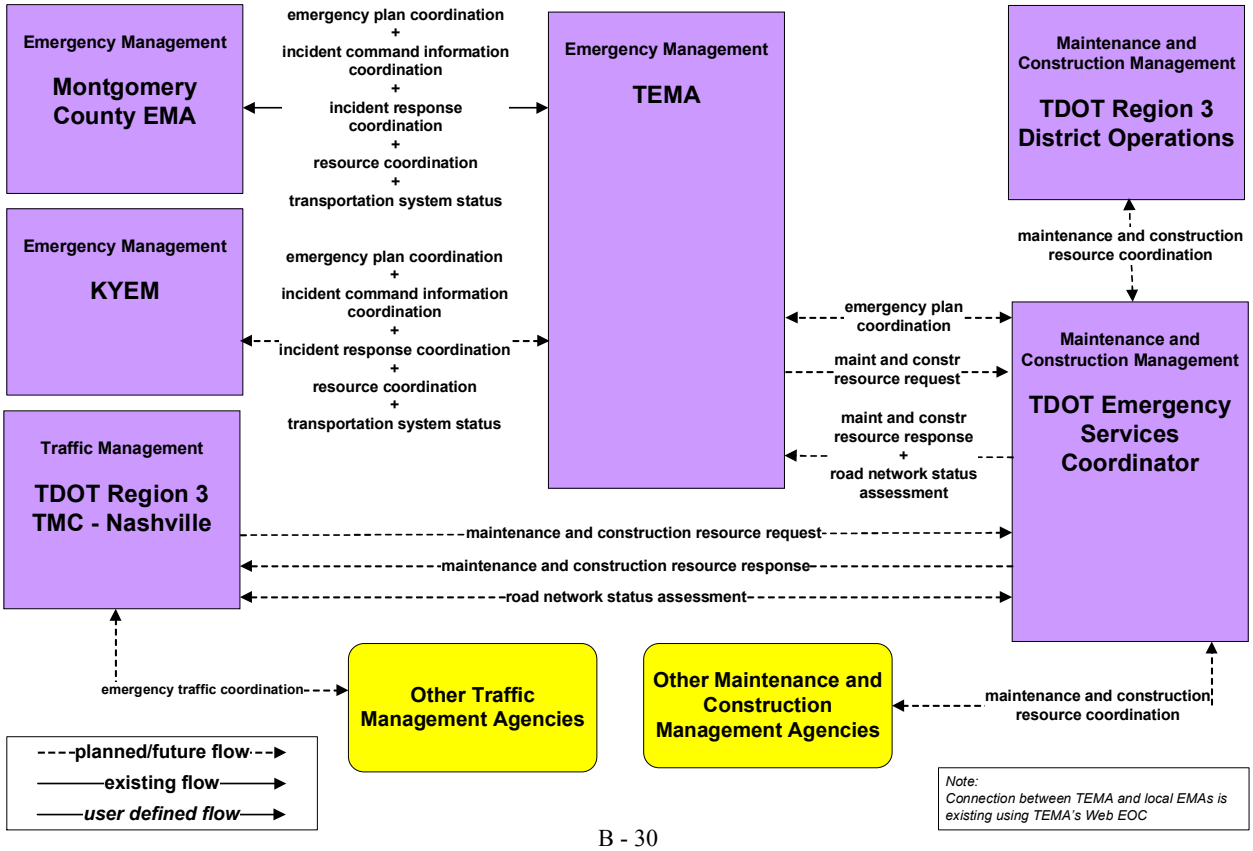

EM06 - Wide-Area Alert
Tennessee AMBER Alert
Roadway
TDOT DMS
+
TDOT HAR
roadway information system data
roadway information system status
Traffic Management
TDOT Region 3 TMC - Nashville
alert notification
alert status
Emergency Management
Tennessee Bureau of Investigation
alert information_ud
alert notification coordination
Information Service Provider
Tennessee 511 System
+
TDOT SmartWay Mobile App
+
TDOT SmartWay Website
Emergency Management
Montgomery County E-911 Center Dispatch
+
THP Dispatch
planned/future flow
existing flow
user defined flow


EM06 - Wide-Area Alert
Kentucky AMBER Alert
Roadway
KYTC DMS
roadway information system data
roadway information system status
Traffic Management
KYTC Statewide IMOC
alert notification
alert status
Emergency Management
KSP Post 2 Dispatch
alert information_ud
alert notification coordination
Information Service Provider
Kentucky 511 System
Emergency Management
Hopkinsville-Christian County Emergency Communications Center
Note:
The Kentucky 511 System includes the KY 511 telephone number, KY 511 Website, and KY 511 Smartphone App.
planned/future flow
existing flow
user defined flow

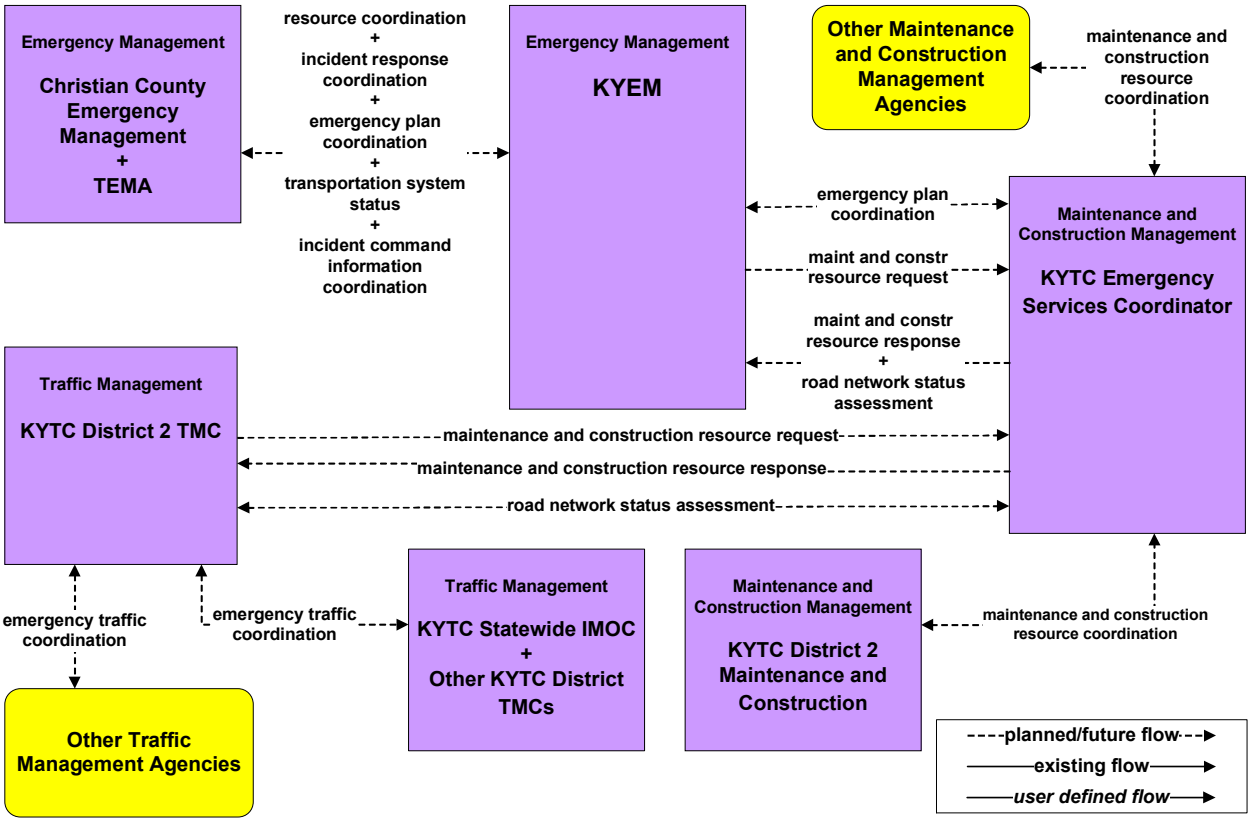
EM07 – Early Warning System
City of Clarksville – Flood Monitoring



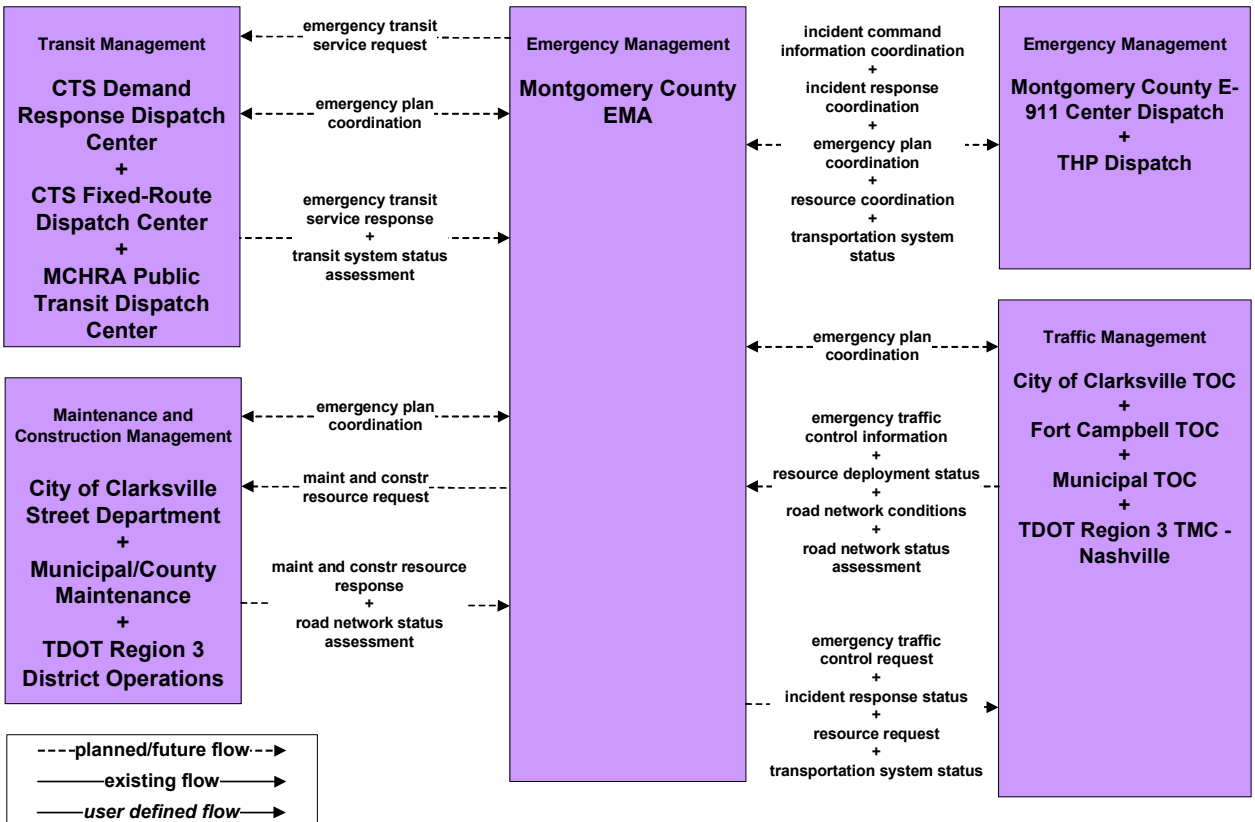
EM08 - Disaster Response and Recovery
Tennessee Emergency Management Agency



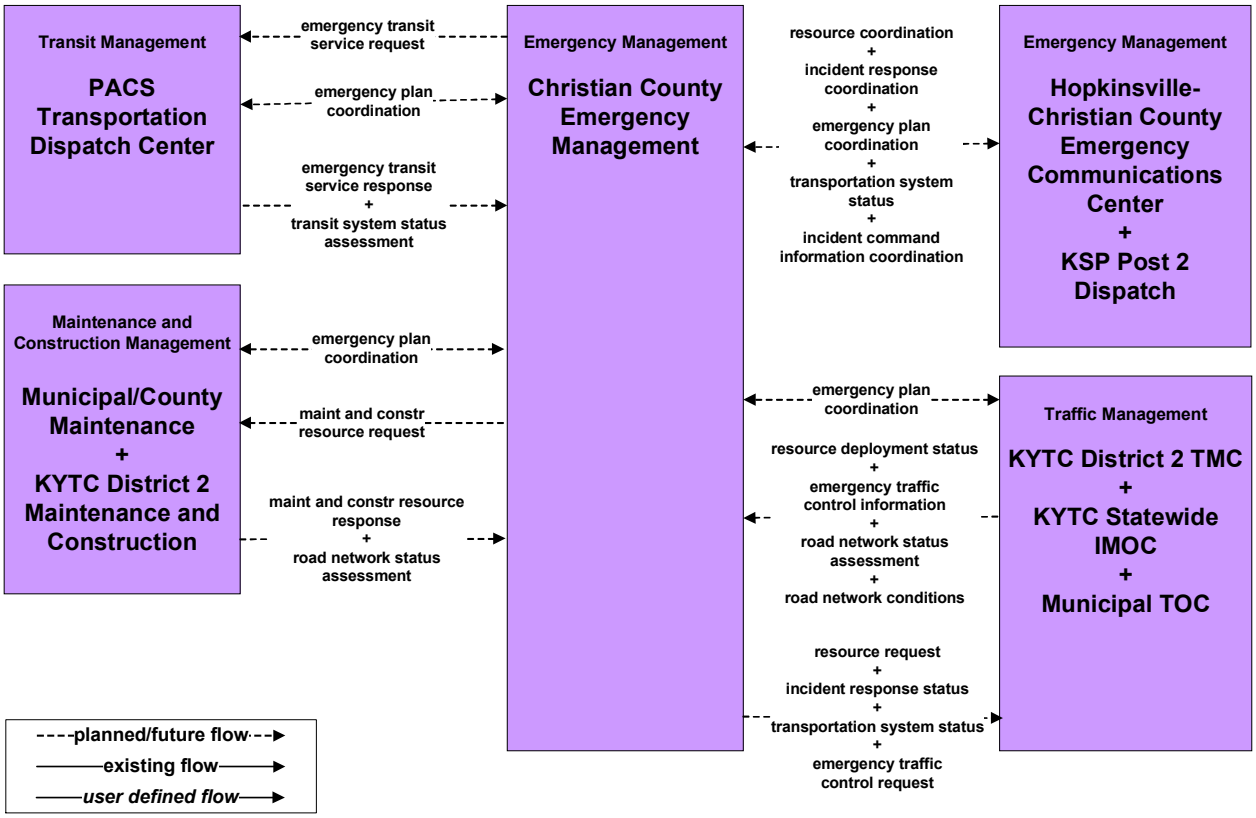
EM08 - Disaster Response and Recovery
Kentucky Emergency Management



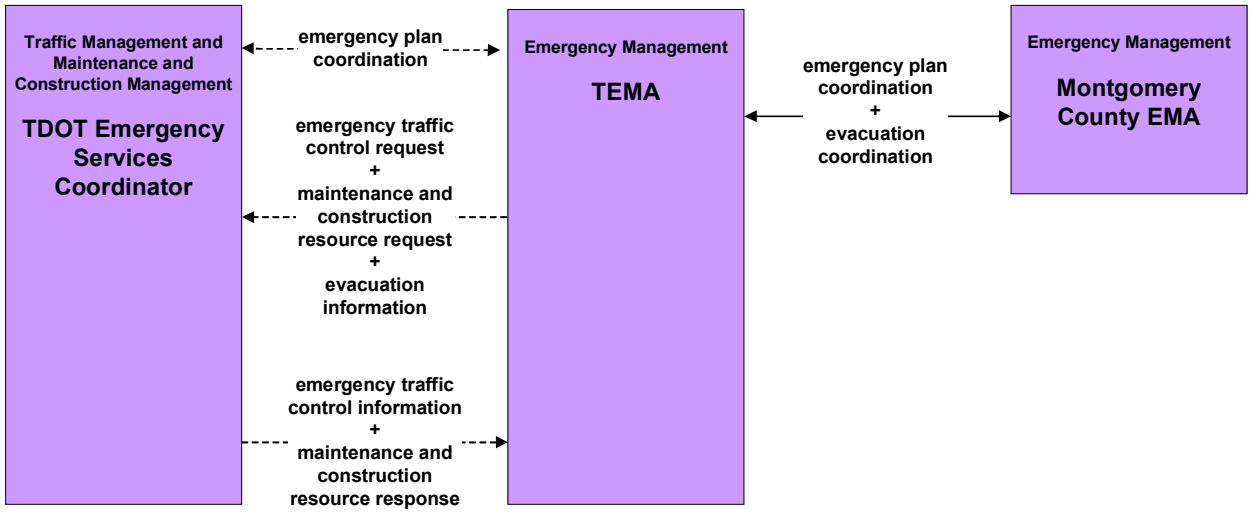
EM08 - Disaster Response and Recovery
Montgomery County Emergency Management Agency



EM08 - Disaster Response and Recovery
Christian County Emergency Management

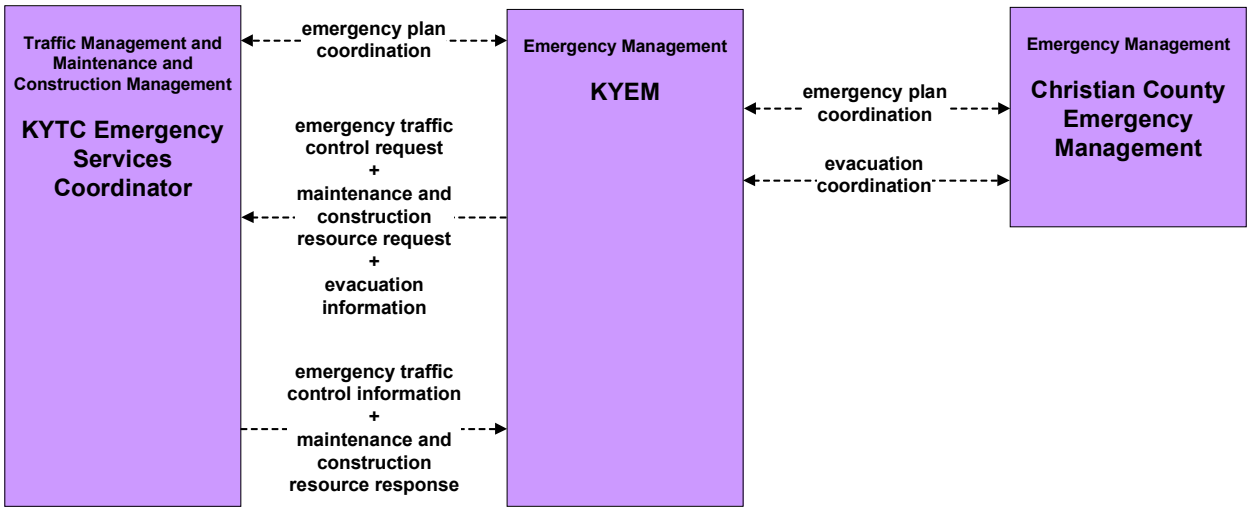


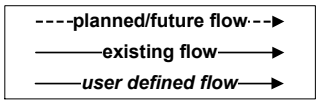
EM09 - Evacuation and Reentry Management
Tennessee Emergency Management Agency



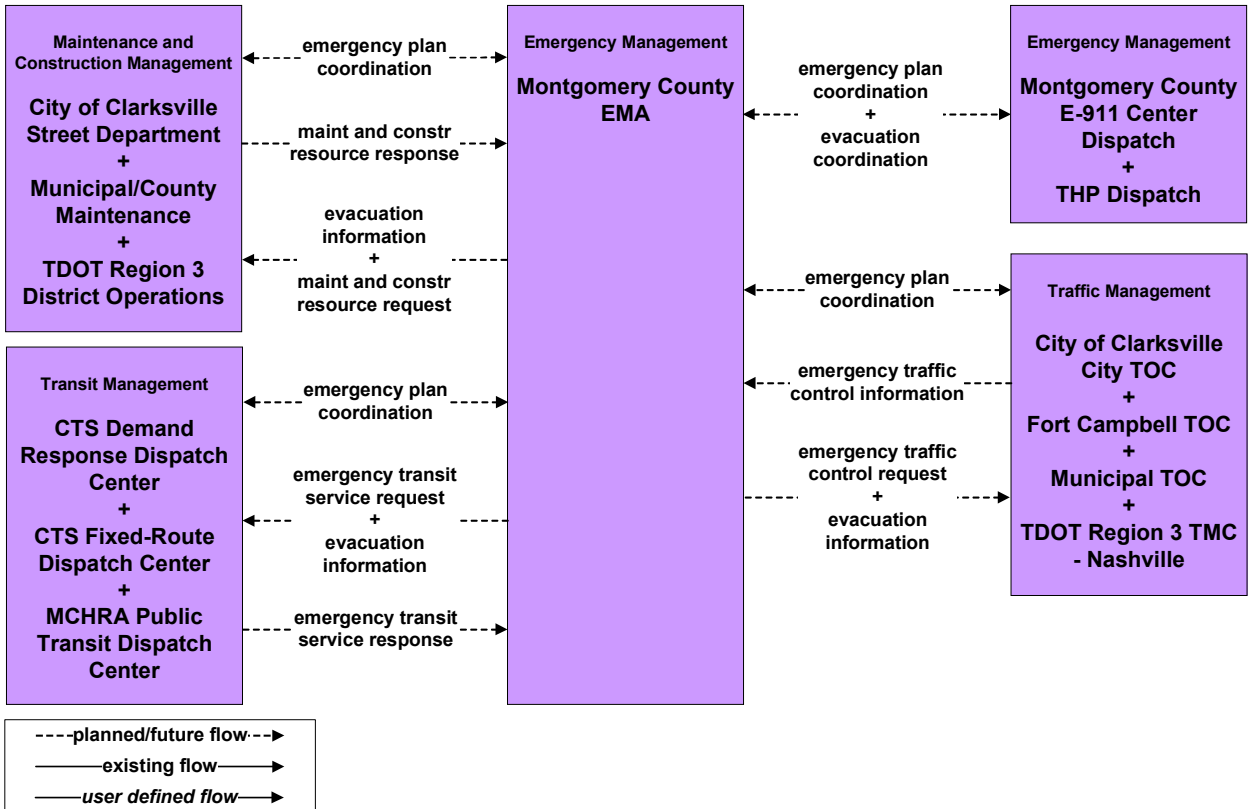
Note:
Connection between TEMA and local EMAs is existing using TEMA's Web EOC

EM09 - Evacuation and Reentry Management
Kentucky Emergency Management

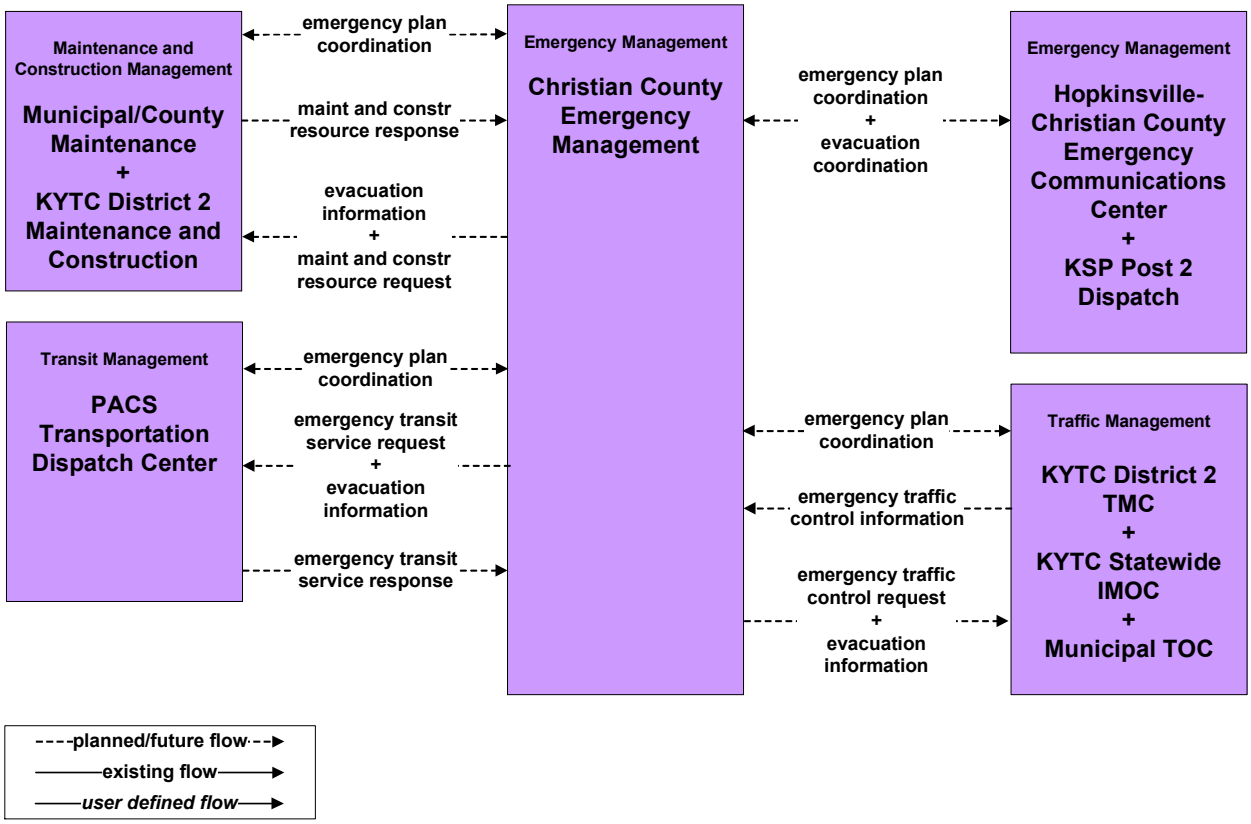




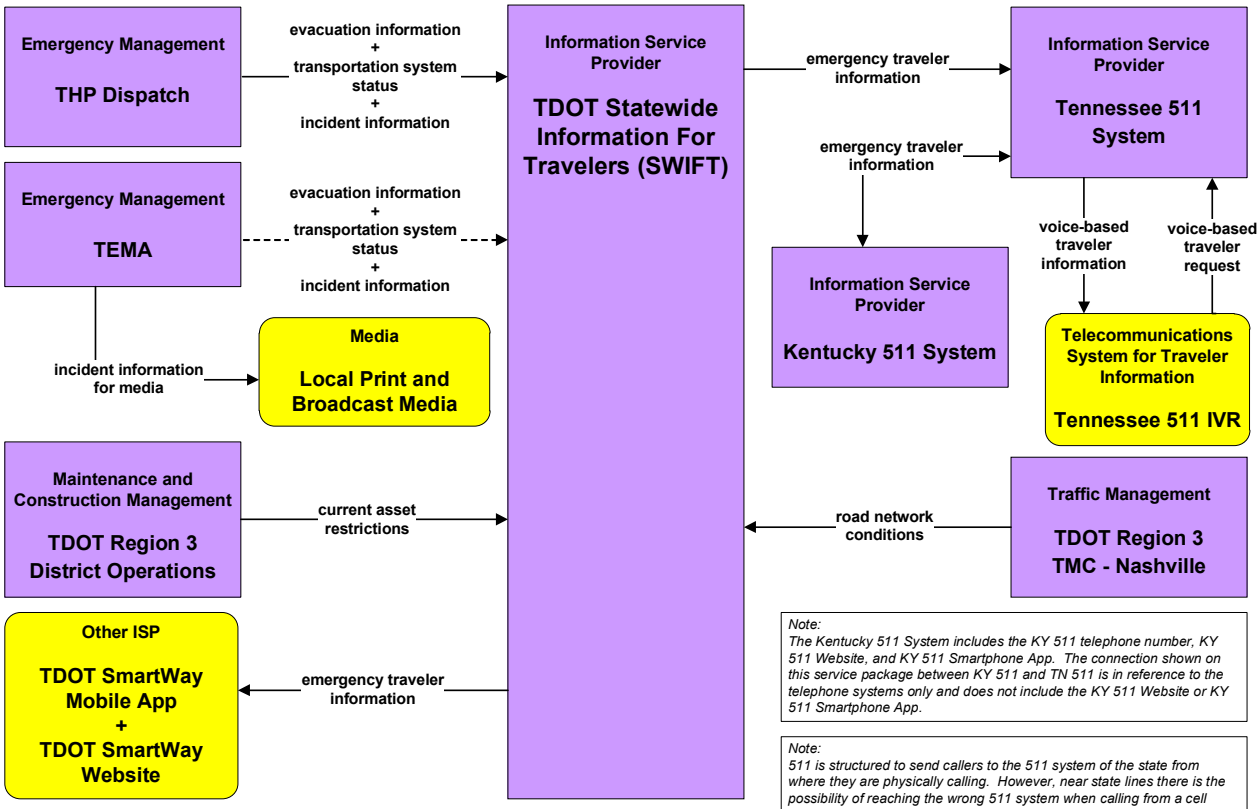
EM09 - Evacuation and Reentry Management
Montgomery County Emergency Management Agency



EM09 - Evacuation and Reentry Management
Christian County Emergency Management



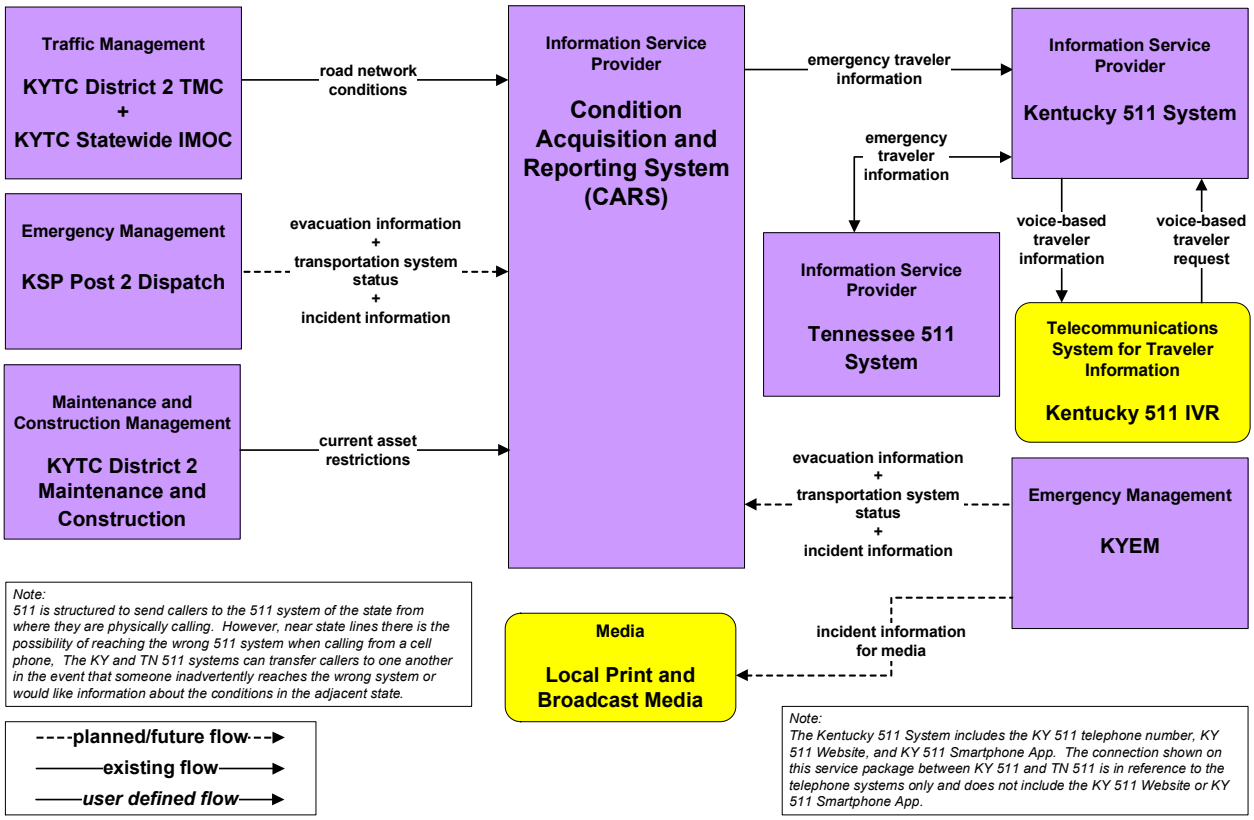
EM10 – Disaster Traveler Information
Tennessee 511 and SWIFT



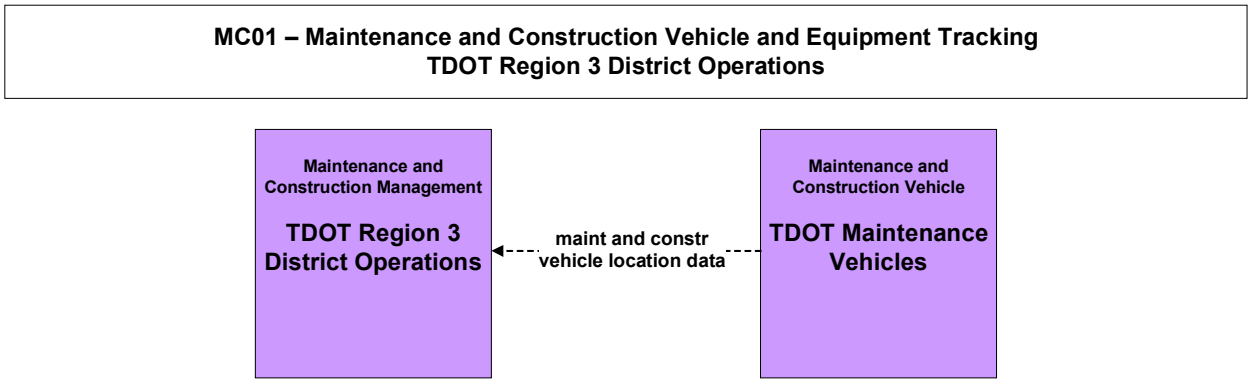
Note:
The Kentucky 511 System includes the KY 511 telephone number, KY 511 Website, and KY 511 Smartphone App. The connection shown on this service package between KY 511 and TN 511 is in reference to the telephone systems only and does not include the KY 511 Website or KY 511 Smartphone App.

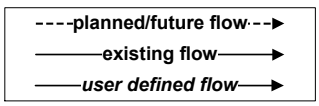
Note:
511 is structured to send callers to the 511 system of the state from where they are physically calling. However, near state lines there is the possibility of reaching the wrong 511 system when calling from a cell phone, The KY and TN 511 systems can transfer callers to one another in the event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

EM10 – Disaster Traveler Information
Kentucky 511 System and CARS

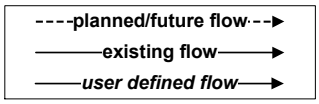


Maintenance and Construction Management

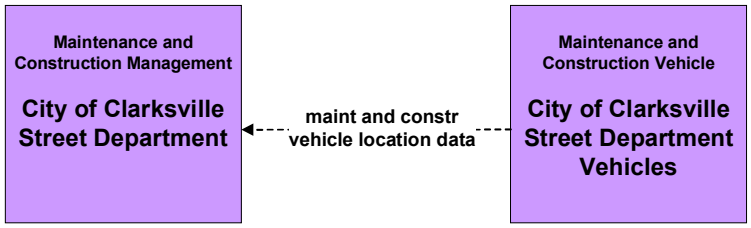


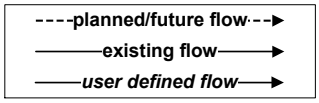


MC01 – Maintenance and Construction Vehicle and Equipment Tracking
KYTC District 2 Maintenance and Construction

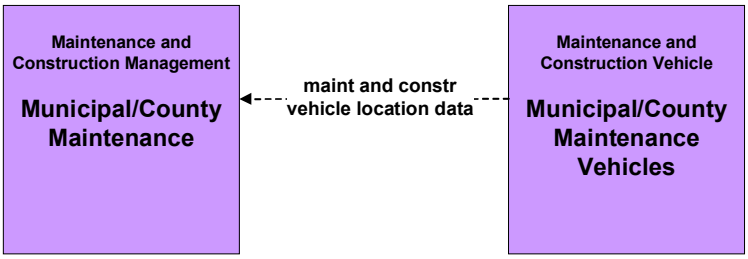


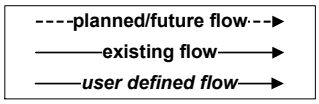
MC01 – Maintenance and Construction Vehicle and Equipment Tracking
City of Clarksville



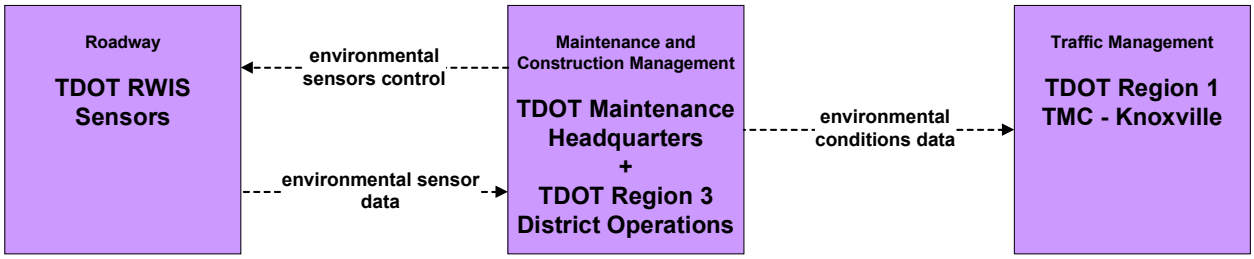


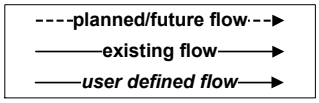
MC01 – Maintenance and Construction Vehicle and Equipment Tracking
Municipal/County



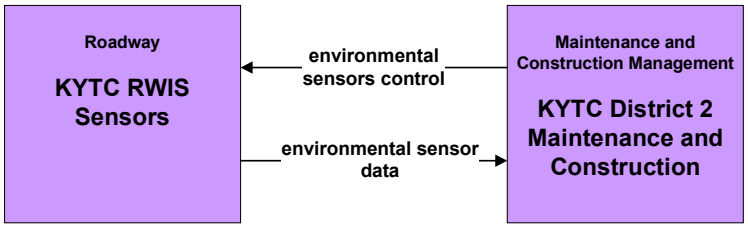


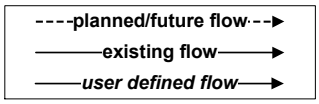
MC03 – Road Weather Data Collection
TDOT RWIS



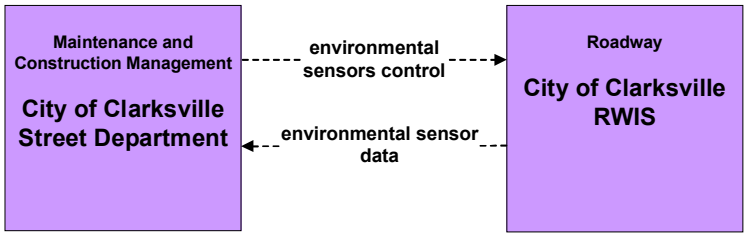


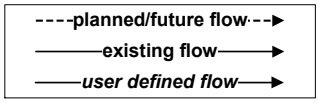
MC03 – Road Weather Data Collection
KYTC RWIS



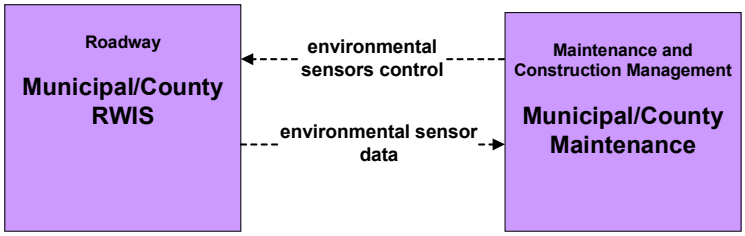


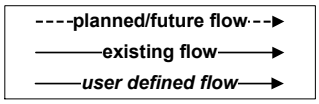
MC03 – Road Weather Data Collection
City of Clarksville



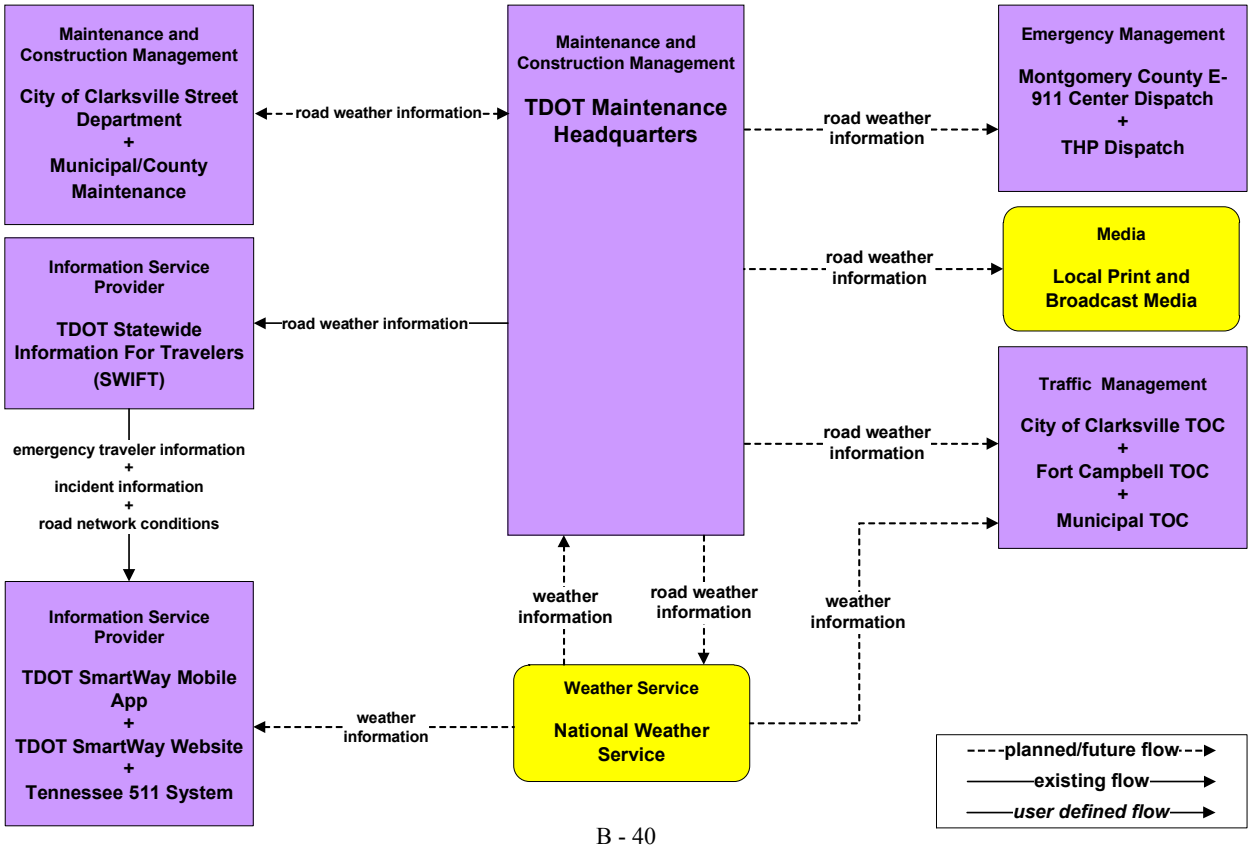


MC03 – Road Weather Data Collection
Municipal/County

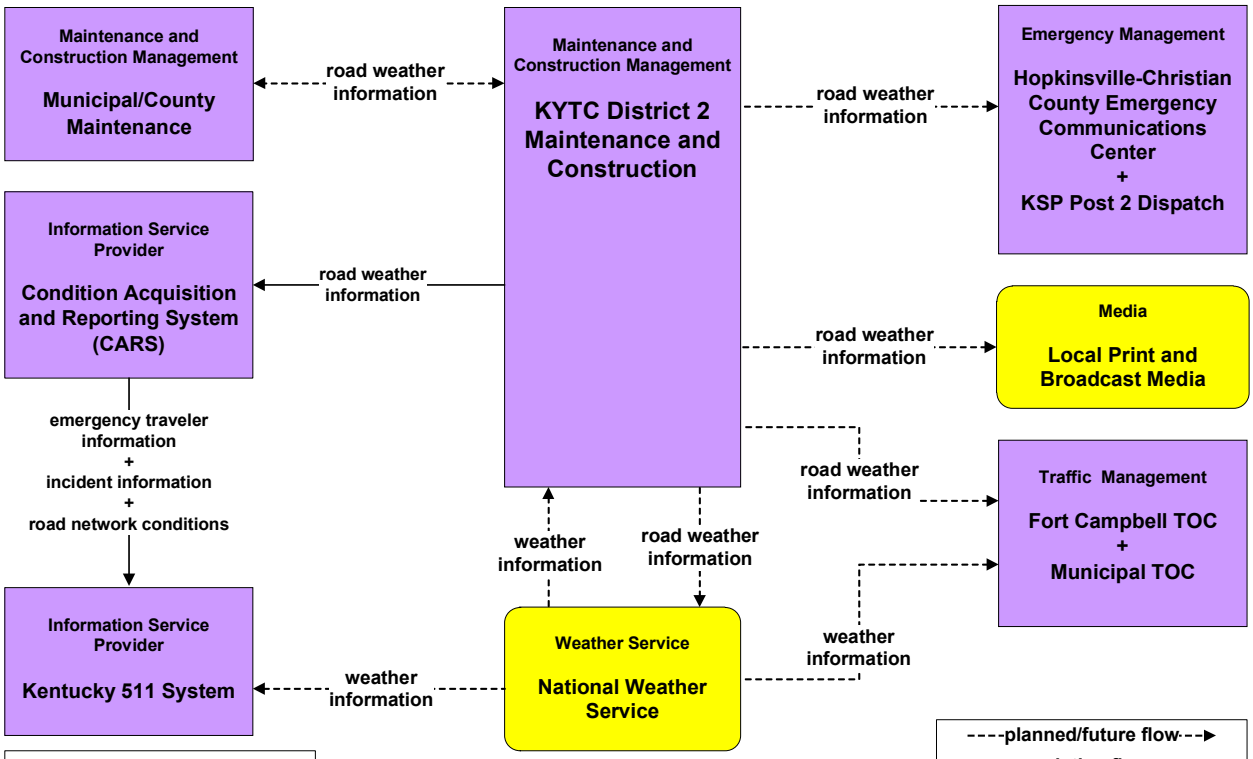




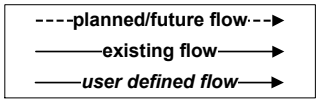
MC04 – Weather Information Processing and Distribution
TDOT Maintenance Headquarters



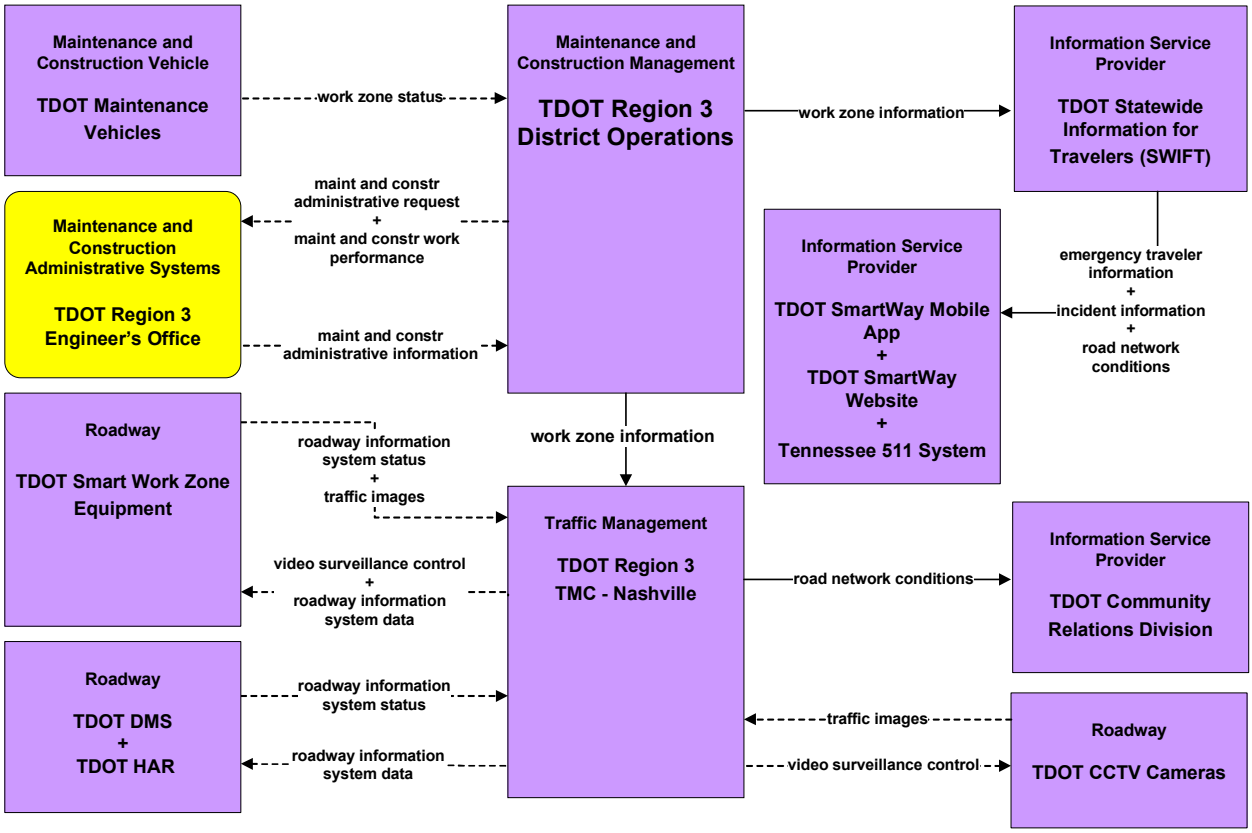
MC04 – Weather Information Processing and Distribution
KYTC District 2 Maintenance and Construction



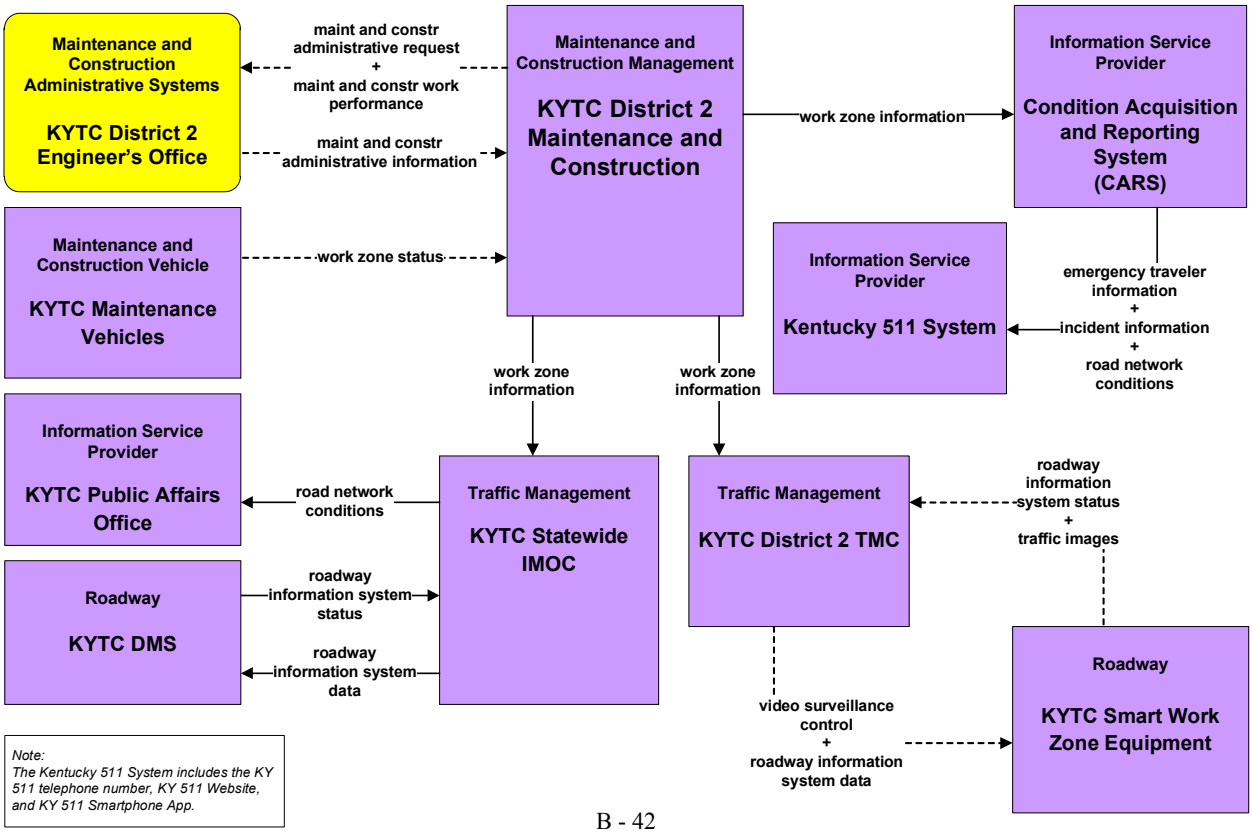
MC04 – Weather Information Processing and Distribution
Montgomery County



MC08 – Work Zone Management
TDOT Region 3 District Operations

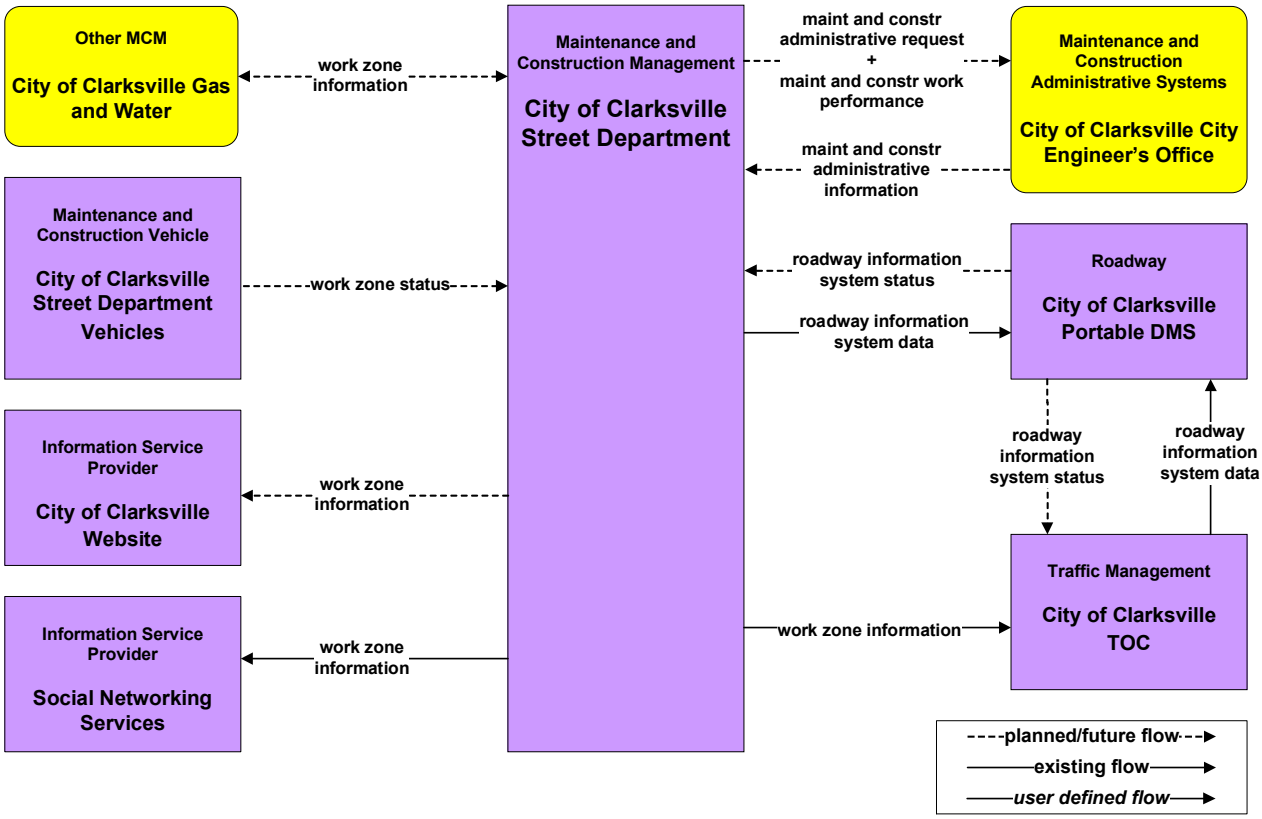


MC08 – Work Zone Management
KYTC District 2 Maintenance and Construction

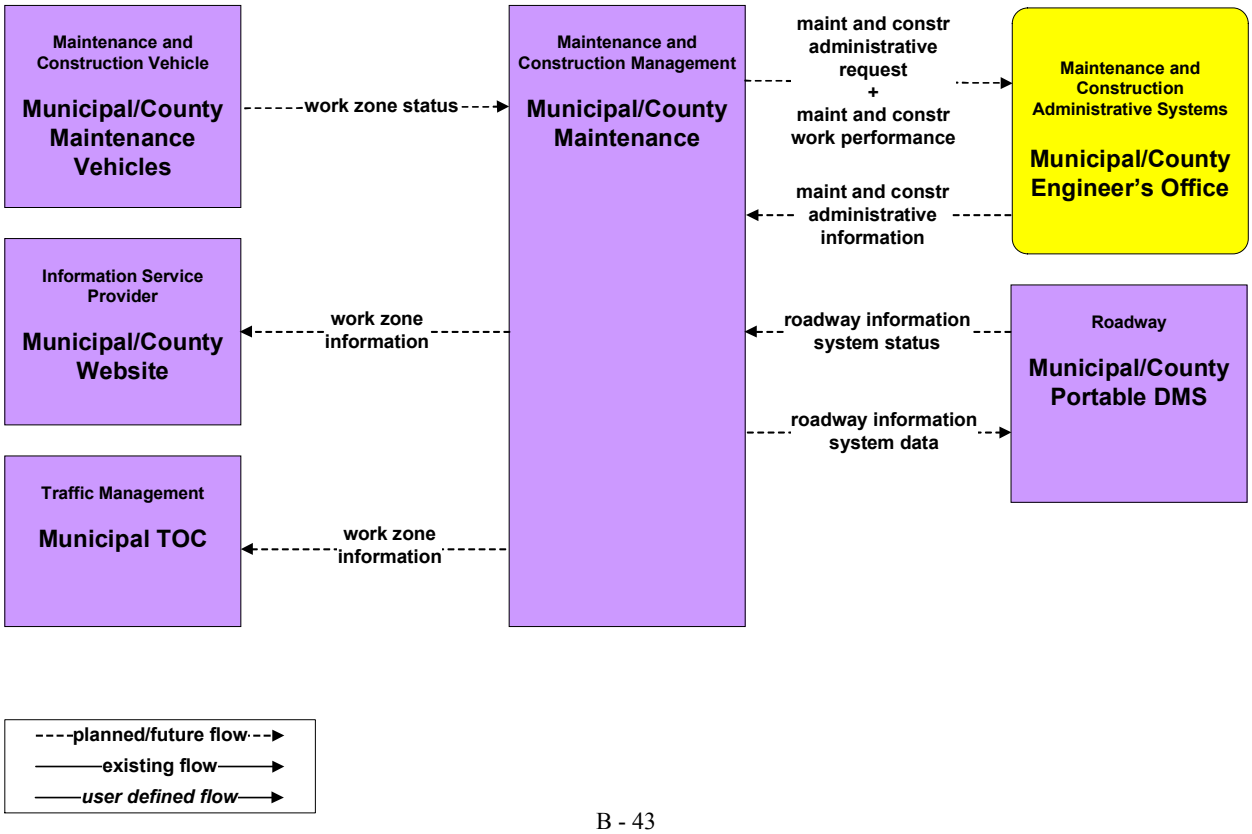


Note:
The Kentucky 511 System includes the KY 511 telephone number, KY 511 Website, and KY 511 Smartphone App.

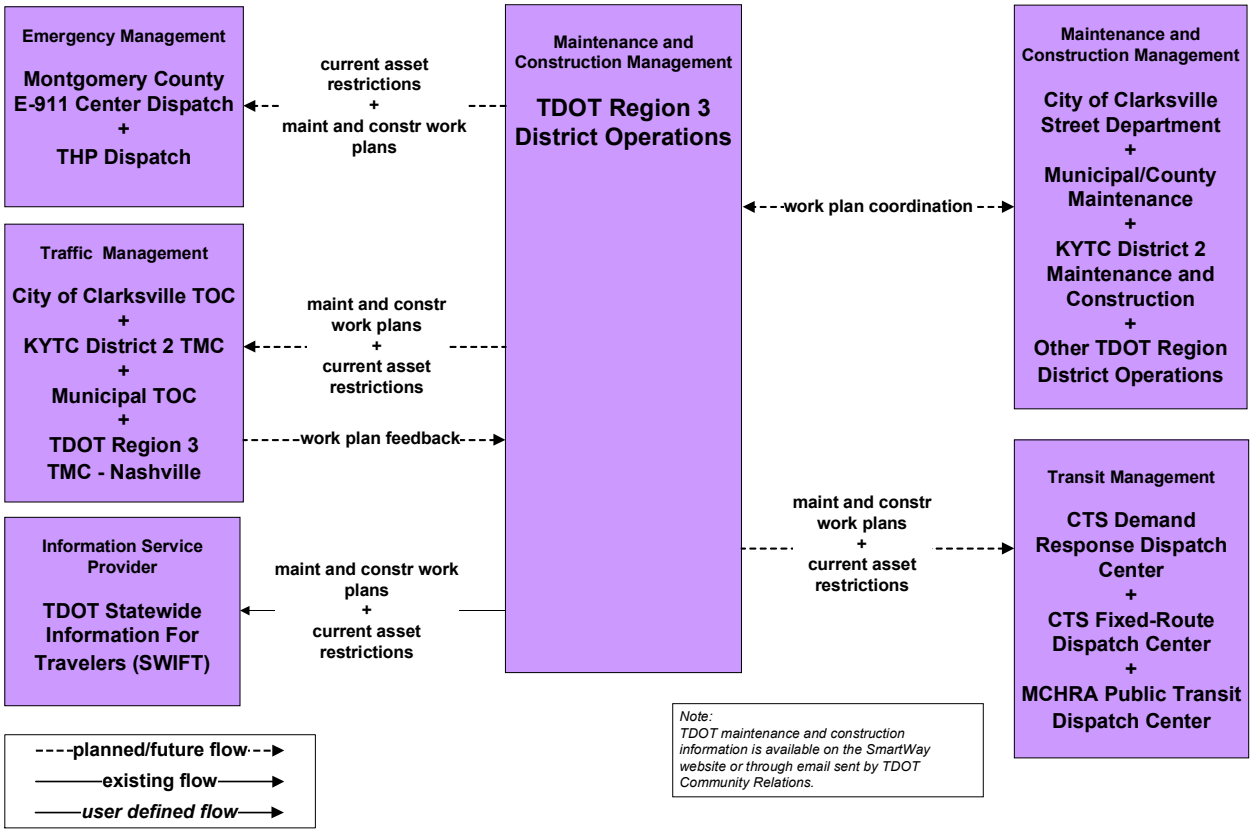
MC08 – Work Zone Management
City of Clarksville



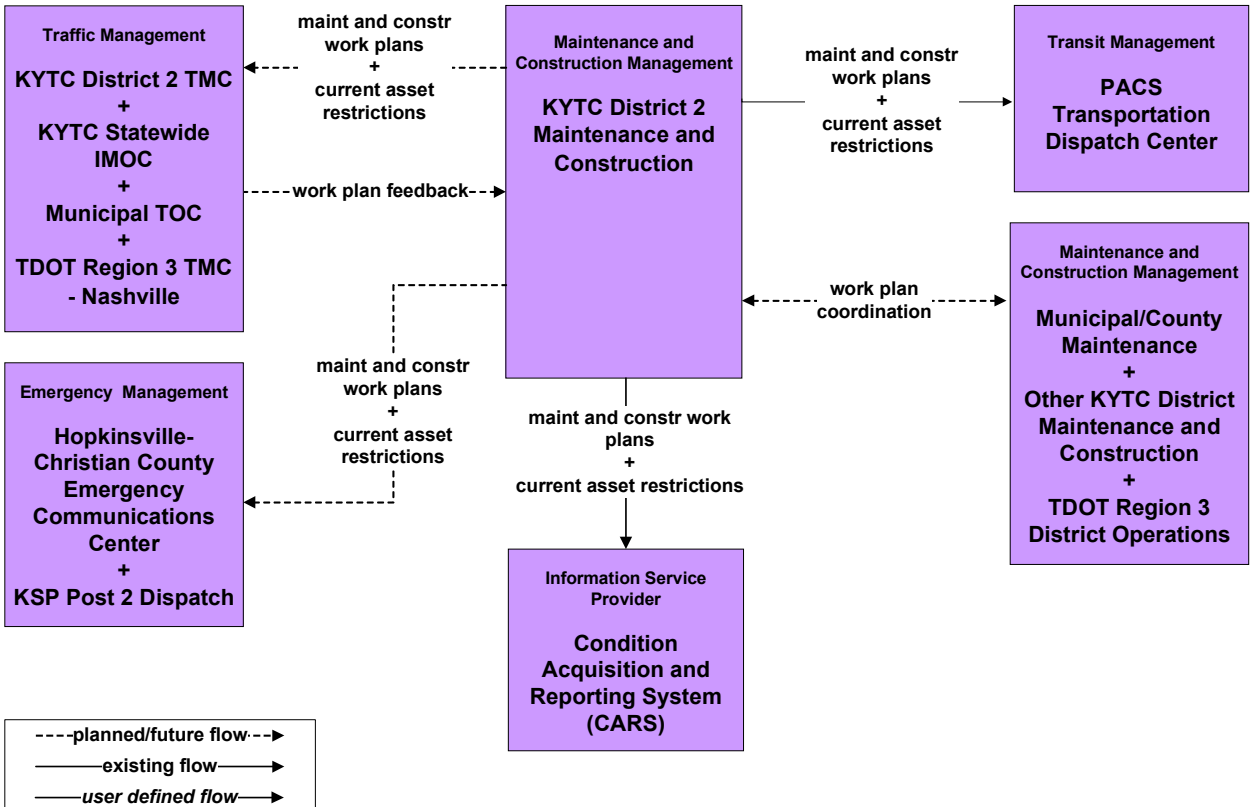
MC08 – Work Zone Management
Municipal/County



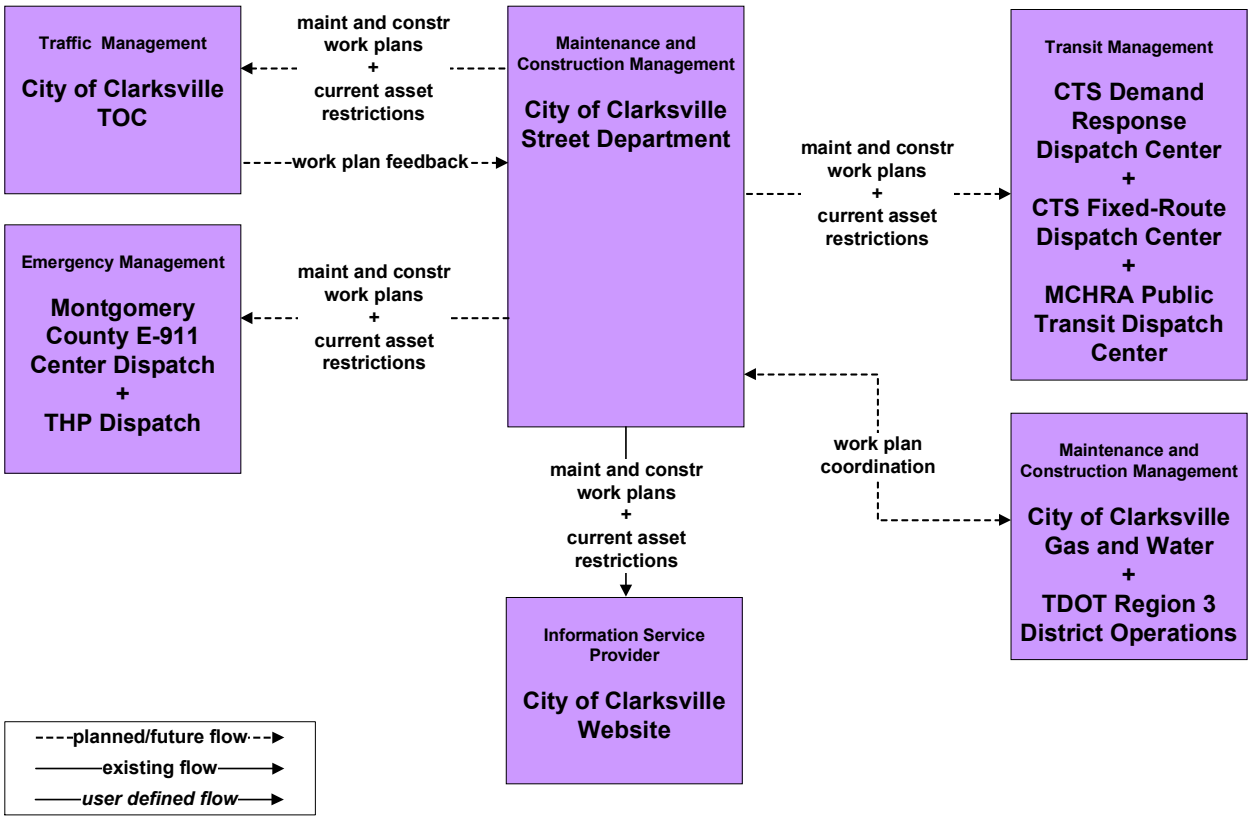
MC10 – Maintenance and Construction Activity Coordination
TDOT



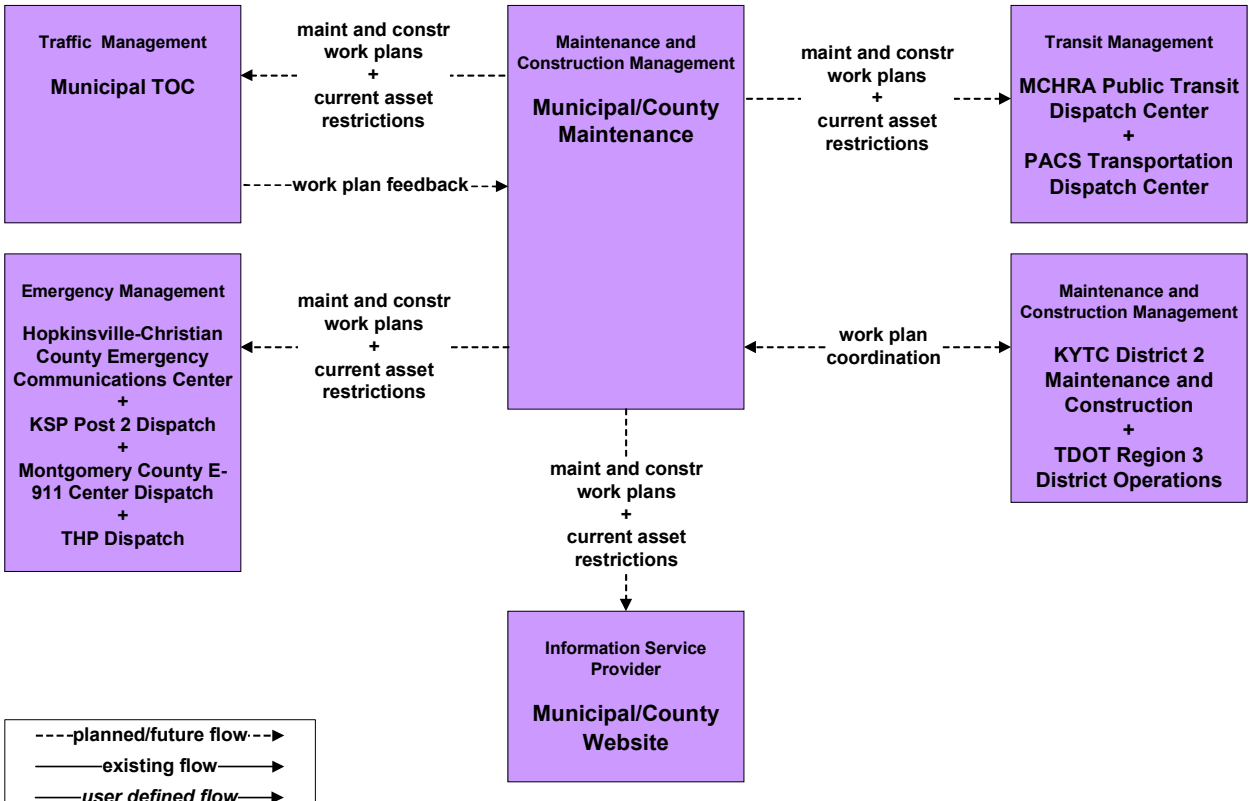
MC10 – Maintenance and Construction Activity Coordination
KYTC



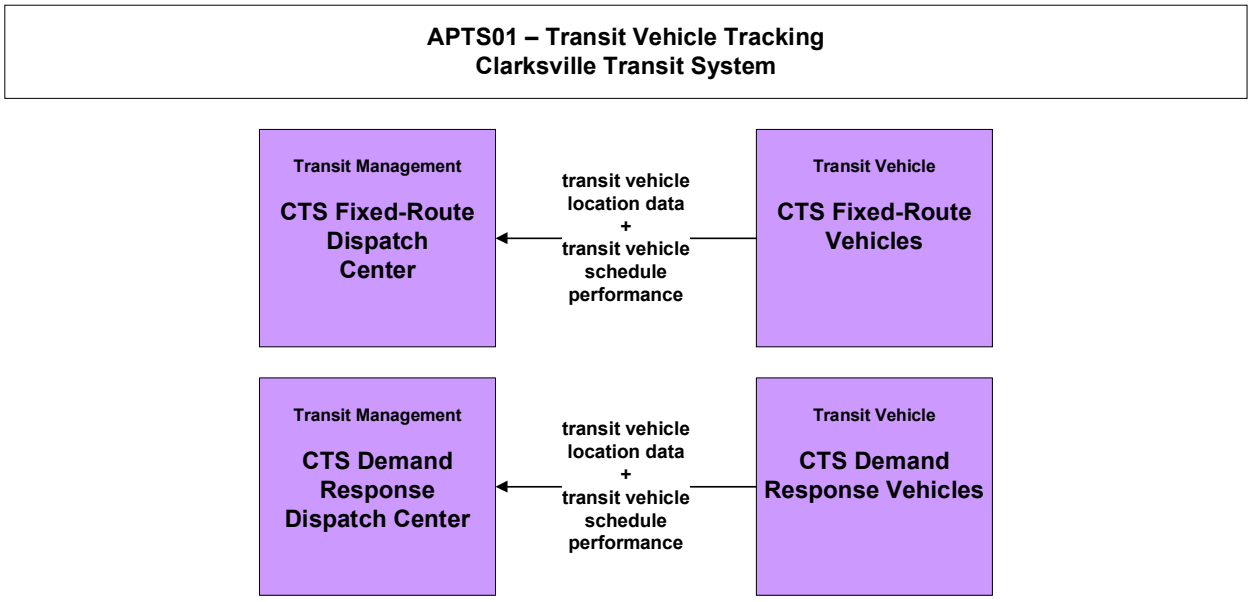
MC10 – Maintenance and Construction Activity Coordination
City of Clarksville

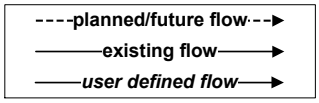


MC10 – Maintenance and Construction Activity Coordination
Municipal/County

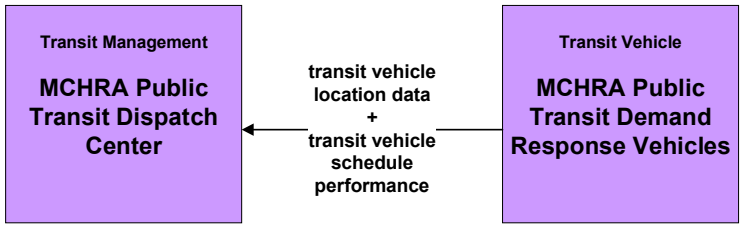


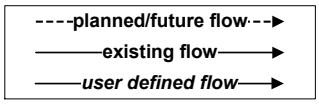
Advanced Public Transportation Systems



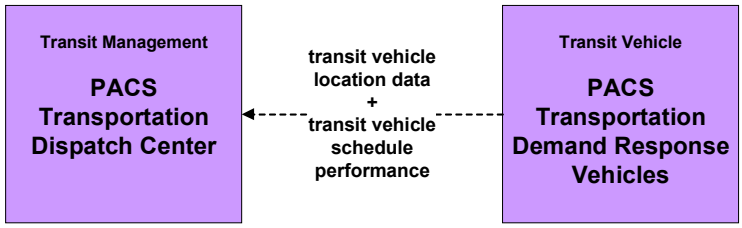


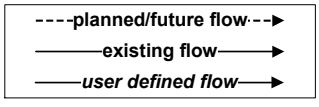
APTS01 – Transit Vehicle Tracking
Mid-Cumberland HRA Public Transit



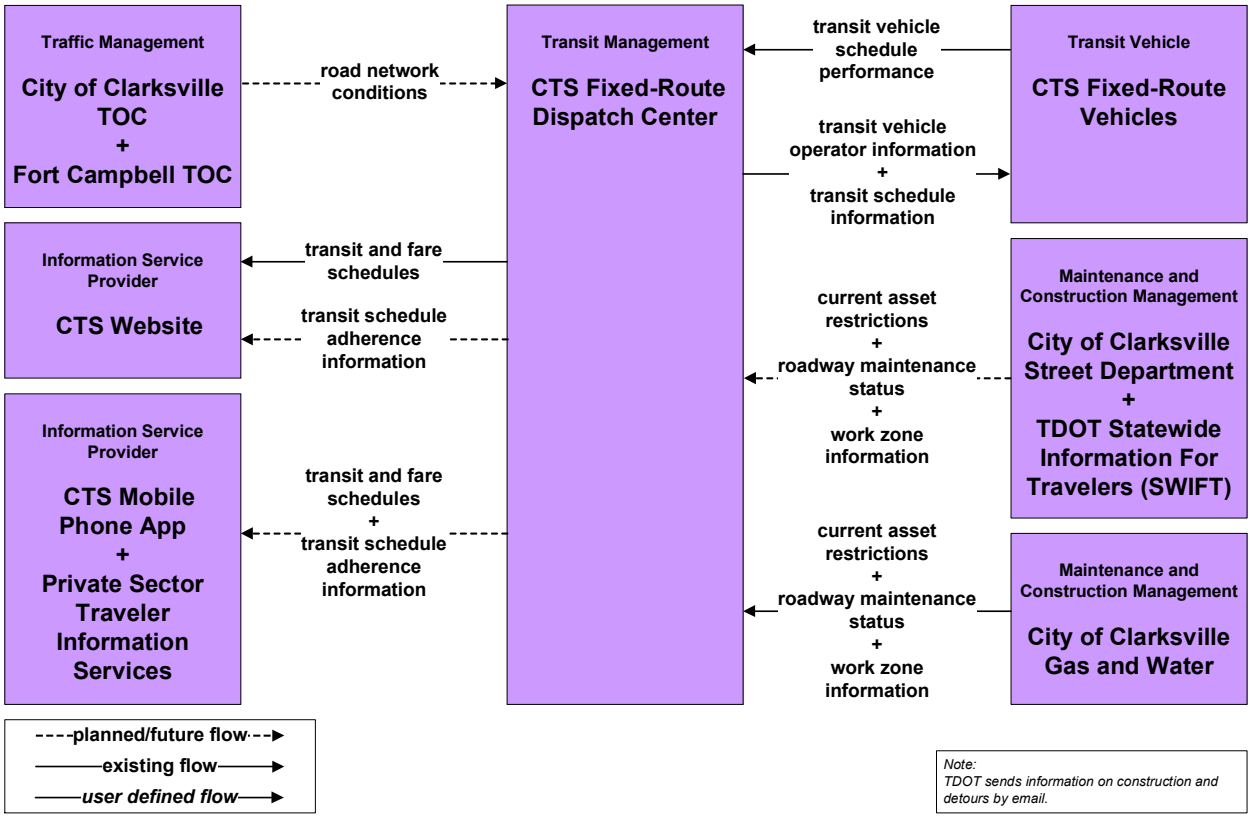


APTS01 – Transit Vehicle Tracking
Pennyrile Allied Community Services

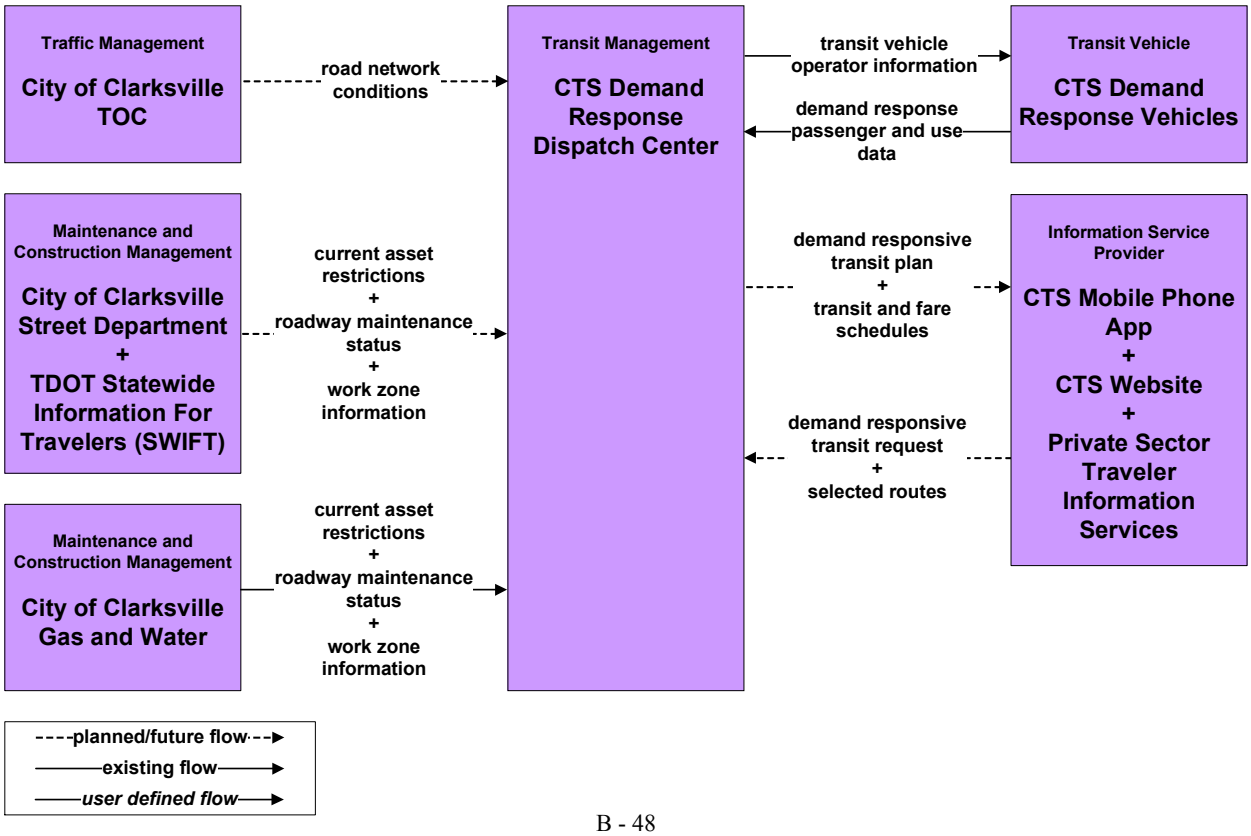




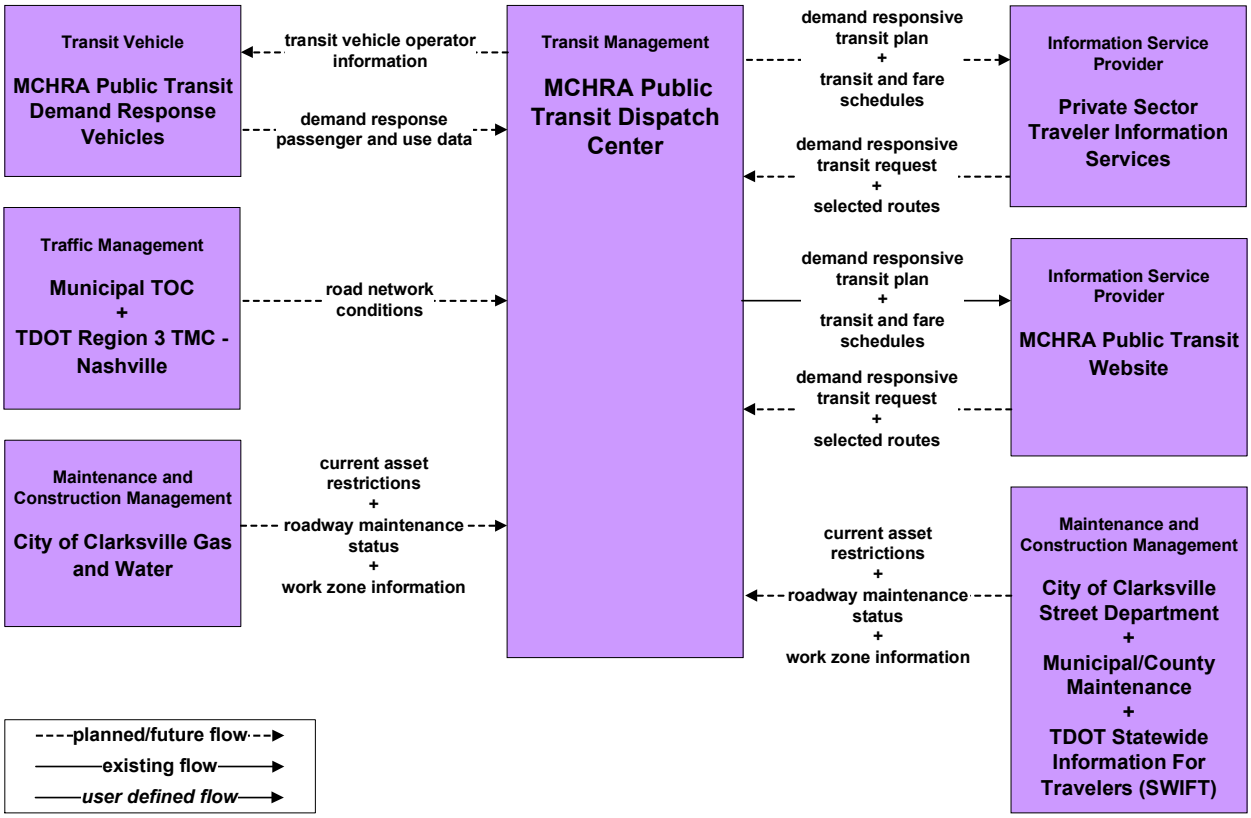
APTS02 – Transit Fixed-Route Operations
Clarksville Transit System



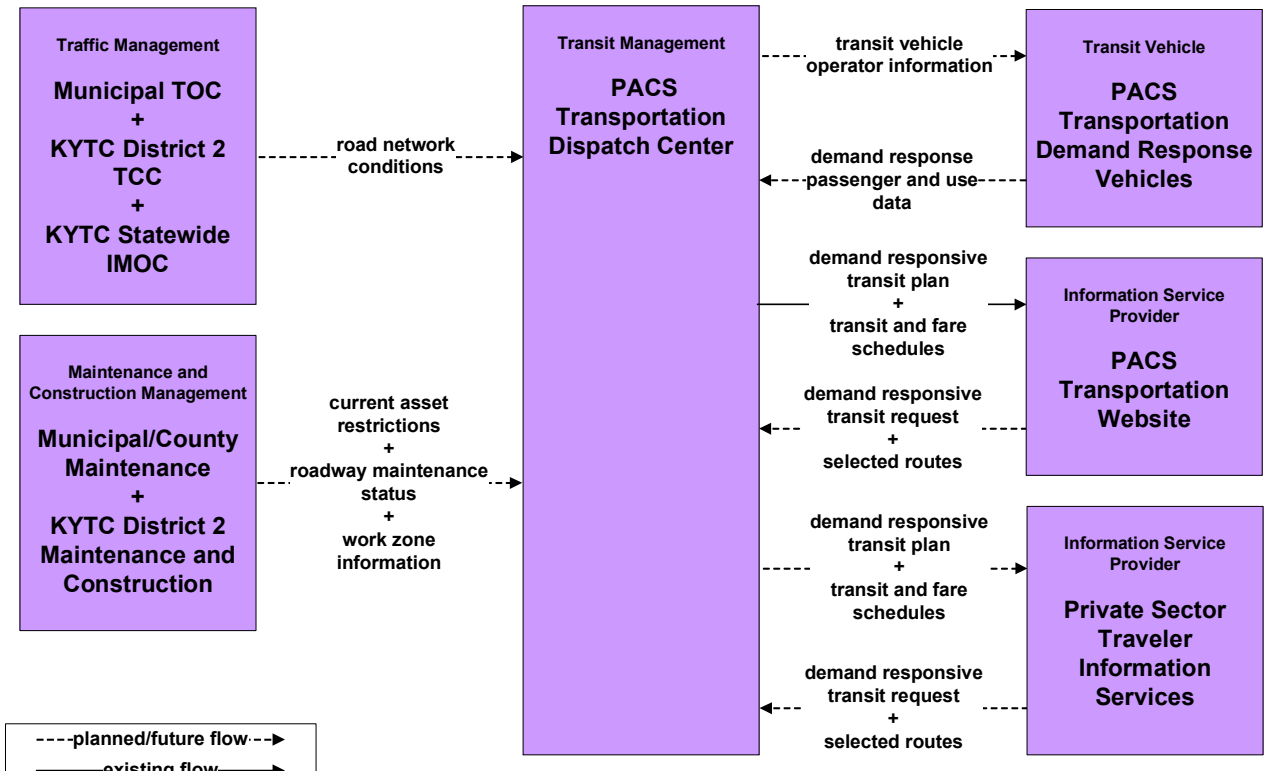
APTS03 – Demand Response Transit Operations
Clarksville Transit System



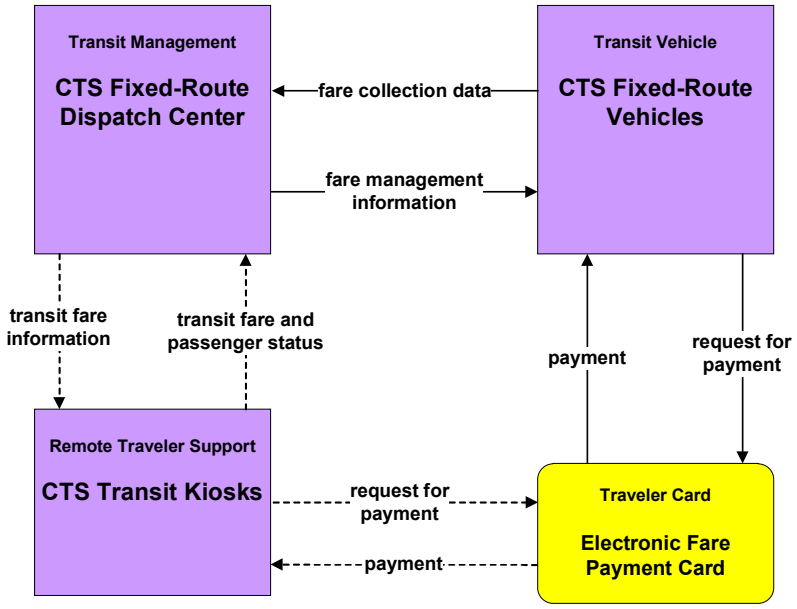
APTS03 – Demand Response Transit Operations
Mid-Cumberland HRA Public Transit

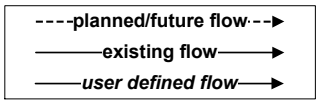


APTS03 – Demand Response Transit Operations
Pennyrile Allied Community Services

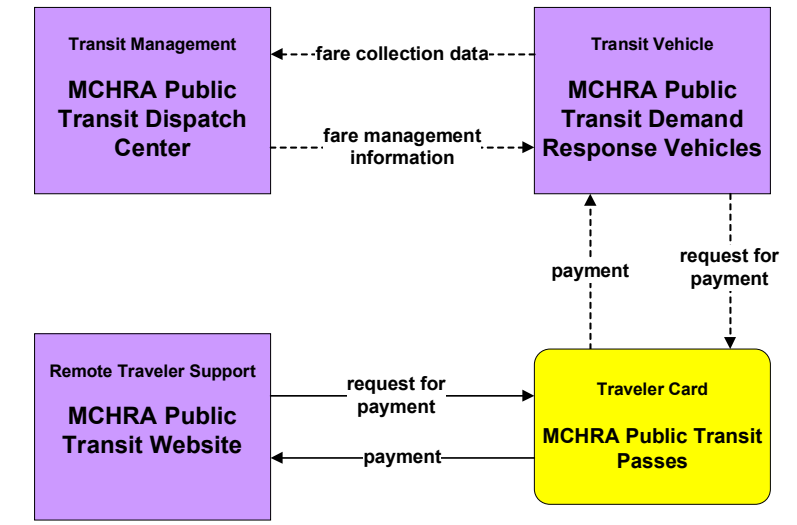


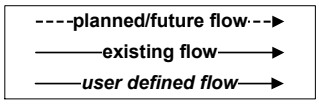
APTS04 – Transit Fare Collection Management
Clarksville Transit System



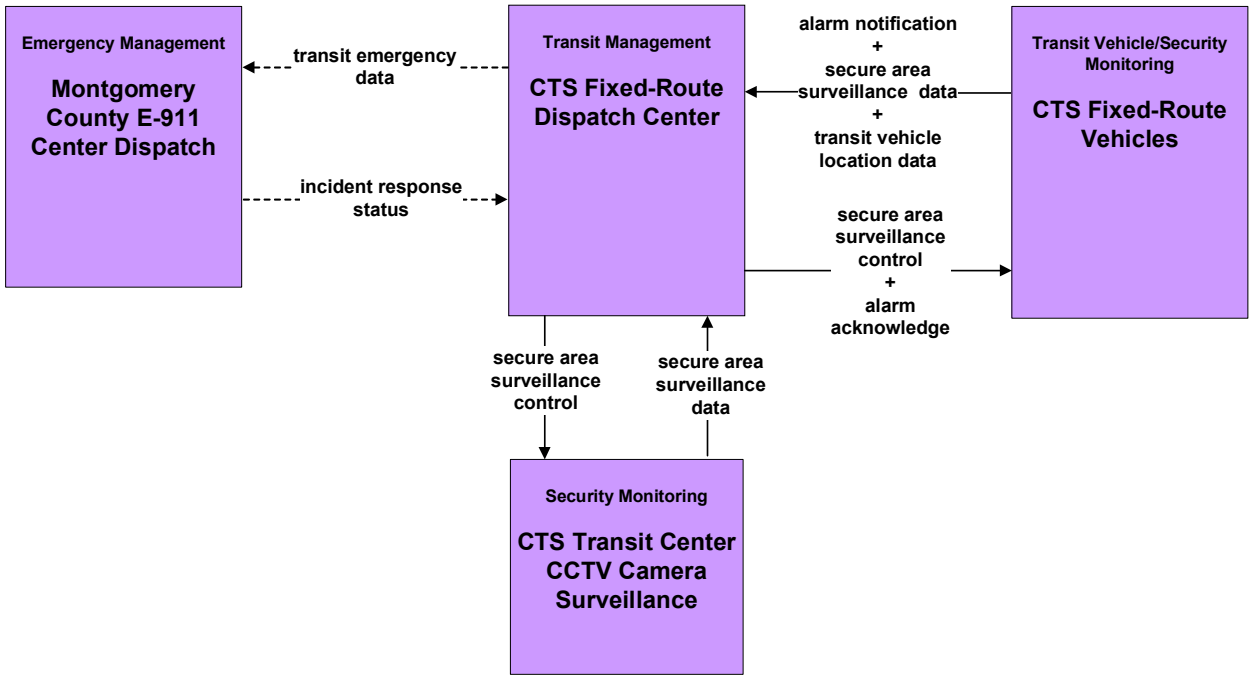


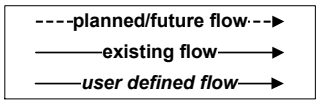
APTS04 – Transit Fare Collection Management
Mid-Cumberland HRA Public Transit



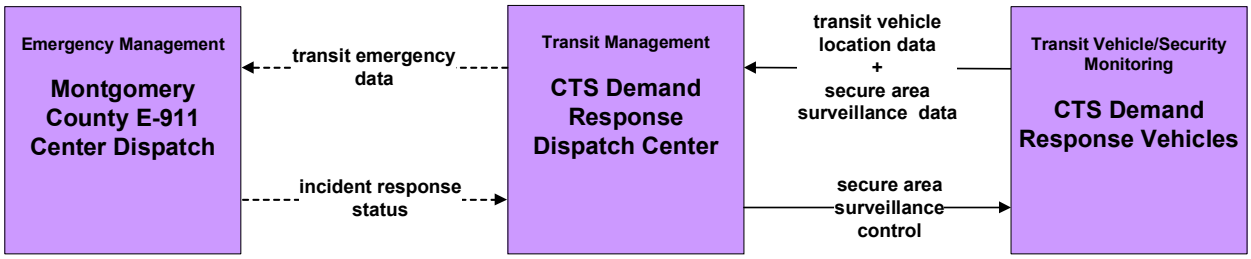


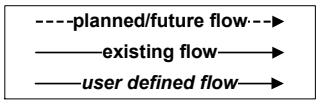
APTS05 – Transit Security
Clarksville Transit System (Fixed-Route)



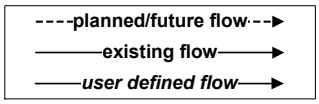


APTS05 – Transit Security
Clarksville Transit System (Paratransit)

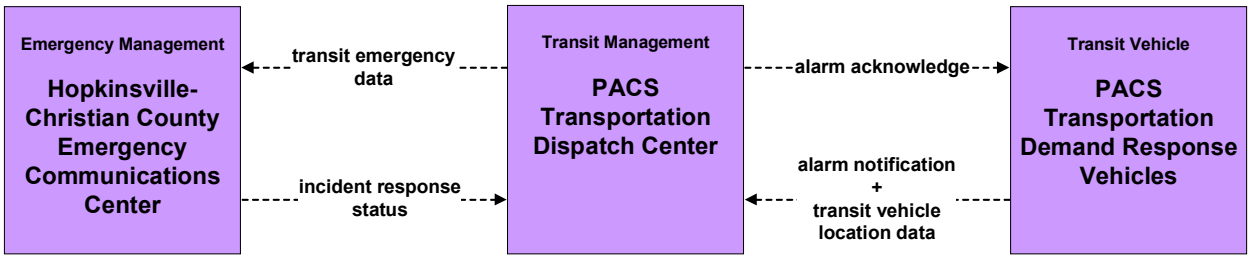


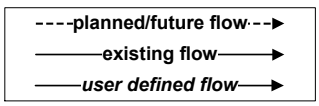


APTS05 – Transit Security
Mid-Cumberland HRA Public Transit

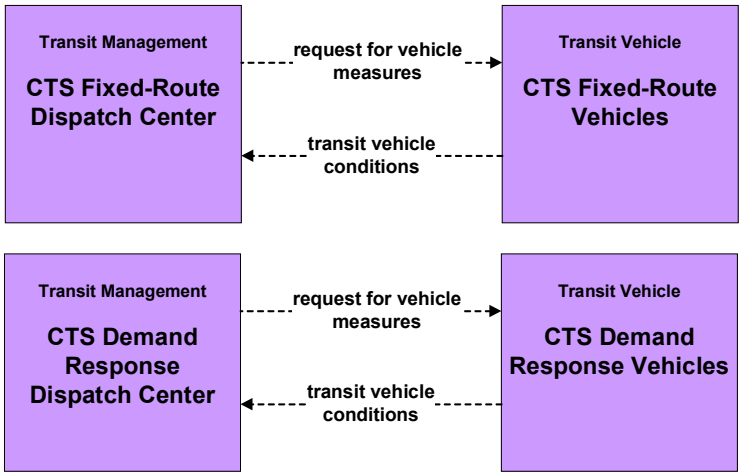


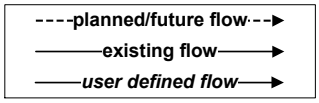
APTS05 – Transit Security
Pennyrile Allied Community Services





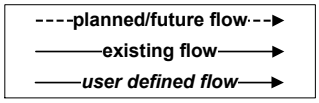
APTS06 – Transit Fleet Management
Clarksville Transit System



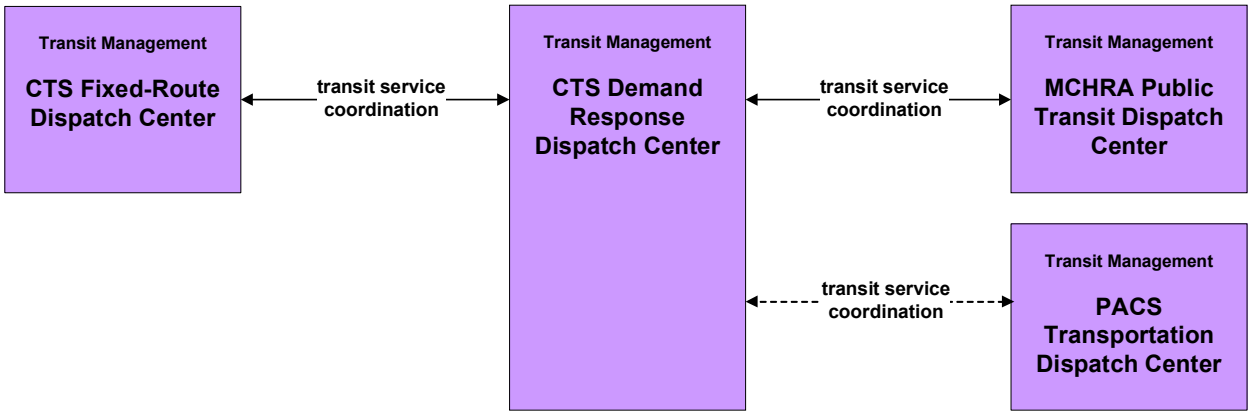


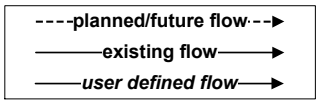
APTS06 – Transit Fleet Management
Mid-Cumberland HRA Public Transit

Note:
Drivers currently perform a pre- and post-trip safety inspection of vehicles. MCHRA Transit plans to automate the process utilizing tablets that are connected to the vehicle in the future.

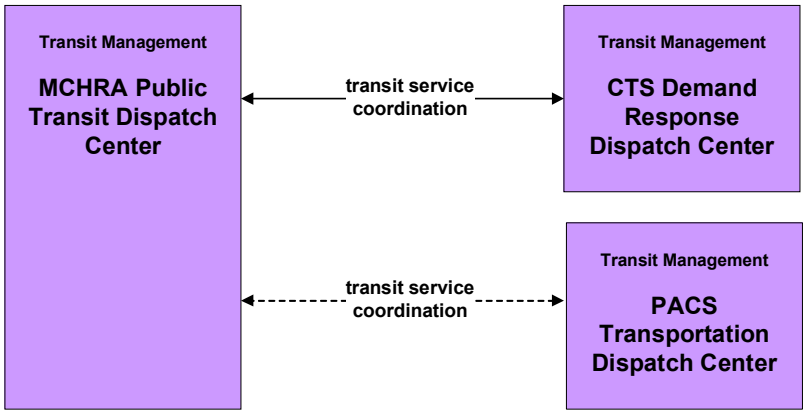


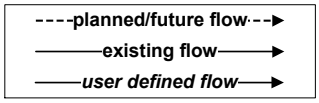
APTS07 – Multimodal Coordination
Clarksville Transit System



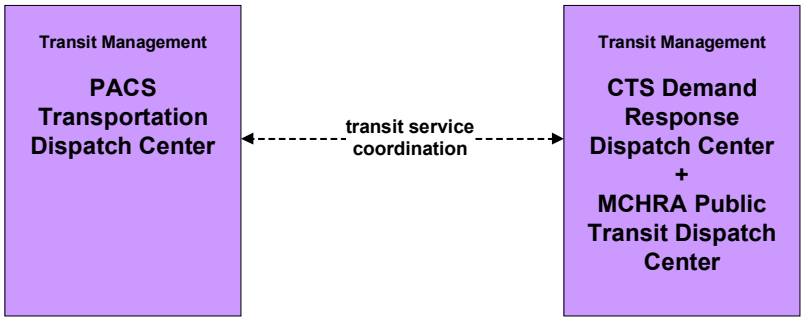


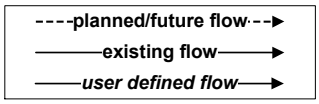
APTS07 – Multimodal Coordination
Mid-Cumberland HRA Public Transit



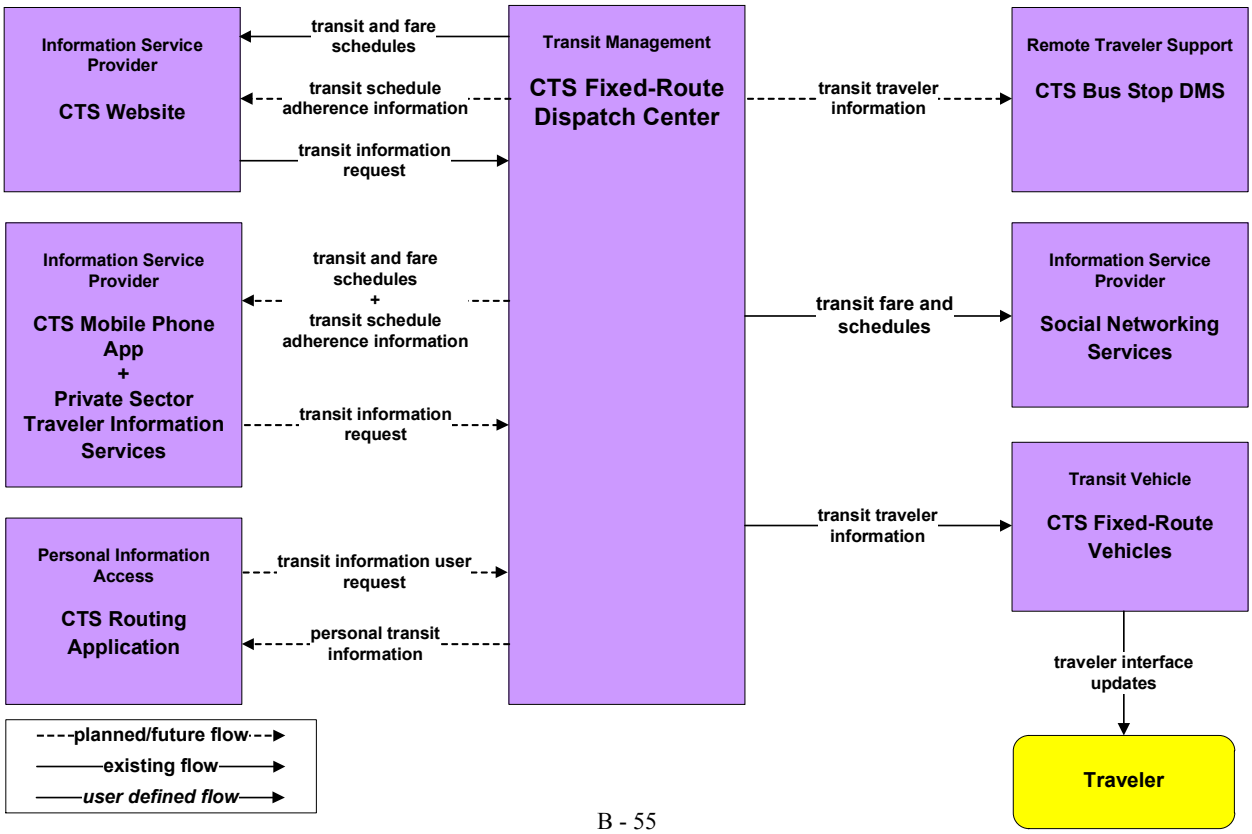


APTS07 – Multimodal Coordination
Pennyrile Allied Community Services

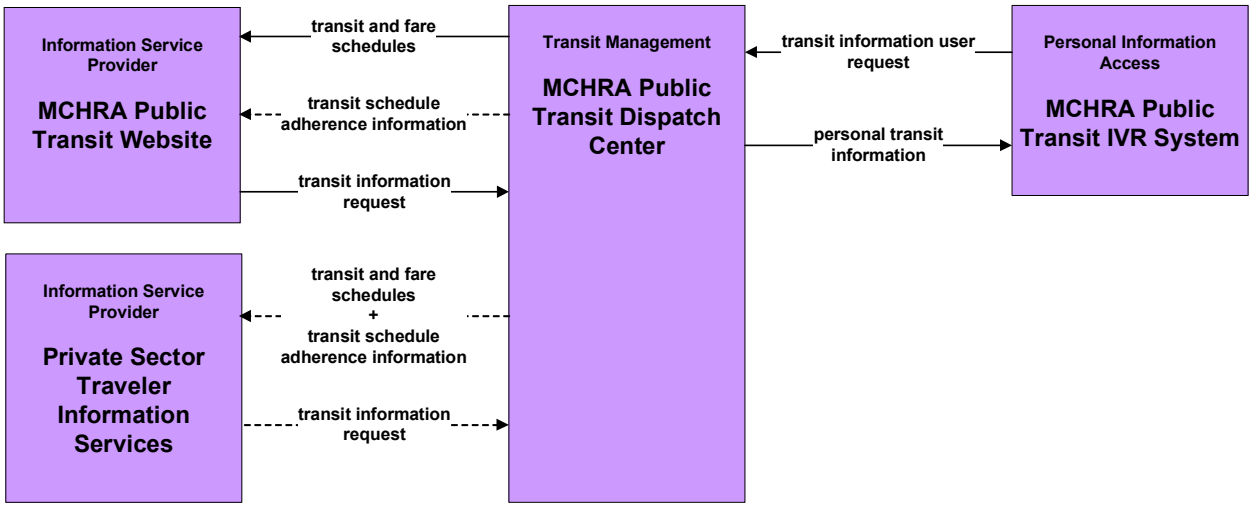




APTS08 – Transit Traveler Information
Clarksville Transit System



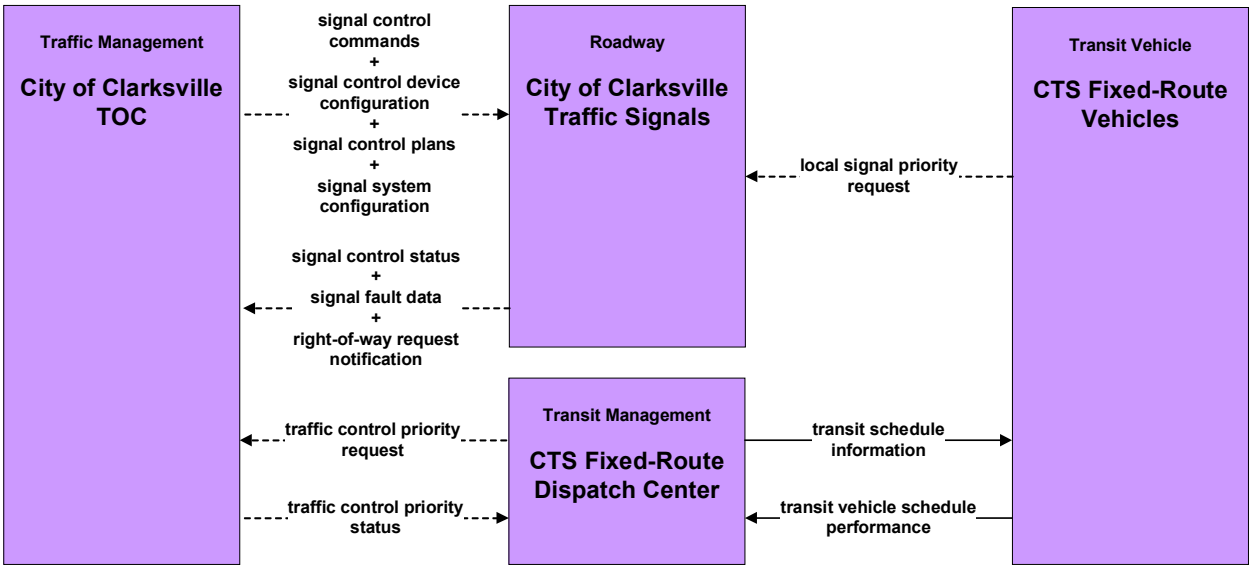
APTS08 – Transit Traveler Information
Mid-Cumberland HRA Public Transit



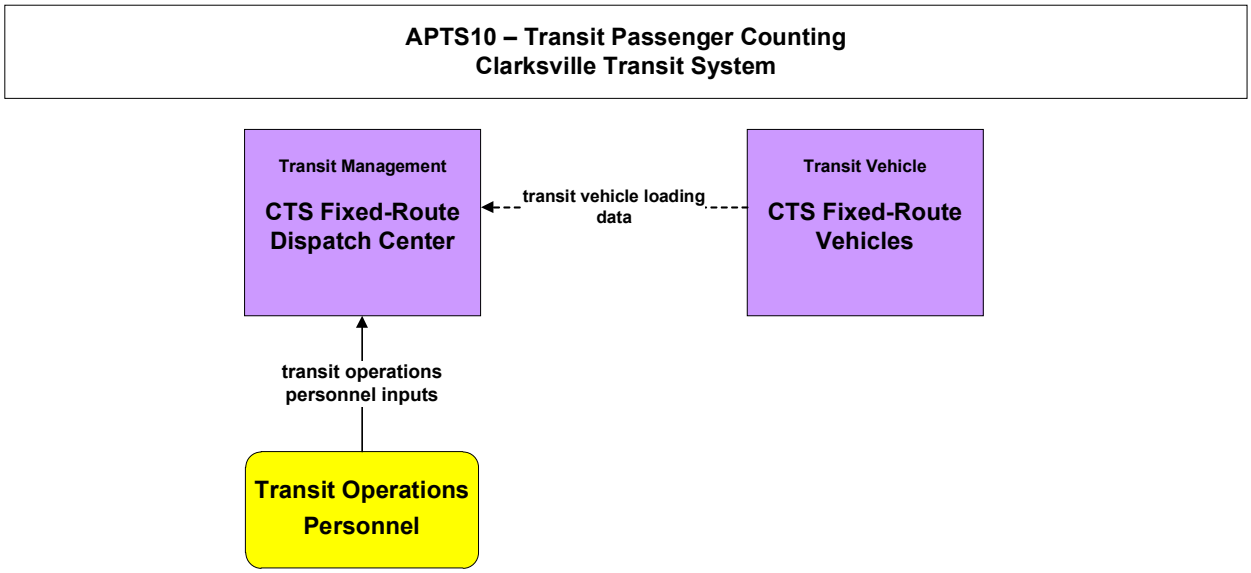
planned/future flow
existing flow
user defined flow

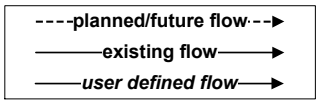
Note:
The MCHRA Transit IVR System calls transit riders to remind them of their transit trip and provides approximate next-stop arrival time of the transit vehicle.

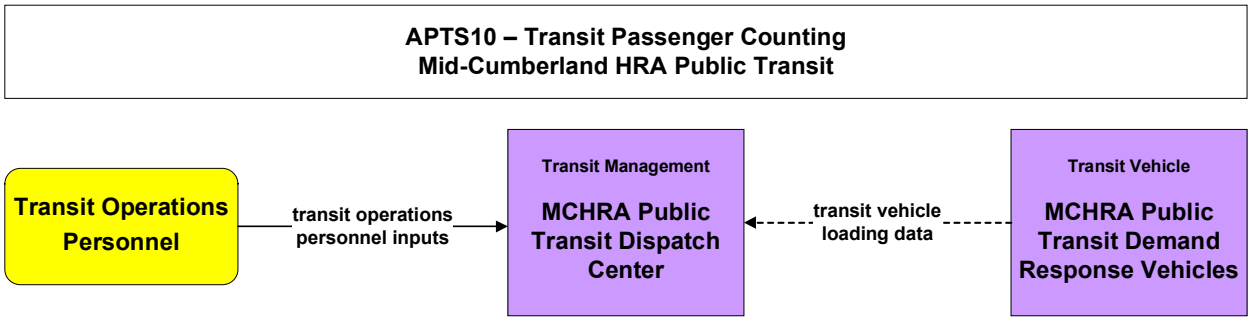
APTS09 – Transit Signal Priority
Clarksville Transit System

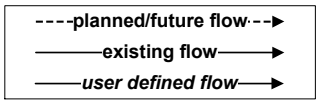


planned/future flow
existing flow
user defined flow

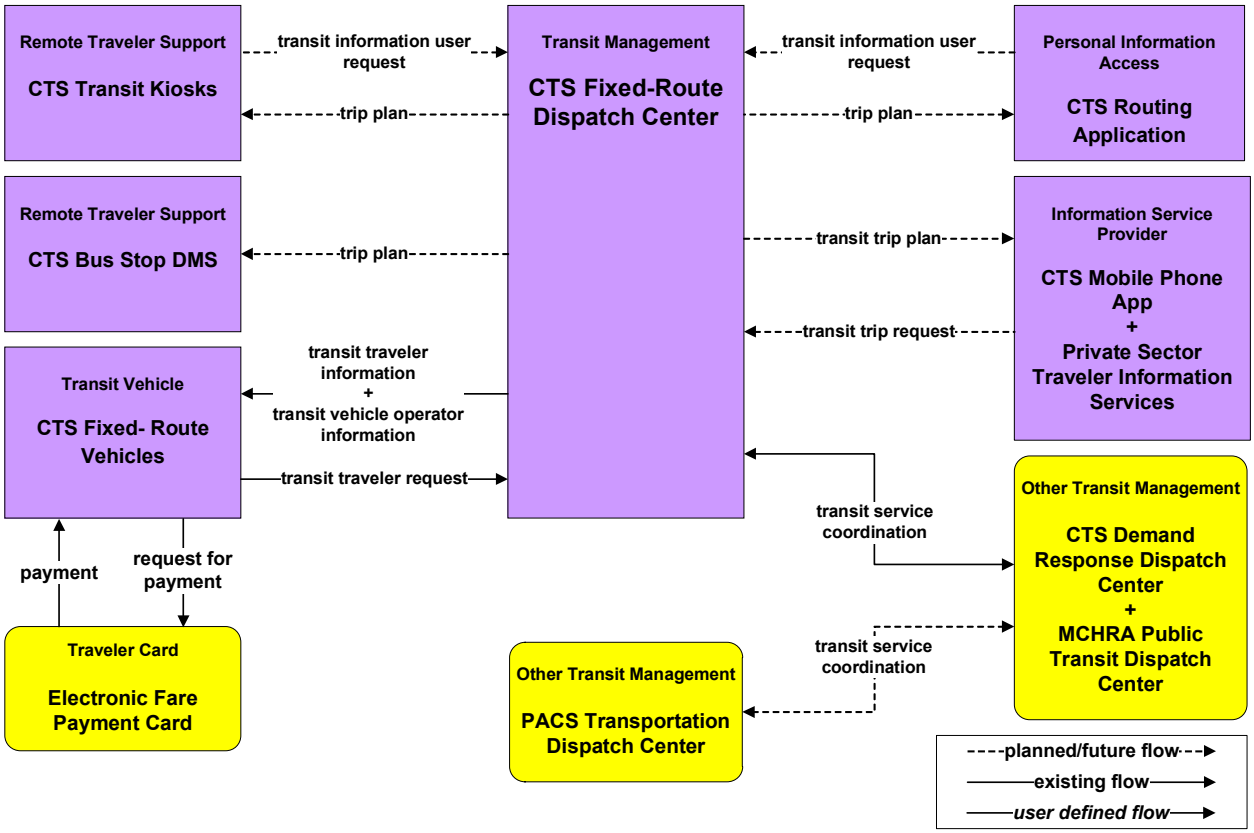

APTS10 – Transit Passenger Counting
Clarksville Transit System
Transit Management
CTS Fixed-Route Dispatch Center
transit vehicle loading data
Transit Vehicle
CTS Fixed-Route Vehicles
transit operations personnel inputs
Transit Operations Personnel


planned/future flow
existing flow
user defined flow

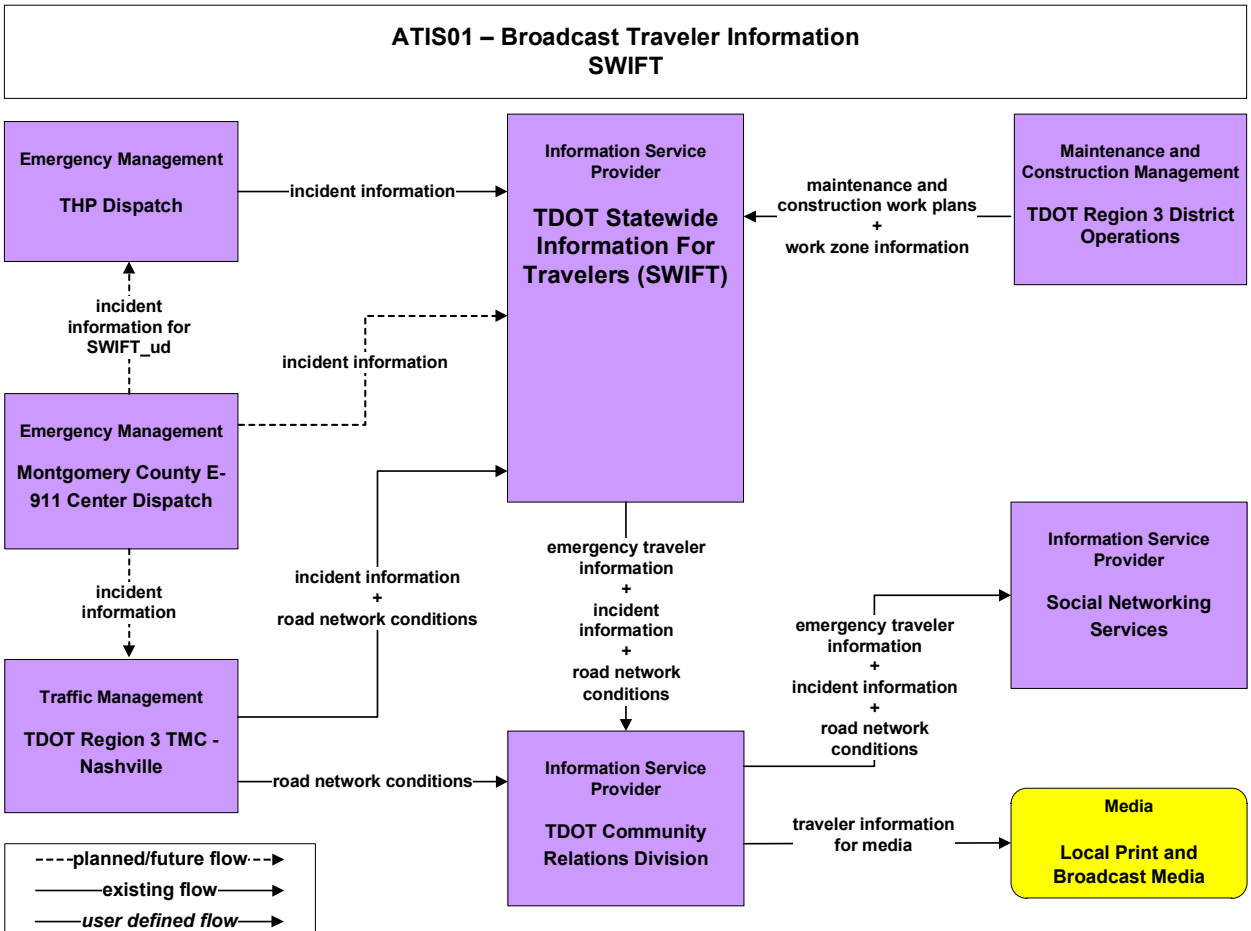

APTS10 – Transit Passenger Counting
Mid-Cumberland HRA Public Transit
Transit Operations Personnel
transit operations personnel inputs
Transit Management
MCHRA Public Transit Dispatch Center
transit vehicle loading data
Transit Vehicle
MCHRA Public Transit Demand Response Vehicles


planned/future flow
existing flow
user defined flow

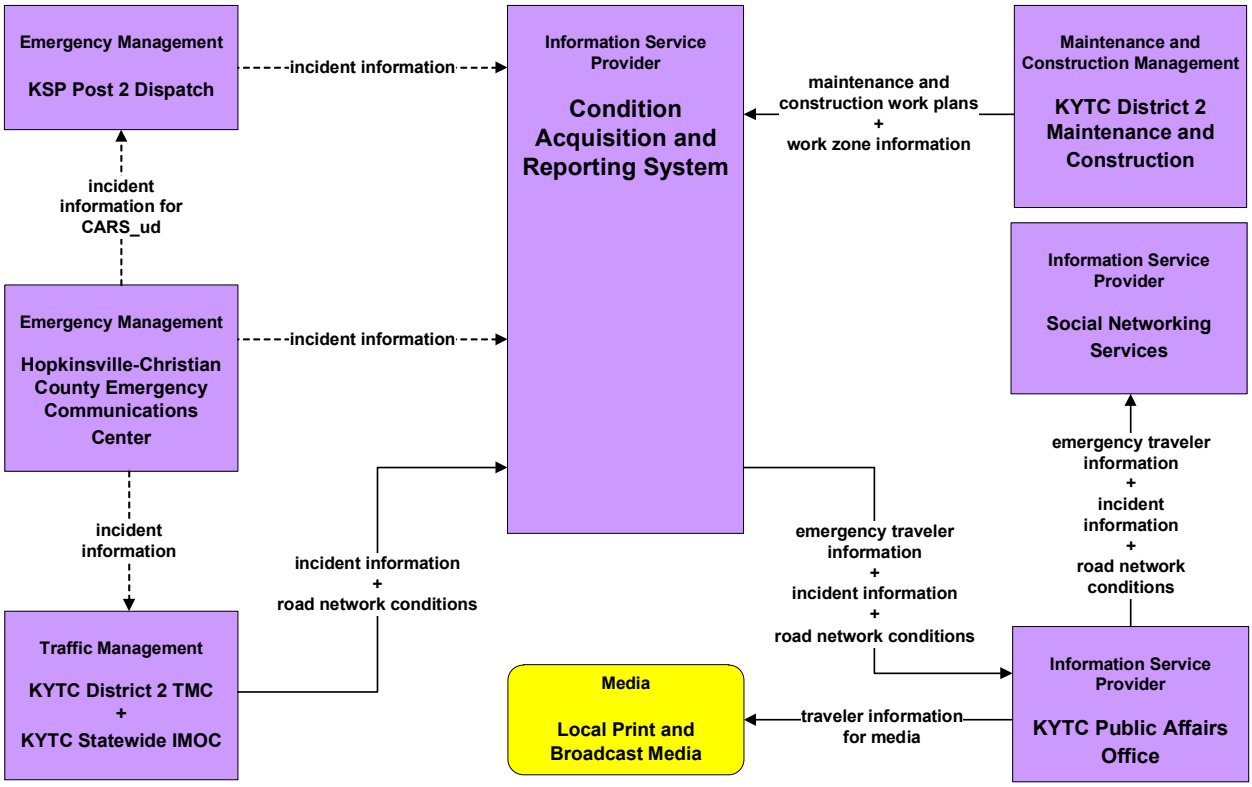
APTS11 – Multimodal Connection Protection
Clarksville Transit System



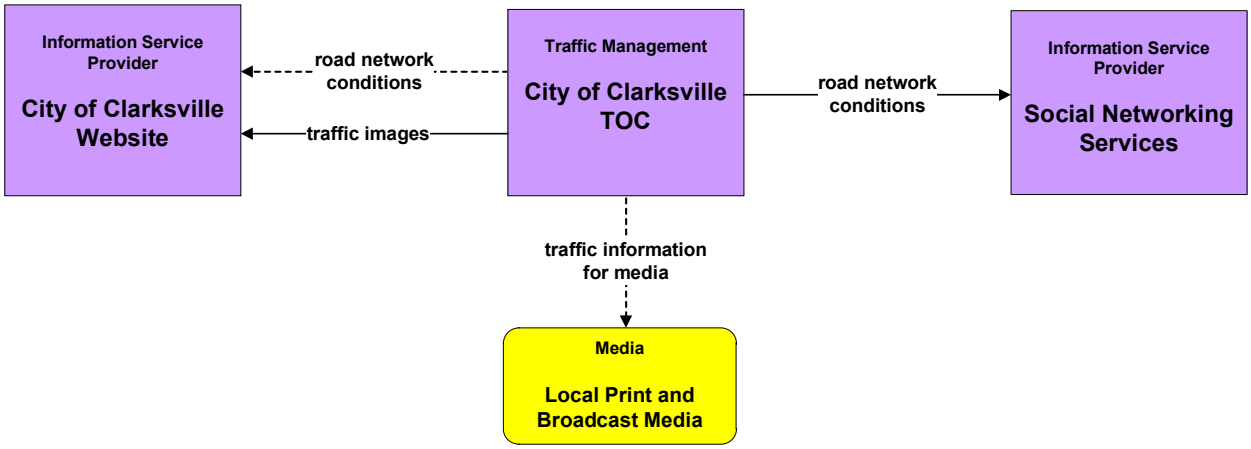
Advanced Traveler Information System

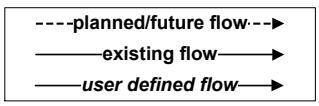


ATIS01 – Broadcast Traveler Information
CARS

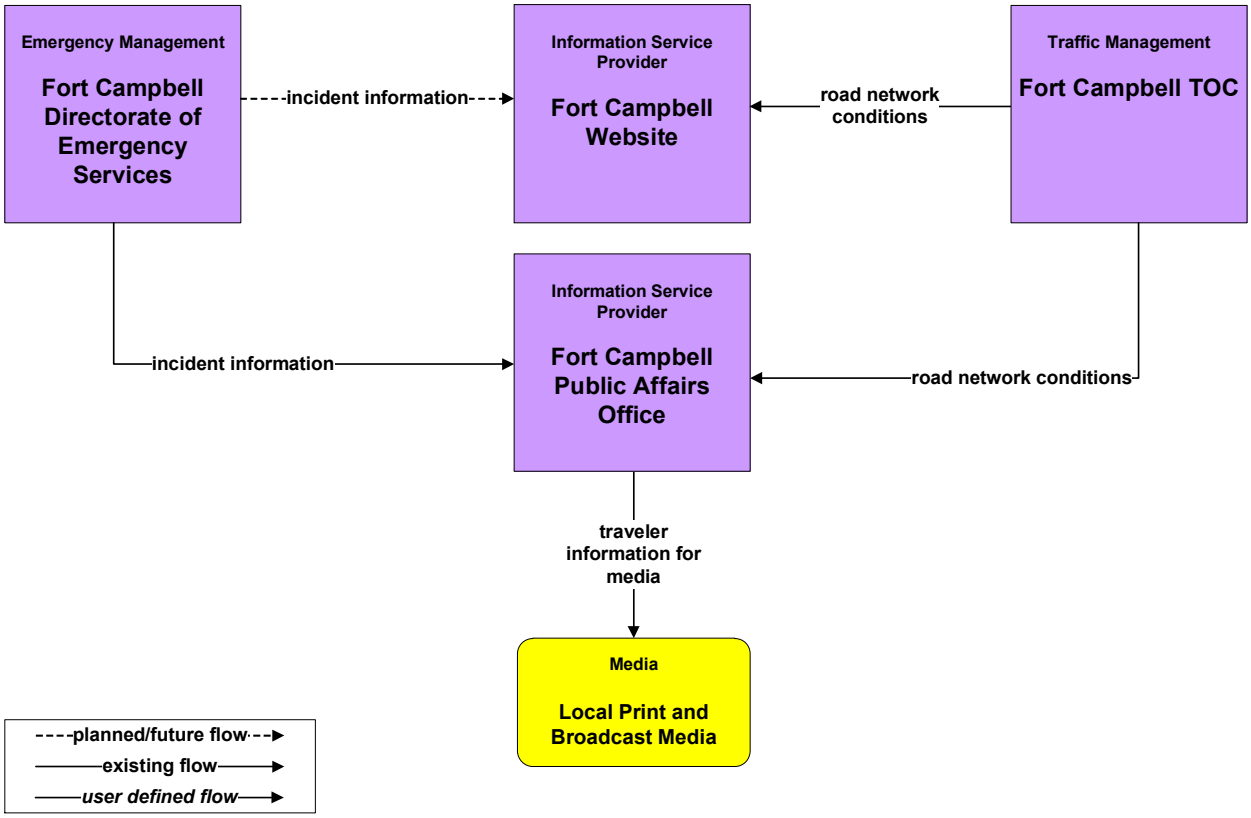


ATIS01 – Broadcast Traveler Information
City of Clarksville

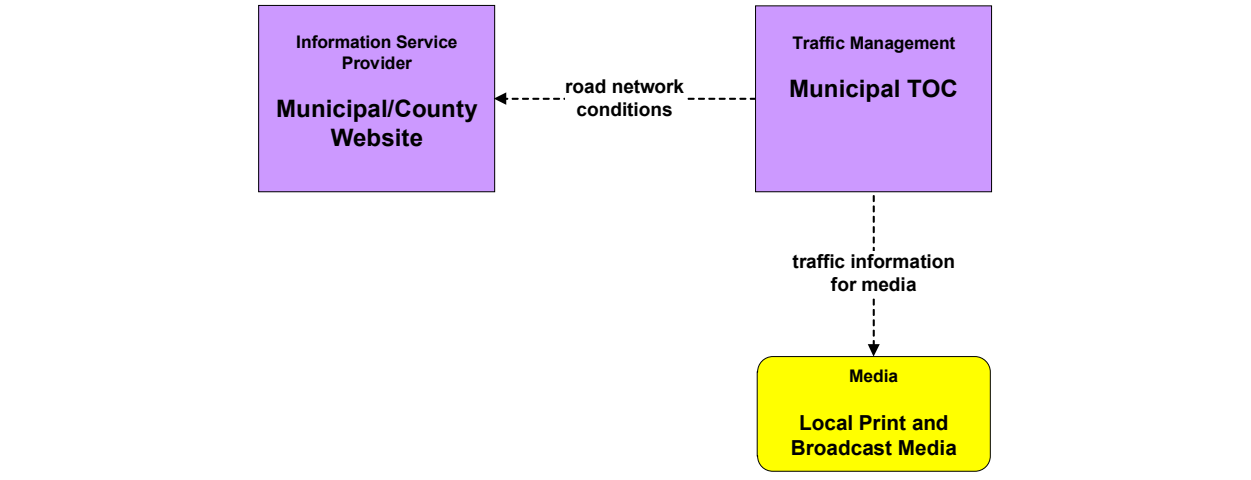




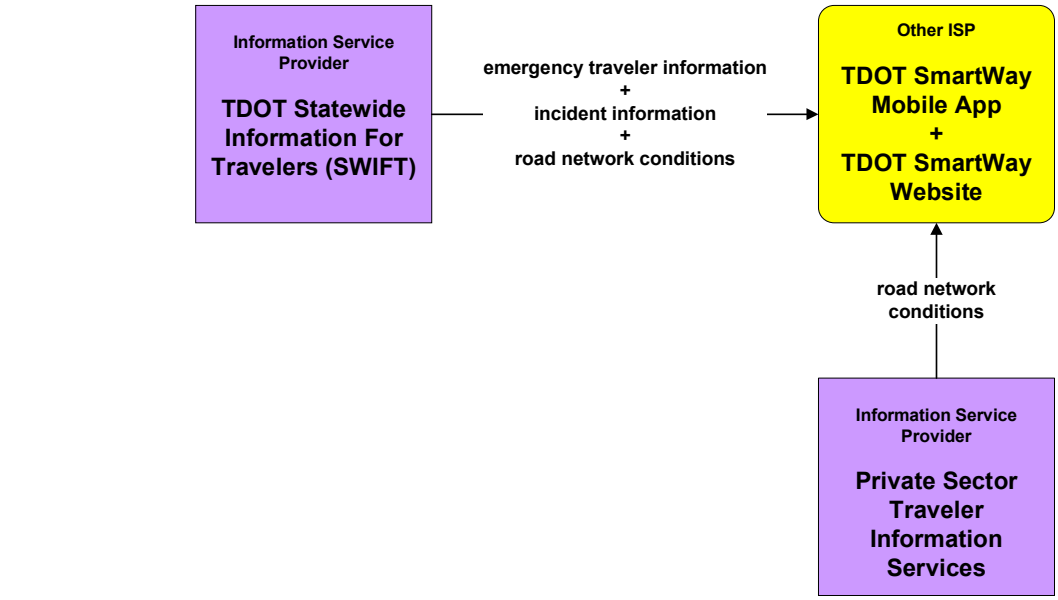
ATIS01 – Broadcast Traveler Information
Fort Campbell



ATIS01 – Broadcast Traveler Information
Municipal



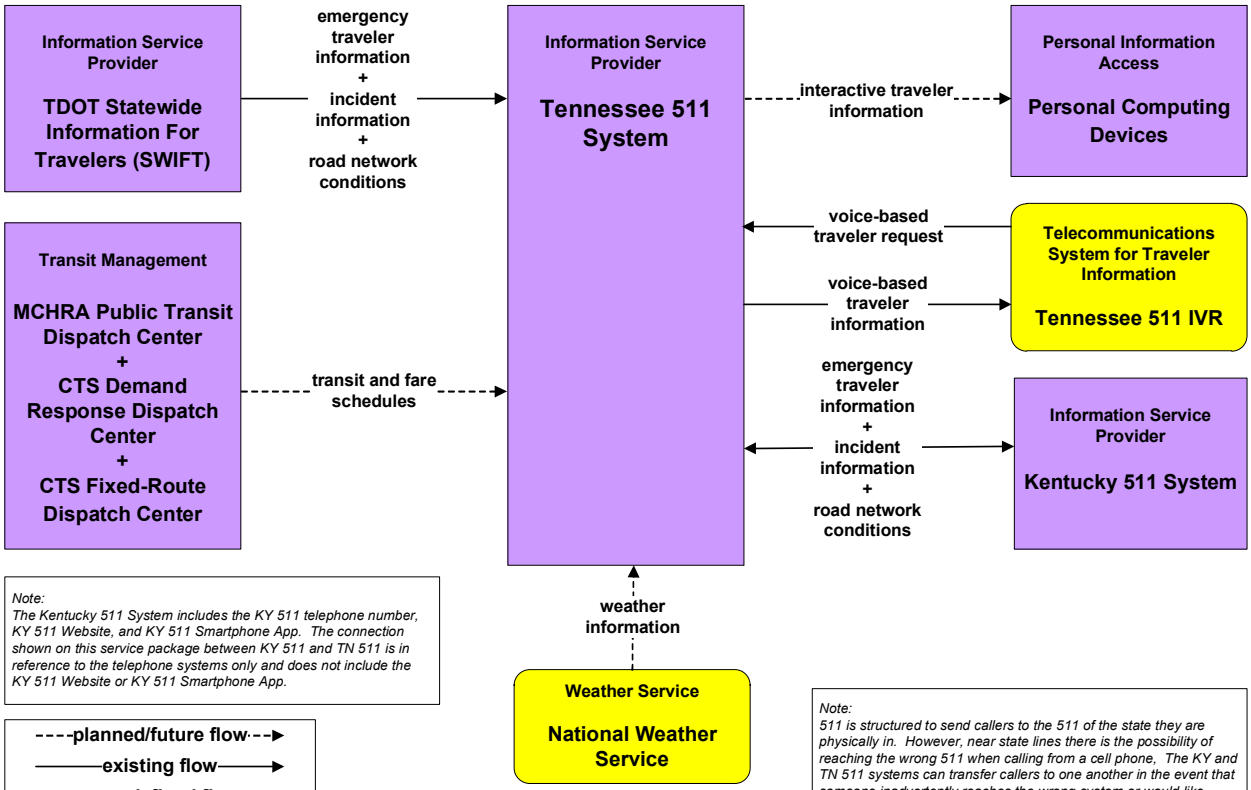
ATIS02 – Interactive Traveler Information
TDOT SmartWay



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

Note:
TDOT displays Google Traffic Data on the SmartWay website.

ATIS02 – Interactive Traveler Information
Tennessee 511

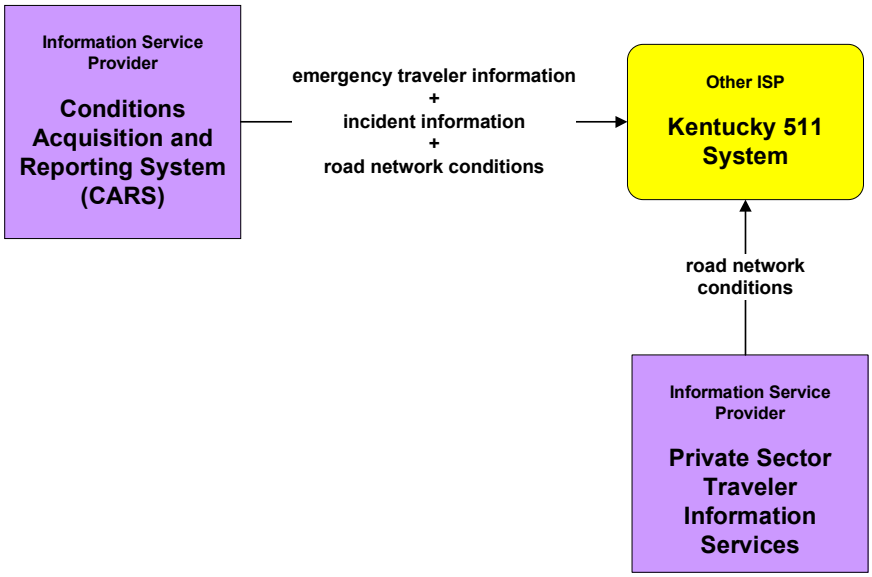


Note:
The Kentucky 511 System includes the KY 511 telephone number, KY 511 Website, and KY 511 Smartphone App. The connection shown on this service package between KY 511 and TN 511 is in reference to the telephone systems only and does not include the KY 511 Website or KY 511 Smartphone App.

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 KY 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.

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

ATIS02 – Interactive Traveler Information
CARS

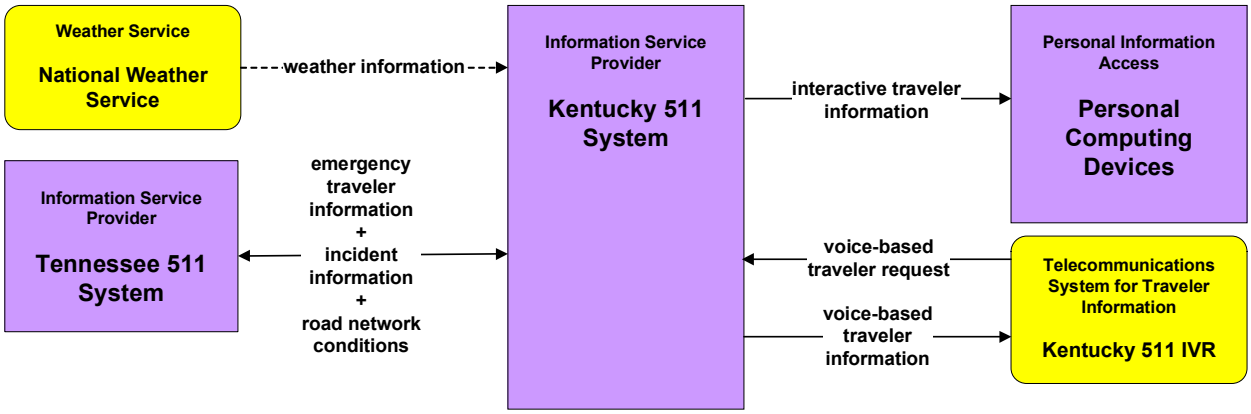


Note:
The Kentucky 511 System includes the KY 511 telephone number, KY 511 Website, and KY 511 Smartphone App.

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

Note:
KYTC displays Google Traffic Data on the Kentucky 511 website.

ATIS02 – Interactive Traveler Information
Kentucky 511

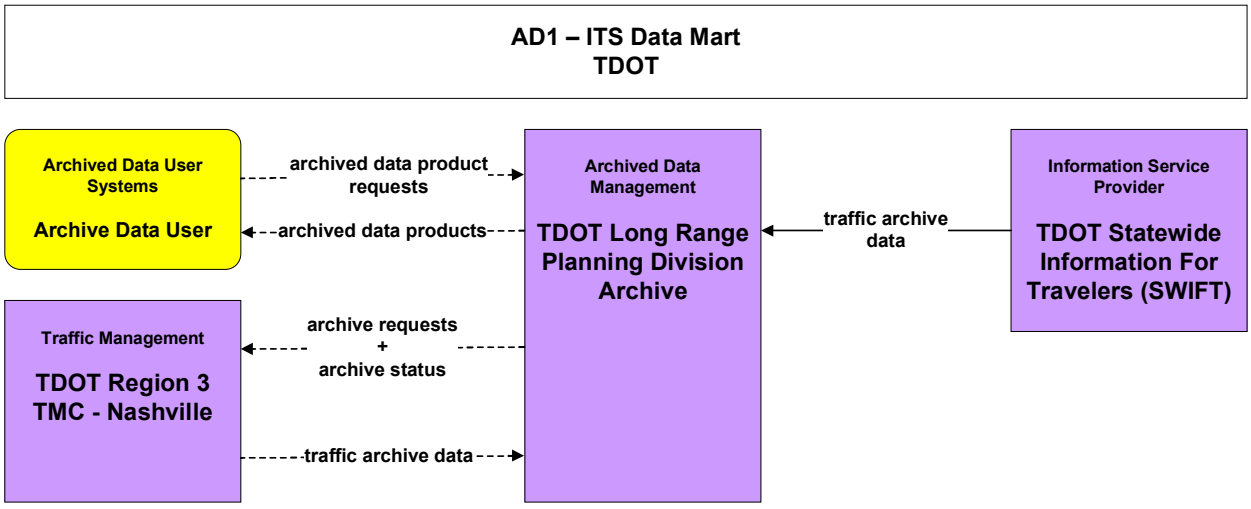


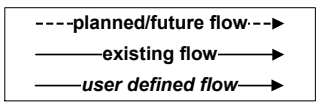
Note:
The Kentucky 511 System includes the KY 511 telephone number, KY 511 Website, and KY 511 Smartphone App. The connection shown on this service package between KY 511 and TN 511 is in reference to the telephone systems only and does not include the KY 511 Website or KY 511 Smartphone App.

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 KY 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.

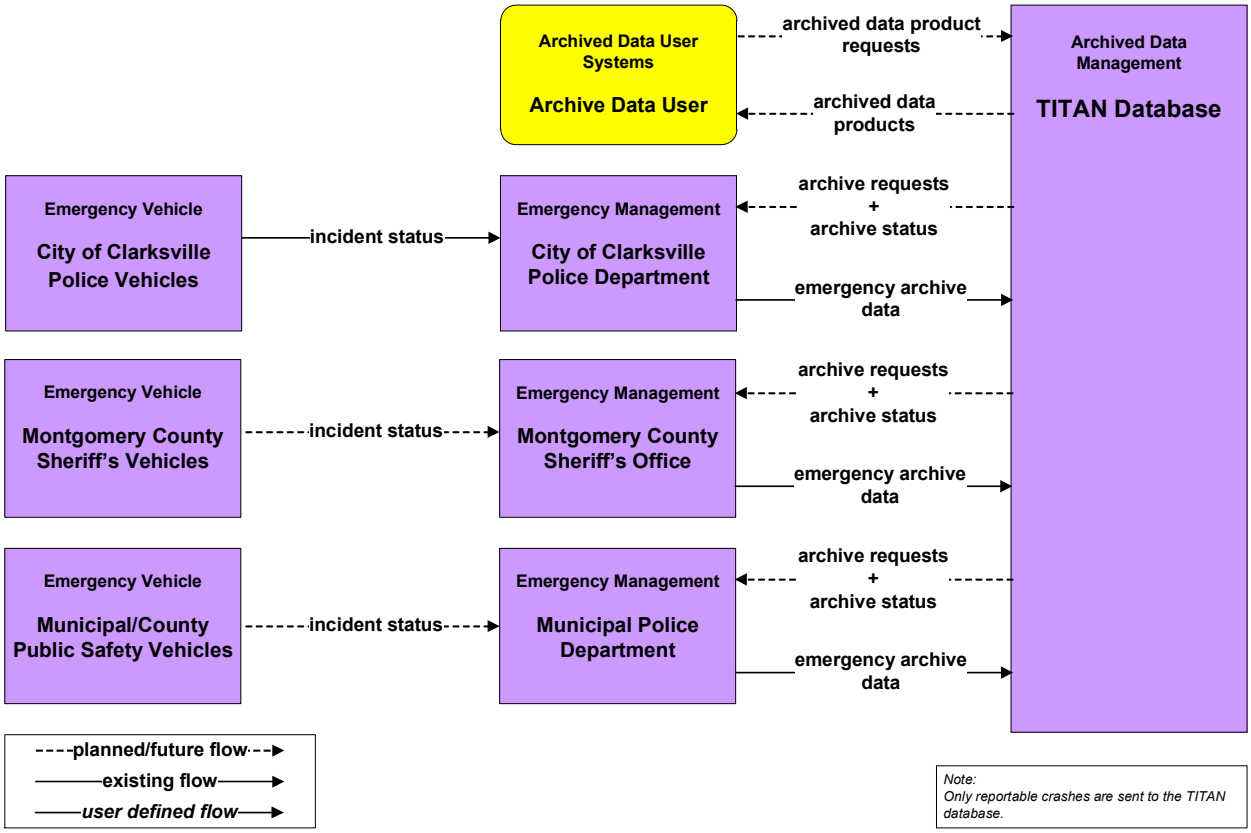
----planned/future flow-->
————existing flow————>
——*user defined flow*——>

Archived Data

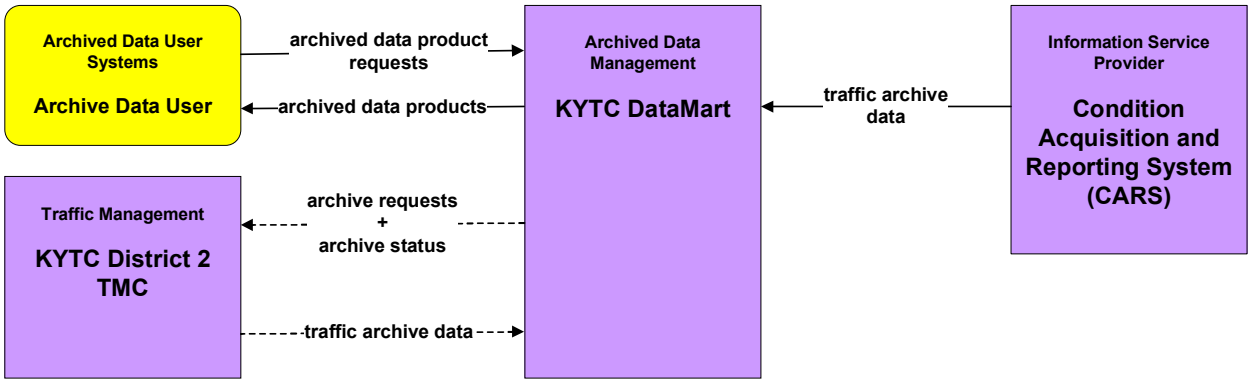


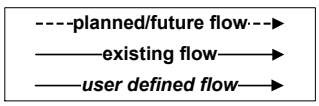


AD1 – ITS Data Mart
TITAN

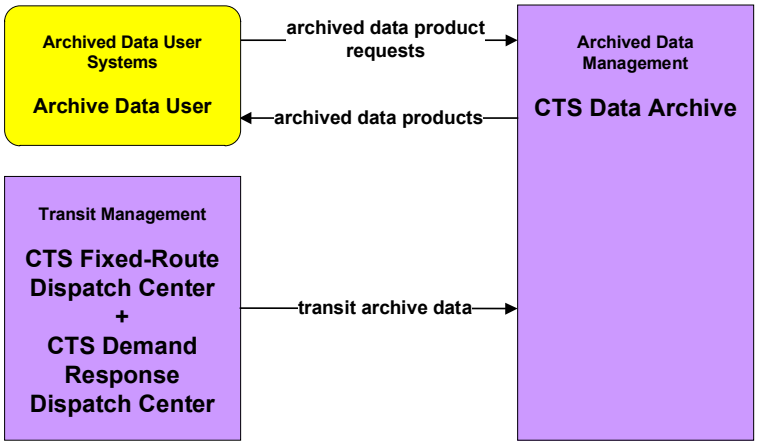


AD1 – ITS Data Mart
KYTC





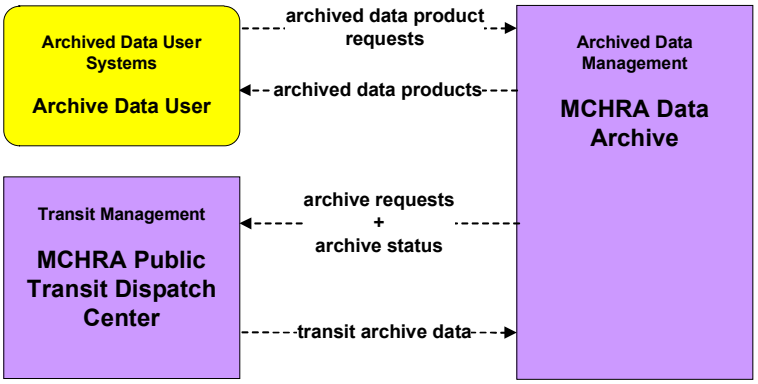
AD1 – ITS Data Mart
CTS



planned/future flow
existing flow
user defined flow

Note:
Data archive used by FTA, NTD, and TDOT Division of Multi Modal Transportation Resources.

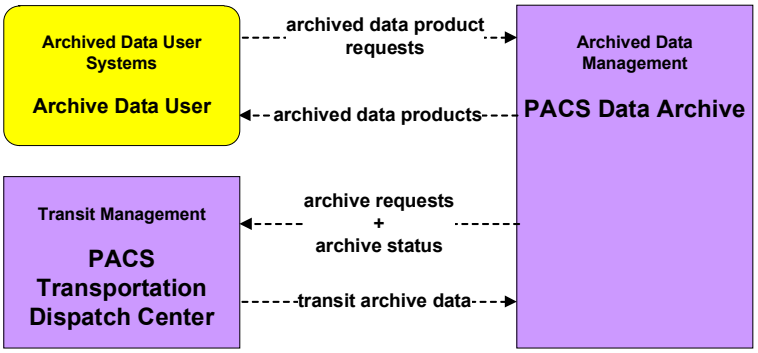
AD1 – ITS Data Mart
Mid-Cumberland HRA Transportation

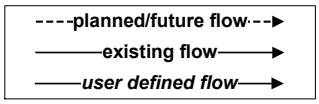


planned/future flow
existing flow
user defined flow

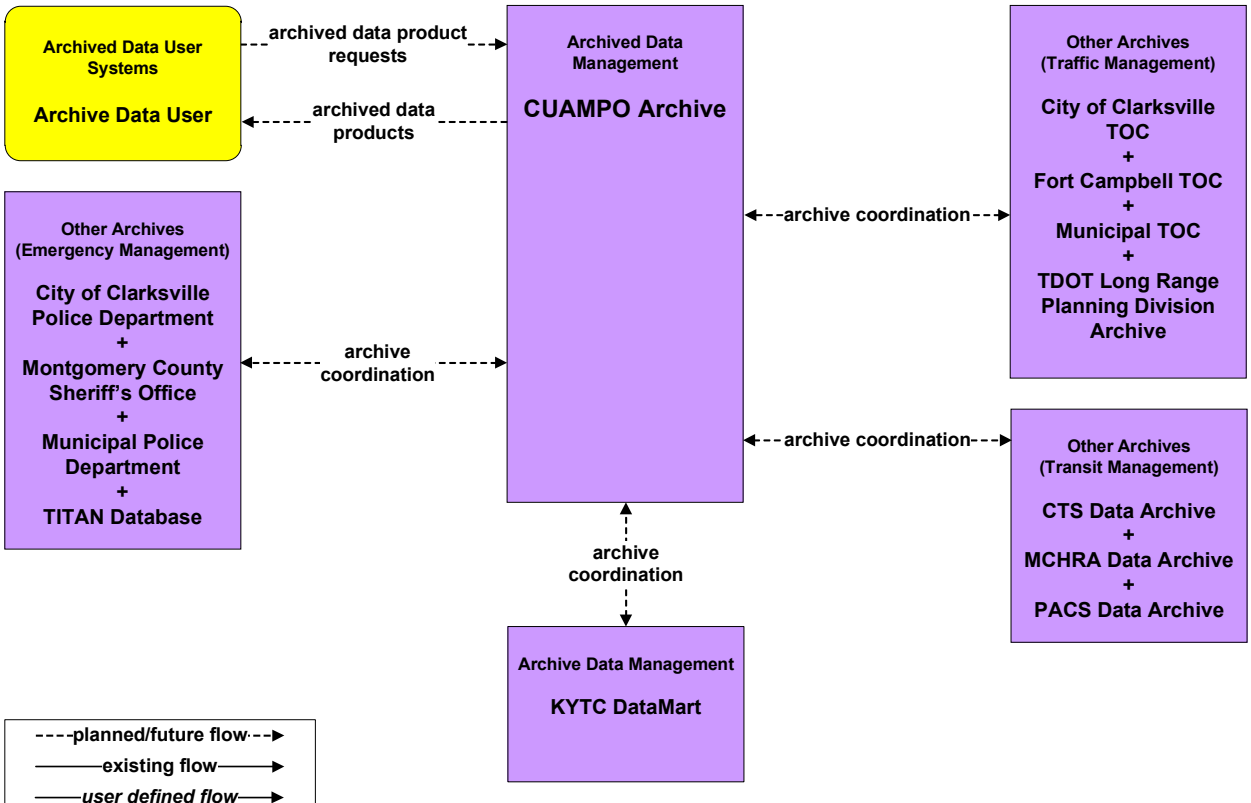
Note:
Data archive used by FTA, NTD, and TDOT Division of Multi Modal Transportation Resources.

AD1 – ITS Data Mart
Pennyrile Allied Community Services





AD3 – ITS Virtual Data Warehouse
Clarksville Urbanized Area MPO



APPENDIX C – ELEMENT FUNCTIONS

Element Name	Equipment Package (Function)
Blanchfield Army Community Hospital	On-Board EV En Route Support
	On-Board EV Barrier System Control
Christian County Emergency Management	Emergency Evacuation Support
	Emergency Response Management
	Incident Command
Cincinnati/Northern Kentucky (ARTIMIS) TMC	TMC Regional Traffic Management
City of Clarksville CCTV Cameras	Roadway Basic Surveillance
City of Clarksville Changeable Speed Limit Signs	Roadway Equipment Coordination
	Roadway Speed Monitoring and Warning
City of Clarksville DMS	Roadway Equipment Coordination
	Roadway Traffic Information Dissemination
City of Clarksville Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
Clarksville Fire Dispatch	Emergency Dispatch
	Emergency Evacuation Support
	Emergency Response Management
	Emergency Routing
City of Clarksville Fire Vehicles	On-Board EV En Route Support
	On-Board EV Incident Management Communication
City of Clarksville Flood Detectors	Roadway Environmental Monitoring
	Roadway Equipment Coordination
	Roadway Safety Warning System
City of Clarksville Flood Warning Beacons	Roadway Equipment Coordination
	Roadway Safety Warning System
City of Clarksville Gas and Water	MCM Roadway Maintenance and Construction
	MCM Work Activity Coordination
	MCM Work Zone Management
City of Clarksville On-Street Parking Meters	Parking Coordination
	Parking Data Collection
	Parking Electronic Payment
City of Clarksville Parking Authority	Parking Coordination
	Parking Data Collection
	Parking Management
City of Clarksville Police Department	Emergency Data Collection
	Emergency Dispatch
	Emergency Routing
City of Clarksville Police Vehicles	On-Board EV En Route Support
	On-Board EV Incident Management Communication

Element Name	Equipment Package (Function)
City of Clarksville Portable DMS	Roadway Traffic Information Dissemination
	Roadway Work Zone Traffic Control
City of Clarksville Programmable School Flashing Beacons	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Signal Control
City of Clarksville Rail Notification System	Roadway Equipment Coordination
	Standard Rail Crossing
City of Clarksville Reversible Lane Equipment	Roadway Equipment Coordination
	Roadway Reversible Lanes
	Roadway Signal Controls
City of Clarksville RWIS	Roadway Environmental Monitoring
City of Clarksville Speed Monitoring Equipment	Roadway Speed Monitoring and Warning
City of Clarksville Street Department	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Infrastructure Monitoring
	MCM Roadway Maintenance and Construction
	MCM Vehicle Tracking
	MCM Wok Activity Coordination
	MCM Work Zone Management
City of Clarksville Street Department Vehicles	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Work Zone Support
City of Clarksville TOC	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Evacuation Support
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Lighting System Control
	TMC Multimodal Coordination
	TMC Regional Traffic Management
	TMC Reversible Lane Management
	TMC Roadway Warning
	TMC Signal Control
	TMC Speed Monitoring and Warning
	TMC Traffic Information Dissemination

Element Name	Equipment Package (Function)
City of Clarksville TOC (continued)	TMC Variable Speed Limits
	TMC Work Zone Traffic Management
	Traffic Equipment Maintenance
City of Clarksville Traffic Signals	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Signal Controls
	Roadway Signal Preemption
	Roadway Signal Priority
	Standard Rail Crossing
City of Clarksville Variable Led Streetlights	Roadside Lighting System
City of Clarksville Website	ISP Traveler Data Collection
	ISP Traveler Information Alerts
Conditions Acquisition and Reporting System (CARS)	Basic Information Broadcast
	ISP Data Collection
	ISP Emergency Traveler Information
	ISP Operational Data Repository
	ISP Traveler Data Collection
	MCM Data Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Work Activity Coordination
	MCM Work Zone Management
CTS Bus Stop DMS	Remote Transit Information Services
CTS Data Archive	Government Reporting Systems Support
	ITS Data Repository
CTS Demand Response Dispatch Center	Transit Center Connection Protection
	Transit Center Fare Management
	Transit Center Information Services
	Transit Center Multi-modal Coordination
	Transit Center Paratransit Operations
	Transit Passenger Counting
	Transit Center Vehicles Tracking
	Transit Data Collection
	Transit Evacuation Support
	Transit Garage Maintenance
CTS Demand Response Vehicles	On-Board Maintenance
	On-Board Paratransit Operations
	On-Board Schedule Management
	On-Board Transit Security
	On-Board transit Trip Monitoring

Element Name	Equipment Package (Function)
CTS Fixed-Route Dispatch Center	Center Secure Area Alarm Support
	Center Secure Area Sensor Management
	Center Secure Area Surveillance
	Transit Center Connection Protection
	Transit Center Fare Management
	Transit Center Fixed-Route Operations
	Transit Center Information Services
	Transit Center Multi-modal Coordination
	Transit Center Passenger Counting
	Transit Center Security
	Transit Center Signal Priority
	Transit Center Vehicles Tracking
	Transit Data Collection
	Transit Evacuation Support
	Transit Garage Maintenance
	Transit Vehicle Assignment
	Transit Vehicle Operator Assignment
CTS Fixed-Route Vehicles	Field Secure Area Sensor Monitoring
	Field Secure Are Surveillance
	On-Board Maintenance
	On-Board Passenger Counting
	On-Board Schedule Management
	On-Board Transit Fare Management
	On-Board Transit Information Services
	On-Board Transit Security
	On-Board Transit Signal Priority
	On-Board transit Trip Monitoring
CTS Mobile Phone App	Infrastructure Provided Trip Planning
	Interactive Infrastructure Information
CTS Routing Application	Personal Autonomous Route Guidance
	Personal Interactive Information Reception
	Personal Trip Planning and Route Guidance
CTS Transit Center CCTV Camera Surveillance	Field Secure Area Sensor Monitoring
	Field Secure Are Surveillance
CTS Transit Kiosks	Remote Transit Fare Management
	Remote Transit Information Services
CTS Website	Infrastructure Provided Trip Planning
	ISP Traveler Data Collection

Element Name	Equipment Package (Function)
CUAMPO Data Archive	Government Reporting Systems Support
	ITS Data Repository
	On-Line Analysis and Mining
	Virtual Data Warehouse Services
CUAMPO Website	ISP Data Collection
	ISP Traveler Data Collection
Fort Campbell CCTV Cameras	Roadway Basic Surveillance
	Filed Secure Area Surveillance
Fort Campbell Directorate of Emergency Services	Center Secure Area Sensor Management
	Center Secure Area Surveillance
	Emergency Call-Taking
	Emergency Data Collection
	Emergency Dispatch
	Emergency Evacuation Support
	Emergency Response Management
	Emergency Routing
	Incident Command
	Barrier System Management
Fort Campbell Entry Gate Closure Barriers	Field Barrier System Control
	Roadway Equipment Coordination
Fort Campbell Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
Fort Campbell Public Affairs Office	Basic Information Broadcast
	ISP Emergency Traveler Information
Fort Campbell Public Safety Vehicles	On-Board EV Barrier System Control
	On-Board EV En Route Support
	On-Board EV Incident Management Communication
Fort Campbell Rail Notification System	Roadway Traffic Information Dissemination
	Standard Rail Crossing
Fort Campbell TOC	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Evacuation Support
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Management
	TMC Signal Control
	TMC Traffic Information Dissemination
	TMC Work Zone Traffic Management
	Traffic Equipment Maintenance

Element Name	Equipment Package (Function)
Fort Campbell Traffic Signal Controls	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Signal Controls
	Roadway Signal Preemption
	Standard Rail Crossing
Fort Campbell Website	ISP Traveler Data Collection
	ISP Traveler Information Alerts
Hopkinsville-Christian County Emergency Communications Center	Emergency Call-Taking
	Emergency Dispatch
	Emergency Evacuation Support
	Emergency Response Management
	Emergency Routing
	Incident Command
Kentucky 511 System	Basic Information Broadcast
	Interactive Infrastructure Information
	ISP Emergency Traveler
	ISP Operational Data Repository
	ISP Traveler Data Collection
	ISP Traveler Information Alerts
	Traveler Telephone Information
Kentucky SAFE Patrol Dispatch	Emergency Response Management
	Incident Command
	Service Patrol Management
Kentucky SAFE Patrol Vehicles	On-Board En Route Support
	On-Board EV Incident Management Communication
KSP Post 2 Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Emergency Early Warning System
	Emergency Evacuation Support
	Emergency Response Management
	Emergency Routing
	Incident Command
KSP Vehicles	On-Board En Route Support
	On-Board EV Incident Management Communication
KYEEC Air Quality Sensors	Roadway Emissions Monitoring
KYEEC Division for Air Quality	Emissions Data Collection
	Emissions Data Management

Element Name	Equipment Package (Function)
KYEM	Emergency Early Warning System
	Emergency Environmental Monitoring
	Emergency Evacuation Support
	Emergency Response Management
	Incident Command
KYTC CCTV Cameras	Roadway Basic Surveillance
KYTC DataMart	Government Reporting Systems Support
	ITS Data Repository
	On-Line Analysis and Mining
	Virtual Data Warehouse Services
KYTC District 2 Maintenance and Construction	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Vehicle Tracking
	MCM Work Activity Coordination
	MCM Work Zone Management
KYTC District 2 TMC	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Evacuation Support
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Management
	TMC Traffic Signal Control
	TMC Traffic Information Dissemination
	TMC Work Zone Traffic Management
	Traffic Equipment Maintenance
KYTC DMS	Roadway Equipment Coordination
	Roadway Traffic Information Dissemination
	Roadway Work Zone Traffic Control
KYTC Emergency Services Coordinator	MCM Incident Management
	MCM Roadway Maintenance and Construction
	TMC Evacuation Support
	TMC Incident Dispatch Coordination/Communication
KYTC Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
KYTC HAR	Roadway Traffic Information Dissemination
	Roadway Work Zone Traffic Control

Element Name	Equipment Package (Function)
KYTC Maintenance Vehicles	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Work Zone Support
KYTC Public Affairs Office	Basic Information Broadcast
	ISP Emergency Traveler Information
KYTC RWIS Sensors	Roadway Environmental Monitoring
KYTC Smart Work Zone Equipment	Roadway Work Zone Safety
	Roadway Work Zone Traffic Control
KYTC Statewide IMOC	TMC Regional Traffic Management
	TMC Traffic Information Dissemination
KYTC Traffic Signals	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Signal Controls
	Roadway Signal Preemption
	Standard Rail Crossing
Louisville (TRIMARC) TMC	TMC Regional Traffic Management
MCHRA Data Archive	Government Reporting Systems Support
	ITS Data Repository
MCHRA Public Transit Demand Response Vehicles	On-Board Paratransit Operations
	On-Board Transit Trip Monitoring
	On-Board Maintenance
MCHRA Public Transit Dispatch Center	Transit Center Information Services
	Transit Center Multi-Modal Coordination
	Transit Center Paratransit Operations
	Transit Center Vehicle Tracking
	Transit Data Collection
	Transit Evacuation Support
	Transit Vehicle Operator Assignment
MCHRA Public Transit Website	ISP Travel Services Information and Reservation
	ISP Traveler Data Collection
Montgomery County E-911 Center Dispatch	Center Secure Alarm Support
	Emergency Call-Taking
	Emergency Dispatch
	Emergency Evacuation Support
	Emergency Response Management
	Emergency Routing
	Incident Command
Montgomery County EMA	Emergency Evacuation Support
	Emergency Response Management
	Incident Command

Element Name	Equipment Package (Function)
Montgomery County EMS Vehicles	On-Board EV En Route Support
	On-Board Incident Management Communication
Montgomery County Sheriff Vehicles	On-Board EV En Route Support
	On-Board Incident Management Communication
Montgomery County Sheriff's Office	Emergency Data Collection
	Emergency Dispatch
	Emergency Response Management
	Incident Command
Municipal CCTV Cameras	Roadway Basic Surveillance
Municipal Basic Surveillance	Roadway Basic Surveillance
	Roadway equipment Coordination
Municipal Police Department	Emergency Data Collection
	Emergency Dispatch
	Emergency Response Management
	Incident Command
Municipal Rail Notification System	Roadway Equipment Coordination
	Standard Rail Crossing
Municipal TOC	Collect Traffic Surveillance
	HRI Traffic Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Evacuation Support
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Management
	TMC Traffic Signal Control
	TMC Traffic Information Dissemination
	TMC Work Zone Traffic Management
	Traffic Equipment Maintenance
Municipal Traffic Signals	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Signal Controls
	Roadway Signal Preemption
	Standard Rail Crossing
Municipal/County Maintenance	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Vehicle tracking

Element Name	Equipment Package (Function)
Municipal/County Maintenance (continued)	MCM Work Activity Coordination
	MCM Work Zone Management
	MCM Work Zone Safety Management
Municipal/County Maintenance Vehicles	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Work Zone Support
Municipal/County Portable DMS	Roadway Traffic Information Dissemination
	Roadway Work Zone Traffic Control
Municipal/County Public Safety Vehicles	On-Board EV En Route Support
	On-Board Incident Management Communication
Municipal/County RWIS	Roadway Environmental Monitoring
Municipal/County Website	ISP Traveler Data Collection
	ISP Traveler Information Alerts
Other KYTC District Maintenance and Construction	MCM Work Activity Coordination
	MCM Work Zone Management
Other KYTC District TMCs	TMC Regional Traffic Management
Other TDOT Region District Operations	MCM Work Activity Coordination
	MCM Work Zone Management
PACS Data Archive	Government Reporting Systems Support
	ITS Data Repository
PACS Transportation Demand Response Vehicles	On-Board Paratransit Operations
	On-Board Transit Trip Monitoring
PACS Transportation Dispatch Center	Transit Center Multi-Modal Coordination
	Transit Center Paratransit Operations
	Transit Center Vehicle Tracking
	Transit Data Collection
	Transit Evacuation Support
PAC Transportation Website	ISP Data Collection
	ISP Traveler Information Alerts
Personal Computing Devices	Personal Interactive Information Reception
Public/Private Vehicles	Vehicle Traffic Probe Support
Private Sector Traveler Information Services	Basic Information Broadcast
	Infrastructure Provided Dynamic Ridesharing
	Infrastructure Provided Trip Planning
	Interactive Infrastructure Information
	ISP Data Collection
	ISP Traveler Information Alerts

Element Name	Equipment Package (Function)
Social Networking Services	Basic Information Broadcast
	ISP Traveler Information Alerts
TDEC Air Quality Sensors	Roadway Emissions Monitoring
TDEC Division of Air Pollution Control	Emissions Data Collection
	Emissions Data Management
TDOT CCTV Cameras	Roadway Basic Surveillance
TDOT Changeable Speed Limit Signs	Roadway Equipment Coordination
	Roadway Speed Monitoring and Warning
	Roadway Variable Speed Limits
TDOT Community Relations Division	Basic Information Broadcast
	ISP Emergency Traveler Information
TDOT DMS	Roadway Equipment Coordination
	Roadway Traffic Information Dissemination
TDOT Emergency Services Coordinator	MCM Incident Management
	MCM Roadway Maintenance and Construction
	TMC Evacuation Support
	TMC Incident Dispatch Coordination/Communication
TDOT Field Sensors	Roadway Basic Surveillance
	Roadway Equipment Coordination
TDOT HAR	Roadway Traffic Information Dissemination
TDOT HELP Vehicles	On-Board EV En Route Support
	On-Board EV Incident Management Communication
TDOT Long Range Planning Division Archive	Government Reporting Systems Support
	ITS Data Repository
	Traffic Data Collection
TDOT Maintenance Headquarters	MCM Environmental Information Collection
	MCM Environmental Information Processing
TDOT Maintenance Vehicles	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Work Zone Support
TDOT Ramp Metering Equipment	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Traffic Information Dissemination
	Roadway Traffic Metering
TDOT Region 1 TMC - Knoxville	TMC Regional Traffic Management
TDOT Region 2 TMC - Chattanooga	TMC Regional Traffic Management
TDOT HELP Dispatch	Emergency Response Management
	Incident Command
	Service Patrol Management

Element Name	Equipment Package (Function)
TDOT Region 3 District Operations	MCM Incident Management
	MCM Roadway Maintenance and Construction
	MCM Vehicle Tracking
	MCM Work Activity Coordination
	MCM Work Zone Management
TDOT Region 3 TMC - Nashville	Collect Traffic Surveillance
	TMC Evacuation Support
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Management
	TMC Speed Monitoring and Warning
	TMC Traffic Information Dissemination
	TMC Traffic Metering
	TMC Transportation Operations Data Collection
	TMC Variable Speed Limits
	TMC Work Zone Traffic Management
	Traffic Data Collection
	Traffic Equipment Maintenance
TDOT Region 4 TMC - Memphis	TMC Regional Traffic Management
TDOT RWIS Sensors	Roadway Environmental Monitoring
TDOT Smart Work Zone Equipment	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Traffic Information Dissemination
	Roadway Variable Speed Limits
	Roadway Work Zone Safety
	Roadway Work Zone Traffic Control
TDOT SmartWay Mobile App	Interactive Infrastructure
	ISP Emergency Traveler Information
	ISP Traveler Data Collection
	ISP Traveler Information Alerts
TDOT SmartWay Website	Interactive Infrastructure
	ISP Emergency Traveler Information
	ISP Traveler Data Collection
	ISP Traveler Information Alerts
TDOT Statewide Information for Travelers (SWIFT)	Basic Information Broadcast
	ISP Data Collection
	ISP Emergency Traveler Information
	ISP Operational Data Repository
	ISP Traveler Data Collection
	ISP Traveler Information Alerts

Element Name	Equipment Package (Function)
TDOT Statewide Information for Travelers (SWIFT) (continued)	MCM Data Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Work Activity Coordination
	MCM Work Zone Management
TDOT Wrong-Way Detection and Warning Equipment	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Safety Wanting System
	Roadway Warning
TEMA	Emergency Early Warning System
	Emergency Environmental Monitoring
	Emergency Evacuation Support
	Emergency Response Management
	Incident Command
Tennessee 511 System	Basic Information Broadcast
	Interactive Infrastructure Information
	ISP Emergency Traveler Information
	ISP Traveler Data Collection
	ISP Traveler Information Alerts
	Traveler Telephone Information
Tennessee Bureau of Investigation	Emergency Early Warning System
	Incident Command
THP Dispatch	Emergency Call-Taking
	Emergency Dispatch
	Emergency Evacuation Support
	Emergency Response Management
	Emergency Routing
	Incident Command
THP Vehicles	On-Board EV En Route Support
	On-Board EV Incident Management Communication
TITAN Database	Government Reporting Systems Support
	ITS Data Repository
	Virtual Data Warehouse Services

APPENDIX D – STAKEHOLDER DATABASE

Clarksville Regional ITS Architecture Update
Stakeholder Participation Record

Invitees			Participation	
Organization	**First Name**	**Last Name**	**In-person or Telephone Interview**	**Document Reviewer**
Christian County Road Department	Chuck	Chambers		X
City of Hopkinsville (Hopkinsville/Christian County Community Development Services)	Steve	Bourne	X	X
City of Oak Grove	Misty	Cutshall		X
Clarksville Street Department	Chris	Cowan	X	X
Clarksville Transit System	Arthur	Bing	X	X
Clarksville Transit System	Paul	Nelson	X	X
Clarksville Urbanized Area MPO	Jill	Hall		X
Clarksville Urbanized Area MPO	Stan	Williams	X	X
FHWA - Kentucky	Tony	Young		X
FHWA - Tennessee Division	Pam	Heimsness		X
FHWA - Tennessee Division	Nick	Renna		X
Fort Campbell Directorate of Public Works	Chris	Brown	X	X
Fort Campbell Directorate of Public Works	Wally	Crow	X	X
Kentucky Transportation Cabinet - District 2	Kenny	Potts	X	X
Mid-Cumberland HRA	Jeff	Simpson	X	X
Montgomery County Emergency Management Agency	Jerry	Buchanan		X
Montgomery County Highway Department	Mike	Frost		X
TDOT Long Range Planning Division	Katy	Braden		X
TDOT Long Range Planning Division	Tanisha	Hall		X
TDOT Long Range Planning Division	Larry	McGoogin		X
TDOT Long Range Planning Division	Angela	Midgett		X
TDOT Long Range Planning Division	Lia	Prince		X

Clarksville Regional ITS Architecture Update
Stakeholder Participation Record

Invitees			Participation	
Organization	First Name	Last Name	In-person or Telephone Interview	Document Reviewer
TDOT Region 3	Adam	Perez	X	X
TDOT Region 3	Phil	Trammel	X	X
TDOT Traffic Operations Division	Robert	Benshoof	X	X
TDOT Traffic Operations Division	Said	El Said		X
TDOT Traffic Operations Division	Brad	Freeze		X
TDOT Traffic Operations Division	Asem	Halim		X

APPENDIX E – AGREEMENTS

TDOT LIVE CCTV VIDEO ACCESS AGREEMENT FOR PRIVATE ENTITY USERS

TDOT LIVE CCTV VIDEO ACCESS AGREEMENT FOR GOVERNMENTAL USERS

TDOT AND TDOSHS "OPEN ROADS POLICY" (QUICK CLEARANCE FOR SAFETY AND MOBILITY) MEMORANDUM OF UNDERSTANDING

Tennessee Department of Transportation

TRAFFIC OPERATIONS PROGRAM POLICY

Effective Date:
Title: Access to Live Video

POLICY

The Tennessee Department of Transportation (TDOT) will make live video of traffic conditions from Closed Circuit Television (CCTV) available to the public. CCTV images will be supplied from Nashville Regional Transportation Management Center (RTMC) at TDOT Region 3 Complex. The video images provided would be those selected by the RTMC Operators from the images on the traffic surveillance monitors within the RTMC and that are consistent with the objectives of traffic management.

Live video images will generally be made available upon request to other government and public agencies to better coordinate traffic management strategies on incidents and crashes, and to private news media and other companies for their use in providing traffic information to the public or their customers.

A non-exclusive access agreement is required in order for governmental and private interests to receive direct access to live video. Costs for the access connection will be determined by TDOT and paid for by the USER.

BACKGROUND

In order to gather real-time traffic condition information, TDOT has constructed and operates an RTMC at the Region 3 Complex on Centennial Boulevard. The RTMC is the central collection point for freeway condition information. The RTMC support systems gather and disseminate traffic information using the latest technologies.

CCTV has proven to be a significant management and delay-reduction tool for the identification and verification of incidents and crashes, thereby enabling a proper and timely response. The sharing of video information enhances the communication of current traffic conditions, thereby aiding travelers in planning their trip times, routes, and travel mode using the latest available information. TDOT will operate and maintain the CCTV system for the purpose of enhancing traffic incident response on the Nashville regional freeway system. TDOT wishes to share that traffic information with other transportation operating agencies, incident response agencies and the public.

Live CCTV Video Access Agreement Between
Tennessee Department of Transportation
And
Private Entity Users

Tennessee Department of Transportation
And
Private Entity Users

ACCESS AGREEMENT FOR LIVE VIDEO

This Access Agreement for Live Video (Agreement), is an agreement between the Tennessee Department of Transportation (TDOT) and _____hereafter referred to as the "USER."

The effective date of this Agreement is _____.

The "Access to Live Video" is that video provided by a Closed Circuit Television (CCTV) system developed for traffic management and provided by the Nashville Regional Transportation Management Center (RTMC) which is operated by TDOT. The CCTV images will show live traffic conditions including crashes, stalled vehicles, road hazards, weather conditions, traffic congestion, and maintenance and repair work locations.

The purpose of providing the USER with Access to Live Video is to disseminate real-time traffic information to motorists. The following provisions of this Agreement are intended to ensure that the CCTV system is accessed and its information used for this purpose, and this purpose alone.

The USER hereby acknowledges that other matters not addressed in this Agreement may arise after the RTMC begins operating the CCTV system. Therefore, TDOT reserves the right to make changes in this Agreement, by adding provisions, deleting provisions, and/or changing existing provisions when in TDOT's opinion circumstances require such changes. TDOT shall provide prior written notice of any such changes in this Agreement. USER shall retain the right to terminate this Agreement as provided hereinbelow.

GENERAL INFORMATION:

1. TDOT will operate and maintain the CCTV system as a traffic management tool and, consistent with this purpose, TDOT agrees to provide the USER with Access to Live Video. TDOT does not guarantee the continuity of this access, and TDOT does not warrant the quality of any video image or the accuracy of any image or information provided. Any reliance on such images or information is at the risk of the USER.

2. TDOT will not record video images except for staff training purposes, and no videotapes will be made available to the USER under this Agreement.

3. TDOT will maintain exclusive control of the information and images released from the CCTV system to the USER, including but not limited to determining whether and when to provide a CCTV system feed, from what location, and for what duration. No feed will deploy the cameras' zoom capabilities, and no image will focus on vehicle license plates, drivers, or other personal identification of individuals involved in any traffic-related incident. No image will focus on any property or person outside the TDOT right-of-way. Access via feed will not be provided for events that are not, in the opinion of TDOT personnel, traffic-related. The decision whether to activate, and upon activation to terminate the access, is exclusively at the discretion of TDOT personnel.

4. RTMC personnel will not accept requests that specific CCTV cameras be operated or that cameras be repositioned.

5. Each USER will receive the same video feed from the CCTV system as any other USER participating in this Agreement. This Agreement in no way limits or restricts TDOT from providing video information to any other potential USER.

6. TDOT reserves the right to terminate this video access program or to change the areas, times, or levels of access within the RTMC at any time.

USER'S RESPONSIBILITIES:

7. USER may install necessary equipment at the RTMC in order to obtain the video feed; the USER is exclusively responsible for any costs related to the purchase and installation of the equipment. TDOT personnel shall determine at what location within the RTMC the equipment is to be placed, and TDOT reserves the right to inspect all installation of equipment. Under no circumstances shall the placement and installation of USER's equipment interfere with RTMC equipment or activities of RTMC personnel. The responsibility for the service, maintenance, and upkeep of the installed equipment is exclusively that of the USER. USER must give RTMC personnel reasonable advance notice of any maintenance/repair visits, and RTMC personnel reserves the right to schedule such visits at a time and in such a manner so as to not interrupt or otherwise obstruct RTMC operations. USER assumes any and all liability for the cost of any repair and/or other damages to TDOT's CCTV system caused in any manner by the installation, servicing or maintenance of the USER's equipment or by the equipment once installed. USER staff at the RTMC shall be under the general direction of the RTMC Manager for routine conduct, privileges, and protocols within the RTMC.

8. USER shall maintain the security and integrity of the CCTV system by limiting use of the system to trained and authorized individuals, and by insuring the system is used for the specific purpose stated in this Agreement. No feed shall be purposely

broadcast live or rebroadcast that is zoomed in on an accident where individuals or license numbers are recognizable.

9. USER agrees to move or alter, at its own expense, any of its equipment, hardware, or software, as TDOT deems necessary to accommodate future alterations, improvements, or other changes to the RTMC equipment or facilities.

10. USER accepts all risks inherent with the live video feeds, including, but not limited to, interruptions in the video feed, downtime for maintenance, or unannounced adjustments to the camera displays. TDOT is providing the video feeds as a convenience to the private media company and agrees to provide a good faith effort to maintain the video feed from TDOT equipment. The USER agrees to hold TDOT harmless, including TDOT employees and TDOT-designated agents, from any damages caused to USER by loss of a video signal due to equipment failure or any unintentional act on their part.

11. USER agrees to provide TDOT with a technical contact person and with a list of all USER's owned and supplied equipment connected to the RTMC, including the basic operational capabilities of such equipment. USER shall limit calls to the RTMC for monitoring, diagnosing problems or otherwise performing any minor service on USER owned and supplied equipment.

12. The User agrees to acknowledge the video images are provided by the Tennessee Department of Transportation.

LIABILITY AND INDEMNITY PROVISIONS:

13. The USER agrees to defend, indemnify, and hold TDOT harmless from and against any and all liability and expense, including defense costs and legal fees, caused by any negligent or wrongful act or omission of the USER, or its agents, officers, and employees, in the use, possession, or dissemination of information made available from the CCTV system to the extent that such expenses or liability may be incurred by TDOT, including but not limited to, personal injury, bodily injury, death, property damage, and/or injury to privacy or reputation.

14. The liability obligations assumed by the USER pursuant to this Agreement shall survive the termination of the Agreement, as to any and all claims including without limitation liability for any damages to TDOT property or for injury, death, property damage, or injury to personal reputation or privacy occurring as a proximate result of information made available from the CCTV system.

TERMINATION:

15. TDOT or USER may terminate this Agreement at any time for any reason by providing written notice of termination.

16. Upon termination of this Agreement by either party, the USER shall promptly remove its equipment from the RTMC as directed by TDOT.

State of Tennessee
Department of Transportation

Approved as to Form:

By:_____ _____
John Schroer
Commissioner General Counsel

Date:_____

USER AGENCY_____

By_____

(Print Name)_____

(Title)_____

Date:_____

Approved by Legal Counsel for USER AGENCY

By_____

(Print Name)_____

(Title)_____

Date:_____

Live CCTV Video Access Agreement Between
Tennessee Department of Transportation
And
Governmental Agency Users

Tennessee Department of Transportation
And
Governmental Agency Users

ACCESS AGREEMENT FOR LIVE VIDEO

This Access Agreement for Live Video (Agreement) is an agreement between the Tennessee Department of Transportation (TDOT) and _____, hereafter referred to as the "USER."

The effective date of this Agreement is _____.

The "Access to Live Video" is that video provided by a Closed Circuit Television (CCTV) system developed for traffic management and provided by the Chattanooga Regional Transportation Management Center (RTMC) which is operated by TDOT. The CCTV images will show live traffic conditions, including crashes, stalled vehicles, road hazards, weather conditions, traffic congestion, and maintenance and repair work locations.

The purpose of providing the USER with Access to Live Video is to disseminate real-time traffic information to motorists and to help improve incident management response times. The following provisions of this Agreement are provided to ensure that the CCTV system is accessed and its information used for this purpose and this purpose alone.

The USER hereby acknowledges that other matters not addressed in this Agreement may arise after the signing of this Agreement. Therefore, TDOT reserves the right to make changes in this Agreement, by adding provisions, deleting provisions, and/or changing existing provisions when in TDOT's opinion circumstances require such changes.

A. GENERAL INFORMATION:

1. TDOT will operate and maintain the CCTV system as a traffic management tool and, consistent with this purpose, TDOT agrees to provide the USER with Access to Live Video. TDOT does not guarantee the continuity of this access, and TDOT does not warrant the quality of any video image or the accuracy of any image or information provided. Any reliance on such images or information is at the risk of the USER.

2. TDOT will not record video images except for staff training purposes, and no videotapes will be made available to the USER under this Agreement.

3. TDOT will maintain exclusive control of the information and images released from the CCTV system to the USER, including but not limited to determining whether and when to provide a CCTV system feed, from what location, and for what duration. No feed will deploy the cameras' zoom capabilities, and no image will focus on vehicle license plates, drivers, or other personal identification of individuals involved in any

traffic-related incident. No image will focus on any property or person outside the TDOT right-of-way. Access via feed will not be provided for events that are not, in the opinion of TDOT personnel, traffic-related. The decision whether to activate, and upon activation to terminate the access, is exclusively at the discretion of TDOT personnel.

4. RTMC personnel will not accept requests that specific CCTV cameras be operated or that cameras be repositioned.

5. Each USER will receive the same video feed from the CCTV system as any other USER participating in this Agreement. This Agreement in no way limits or restricts TDOT from providing video information to any other potential USER.

6. TDOT reserves the right to terminate this video access program or to change the areas, times, or levels of access within the RTMC at any time.

B. USER'S RESPONSIBILITIES:

1. USER, through this Agreement, may be allowed to control the pan, tilt and zoom capabilities of selected CCTV cameras. TDOT will maintain an override capability of these functions.

2. USER agrees not to focus on vehicle license plates, drivers, or other personal identification of individuals involved in any traffic-related incident, nor focus on any property or person outside the TDOT right-of-way. USER further agrees to access the feed only for traffic-related or emergency response activities.

3. USER may install necessary equipment at the RTMC in order to obtain the video feed; the USER is exclusively responsible for any costs related to the purchase and installation of the equipment. TDOT personnel shall determine at what location within the RTMC the equipment is to be placed, and TDOT reserves the right to inspect all installation of equipment. Under no circumstances shall the placement and installation of USER's equipment interfere with RTMC equipment or activities of RTMC personnel. The responsibility for the service, maintenance, and upkeep of the installed equipment is exclusively that of the USER. USER must give RTMC personnel reasonable advance notice of any maintenance/repair visits, and RTMC personnel reserve the right to schedule such visits at a time and in such a manner so as to not interrupt or otherwise obstruct RTMC operations. USER assumes any and all liability for the cost of repair and/or other damages to TDOT's CCTV system caused in any manner by the installation, servicing or maintenance of the USER equipment or by the equipment once installed. USER staff at the RTMC shall be under the general direction of the RTMC Manager for routine conduct, privileges, and protocols within the RTMC.

4. USER shall maintain the security and integrity of the CCTV system by limiting use of the system to trained and authorized individuals, and by insuring that the system is used for the specific purpose stated in this Agreement. No feed shall be purposely

broadcast live or rebroadcast that is zoomed in on an accident where individuals or license numbers are recognizable.

5. USER agrees to move or alter, at its own expense, any of its equipment, hardware, or software, as TDOT deems necessary to accommodate future alterations, improvements, or other changes to the RTMC equipment or facilities.

6. USER accepts all risks inherent with the live video feeds, including, but not limited to, interruptions in the video feed, downtime for maintenance, or unannounced adjustments to the camera displays. TDOT is providing the video feeds as a convenience to the USER and agrees to provide a good faith effort to maintain the video feed from TDOT equipment.

7. USER agrees to provide TDOT with a technical contact person and with a list of all USER'S owned and supplied equipment connected to the RTMC, including the basic operational capabilities of such equipment. USER shall limit calls to the RTMC for monitoring, diagnosing problems or otherwise performing any minor service on USER owned and supplied equipment.

8. USER agrees that video feed will not be used for automated traffic enforcement purposes unless it is specifically allowed by legislation.

C. LIABILILTY AND INDEMNITY PROVISIONS:

1. The USER agrees to be responsible for any and all liability and expense, including defense costs and legal fees, caused by the negligent or wrongful act or omission of the USER, or its agents, officers, and employees, in the use, possession, or dissemination of information made available from the CCTV system to the extent provided by law, including but not limited to, personal injury, bodily injury, death, property damage, and/or injury to privacy or reputation.

2. The liability obligations assumed by the USER pursuant to this Agreement shall survive the termination of this Agreement, as to any and all claims, including without limitation liability for any damages to TDOT property or for personal injury, death, property damage, or injury to personal reputation or privacy occurring as a proximate result of information made available from the CCTV system.

D. TERMINATION:

1. TDOT or USER may terminate this Agreement any time for any reason by providing written notice of termination.

2. Upon termination of this Agreement by either party, the USER shall promptly remove its equipment from the RTMC as directed by TDOT.

State of Tennessee
Department of Transportation

By:_____ Date:_____
John Schroer
Commissioner

Approved as to Form:

By:_____ Date: _____
General Counsel

USER AGENCY:_____

By_____

(Print Name)_____

(Title)_____

Date:_____

Approved by Legal Counsel for USER AGENCY

By_____

(Print Name)_____

(Title)_____

Date:_____

State of Tennessee

"OPEN ROADS POLICY"

Quick Clearance for Safety and Mobility

Between the Tennessee Department of Transportation,

Tennessee Department of Safety and Homeland Security, and

Tennessee Counties and Cities

This Memorandum of Understanding (MOU) by and between the Tennessee Department of Transportation (TDOT), the Tennessee Department of Safety and Homeland Security (TDOSHS), County/City Law Enforcement and Fire and Rescue Agencies (City/County Agencies), establishes a policy for the Tennessee Highway Patrol (THP), TDOT, City/County Agencies to expedite the removal of vehicles, cargo, and debris from roadways on the State Highway System (roadways) to restore, in an URGENT MANNER the safe and orderly flow of traffic following a motor vehicle crash or incident on Tennessee's roadways. This MOU is intend to complement the existing Memorandum of Understanding between TDOT and TDOSHS entered into on February 16, 2012, and does not supersede or circumvent any of the components of that document between the two State departments.

Whereas: Public safety is the highest priority and must be maintained especially when injuries or hazardous materials are involved. The quality of life in the State of Tennessee is heavily dependent upon the free movement of people, vehicles, and commerce. THP, TDOT, and City/County Agencies share the responsibility for achieving and maintaining the degree of order necessary to make this free movement possible. THP, TDOT, and City/County Agencies have the responsibility to do whatever is reasonable to reduce the risk to responders, secondary crashes, and delays associated with incidents, crashes, roadway maintenance, construction, and enforcement activities.

The following operating standards are based on the philosophy that the State Highway System will not be closed or restricted any longer than is absolutely necessary.

Be it resolved: Roadways will be cleared of damaged vehicles, spilled cargo, and debris as soon as it is safe to do so. It is understood that damage to vehicles or cargo may occur as a result of clearing the roadway on an urgent basis. While reasonable attempts to avoid such damage shall be taken, the highest priority is restoring traffic to normal conditions. Incident caused congestion has an enormous cost to society. This cost is significantly greater than the salvage value of an already damaged vehicle and its cargo.

Tennessee Highway Patrol Responsibilities

Members of the THP who respond to the scene of traffic incidents will make clearing the travel portion of the roadway a high priority. When an investigation is required, it will be conducted in as expedient a manner as possible considering the severity of the collision. Non-critical portions of the investigation may be delayed until lighter traffic conditions allow completion of those tasks. The THP will only close those lanes absolutely necessary to conduct the investigation safely. THP will coordinate with TDOT representatives to set up appropriate traffic control, establish alternate routes, expedite the safe movement of traffic trapped at the scene, and restore the roadway to normal as soon as possible.

Whenever practical, crashes on access controlled roadways will be removed to off ramps, accident investigation sites or other safe areas for completion of investigations to reduce the delays associated with motorists slowing to "gawk". Tow trucks will be requested a soon as it is evident that they will be needed to clear the roadway. THP will assure that all authorized tow operators have met established competency levels and that the equipment is of appropriate size, capacity and design meeting the standards for the State of Tennessee.

The THP will not unnecessarily cause the delay in reopening all or part of a roadway to allow a company to dispatch their own equipment to off-load cargo or recover a vehicle or load that is impacting traffic during peak traffic hours or creating a hazard to the public. The THP and TDOT will cooperate in planning and implementing clearance operations in the most safe and expeditious manner.

Tennessee Department of Transportation Responsibilities

When requested by the THP or City/County Agencies, TDOT will respond and deploy resources to major traffic incidents 24 hours a day, 7 days per week. Each TDOT District will develop and implement response procedures to meet the goal of providing initial traffic control within **30 minutes** of notification during normal working hours and **60 minutes** after hours and on weekends.

TDOT, in cooperation with the THP, will determine and deploy the necessary heavy equipment and manpower to reopen the roadway if clearance of the travel lanes are being delayed or is determined that the task is beyond the capabilities of the wrecker service on scene. If cargo or non-hazardous spilled loads are involved, TDOT will make every effort to assist in the relocation of the materials in the shortest possible time, using whatever equipment necessary. All such materials or any vehicles relocated by TDOT will be moved as short a distance as possible to eliminate the traffic hazard.

TDOT personnel will document all hours and equipment used for traffic control, roadway clearance, and debris clean up. TDOT will place traffic control devices at the scene should any damaged vehicles or cargo remain adjacent to the travel lanes on the shoulder for removal at a later time.

The THP and TDOT will continually work together to ensure that the needs of motorists on our roadways are being met in the most professional, safe, and efficient manner.

Local Law Enforcement, Fire and Rescue Department Responsibilities

Members of City/County Agencies who respond to the scene of traffic incidents will make clearing the travel portion of the roadway a high priority. When investigating an incident, the investigation will be conducted in as expedient a manner as possible considering the severity of the collision (serious injuries, fatality, or hazardous materials). City/County Agencies will close only those lanes absolutely necessary to safely conduct the fire/rescue operations. City/County Agencies will coordinate with TDOT representatives to set up appropriate traffic control, establish alternate routes, expedite the safe movement of traffic trapped at the scene, and restore the roadway to normal conditions as soon as possible. As soon as TDOT has set up appropriate traffic control for the safety of the responders and travelers, City/County Agencies will move any fire/rescue apparatus or vehicles initially used to shield responders to appropriate areas.

Therefore, it is agreed as follows:

The THP, TDOT, and City/County Agencies, will evaluate and continually update and modify their operating policies, procedures, rules, and standards to assure they are consistent with this **"OPEN ROADS POLICY"** MOU.

The THP, TDOT, and City/County Agencies, will research, evaluate and conduct training in the most advanced technologies, equipment, and approved methods for the documentation and investigation of crash or incident scenes. THP and City/County Agencies will prioritize the investigative tasks and reopen travel lanes upon completion of tasks that must be conducted, without the impediment of traffic flowing.

Roadways will be cleared as soon as possible. It is the goal of THP, TDOT, and City/County Agencies that **all incidents be cleared from the roadway within 90 minutes of the arrival of the first responding officer.** This goal is being made with the understanding that a more complex scenario may require additional time for complete clearance. Incidents that extend beyond the 90 minute goal will be assessed every 30 minutes to determine an expected clearance time and reported to the appropriate communications center.

City/County Agencies will determine the well-being of motorists in the event of a lengthy traffic queue and /or roadway closure and provide assistance to motorists within the stopped traffic queue whenever possible.

~~City/County Agencies will establish a local Highway Incident Management Committee that will include Local Law Enforcement, Fire and Rescue Departments and all other City/County agencies that respond to roadway incidents for the purpose of optimizing communication, coordination and collaboration at roadway incident scenes. The Committee will meet at least bi-monthly~~

It is further agreed that:

The THP, TDOT, and City/County Agencies, will actively solicit and enlist other state, county, and local agencies, political subdivisions, industry groups, and professional associations to endorse and become party to this **"OPEN ROADS POLICY"** for the State of Tennessee.

MOU Execution: ***Use of Counterpart Signature Pages***

This MOU, and any amendments hereto may be simultaneously executed in multiple counterparts, each of which so executed shall be deemed to be an original, and such counterparts together shall constitute one and the same instrument. Notwithstanding any other provision herein to the contrary, this MOU shall constitute an agreement amongst the parties that have executed a counterpart and parties listed but not executing shall not be deemed to be parties to the MOU.

In witness whereof, each party hereto has caused this document to be executed in its name and on its behalf by it's duly authorized Chief Executive.

TENNESSEE DEPARTMENT OF TRANSPORTATION

By: _____
Commissioner

Date: 10/12/2012

TENNESSEE DEPARTMENT OF SAFETY AND HOMELAND SECURITY

By: Bill Gibbons
Commissioner

Date: 9/19/12

Tennessee's

"OPEN ROADS POLICY"

Quick Clearance for Safety and Mobility

MONTGOMERY COUNTY EMA
Local Agency

By: Jerry J. Buchanan

Print/Type Name: JERRY J. BUCHANAN

Title: DIRECTOR

Date: 12-3-2013

ADDITIONAL SIGNATORIES

Name	Title	Date
Name	Title	Date
Name	Title	Date
Name	Title	Date

Tennessee's

"OPEN ROADS POLICY"

Quick Clearance for Safety and Mobility

Montgomery County Sheriff's Office
Local Agency

By: _____

Print/Type Name: John R Smith

Title: Chief Deputy

Date: 12/16/13

ADDITIONAL SIGNATORIES

Name	Title	Date

Tennessee's

"OPEN ROADS POLICY"

Quick Clearance for Safety and Mobility

CLARKSVILLE POLICE DEPARTMENT

Local Agency

By: Alonzo R Ansley

Print/Type Name: ALONZO R. ANSLEY

Title: CHIEF OF POLICE

Date: October 1, 2013

ADDITIONAL SIGNATORIES

Name	Title	Date
Name	Title	Date
Name	Title	Date
Name	Title	Date

Tennessee's

"OPEN ROADS POLICY"

Quick Clearance for Safety and Mobility

Montgomery County EMS
Local Agency

By: Jimmie Edwards

Print/Type Name: Jimmie Edwards

Title: EMS Director

Date: 12-3-2013

ADDITIONAL SIGNATORIES

Name	Title	Date
Name	Title	Date
Name	Title	Date
Name	Title	Date

APPENDIX F – REGIONAL ITS ARCHITECTURE MAINTENANCE FORM

Clarksville Region
Regional ITS Architecture
Maintenance Form

Please complete the following form to document changes to the 2015 Clarksville Regional ITS Architecture. Forms should be submitted to the Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO) for review and acceptance. All accepted changes will be kept on file by CUAMPO and shared with the TDOT Traffic Operations Division. Changes will be incorporated into the 2015 Clarksville 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 service 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 service packages that impact only one agency in the Regional ITS Architecture.
  Examples include: Addition of a new ITS service package or changes to data flow connections of an existing ITS service package. The addition or changes would only impact a single agency.
- ☐ Functional Change – Multiple Agencies: Structural changes to the ITS service packages that have the potential to impact multiple agencies in the Regional ITS Architecture.
  Examples include: Addition of a new ITS service package or changes to data flow connections of an existing ITS service package. The addition or changes would impact multiple agencies and require coordination between the agencies.
- ☐ Project Change – Addition, modification, or removal of a project in the Regional ITS Deployment Plan.
- ☐ Other: _____
  _____

Submittal

Please submit ITS Architecture Maintenance Documentation form to:

Clarksville Urbanized Area Metropolitan Planning Organization
329 Main Street
Clarksville, TN 37040
Phone: 931-645-7448
E-mail: cuampo@cityofclarksville.com

Form Submittal Date: _____

Clarksville Region
Regional ITS Architecture
Maintenance Form

Question 1 Describe the requested change to the Regional ITS Architecture or Deployment Plan.	
Question 2 Are any of the Regional ITS Architecture service packages impacted by the proposed change?	☐ Yes: Please complete Questions 2A and 2B ☐ No: Please proceed to Question 3 ☐ Unknown: Please coordinate with the Clarksville Urbanize Area MPO to determine impacts of the change to the Regional ITS Architecture
Question 2A List all of the ITS service packages impacted by the proposed change.	
Question 2B Include a copy of the ITS service packages impacted by the proposed change and mark any proposed modifications to the ITS service packages. Add any additional notes on proposed changes in this section.	
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 Clarksville Urbanized Area MPO 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.	
Question 3B Describe the coordination that has occurred with the stakeholder agencies and the results of the coordination?	

Clarksville Region
Regional ITS Architecture
Maintenance Form (Example of Completed 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 service packages impacted by the proposed change?	☐ Yes: Please complete Questions 2A and 2B ☐ No: Please proceed to Question 3 ☐ Unknown: Please coordinate with the Clarksville Urbanize Area MPO to determine impacts of the change to the Regional ITS Architecture
Question 2A List all of the ITS service packages impacted by the proposed change.	*Example: ATMS08 – Traffic Incident Management System* *ATMS01 – Network Surveillance*
Question 2B Include a copy of the ITS service packages impacted by the proposed change and mark any proposed modifications to the ITS service packages. Add any additional notes on proposed changes in this section.	*Example: A sketch of the ATMS08 – Traffic Incident Management System service 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 service package diagram. (Note: The ITS service 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 Clarksville Urbanized Area MPO 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.*