



Tennessee Department of Transportation  
Regional ITS Architectures and Deployment Plans

## Johnson City Region

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# Regional ITS Deployment Plan

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## LIST OF ACRONYMS

AD	Archived Data
APTS	Advanced Public Transportation Systems
ATIS	Advanced Travel Information System
ATMS	Advanced Traffic Management System
AVL	Automated Vehicle Location
CAD	Computer Aided Dispatch
CCTV	Closed-circuit television
DMS	Dynamic Message Sign
EM	Emergency Management
EMS	Emergency Medical Services
ETSU	East Tennessee State University
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HAR	Highway Advisory Radio
HRI	Highway-rail intersections
ITS	Intelligent Transportation System
MC	Maintenance and Construction
MTPO	Metropolitan Transportation Planning Organization
NOAA	National Oceanic and Atmospheric Administration
RPO	Rural Planning Organization
RWIS	Road Weather Information System
TDOT	Tennessee Department of Transportation
TIP	Transportation Improvement Program
TMC	Traffic Management Center
TOC	Traffic Operations Center

## 1. INTRODUCTION

### 1.1 Project Overview

The Johnson City Region has developed a Regional Intelligent Transportation System (ITS) Architecture under the direction of the Tennessee Department of Transportation (TDOT) with support from the Johnson City Metropolitan Transportation Planning Organization (MTPO). ITS architectures provide a framework for implementing ITS projects, encourage interoperability and resource sharing among agencies, identify applicable standards to apply to projects, and allow for cohesive long-range planning among regional stakeholders. The Regional ITS Architecture focuses on the functionality that ITS provides in the Region as well as how those functions can operate for agencies in and around the Johnson City Region. The Regional ITS Architecture also satisfies an important requirement from the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) regarding transportation and funding. An FHWA Final Rule and an FTA Final Policy issued in 2001 require that regions develop an ITS architecture and show how ITS projects conform to that regional ITS architecture in order to receive federal funding.

The ITS Deployment Plan, while not required by FHWA and FTA, is a useful tool for regions to identify specific projects to be deployed in order to implement the architecture. The ITS Deployment Plan builds on the architecture by outlining specific ITS project recommendations and strategies for the Region as well as identifying deployment timeframes so that the recommended projects and strategies can be implemented over time.

The ITS Deployment Plan also shows the correlation between each project and the architecture by identifying the market packages that correspond with each project. If projects are identified that do not correspond to a market package, the ITS architecture can be revised while in draft format. The resulting ITS deployment projects from this effort should be clearly supported by the ITS architecture.

The Johnson City Regional ITS Architecture and ITS Deployment Plan were both developed with significant input from local, state, and federal officials. A series of four workshops were held to solicit input from stakeholders and ensure that the plans reflected the unique needs of the Region. Copies of the draft reports were available to all stakeholders. The Regional ITS Architecture and Deployment Plan developed reflects an accurate snapshot of existing ITS deployment and future ITS plans in the Region. In order to remain effective, this plan should be periodically reviewed and updated to reflect the changing needs and priorities of the Region.

### 1.2 Document Overview

The Johnson City Regional ITS Deployment Plan is organized into four key sections:

#### **Section 1 – Introduction**

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

## **Section 2 – Application of Regional ITS Architecture Market Packages**

A summary of the market packages selected and prioritized for the Region is provided in this section. Each market package is defined, accompanied by a listing of projects that support implementation of the market package services.

## **Section 3 – Project Recommendations**

This section contains project recommendations to address stakeholder needs and goals for ITS implementation in the Region. Each project includes a description of the project, the responsible agency, an opinion of probable cost, the decision of whether or not funding has been identified, and a listing of market packages that are associated with the project.

## **Section 4 – Maintaining the Regional ITS Deployment Plan**

A brief description of the maintenance procedure for the Regional ITS Deployment Plan is provided in this section.

### **1.3 Johnson City Region**

#### *1.3.1 Region Overview*

The Johnson City Region is defined by the boundaries of the Johnson City MTPO study area. The Region encompasses Washington and Carter Counties in northeastern Tennessee.

The primary roadway facilities include I-26 and SR 34 (also designated as US 11). I-26 is a divided interstate highway that begins at SR1 (US 11 West) in Kingsport and ends at the coast in Charleston, South Carolina. I-26 connects Kingsport and Johnson City and provides the Johnson City Region with access to I-81. From I-81 travelers can connect to I-40 and drive west across the State of Tennessee to Knoxville, Nashville, and Memphis. SR 34 provides the connection to Bristol, Tennessee near the Virginia state line. Together, Johnson City, Kingsport, and Bristol form the Tri-Cities Area. The roads that connect the Tri-Cities are important to the health of these communities. The Tri-Cities Regional Airport located in Blountville is the commercial airport for the area.

Johnson City Transit and NET Trans are the transit providers that operate within the Regional boundaries. Johnson City transit provides transit service within the Johnson City urban area. Net Trans primarily operates in the rural areas of the Region, only entering the urban area on trips that originate outside the Johnson City Transit service area. Since the majority of NET Trans' operations occur outside the Regional boundaries, they are included in a Rural Planning Organization (RPO). TDOT decided that RPOs are covered by the Statewide Architecture; therefore, NET Trans is only included in this architecture where the agency interacts with other agencies in the Johnson City Region.

#### *1.3.2 Stakeholders*

Due to the fact that ITS often transcends traditional transportation infrastructure, it is important to involve non-traditional stakeholders in the architecture development and visioning process. Input from these stakeholders, both public and private, is a critical part of defining the interfaces, integration needs, and overall vision for ITS in a region.

The following stakeholder agencies have participated in the Johnson City Region project workshops or provided input to the study team:

- City of Elizabethton;
- City of Johnson City;
- Federal Highway Administration – Tennessee Division;
- First Tennessee Development District;
- Johnson City Metropolitan Transportation Planning Organization;
- Johnson City Transit System;
- Tennessee Department of Transportation – Region 1;
- Tennessee Department of Transportation – Long Range Planning Division;
- Tennessee Department of Transportation – Design Division, Signals and Signing, and;
- Washington County – Johnson City Emergency Management Agency;

A more detailed list of stakeholders, including the individuals representing each agency, is provided in the ITS Architecture report.

## 2. REGIONAL ITS ARCHITECTURE MARKET PACKAGE IMPLEMENTATION

Of the 85 market packages available in Version 5.1 of the National ITS Architecture, 32 were selected and customized for deployment in the Johnson City Region. The market packages outline the functions that stakeholders envision ITS to perform in coming years. The Deployment Plan builds on those market packages through the development of project concepts to implement in the Region.

### 2.1 Market Package Prioritization

Stakeholders were asked to prioritize the market packages into high, medium, and low priorities based on regional needs, feasibility, likelihood of deployment, and overall contribution of the market package to the goals and vision for ITS functionality in the Region. A summary of these prioritized market packages is shown in **Table 1**. More detail on the ITS Market Packages is provided in the ITS Architecture report.

**Table 1 – Johnson City Market Package Prioritization by Functional Area**

High Priority Market Packages	Medium Priority Market Packages	Low Priority Market Packages
<b><i>Travel and Traffic Management</i></b>		
ATMS01 Network Surveillance ATMS03 Surface Street Control ATMS06 Traffic Information Dissemination ATMS08 Traffic Incident Management System	ATMS07 Regional Traffic Control ATMS13 Standard Railroad Grade Crossing	ATMS19 Speed Monitoring
<b><i>Emergency Management</i></b>		
EM01 Emergency Call-Taking and Dispatch EM02 Emergency Routing EM04 Roadway Service Patrols EM06 Wide-Area Alert EM10 Disaster Traveler Information	EM08 Disaster Response and Recovery EM09 Evacuation and Reentry Management	
<b><i>Maintenance and Construction Management</i></b>		
MC03 Road Weather Data Collection MC04 Weather Information Processing and Distribution MC08 Work Zone Management MC10 Maintenance and Construction Activity Coordination	MC01 Maintenance and Construction Vehicle and Equipment Tracking MC06 Winter Maintenance	



**Table 1 – Johnson City Market Package Prioritization by Functional Area (continued)**

<b>High Priority Market Packages</b>	<b>Medium Priority Market Packages</b>	<b>Low Priority Market Packages</b>
<b><i>Public Transportation Management</i></b>		
APTS1 Transit Vehicle Tracking APTS2 Transit Fixed Route Operations APTS3 Demand Response Transit Operations APTS5 Transit Security	APTS4 Transit Passenger and Fare Management APTS8 Transit Traveler Information	APTS6 Transit Maintenance APTS7 Multi-modal Coordination
<b><i>Traveler Information</i></b>		
ATIS1 Broadcast Traveler Information ATIS2 Interactive Traveler Information		
<b><i>Archived Data Management</i></b>		
	AD1 ITS Data Mart	AD2 ITS Data Warehouse

The market package prioritization was a primary factor in developing recommendations for ITS deployment and integration in the Johnson City Region. These priorities identified the key ITS services desired by stakeholders in the Johnson City Region, as well as the interfaces that need to be established to provide integrated functionality and establish communication between elements. The high, medium, and low prioritization does not necessarily correspond to any specific timeframe (such as five-, ten-, or twenty-year deployment horizon). For example, a market package can be a high priority, but due to funding needs or prerequisite project requirements, the market package might not be feasible for deployment for several years. Maturity and availability of technology were also considered in prioritizing the market packages. Another consideration for prioritization was determining if the market package was more suitable for private deployment and operations or public sector deployment.

## **2.2 Market Packages and Supporting Projects**

In order to implement the ITS market package services in the Johnson City Region, each market package was reviewed to determine which projects should be deployed. Stakeholders provided a great deal of feedback on these projects at an ITS Deployment Plan Workshop. Although the timeframe of the Deployment Plan extended into twenty years, stakeholders generally focused on identifying shorter term projects more likely to be funded.

Every market package does not have an associated ITS project. Several market packages were identified as being important to the Region; however, there were no projects that stakeholders felt were feasible enough to document in the ITS Deployment Plan. In the future, additional projects will likely be added to the ITS Deployment Plan to implement these market packages.

The market packages in the following subsections are organized by service areas in the order they appear in the National ITS Architecture. Each market package includes:

- Stakeholder priority for the market package;
- A brief definition of the market package (which have been modified from the National ITS Architecture definitions); and
- Recommended projects that will address some or all of the services that are contained in the market package.

### 2.2.1 Traffic Management Service Area

The following market packages and related projects implement the traffic management service area functions. These traffic management service areas represent some of the most commonly deployed projects, such as closed-circuit television (CCTV) cameras, dynamic message signs (DMS), transportation management centers (TMCs), traffic operations centers (TOCs), and traffic signal systems. Many of the market packages in this service area are expected to be deployed prior to market packages in other service areas.

**Table 2 – Traffic Management Market Packages and Projects**

<b>Network Surveillance (ATMS01)</b>	<b>High Priority</b>
Includes traffic detectors, CCTV cameras, other surveillance equipment, supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to a traffic management center.	
<b>Recommended Projects</b> <ul style="list-style-type: none"> <li>▪ City of Elizabethton CCTV Cameras</li> <li>▪ City of Elizabethton Vehicle Detection</li> <li>▪ City of Johnson City CCTV Cameras Phases 1 and 2</li> <li>▪ City of Johnson City TOC Upgrades</li> <li>▪ City of Johnson City Vehicle Detection Phases 1, 2, and 3</li> <li>▪ TDOT Portable CCTV Camera Technology with Cellular Communications</li> <li>▪ TDOT SmartWay Deployment on I-26 – Vehicle Detection and DMS</li> <li>▪ TDOT SmartWay Deployments on I-26 – CCTV Cameras</li> </ul>	

<b>Surface Street Control (ATMS03)</b>	<b>High Priority</b>
Provides the central control and monitoring equipment, communication links, and signal control equipment that support local street and/or arterial traffic management. This market package is consistent with typical urban traffic signal control systems.	
<b>Recommended Projects</b> <ul style="list-style-type: none"> <li>▪ City of Elizabethton Emergency Vehicle Signal Preemption Expansion Phases 1, 2, and 3</li> <li>▪ City of Elizabethton Signal System Upgrades Phases 1, 2, and 3</li> <li>▪ City of Elizabethton Signal Timing Improvements</li> <li>▪ City of Johnson City Signal System Upgrades Phases 1, 2, and 3</li> <li>▪ City of Johnson City Traffic Signal Battery Backup</li> <li>▪ Washington County Emergency Vehicle Signal Preemption Expansion Phases 1, 2, and 3</li> </ul>	

**Table 2 – Traffic Management Market Packages and Projects (continued)**

<b>Traffic Information Dissemination (ATMS06)</b>	<b>High Priority</b>
<p>Provides information to drivers 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.</p>	
<p><b>Recommended Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Elizabethton Portable DMS</li> <li>▪ City of Johnson City DMS Phases 1 and 2</li> <li>▪ TDOT HAR Deployment</li> <li>▪ TDOT Portable DMS</li> <li>▪ TDOT Portable DMS Upgrade to Support Remote Communications</li> <li>▪ TDOT Portable HAR</li> <li>▪ TDOT SmartWay Deployment on I-26 – Vehicle Detection and DMS</li> <li>▪ TDOT SmartWay Deployments on I-26 – CCTV Cameras</li> </ul>	
<b>Regional Traffic Control (ATMS07)</b>	<b>Medium Priority</b>
<p>Facilitates the sharing of traffic information and control among traffic management centers to support a regional control strategy. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions.</p>	
<p><b>Recommended Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Johnson City TOC Coordination with TDOT SmartWay Center</li> </ul>	

**Table 2 – Traffic Management Market Packages and Projects (continued)**

<b>Traffic Incident Management System (ATMS08)</b>	<b>High Priority</b>
<p>Manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. This market package includes incident detection capabilities and coordination with other agencies. It supports traffic operations personnel in developing an appropriate response in coordination with emergency management, maintenance and construction management, and other incident response personnel.</p>	
<p><b>Recommended Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Elizabethton CCTV Cameras</li> <li>▪ City of Elizabethton Portable DMS</li> <li>▪ City of Elizabethton Vehicle Detection</li> <li>▪ City of Johnson City CCTV Cameras Phases 1 and 2</li> <li>▪ City of Johnson City DMS Phases 1 and 2</li> <li>▪ City of Johnson City TOC Upgrades</li> <li>▪ City of Johnson City Vehicle Detection Phases 1, 2, and 3</li> <li>▪ TDOT HAR Deployment</li> <li>▪ TDOT Portable CCTV Camera Technology with Cellular Communications</li> <li>▪ TDOT Portable DMS</li> <li>▪ TDOT Portable DMS Upgrade to Support Remote Communications</li> <li>▪ TDOT Portable HAR</li> <li>▪ TDOT SmartWay Deployment on I-26 – Vehicle Detection and DMS</li> </ul>	
<b>Standard Railroad Grade Crossing (ATMS13)</b>	<b>Medium Priority</b>
<p>Manages highway traffic at highway-rail intersections (HRIs) where rail operations speeds are less than 80 mph.</p>	
<p><b>Recommended Projects</b></p> <p>No projects have been identified at this time</p>	
<b>Speed Monitoring (ATMS19)</b>	<b>Low Priority</b>
<p>Monitors the speed of vehicles traveling through a roadway system.</p>	
<p><b>Recommended Projects</b></p> <p>No projects have been identified at this time</p>	

### 2.2.2 Emergency Management Service Area

The following market packages and related projects implement ITS functions that support emergency management activities. These market packages are important for incident response, coordination of the emergency management and transportation systems, traveler information during disasters, and protection of the transportation infrastructure.

**Table 3 – Emergency Management Market Packages and Projects**

<b>Emergency Call-Taking and Dispatch (EM01)</b>	<b>High Priority</b>
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.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ TDOT HELP Vehicle AVL</li> <li>▪ TDOT Interstate Reference Marker Deployment</li> <li>▪ Washington County 911 Dispatch CCTV Camera Image Sharing</li> </ul>	
<b>Emergency Routing (EM02)</b>	<b>High Priority</b>
Supports automated vehicle location (AVL) 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.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Elizabethton Emergency Vehicle Signal Preemption Expansion Phases 1, 2, and 3</li> <li>▪ Washington County 911 Dispatch CCTV Camera Image Sharing</li> <li>▪ Washington County Emergency Vehicle Signal Preemption Expansion Phases 1, 2, and 3</li> </ul>	
<b>Roadway Service Patrols (EM04)</b>	<b>High Priority</b>
Supports the roadway service patrol vehicles that aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. This market package monitors service patrol vehicle locations and supports vehicle dispatch.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ TDOT HELP Vehicle AVL</li> <li>▪ TDOT HELP Vehicle Service Area Expansion</li> <li>▪ TDOT Interstate Reference Marker Deployment</li> </ul>	
<b>Wide-Area Alert (EM06)</b>	<b>High Priority</b>
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.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Johnson City DMS Phases 1 and 2</li> <li>▪ TDOT SmartWay Deployment on I-26 – Vehicle Detection</li> </ul>	

**Table 3 – Emergency Management Market Packages and Projects (continued)**

<b>Disaster Response and Recovery (EM08)</b>	<b>Medium Priority</b>
Enhances the ability of the surface transportation system to respond to and recover from disasters. It addresses the most severe incidents that require an extraordinary response from outside the local community.	
<b>Recommended Projects</b>	
No projects have been identified at this time	

<b>Evacuation and Reentry Management (EM09)</b>	<b>Medium Priority</b>
Supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. This market package supports both anticipated, well-planned, and orderly evacuations such as for a hurricane, as well as sudden evacuations with little or no time for preparation or public warning such as a terrorist act. Employs a number of strategies to maximize capacity along an evacuation route including coordination with transit.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Elizabethton Portable DMS</li> <li>▪ TDOT Portable DMS</li> <li>▪ TDOT Portable DMS Upgrade to Support Remote Communications</li> <li>▪ TDOT Portable HAR</li> </ul>	

<b>Disaster Traveler Information (EM10)</b>	<b>High Priority</b>
Uses 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.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Elizabethton Portable DMS</li> <li>▪ City of Johnson City DMS Phases 1 and 2</li> <li>▪ TDOT HAR Deployment</li> <li>▪ TDOT Portable DMS</li> <li>▪ TDOT Portable DMS Upgrade to Support Remote Communications</li> <li>▪ TDOT Portable HAR</li> <li>▪ TDOT SmartWay Deployment on I-26 – Vehicle Detection and DMS</li> </ul>	

### 2.2.3 Maintenance and Construction Management Service Area

The following market packages and related projects implement maintenance and construction management ITS functions. The priorities identified for the Region were maintenance and construction activity coordination, portable DMS for road closures and detour information, and road weather data collection primarily for detection of ice.

**Table 4 – Maintenance and Construction Management Market Packages and Projects**

<b>Maintenance and Construction Vehicle and Equipment Tracking (MC01)</b>	<b>Medium Priority</b>
Tracks the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Elizabethton Maintenance Vehicle AVL</li> <li>▪ City of Johnson City Maintenance Vehicle AVL</li> <li>▪ TDOT HELP Vehicle AVL</li> <li>▪ TDOT Snow Plow AVL</li> </ul>	

<b>Road Weather Data Collection (MC03)</b>	<b>High Priority</b>
Collects current road weather conditions using data collected from environmental sensors deployed on and about the roadway.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Johnson City RWIS Phases 1 and 2</li> <li>▪ City of Johnson City Upgrade and Expansion of Flood Detection Network Phases 1 and 2</li> </ul>	

<b>Weather Information Processing and Distribution (MC04)</b>	<b>High Priority</b>
Processes and distributes the environmental information collected from the Road Weather Data Collection market package. This market package uses the environmental data to detect environmental hazards such as icy road conditions, high winds, dense fog, etc. so system operators can make decisions on corrective actions to take.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Johnson City RWIS Phases 1 and 2</li> <li>▪ City of Johnson City Upgrade and Expansion of Flood Detection Network Phases 1 and 2</li> </ul>	

<b>Winter Maintenance (MC06)</b>	<b>Medium Priority</b>
Supports winter road maintenance. Monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Elizabethton Maintenance Vehicle AVL</li> <li>▪ City of Johnson City Maintenance Vehicle AVL</li> <li>▪ TDOT Snow Plow AVL</li> </ul>	



**Table 4 – Maintenance and Construction Management Market Packages and Projects  
(continued)**

<b>Work Zone Management (MC08)</b>	<b>High Priority</b>
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.	
<p><b>Recommended Projects</b></p> <ul style="list-style-type: none"> <li>▪ City of Elizabethton Portable DMS</li> <li>▪ TDOT Portable CCTV Camera Technology with Cellular Communications</li> <li>▪ TDOT Portable DMS</li> <li>▪ TDOT Portable DMS Upgrade to Support Remote Communications</li> </ul>	
<b>Maintenance and Construction Activity Coordination (MC10)</b>	<b>High Priority</b>
Supports the dissemination of maintenance and construction activity information to centers that can utilize it as part of their operations. (i.e., traffic management, transit, emergency management).	
<p><b>Recommended Projects</b></p> <p>No projects have been identified at this time</p>	

### 2.2.4 Public Transportation Management Service Area

The following market packages and related projects implement public transportation management ITS functions. Public transportation projects for Johnson City Transit were identified for a number of market packages. Many of these market packages were considered high priority and will likely be implemented in the near future.

**Table 5 – Public Transportation Management Market Packages and Projects**

<b>Transit Vehicle Tracking (APTS1)</b>	<b>High Priority</b>
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.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ Johnson City Transit AVL Phases 1 and 2</li> <li>▪ Johnson City Transit Fixed Route CAD</li> </ul>	
<b>Transit Fixed-Route Operations (APTS2)</b>	<b>High Priority</b>
Performs vehicle routing and scheduling, as well as operator assignment and system monitoring for fixed-route and flexible-route transit services.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ Johnson City Transit AVL Phase 2</li> </ul>	
<b>Demand Response Transit Operations (APTS3)</b>	<b>High Priority</b>
Performs vehicle routing and scheduling, as well as operator assignment and system monitoring for demand responsive transit services.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ Johnson City Transit AVL Phase 1</li> <li>▪ Johnson City Transit Fixed Route CAD</li> <li>▪ Johnson City Transit Paratransit Schedule and Call Back System</li> </ul>	
<b>Transit Passenger and Fare Management (APTS4)</b>	<b>Medium Priority</b>
Manages passenger loading and fare payments on transit vehicles using electronic means.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ Johnson City Transit Automated Passenger Counters</li> <li>▪ Johnson City Transit Fixed Route CAD</li> <li>▪ Johnson City Transit Smartcard System</li> </ul>	

**Table 5 – Public Transportation Management Market Packages and Projects  
(continued)**

<b>Transit Security (APTS5)</b>	<b>High Priority</b>
Provides for the physical security of transit passengers and transit vehicle operators. Includes on-board security cameras and panic buttons.	
<b>Recommended Projects</b>	
No projects have been identified at this time	

<b>Transit Maintenance (APTS6)</b>	<b>Low Priority</b>
Supports automatic transit maintenance scheduling and monitoring for both routine and corrective maintenance.	
<b>Recommended Projects</b>	
No projects have been identified at this time	

<b>Multi-Modal Coordination (APTS7)</b>	<b>Low Priority</b>
Establishes two way communications between multiple transit and traffic agencies to improve service coordination.	
<b>Recommended Projects</b>	
No projects have been identified at this time	

<b>Transit Traveler Information (APTS8)</b>	<b>Medium Priority</b>
Provides transit users at transit stops and on board transit vehicles with ready access to transit information. Services include stop annunciation, imminent arrival signs, and real-time transit schedule displays. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ Johnson City Transit Paratransit Schedule and Call Back System</li> <li>▪ Johnson City Transit Real Time Arrival Information Phases 1 and 2</li> </ul>	

### 2.2.5 Traveler Information Service Area

The following market packages and related projects implement traveler information ITS functions. Projects in this service area address market packages such as the 511 traveler information phone number that broadcast traveler information over a wide area. Traveler information provided at a specific location on the roadway, such as messages on a DMS, is addressed in the ATMS06 – Traffic Information Dissemination market package in Section 2.2.1.

**Table 6 – Traveler Information Market Packages and Projects**

<b>Broadcast Traveler Information (ATIS1)</b>	<b>High Priority</b>
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.).	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ Regional Media Liaison and Coordination</li> </ul>	

<b>Interactive Traveler Information (ATIS2)</b>	<b>High Priority</b>
Provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that "push" a tailored stream of information to the traveler based on a submitted profile are supported. 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.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ City of Johnson City TOC Coordination with TDOT SmartWay Center</li> </ul>	

### 2.2.6 Archived Data Management Service Area

The following market packages and related projects implement archived data management ITS functions. Data collected through ITS deployments can be housed in several different formats. The market packages selected by stakeholders will allow data from a specific agency to be housed by that agency, or data from throughout the Region can be sent to a site to be housed together. Data housed by an agency as part of an ITS data mart would likely be part of another project deployment and are not selected separately in this section. For example, DMS implementation might include software to archive all of the messages placed on the DMS over a period of time.

**Table 7 – Archived Data Management Market Packages and Projects**

<b>ITS Data Mart (AD1)</b>	<b>Medium Priority</b>
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.	
<b>Recommended Projects</b>	
No projects have been identified at this time	
<b>ITS Data Warehouse (AD2)</b>	<b>Low Priority</b>
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.	
<b>Recommended Projects</b>	
<ul style="list-style-type: none"> <li>▪ Johnson City MTPO Archive Data Warehouse</li> </ul>	

### 3. ITS PROJECT RECOMMENDATIONS

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

Input from all stakeholders is required in order for the stakeholders to have ownership of the ITS Deployment Plan and also to ensure that the plan has realistically identified projects and timeframes for the Region. 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.

In order to achieve input from stakeholders, a workshop was held in the Johnson City Region on August 30, 2006 to discuss potential projects. Each project recommended for the Regional ITS Deployment Plan was discussed, and consensus was reached by the stakeholders on the project description and the timeframe for implementation.

In the following sections, projects are categorized into functional areas: Travel and Traffic Management, Emergency Management, Maintenance and Construction Management, Public Transportation Management, and Archived Data Management. For each functional area, stakeholders grouped projects into timeframes for deployment based on priority, dependence on other projects, technology, and feasibility. The timeframes have been categorized as short-term (5-year deployment timeframe), mid-term (10-year deployment timeframe), and long-term (20-year deployment timeframe). Actual deployment timeframes for the projects will depend on inclusion in the Transportation Improvement Program (TIP) and identification of funding sources.

For each project, the tables include a project description, the responsible agency, an opinion of probable cost, an indication as to whether funding has been identified, and the applicable market packages in the Johnson City Regional ITS Architecture.

#### 3.1 Regional Projects

Regional projects are identified in **Table 8** through **Table 12**. The tables are divided as follows:

- **Table 8** – Travel and Traffic Management Project Recommendations;
- **Table 9** – Emergency Management Project Recommendations;
- **Table 10** – Maintenance and Construction Management Project Recommendations;
- **Table 11** – Public Transportation Project Recommendations; and
- **Table 12** – Archived Data Management Project Recommendations.

**Table 8 – Travel and Traffic Management Project Recommendations**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Short-Term Travel and Traffic Management Projects</b>					
City of Elizabethton Signal Timing Improvements	Improve timing and coordination of traffic signals in key corridors within the City of Elizabethton.	City of Elizabethton	To Be Determined	No	ATMS03
City of Elizabethton Signal System Upgrades Phase 1	Continue to upgrade and expand the City of Elizabethton traffic signal system. Cost represents an average cost per intersection for upgrading and adding to the closed loop signal system. Cost will vary based on the level of upgrade required to integrate signals into the closed loop signal system.	City of Elizabethton	\$20,000 per intersection	No	ATMS03
City of Johnson City TOC Upgrades	Upgrade the equipment at the City of Johnson City TOC to allow video images from closed circuit television (CCTV) cameras to be brought back to the TMC for monitoring.	City of Johnson City	\$50,000	No	ATMS01 ATMS08
City of Johnson City CCTV Cameras Phase 1	Implement CCTV cameras on key sections of roadway within the City of Johnson City. CCTV cameras can be used to monitor traffic conditions and to aid in incident management. Video feeds can be shared with emergency management agencies to facilitate emergency response. Cost includes the pole and camera. The cost will be lower if the camera is installed on a signal mast arm. The Johnson City ITS Earmark will be used to fund Phase 1 Deployments.	City of Johnson City	\$30,000 per site	Yes	ATMS01 ATMS08
City of Johnson City Vehicle Detection Phase 1	Implement vehicle detection technologies on roadways in the City of Johnson City so that traffic management staff can monitor speeds and volumes. This information can be used to detect incidents and improve the management of the transportation system. The cost and capabilities will depend on the technology chosen. Cost range represents a variety of technologies from in-pavement loop detectors to non-intrusive detectors that would be mounted on an existing or new pole. Communications costs in locations of new without existing communications vary greatly.	City of Johnson City	\$5,000 to \$20,000 per site	Yes	ATMS01 ATM08

**Table 8 – Travel and Traffic Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Short-Term Travel and Traffic Management Projects (continued)</b>					
City of Johnson City Signal System Upgrades Phase 1	Continue to upgrade and expand the City of Johnson City traffic signal system. Cost will vary based on the level of upgrade required to integrate signals into the closed loop signal system. Includes incorporation of video detection including advance detection. Cost represents an average cost per intersection for upgrading and coordinating. Cost will vary based on the level of upgrade required to integrate signals into the closed loop signal system. Some STP funding is available for upgrades.	City of Johnson City	\$20,000 per intersection	Partial	ATMS03
City of Johnson City Traffic Signal Battery Backup	Install battery backup equipment on approximately 20 intersections in the City of Johnson City. The battery backup would allow the continued operation of the traffic signals at the intersection for 8 hours in the event of a power service interruption. The system allows full operation until battery power declines to a predetermined level at which time the traffic signal will be switched to flashing operation. Flashing operation uses about half the power as full operation and will be continued until the battery can no longer provide sufficient current. If outages are expected to be lengthy, the most important intersections will be hooked up to generators.	City of Johnson City	\$175,000	Yes	ATMS03
City of Johnson City Communications Backbone Expansion Phase 1	Expand the communications backbone to support additional ITS technologies and expand data transfer capabilities. The system is owned and operated by the Traffic Department and supports the traffic management system in Johnson City.	City of Johnson City	To Be Determined	Yes	All <sup>3</sup>
TDOT Portable CCTV Camera Technology with Cellular Communications	Procure portable CCTV cameras with cellular communications capabilities. The portable systems can be deployed for long term construction work zones, major incidents, and special events. When these special circumstances do not exist the system could be deployed at a particular location for general use.	TDOT	To Be Determined	No	ATMS01 ATMS08 MC08
TDOT HELP Vehicle Service Area Expansion	Expand the TDOT Region 1 HELP service area to include the Johnson City Region. HELP vehicles stationed in the area would facilitate incident management as well as special event management.	TDOT	To Be Determined	No	EM04



**Table 8 – Travel and Traffic Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Short-Term Travel and Traffic Management Projects (continued)</b>					
TDOT HELP Vehicle AVL	Implement automated vehicle location (AVL) on TDOT HELP vehicles. AVL will facilitate vehicle dispatch. Cost represents in-vehicle equipment as well as supporting software.	TDOT	\$3,000 per vehicle	No	EM01 EM04 MC01
TDOT Interstate Reference Marker Deployment	Install interstate reference markers along interstates in the Johnson City Region to facilitate dispatch of emergency vehicles or other motorist assistance services in the event of an incident or breakdown. The markers are typically installed at 2/10 of a mile spacing.	TDOT	To Be Determined	No	EM01 EM04
<b>Mid-Term Travel and Traffic Management Projects</b>					
TDOT Portable HAR	Procure portable highway advisory radio (HAR) transmitters to disseminate traveler information in the Johnson City Region during construction, large scale incidents or special events.	TDOT	To Be Determined	No	ATMS06 ATMS08 EM09 EM10
Regional Media Liaison and Coordination	Develop agreements and enhanced coordination with local media to improve information sharing and dissemination. There is no cost associated with this project. If the media desires to gather data, such as camera feeds from the transportation agencies in the Region, then it is expected that the media would be responsible for any costs.	TDOT, City of Elizabethton, City of Johnson City	N/A	N/A	ATIS1
Regional Communications Assessment and Master Plan	Assess the current communications infrastructure and develop a communications master plan for the Johnson City Region. The project will examine current and future regional communications needs to support ITS implementation.	TDOT, City of Elizabethton, City of Johnson City	\$100,000 - \$200,000	No	All <sup>3</sup>
City of Elizabethton CCTV Cameras	Implement closed-circuit television (CCTV) cameras on key sections of roadway within the City of Elizabethton. CCTV cameras can be used to monitor traffic conditions and to aid in incident management. Video feeds can be shared with emergency management agencies to facilitate emergency response. Cost includes the pole and camera. The cost will be lower if the camera is installed on a signal mast arm.	City of Elizabethton	\$30,000 per site	No	ATMS01 ATMS08

**Table 8 – Travel and Traffic Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Mid-Term Travel and Traffic Management Projects (continued)</b>					
City of Elizabethton Vehicle Detection	Implement vehicle detection technologies on roadways in the City of Elizabethton so that traffic management staff can monitor speeds and volumes. This information can be used to detect incidents and improve the management of the transportation system. The cost and capabilities will depend on the technology chosen. Cost range represents a variety of technologies from in-pavement loop detectors to non-intrusive detectors that would be mounted on an existing or new pole. Communications costs in locations of new without existing communications vary greatly.	City of Elizabethton	\$5,000 to \$20,000 per site	No	ATMS01 ATMS08
City of Elizabethton Signal System Upgrades Phase 2	Continue to upgrade and expand the City of Elizabethton traffic signal system. Cost will vary based on the level of upgrade required to integrate signals into the closed loop signal system.	City of Elizabethton	\$20,000 per intersection	No	ATMS03
City of Johnson City CCTV Cameras Phase 2	Implement closed-circuit television (CCTV) cameras on key sections of roadway within the City of Johnson City. CCTV cameras can be used to monitor traffic conditions and to aid in incident management. Video feeds can be shared with emergency management agencies to facilitate emergency response. Cost includes the pole and camera. The cost will be lower if the camera is installed on a signal mast arm.	City of Johnson City	\$30,000 per site	No	ATMS01 ATMS08
City of Johnson City DMS Phase 1	Implement dynamic message signs (DMS) for traffic information dissemination. The estimated cost per sign will depend greatly on the size of the sign and type of mounting structure chosen. This cost is for a medium sized DMS on a cantilever or butterfly mount; smaller signs might be more appropriate if signs are to be placed on arterial streets. (Note: TDOT does not permit the use of cantilever signs; this might impact the sign structure choice for implementation on a state roadway). Phase 1 of this project will be funded through the Johnson City ITS Earmark.	City of Johnson City	\$100,000 per sign	Yes	ATMS06 ATMS08 EM06 EM10

**Table 8 – Travel and Traffic Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Mid-Term Travel and Traffic Management Projects (continued)</b>					
City of Johnson City Vehicle Detection Phase 2	Implement vehicle detection technologies on roadways in the City of Johnson City so that traffic management staff can monitor speeds and volumes. This information can be used to detect incidents and improve the management of the transportation system. The cost and capabilities will depend on the technology chosen. Cost range represents a variety of technologies from in-pavement loop detectors to non-intrusive detectors that would be mounted on an existing or new pole. Communications costs in locations of new without existing communications vary greatly.	City of Johnson City	\$5,000 to \$20,000 per site	No	ATMS01 ATMS08
City of Johnson City Signal System Upgrades Phase 2	Continue to upgrade and expand the City of Johnson City traffic signal system. Cost will vary based on the level of upgrade required to integrate signals into the closed loop signal system. Includes incorporation of video detection including advance detection.	City of Johnson City	\$20,000 per intersection	No	ATMS03
City of Johnson City TOC Coordination with TDOT SmartWay Center	Establish a communications connection between the Johnson City TOC and Knoxville SmartWay Center for the coordination of traffic information. This sharing will facilitate the inclusion of regional information in the Tennessee 511 System as well the sharing of weather information and video feeds.	City of Johnson City, TDOT	To Be Determined	No	ATMS07 ATIS2
City of Johnson City Communications Backbone Expansion Phase 2	Expand the communications backbone to support additional ITS technologies and expand data transfer capabilities. The system is owned and operated by the Traffic Department for support of the transportation system in Johnson City.	City of Johnson City	To Be Determined	No	All <sup>3</sup>
TDOT SmartWay Deployments on I-26 – CCTV Cameras	Implement closed-circuit television (CCTV) cameras on I-26 in the Johnson City Region. CCTV cameras can be used to monitor traffic conditions and to aid in incident management. Video feeds can be shared with emergency management agencies to facilitate emergency response. Communications costs are not included and can vary widely depending on available options. Consider fiber sharing agreements to achieve this deployment more quickly.	TDOT	\$30,000 per site	No	ATMS01 ATMS06

**Table 8 – Travel and Traffic Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Mid-Term Travel and Traffic Management Projects (continued)</b>					
TDOT HAR Deployment	Implement HAR transmitters in the Johnson City Region for the dissemination of roadway information.	TDOT	\$25,000 per transmitter	No	ATMS06 ATMS08 EM10
<b>Long-Term Travel and Traffic Management Projects</b>					
City of Elizabethton Signal System Upgrades Phase 3	Continue to upgrade and expand the City of Elizabethton traffic signal system. Cost will vary based on the level of upgrade required to integrate signals into the closed loop signal system.	City of Elizabethton	\$20,000 per intersection	No	ATMS03
City of Johnson City Vehicle Detection Phase 3	Implement vehicle detection technologies on roadways in the City of Johnson City so that traffic management staff can monitor speeds and volumes. This information can be used to detect incidents and improve the management of the transportation system. The cost and capabilities will depend on the technology chosen. Cost range represents a variety of technologies from in-pavement loop detectors to non-intrusive detectors that would be mounted on an existing or new pole. Communications costs in locations of new without existing communications vary greatly.	City of Johnson City	\$5,000 to \$20,000 per site	No	ATMS01 ATMS08
City of Johnson City Signal System Upgrades Phase 3	Continue to upgrade and expand the City of Johnson City traffic signal system. Cost will vary based on the level of upgrade required to integrate signals into the closed loop signal system. Includes incorporation of video detection including advance detection.	City of Johnson City	\$20,000 per intersection	No	ATMS03
City of Johnson City DMS Phase 2	Implement dynamic message signs (DMS) for traffic information dissemination. The estimated cost per sign will depend greatly on the size of the sign and type of mounting structure chosen. This cost is for a medium sized DMS on a cantilever or butterfly mount; smaller signs might be more appropriate if signs are to be placed on arterial streets. (Note: TDOT does not permit the use of cantilever signs; this might impact the sign structure choice for implementation on a state roadway).	City of Johnson City	\$100,000 per sign	No	ATMS06 ATMS08 EM06 EM10

**Table 8 – Travel and Traffic Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Long-Term Travel and Traffic Management Projects (continued)</b>					
City of Johnson City Communications Backbone Expansion Phase 3	Expand the communications backbone to support additional ITS technologies and expand data transfer capabilities. The system is owned and operated by the Traffic Department for support of the transportation system in Johnson City.	City of Johnson City	To Be Determined	No	All <sup>3</sup>
TDOT SmartWay Deployment on I-26 – Vehicle Detection and DMS	Implement vehicle detection technologies on I-26 to monitor speeds and volumes. The cost and capabilities will depend on the technology chosen. Cost range represents a variety of technologies from in-pavement loop detectors to non-intrusive detectors that would be mounted on an existing or new pole. Communications costs in locations of new without existing communications vary greatly. (Note: TDOT typically implements lower cost radar technologies for speed and volume detection and occasionally video detection for classification.) Spacing in between detection sites in rural areas will typically be greater than spacing in urban areas. DMS will be utilized for the dissemination of roadway conditions and traffic information.	TDOT	Detectors: \$5,000-\$20,000 per site  DMS: \$150,000 per sign	No	ATMS01 ATMS06 ATMS08 EM06 EM10

<sup>1</sup>Agency listed is responsible for implementation, operations, and maintenance.

<sup>2</sup>The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

<sup>3</sup>Supports all market packages, but is not specifically represented in any market package.

**Table 9 – Emergency Management Project Recommendations**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Short-Term Emergency Management Projects</b>					
City of Elizabethton Emergency Vehicle Signal Preemption Expansion Phase 1	Implement emergency vehicle signal preemption on additional traffic signals in the City of Elizabethton to improve incident response times and emergency responder safety. Preemption capability would be for Fire Department only. This expansion would be coordinated with other improvement projects on a project by project basis.	City of Elizabethton	\$6,000 per intersection \$1,500 per vehicle	No	ATMS03 EM02
Washington County Emergency Vehicle Signal Preemption Expansion Phase 1	Implement emergency vehicle signal preemption on additional traffic signals in Washington County to improve incident response times and emergency responder safety. Preemption capability would be EMS and the Fire Department.	Washington County	\$6,000 per intersection \$1,500 per vehicle	No	ATMS03 EM02
<b>Mid-Term Emergency Management Projects</b>					
City of Elizabethton Emergency Vehicle Signal Preemption Expansion Phase 2	Implement emergency vehicle signal preemption on additional traffic signals in the City of Elizabethton to improve incident response times and emergency responder safety. Preemption capability would be for Fire Department only. This expansion would be coordinated with other improvement projects on a project by project basis.	City of Elizabethton	\$6,000/ intersection \$1,500/vehicle	No	ATMS03 EM02
Washington County Emergency Vehicle Signal Preemption Expansion Phase 2	Implement emergency vehicle signal preemption on additional traffic signals in Washington County to improve incident response times and emergency responder safety. Preemption capability would be EMS and the Fire Department.	Washington County	\$6,000 per intersection \$1,500 per vehicle	No	ATMS03 EM02
Washington County 911 Dispatch CCTV Camera Image Sharing	Establish a connection to share TDOT and City of Johnson City CCTV camera images with the Washington County 911 Dispatch Center. Connecting to the City of Johnson City TOC would allow access to TDOT video once the TMC was connected to TDOT. It is possible that existing fiber between the City of Johnson City TOC and Washington County 911 Dispatch can be utilized to accomplish this sharing.	City of Johnson City, Washington County, TDOT	To Be Determined	No	EM01 EM02

**Table 9 – Emergency Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Long-Term Emergency Management Projects</b>					
City of Elizabethton Emergency Vehicle Signal Preemption Expansion Phase 3	Implement emergency vehicle signal preemption on additional traffic signals in the City of Elizabethton to improve incident response times and emergency responder safety. Preemption capability would be for Fire Department only. This expansion would be coordinated with other improvement projects on a project by project basis.	City of Elizabethton	\$6,000 per intersection \$1,500 per vehicle	No	ATMS03 EM02
Washington County Emergency Vehicle Signal Preemption Expansion Phase 3	Implement emergency vehicle signal preemption on additional traffic signals in Washington County to improve incident response times and emergency responder safety. Preemption capability would be EMS and the Fire Department.	Washington County	\$6,000 per intersection \$1,500 per vehicle	No	ATMS03 EM02

<sup>1</sup>Agency listed is responsible for implementation, operations, and maintenance.

<sup>2</sup>The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

**Table 10 – Maintenance and Construction Management Project Recommendations**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Short-Term Maintenance and Construction Management Projects</b>					
City of Elizabethton Portable DMS	Procure portable DMS for use in the City of Elizabethton during maintenance activities or for incident management.	City of Elizabethton	\$30,000 per sign	No	ATMS06 ATMS08 EM09 EM10 MC08
City of Johnson City Upgrade and Expansion of Flood Detection Network Phase 1	Upgrade existing stream gauges and implement additional flood detection stations at flood prone locations on roadways in the City of Johnson City. Flood sensors would notify the Johnson City Public Works Department so that crews can close flooded roadways. 8-10 locations will be implemented as part of this phase and will be funded through the Johnson City ITS Earmark.	City of Johnson City	\$10,000 per station	Yes	MC03 MC04
TDOT Portable DMS Upgrade to Support Remote Communications	Retrofit TDOT portable DMS to add remote communication capabilities.	TDOT	\$1,000 per sign	No	ATMS06 ATMS08 EM09 EM10 MC08
<b>Mid-Term Maintenance and Construction Management Projects</b>					
City of Johnson City RWIS Phase 1	Implement road weather information system (RWIS) stations for the monitoring of weather conditions on the roadway. This information will facilitate the effective dispatch of maintenance personnel to close flooded roadways or apply anti-icing chemicals. Phase 1 will be funded through the Johnson City ITS Earmark.	City of Johnson City	\$20,000 per site	Yes	MC03 MC04
City of Johnson City Upgrade and Expansion of Flood Detection Network Phase 2	Upgrade existing stream gauges and implement additional flood detection stations at flood prone locations on roadways in the City of Johnson City. Flood sensors would notify the Johnson City Public Works Department so that crews can close flooded roadways.	City of Johnson City	\$10,000 per station	No	MC03 MC04
TDOT Portable DMS	Procure portable DMS for use in the Johnson City Region during construction activities or for incident management.	TDOT	\$30,000 per sign	No	ATMS06 ATMS08 EM09 EM10 MC08



**Table 10 – Maintenance and Construction Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Long-Term Maintenance and Construction Management Projects</b>					
City of Elizabethton Maintenance Vehicle AVL	Implement automated vehicle location (AVL) on City of Elizabethton Maintenance vehicles. AVL will facilitate vehicle dispatch and management of snow removal operations. Cost represents in-vehicle equipment as well as supporting software.	City of Elizabethton	\$3,000 per vehicle	No	MC01 MC06
City of Johnson City Maintenance Vehicle AVL	Implement automated vehicle location (AVL) on City of Johnson City Maintenance vehicles. AVL will facilitate vehicle dispatch and management of snow removal operations. Cost represents in-vehicle equipment as well as supporting software.	City of Johnson City	\$3,000 per vehicle	No	MC01 MC06
City of Johnson City RWIS Phase 2	Implement road weather information system (RWIS) stations for the monitoring of weather conditions on the roadway. This information will facilitate the effective dispatch of maintenance personnel to close flooded roadways or apply anti-icing chemicals. Phase 2 is likely to be a partnership project between the Traffic Department, Stormwater and Utility Department, and/or NOAA.	City of Johnson City	\$20,000 per site	No	MC03 MC04
TDOT Snow Plow AVL	Implement automated vehicle location (AVL) on TDOT Maintenance vehicles. AVL will facilitate vehicle dispatch and management of snow removal operations. Cost represents in-vehicle equipment as well as supporting software. (Note: Currently, snow removal is provided through a contracted service.)	TDOT	\$3,000 per vehicle	No	MC01 MC06

<sup>1</sup>Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

<sup>2</sup>The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

**Table 11 – Public Transportation Management Project Recommendations**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Short-Term Public Transportation Management Projects</b>					
Johnson City Transit Automated Passenger Counters	Implement mobile passenger counting technology on Johnson City Transit vehicles. This project includes the implementation of software with the capability to transfer the data collected in the field to the Johnson City Transit data archive, currently managed using Excel spreadsheets. Data obtained will include mileage and ridership information required by the National Transit Database (NTD) annual report.	City of Johnson City	\$40,000 to \$50,000	Yes	APTS4
Johnson City Transit AVL Phase 1	Install AVL for real-time vehicle location of the Johnson City Transit fleet. Phase 1 will include AVL for the paratransit vehicles. The system will include GPS and a communication link between vehicle and dispatcher. Partial funding through grants is available now, but is not enough to cover the paratransit fleet. Ongoing communications cost associated with the project are not included in the cost shown here, but will require budgeting of funds before deployment can occur.	City of Johnson City	\$150,000 to \$175,000	Partial	APTS1 APTS3
Johnson City Transit Paratransit Schedule and Call Back System	Implementation of automated trip reservation and scheduling system, including use of GIS mapping database, for JOHNSON CITY TRANSIT demand-response operations, including paratransit and Job Access.	City of Johnson City	\$25,000 to \$50,000	Yes	APTS3 APTS8
Johnson City Transit Real Time Arrival Information Phase 1	Install kiosks at strategic locations on the East Tennessee State University (ETSU) campus to provide real-time vehicle location information to ETSU students, faculty, and other campus area passengers.	City of Johnson City	\$50,000 to \$75,000	No	APTS8

**Table 11 – Public Transportation Management Project Recommendations (continued)**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Mid-Term Public Transportation Management Projects</b>					
Johnson City Transit AVL Phase 2	Install AVL for real-time vehicle location of the Johnson City Transit fleet. Phase 2 will include AVL for the fixed route transit vehicles. The system will include GPS and a communication link between vehicle and dispatcher. Ongoing communications cost associated with the project are not included in the cost shown here, but will require budgeting of funds before deployment can occur.	City of Johnson City	\$150,000 to \$175,000	Partial	APTS1 APTS2
Johnson City Transit Fixed Route CAD	Implement a computer aided dispatch (CAD) system for Johnson City Transit. The CAD system will work in coordination with the AVL technology to facilitate the tracking and dispatch of Johnson City Transit vehicles, including those that service the ETSU campus.	City of Johnson City	To Be Determined	No	APTS1 APTS3 APTS4
Johnson City Transit Real Time Arrival Information Phase 2	Install additional kiosks at strategic locations on the ETSU campus to provide real-time vehicle location information to ETSU students, faculty, and other campus area passengers.	City of Johnson City	\$50,000 to \$75,000	No	APTS8
<b>Long-Term Public Transportation Management Projects</b>					
Johnson City Transit Smartcard System	Evaluate the implementation of Smartcard technology for fare collection on JOHNSON CITY TRANSIT vehicles.	City of Johnson City	To Be Determined	No	APTS4

<sup>1</sup>Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

<sup>2</sup>The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

**Table 12 – Archived Data Management Project Recommendations**

Program Area/Project	Description	Responsible Agency <sup>1</sup>	Opinion of Probable Cost <sup>2</sup>	Funding Identified	Applicable Market Packages
<b>Mid-Term Archived Data Management Projects</b>					
Johnson City MTPO Archive Data Warehouse	Establish a data warehouse to archive data from cities and transit agencies in the MTPO service area for use in regional planning. Cost for this project represents an average range for developing a data warehouse system. Cost could vary widely depending on the level of detail and functionality of the system as well as the amount of development that is done in-house by the Johnson City MTPO. The data warehouse could be developed in coordination with the City of Johnson City and cost savings could be realized through this development approach.	Johnson City MTPO	\$50,000 to \$100,000	No	AD2

<sup>1</sup>Agency listed is responsible for implementation, operations, and maintenance unless otherwise noted.

<sup>2</sup>The design has not been undertaken and thus this is only an opinion of probable cost for planning purposes.

#### 4. MAINTAINING THE REGIONAL ITS DEPLOYMENT PLAN

Just as the ITS Architecture developed for the Johnson City Region documents the Region's goals for ITS implementation at the time it was developed, the ITS Deployment Plan addresses the projects that stakeholders agreed were necessary to implement at the time the plan was developed in order to reach their ITS deployment goals. As the Region grows needs will change and as technology progresses new ITS opportunities will arise. Shifts in regional focus as well as changes in the National ITS Architecture will necessitate the Johnson City Regional ITS Architecture be updated to remain a useful resource for the Region. These same changes will create new project opportunities and revisions to the projects in this ITS Deployment Plan.

Stakeholders discussed the procedure for updating the Regional ITS Architecture and Deployment Plan at the August 30, 2006 ITS Deployment Plan Workshop. The procedure, documented in the Johnson City Regional ITS Architecture, outlines how to document architecture changes for inclusion in the next plan update. Stakeholders agreed that it would be beneficial to meet once a year to discuss the projects identified in the ITS Deployment Plan. The purpose of the discussion would be to update the project status, remove projects that were completed, add project detail when available, and add new projects. Any corresponding architecture changes would be documented for the next update. A major revision would be completed every four years corresponding with the Long Range Plan Update. The Johnson City MTPo will take the lead in collecting details on the changes that need to be made to the architecture and coordinate with the TDOT Long Range Planning Division to schedule the update.