



# Johnson City Regional ITS Architecture Update Review Workshop



March 12, 2015



Johnson City *MTPO*  
Metropolitan Transportation Planning Organization

Kimley»Horn

# Workshop Overview

- Introductions
- Review of the Draft Regional ITS Architecture Document
- Discussion on Existing and Planned ITS Projects in the Region
- Discussion on Use and Maintenance of the Regional ITS Architecture
- Concluding Comments
- Adjourn

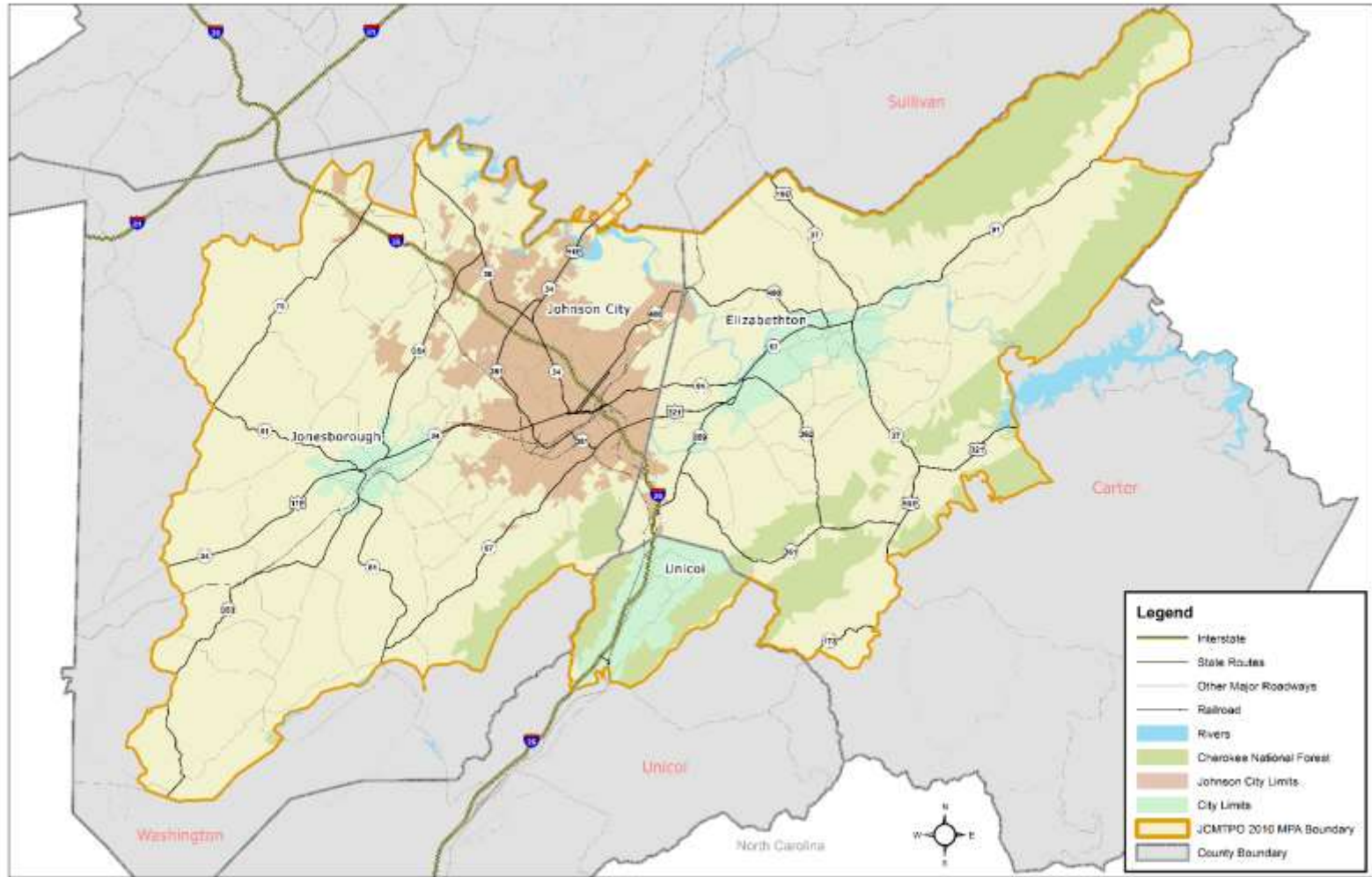


# Project Overview

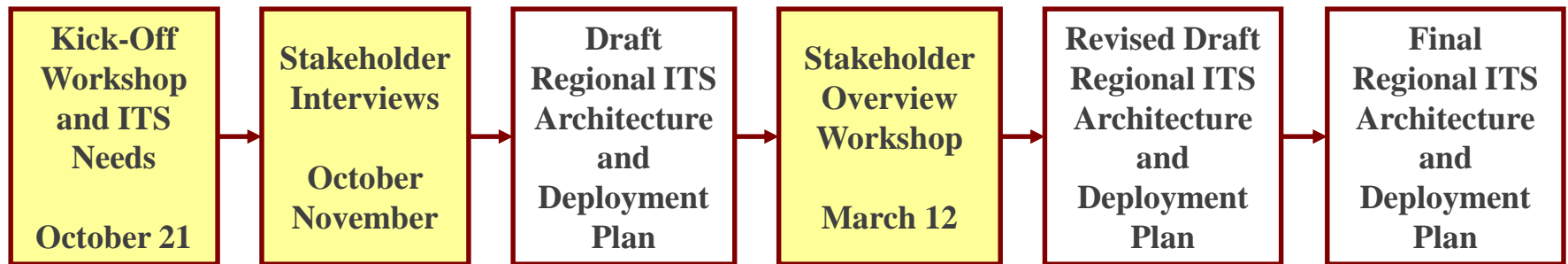
- Purpose: Update the 2007 Johnson City Regional ITS Architecture and Deployment Plan
- Update goals:
  - Include participation from traffic, transit, and public safety stakeholders representing local, state, and federal agencies in the Johnson City Region
  - Provide a high level plan that documents the Region's vision for the deployment, integration, and operation of ITS in the Johnson City Region
  - Assist the Region in meeting the FHWA and FTA requirements for ITS architecture conformity



# Project Overview



# Project Overview



# Remaining Deliverables

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**Revised Draft Regional ITS Architecture**  
**Final Regional ITS Architecture**  
**Final Turbo Architecture Database**

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# Draft Regional ITS Architecture Document

## ■ Draft Regional ITS Architecture Document

- Sent to stakeholders on **January 30<sup>th</sup>**
- Documents updates to the Regional ITS Architecture
- Includes regional ITS needs, ITS element inventory, ITS service packages, Regional ITS Deployment Plan, and use and maintenance plan

## ■ Document Review

- Comments can be submitted to Glenn Berry, Tom Fowler or Terrance Hill
- Document is currently available on project website

<http://www.kimley-horn.com/Projects/TennesseeITSArchitecture/johnsoncity.html>



# Draft Regional ITS Architecture Document

## Executive Summary

### Johnson City Regional ITS Architecture and Deployment Plan

Executive Summary

March 2015

#### Introduction

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

In the Johnson City Region, the first Regional ITS Architecture was developed in 2006. Since that time, several new ITS projects have been implemented and the National ITS Architecture, which serves as the basis for the Johnson City Regional ITS Architecture, has been updated. In order to reflect these changes, the Tennessee Department of Transportation (TDOT) in coordination with the Johnson City Metropolitan Transportation Planning Organization (MTPO), completed an update of the Regional ITS Architecture in 2015.

#### Inside:

Project Approach	2
ITS Service Packages	2
ITS Project Recommendations	3
Use and Maintenance	4
Geographic Boundaries	4
Project Contacts	4

#### Johnson City Region

The update Deployment Johnson City state, and IT Stakeholder

- Carter County
- City of Elizabethton
- City of Johnson City
- FHWA - TN
- First Tennessee Bank
- Johnson City
- TDOE Region 1
- TDOE Long Range
- TDOE Traffic

#### What

Intelligent Transportation System (ITS) operation of detection, and information

### Johnson City Region Recommended ITS Projects

A list of recommended ITS projects for the Johnson City Region was developed through input from stakeholders during the Regional ITS Architecture development process. Stakeholders grouped projects into tranche for deployment based on priority, dependence on other projects, technology, and feasibility. Below is a summary of projects recommended for deployment by stakeholder agencies in the Region. A complete listing of all the projects identified is found in the ITS Deployment Plan section of the Regional ITS Architecture.

#### Tennessee Department of Transportation

- Improve Coordination between the TDOE Region 4 Transportation Management Center (TMC) and the Johnson City Traffic Operations Center (TOC)
- TDOE SmartWay Installation on I-25
- TDOE SmartWay ITS Expansion on I-41
- TDOE SmartWay Implementation for Municipalities to View TDOE Closed Circuit Television (CCTV) Cameras

#### Municipal/County Projects

- Johnson City Adaptive Traffic Signal Control Implementation
- Johnson City CCTV Camera Deployment
- Johnson City Dynamic Message Signs (DMS) Deployment
- Johnson City Flood Detection and Warning System Deployment
- Johnson City Speed Monitoring Deployment
- Johnson City Fiber Optic Communications Expansion
- Johnson City Maintenance Vehicle Automatic Vehicle Location (AVL)
- Johnson City Road Weather Information System (RWIS) Deployment
- City of Elizabethton TOC Implementation

#### What is an ITS Deployment Plan?

An ITS Deployment Plan identifies the projects that need to be implemented in order to meet ITS needs and deliver the ITS services identified in the Regional ITS Architecture.



Traffic Signal Coordination



CCTV Camera

#### Johnson City Transit System

- JCT Mobile Phone Real-Time Information Application Development
- JCT Paratransit Scheduling Implementation
- JCT Smart Card Payment System Implementation
- JCT Regional Transit Coordination
- JCT Northern Transfer Center Implementation

#### Other Projects

- Johnson City MTPO Data Warehouse Implementation



Traffic Operations Center



Highway Advisory Sign



Real-Time Travel Information



Dynamic Message Sign



# Draft Regional ITS Architecture Document

- Key Sections in the Regional ITS Architecture Document
- Regional ITS Needs (Section 3, Section 5.1.4)
- Inventory of Existing and Planned Elements (Section 4)
- Selected ITS Service Packages and Regional Prioritization (Section 5)
- Customized ITS Service Package Diagrams (Appendix B)



# Draft Regional ITS Architecture Document

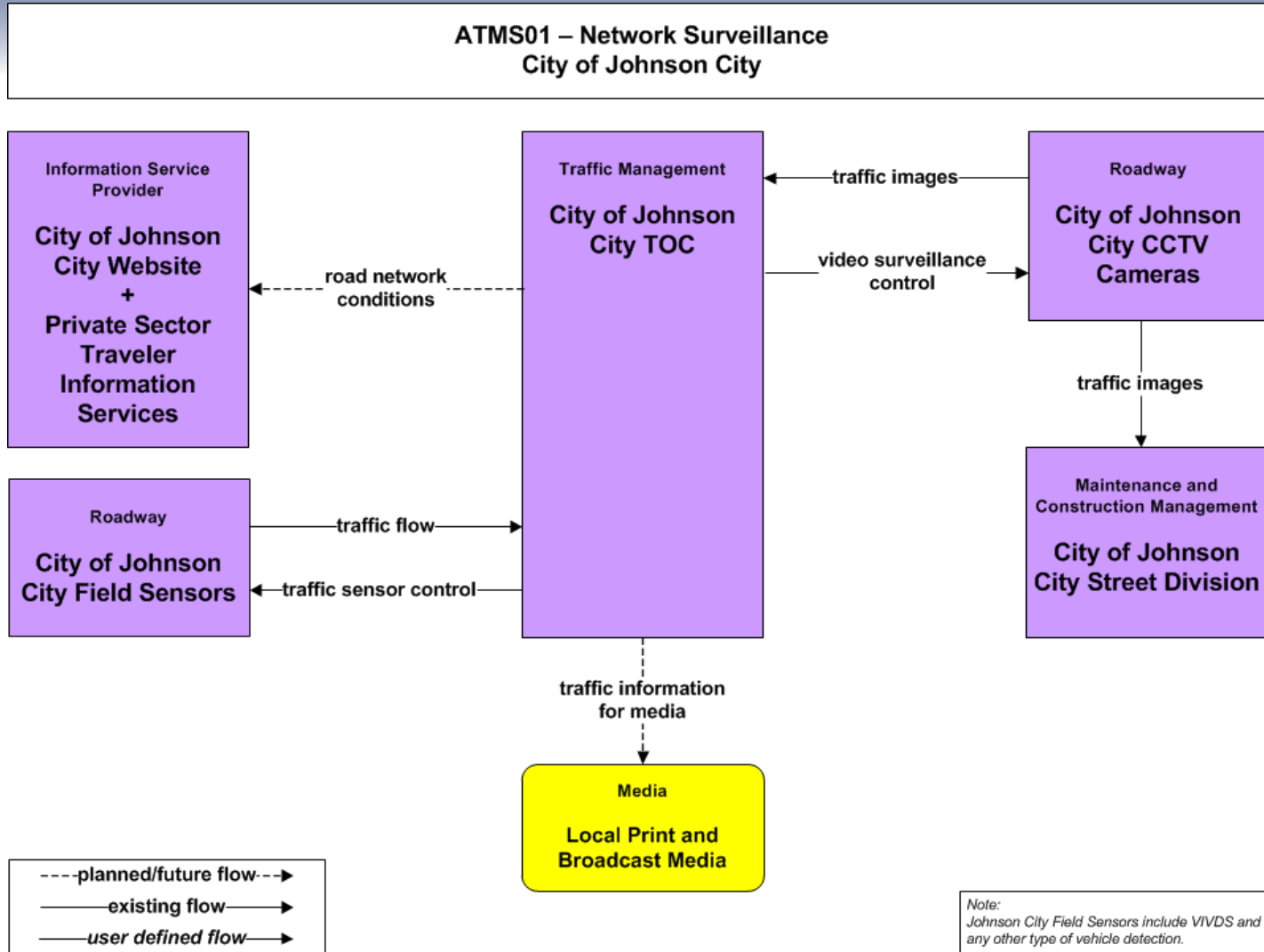
- Key Sections in the Regional ITS Architecture Document
- Regional ITS Deployment Plan (Section 6)
- Use and Maintenance Plan (Section 7)
- Architecture Maintenance Documentation Form (Appendix E)



# Customized ITS Service Packages

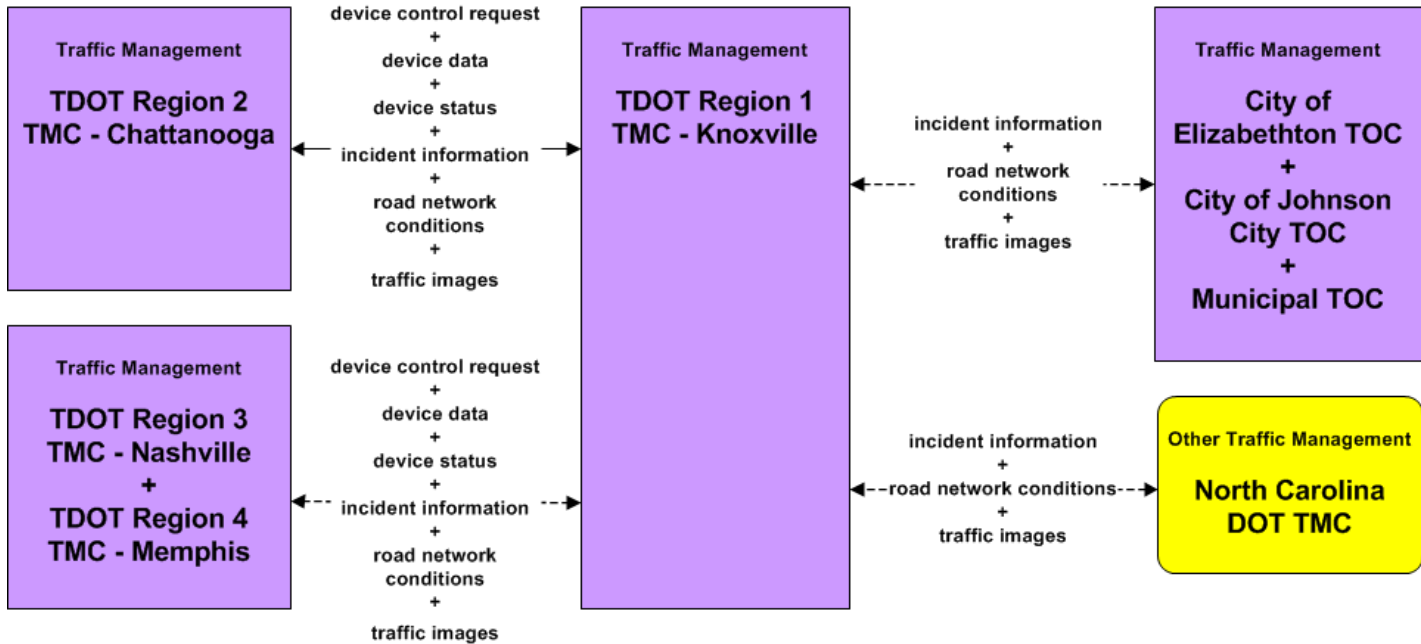


# ITS Service Package Diagram



# ITS Service Package Diagram

**ATMS07 - Regional Traffic Management  
TDOT Region 1 TMC - Knoxville**

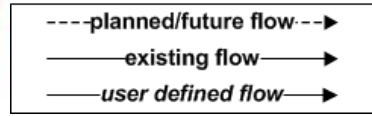
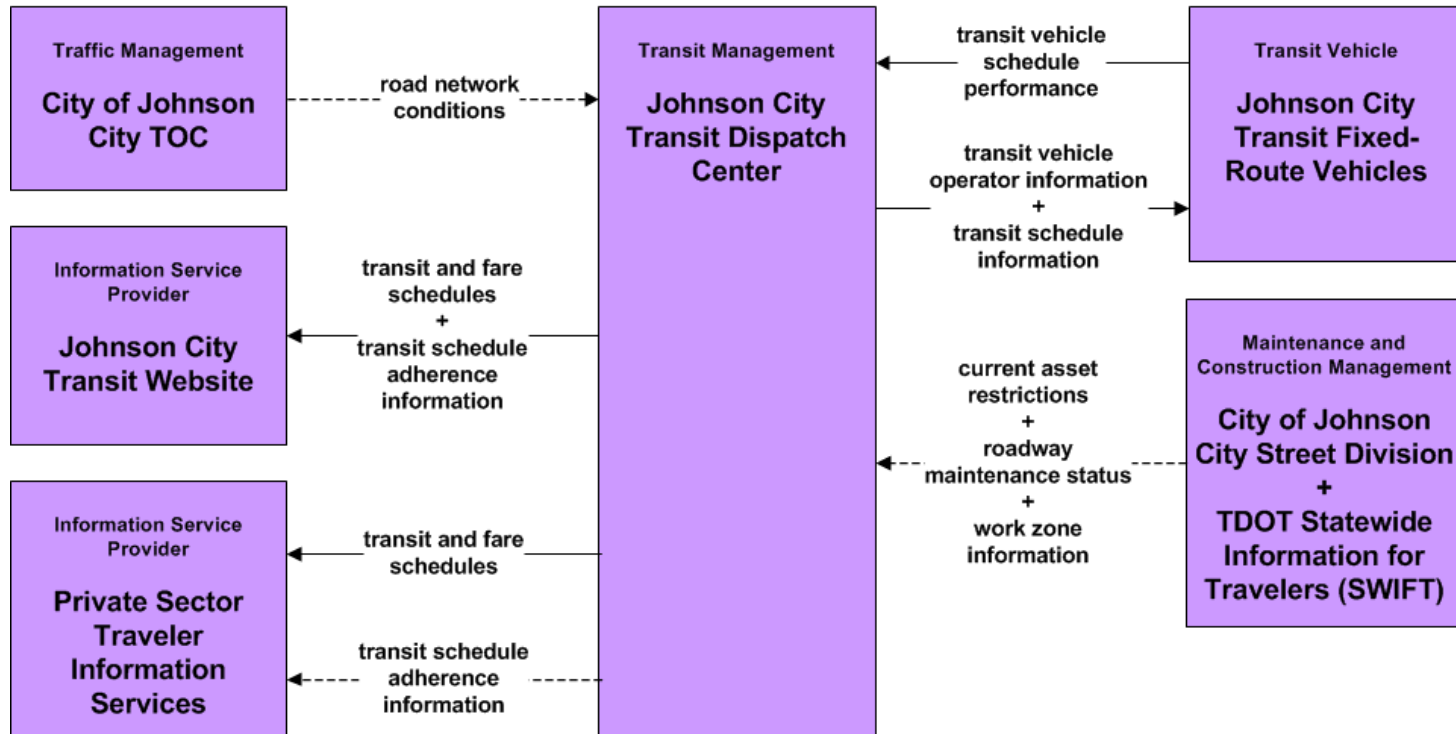


---planned/future flow--->  
 —existing flow—>  
 —user defined flow—>



# ITS Service Package Diagram

## APTS02 – Transit Fixed-Route Operations Johnson City Transit



*Note:*  
Johnson City Transit provides fixed-route bus service (BUCSHOT) to the East Tennessee State University Campus.



# ITS Service Package Prioritization



# ITS Service Package Prioritization

High Priority ITS Service Packages	Medium Priority ITS Service Packages	Low Priority ITS Service Packages
<b>Traffic Management</b>		
ATMS01 Network Surveillance	ATMS02 Traffic Probe Surveillance	ATMS04 Traffic Metering
ATMS03 Traffic Signal Control	ATMS13 Standard Railroad Grade Crossing	ATMS22 Variable Speed Limits
ATMS06 Traffic Information Dissemination	ATMS19 Speed Warning and Enforcement	
ATMS07 Regional Traffic Management	ATMS24 Dynamic Roadway Warning	
ATMS08 Traffic Incident Management System	ATMS26 Mixed Use Warning System	
<b>Emergency Management</b>		
EM01 Emergency Call-Taking and Dispatch	EM08 Disaster Response and Recovery	EM07 Early Warning System
EM02 Emergency Routing	EM09 Evacuation and Reentry Management	
EM04 Roadway Service Patrols		
EM06 Wide-Area Alert		
EM10 Disaster Traveler Information		
<b>Maintenance and Construction Management</b>		
MC03 Road Weather Data Collection	MC01 Maintenance and Construction Vehicle and Equipment Tracking	
MC04 Weather Information Processing and Distribution	MC06 Winter Maintenance	
MC08 Work Zone Management		
MC10 Maintenance and Construction Activity Coordination		





# ITS Service Package Prioritization

High Priority ITS Service Packages	Medium Priority ITS Service Packages	Low Priority ITS Service Packages
<b>Public Transportation Management</b>		
APTS01 Transit Vehicle Tracking APTS02 Transit Fixed-Route Operations APTS03 Demand Response Transit Operations APTS05 Transit Security APTS08 Transit Traveler Information APTS11 Multimodal Connection Protection	APTS04 Transit Passenger and Fare Management APTS07 Multi-modal Coordination APTS10 Transit Passenger Counting	APTS06 Transit Fleet Management
<b>Traveler Information</b>		
ATIS01 Broadcast Traveler Information ATIS02 Interactive Traveler Information		
<b>Archived Data Management</b>		
	AD1 ITS Data Mart	AD3 ITS Virtual Data Warehouse



# ITS Deployment Plan



# ITS Deployment Status

## State and Local Deployments

Deployments	State	Local
Traffic Management Centers	✓	✓
CCTV Cameras	✓	✓
Coordinated Traffic Signals		✓
Automatic Vehicle Location (AVL) for Maintenance Vehicles	Need	Need
Speed Monitoring		Need
Flood Detection and Warning		Need
Dynamic Message Signs (DMS)	✓	Need
Adaptive Signal Control		Need



# ITS Deployment Status

## State Deployments, Local Needs

Deployments	State	Local
Freeway Service Patrol	Need	
Road Weather Information	✓	Need
Traveler Information (Websites)	✓	✓
Traveler Information (Social Media)	✓	Need



# ITS Deployment Status

## State and Local Needs

Deployments	State	Local
<b>Center-to-Center Communications</b> (Local-to-Local)		<b>Need</b>
<b>Center-to-Center Communications</b> (State-to-Local)	<b>Need</b>	<b>Need</b>
<b>Center-to-Center Communications</b> (State-to-State)	<b>Need</b>	



# ITS Deployment Status

## Transit

Deployments	JCT	Rural
Paratransit Scheduling	Need	
Real-Time Transit Arrival Information	✓	
Mobile Phone Applications	Need	
Smart Card Integration	Need	Need



# Regional Agreements



# Regional Agreements

## ■ Existing Agreements

- Agreement between the Johnson City Transit System and Johnson City MTPO defining mutual responsibilities and roles;
- Memorandum of Understanding among TDOT, TDOSHS, and local governments for the quick clearance of incidents along the State Highway System;
- Agreement developed by TDOT for live CCTV video access for governmental agency users; and
- Agreement developed by TDOT for live CCTV video access for private entity users.

## ■ Needed Agreements?





# ITS Architecture Use and Maintenance Plan



# Systems Engineering

## Definition

Systems engineering is an interdisciplinary approach to enable the realization of successful systems. It **focuses on defining customer needs and required functionality early** in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete problem.

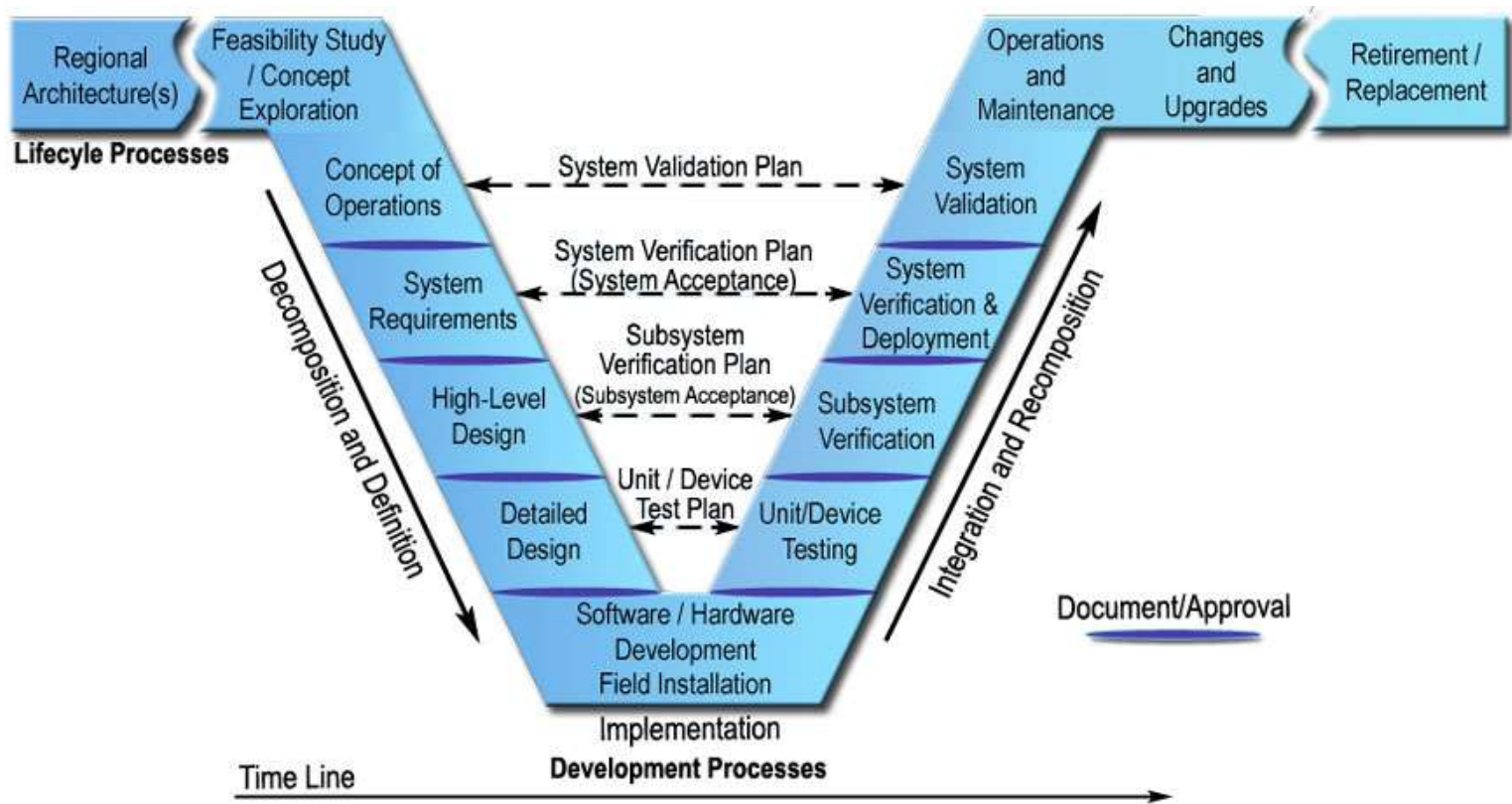
## Requirements

Using a systems engineering approach is required by the USDOT for ITS projects. The process includes demonstrating conformance to the Regional ITS Architecture.

*Additional guidance has been developed by the  
FHWA Tennessee Division and TDOT.*



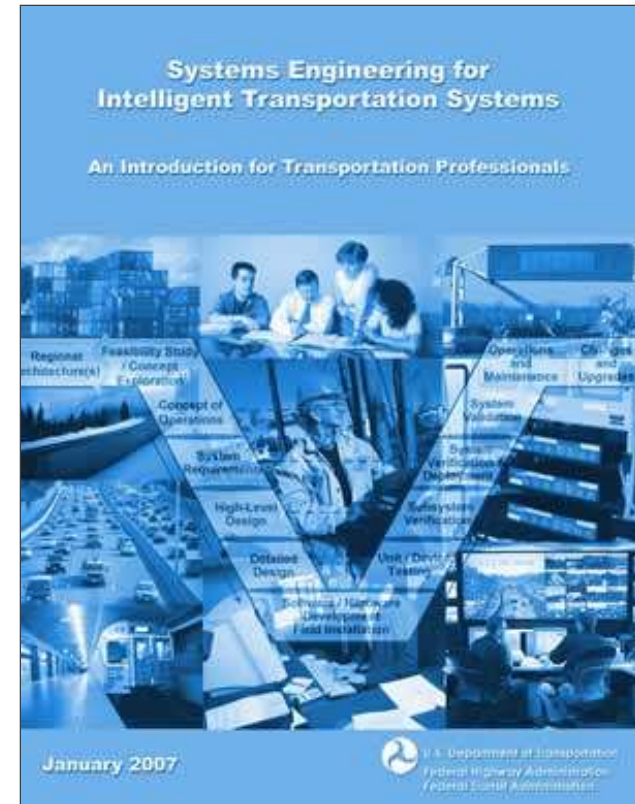
# Systems Engineering



# Resources

## **FHWA Systems Engineering for Intelligent Transportation Systems** An Introduction for Transportation Professionals

## **TDOT Traffic Design Manual** Chapter 8 - Intelligent Transportation Systems



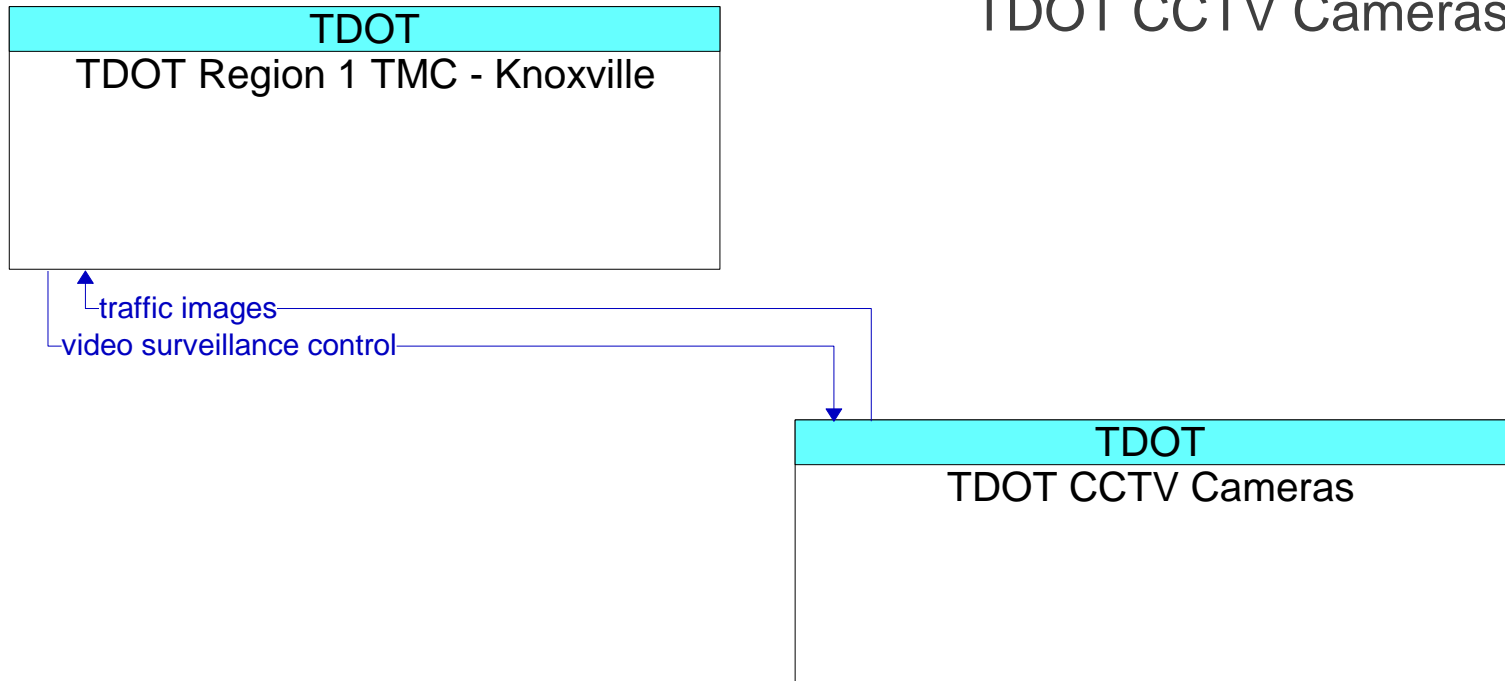
# Systems Engineering in Tennessee

- Guidance contained in TDOT Traffic Design Manual Chapter 8 – Intelligent Transportation Systems
- A systems engineering analysis (SEA) must be performed for ITS projects unless a project is categorically excluded
- Categorically excluded projects fall into one of the following:
  - Projects that do not utilize a centralized control or share data with any other agencies
  - Expansions or enhancements to existing systems that do not add any functionality



# Mapping Systems

## TDOT CCTV Cameras

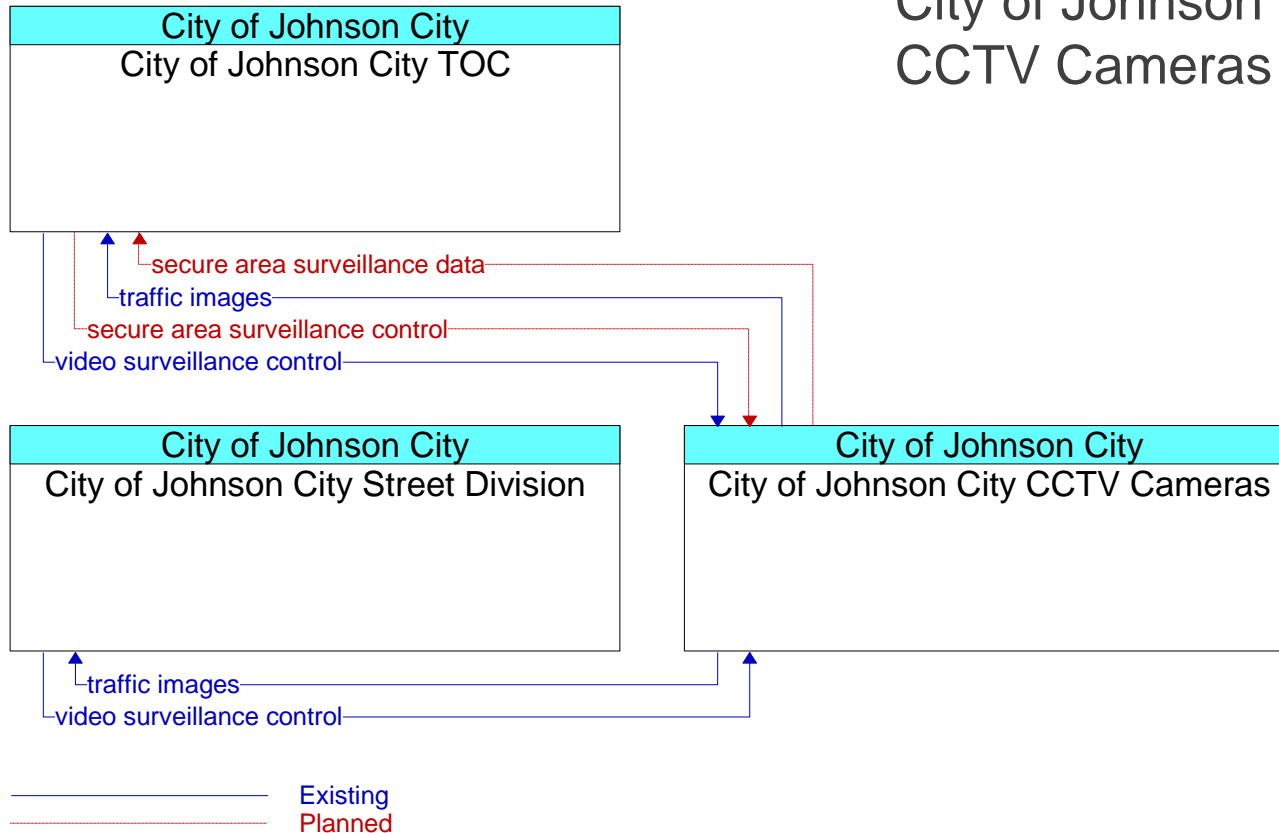


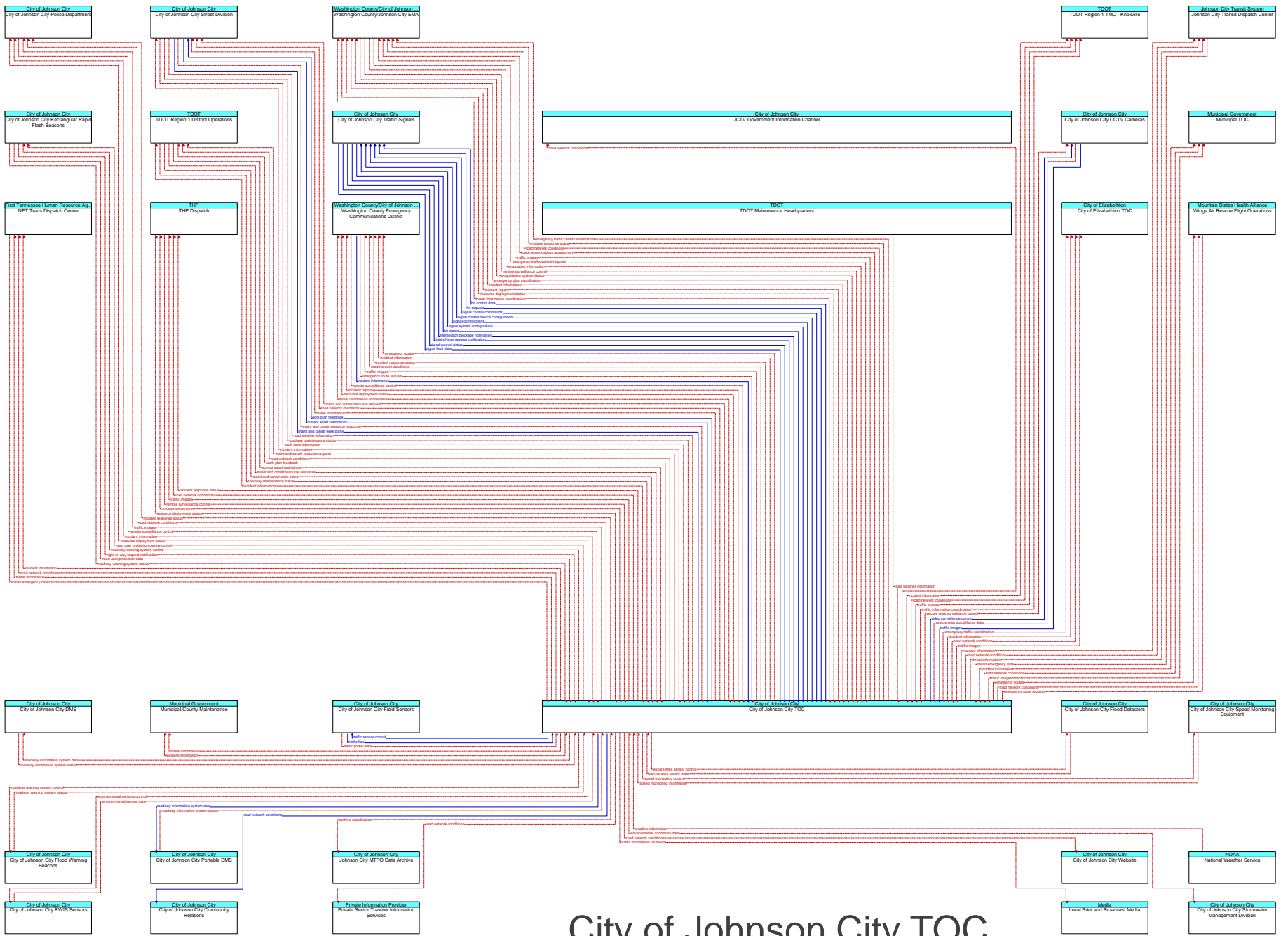
Existing



# Mapping Systems

## City of Johnson City CCTV Cameras





# City of Johnson City TOC

TODD  
TODD



# Use and Maintenance of the Plan



**Johnson City Region  
Regional ITS Architecture  
Maintenance Form**

Johnson City *MTPO*  
Metropolitan Transportation Planning Organization

Please complete the following form to document changes to the 2010 Johnson City Regional ITS Architecture. Forms should be submitted to the Johnson City Metropolitan Transportation Planning Organization (MTPO) for review and acceptance. All accepted changes will be kept on file by the MTPO and shared with the TDOT Traffic Operations Division. Changes will be incorporated into the 2010 Johnson City 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:

- Administrative Change in the Regional ITS Architecture. Examples include:
  - Functional Change one agency in the ITS Architecture. Examples include: existing ITS service packages impacted by the proposed change.
  - Functional Change the potential to new ITS service packages. Examples include: existing ITS service packages impacted by the proposed change.
  - Project Change - A Change in the ITS Architecture.
  - Other: \_\_\_\_\_

**Submittal**

Please submit ITS Architecture Maintenance Form to:  
 Johnson City Metropolitan Transportation Planning Organization  
 137 West Market Street  
 Johnson City, TN 37604  
 Phone: 423-434-4272  
 E-mail: [jctpo@jctpo.org](mailto:jctpo@jctpo.org)

Johnson City Region Regional ITS Architecture Maintenance Form	
<p><b>Question 1</b> Describe the requested change to the Regional ITS Architecture or Deployment Plan.</p>	
<p><b>Question 2</b> Are any of the Regional ITS Architecture service packages impacted by the proposed change? <b>Question 2A</b> List all of the ITS service packages impacted by the proposed change.</p>	<p><input type="checkbox"/> Yes: Please complete Questions 2A and 2B. <input type="checkbox"/> No: Please proceed to Question 3. <input type="checkbox"/> Unknown: Please coordinate with the Johnson City MTPO to determine impacts of the change in the Regional ITS Architecture.</p>
<p><b>Question 2B</b> 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.</p>	
<p><b>Question 3</b> Does the proposed change impact any stakeholder agencies other than the agency completing this form? <b>Question 3A</b> Identify the stakeholder agencies impacted by the change and a contact person for each agency.</p>	<p><input type="checkbox"/> Yes: Please complete Questions 3A and 3B. <input type="checkbox"/> No: Form is complete. <input type="checkbox"/> Unknown: Please coordinate with the Johnson City MTPO to determine impacts of change to other agencies in the Regional ITS Architecture.</p>
<p><b>Question 3B</b> Describe the coordination that has occurred with the stakeholder agencies and the results of the coordination?</p>	

Regional ITS Architecture Maintenance Form  
Version 2.0 - January 2010



# Regional ITS Architecture Maintenance Process

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	Johnson City MTPO 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



# Thank You!

**Glenn Berry**

glennberry@jcmpto.org

**Tom Fowler**

thomas.fowler@kimley-horn.com

**Terrance Hill**

terrance.hill@kimley-horn.com

