MoDOT Intelligent Transportation Systems

STATEWIDE INTEGRATED ITS BUSINESS AND DEPLOYMENT PLAN

Illinois Department of Transportation

EAST-WEST GATEWAY
Council of Governments

Bi-State St. Louis Regional ITS Architecture

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Document Revision History

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1.0	May 5, 2004	4.0	2.0	Initial release
2.0	Nov., 2004	5.0	3.0	St. Louis update
3.0	April 8, 2005	5.0	3.0	Illinois update

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Foreword

The Federal Highway Administration (FHWA) issued a final rule to implement Section 5206(e) of the Transportation Equity Act for the 21st Century (TEA-21) in January of 2001. Federal Rule 940 requires that Intelligent Transportation Systems (ITS) projects funded through the Highway Trust Fund conform to the National ITS Architecture and applicable standards. FHWA has further established a deadline of April 2005 for regions to have an ITS architecture in place.

To meet the requirement and ensure federal funding eligibility for ITS, the Missouri Department of Transportation (MoDOT) and the Illinois Department of Transportation (IDOT) initiated the development of Regional Architectures for several regions in the States of Missouri and Illinois. MoDOT has developed Regional ITS Architectures for three urban regions across the state; Springfield, St. Louis and Kansas City. IDOT has developed ITS Architectures for each major metropolitan area in the state, as well as the Gary-Chicago-Milwaukee Corridor in northeastern Illinois. The Regional ITS Architecture provides a framework for ITS systems, services, integration, and interoperability.

The following documents the Regional ITS Architecture for the Bi-State St. Louis region. The information presented is designed to be modular. Thus future modifications or updates to the information can be done without the need to recompile the entire work. The modules are designed to correlate with the areas outlined by Federal Rule 940. As such each module is designed to address a specific regional architecture requirement established by the Rule.

Many of the modules are concise and require the user to be familiar with the National ITS Architecture version 5.0. The Bi-State St. Louis Regional ITS Architecture was developed looking at a 5-year timeframe. ITS projects slated for design, development, and deployment over the coming 5 years were a focus of the following architecture work.

Architecture work is an ongoing process. ITS project priorities change, personnel and staff change, budgets change, and thus regional architecture work should be periodically "changed" to remain in sync with regional priorities and initiatives. To facilitate future modifications to the Bi-State St. Louis Architecture the final Turbo Architecture Database and architecture report modules are submitted as part of this work. The CD containing these files can be found attached to the back of the report. In addition, a website has been developed to provide a means by which regional stakeholders can reference, use, and suggest modifications to the Bi-State St. Louis Architecture,

1 Regional Description

The St. Louis Region is located on the banks of the Mississippi River. The regional boundaries contain three counties in the State of Illinois and four counties in the State of Missouri, as well as the City of St. Louis. The counties include Madison, Monroe and St. Clair in Illinois, and Franklin, Jefferson, St. Charles and St. Louis in Missouri. The St. Louis Region has a population near 2.5 million. Figures 1.1 and 1.2 illustrate the Metropolitan Planning Organization regional boundaries and major roadway infrastructure.

Principal interstate highways in this region include I-70, I-64, I-44, I-55, I-270, I-255 and I-170. Other primary routes include US 40, US 50, US 61, and US 67, Missouri State Highways 21, 30, 94, 100, 141, 340, 364 and 370, and Illinois State Highways 3, 4, 15, 143, 159 and 255.

Figure 1-1: Metropolitan Planning Organization Boundaries

Figure 1-2: St. Louis Freeway Infrastructure Map

1.1 Existing Regional ITS Deployments

Several agencies in this region have installed many types of ITS equipment, and future projects include more technologies. ITS elements currently in use in St. Louis region include:

- MoDOT ***Gateway Guide*** a Transportation Management Center (TMC)
- IDOT District 8 TMC
- Vehicle detection systems in both Illinois and Missouri
- Closed Circuit Television (CCTV) Cameras in both Illinois and Missouri
- Dynamic Message Sign (DMS) boards in both Illinois and Missouri
- Fiber optic cabling in both Illinois and Missouri
- Lane control on major bridges
- Highway Advisory Radio (HAR) in Illinois
- Call boxes along the interstate system in Illinois
- Motorist Assist program in Missouri and Emergency Patrol Vehicles in Illinois

2 Stakeholders

To begin the formal process of documenting the regional architecture for the St. Louis region a workshop was held November 19, 2003 in St. Louis at the Gateway Guide building and on November 10, 2004 at the IDOT District 8 Headquarters. These workshops gathered information on the existing status of the architecture, the current ITS projects, and planned ITS projects for the area. These workshops focused on those projects that currently exist or were short-term funded programs.

MoDOT, IDOT, and the East-West Gateway Council of Governments have taken lead roles in both the development of the ATMS system in the metropolitan St. Louis region and also in the planning and development of ITS in the region. Thus MoDOT, IDOT, and the East-West Gateway Council of Governments are co-champions for maintaining and monitoring the Bi-State St. Louis Regional ITS Architecture.

2.1 ITS Stakeholders

A key element in the development of a regional ITS architecture is the involvement of all partnering agencies in the planning process. Stakeholders from both Illinois and Missouri took part in the development of the Bi-State St. Louis Regional ITS Architecture. Different branches of government services participated, including municipal, county and state level Department of Transportations (DOTs), several levels of public safety, transit and the regional council of governments. The following stakeholders are directly referenced in the Bi-State St. Louis Regional ITS Architecture:

- 911 Centers
- Ambulance District
- METRO St. Louis Transit
- Central County 911 Dispatch
- Clayton Traffic Department
- East-West Gateway Council of Governments
- IDOT District 8
- IDOT Central Office
- Illinois Environmental Protection Agency
- Illinois Emergency Management Agency (IEMA)/ Emergency Services & Disaster Agency (ESDA)
- Illinois State Police
- Madison County Highway Department
- Madison County Transit District
- Metro Networks
- Missouri CVISN
- Missouri Department of Natural Resources
- Missouri State Highway Patrol
- Mobility Technologies (Traffic.com)
- MoDOT Central Office
- MoDOT District 6
- Monroe County Highway Department
- Older Adult Transportation Service (OATS) Inc.
- Gateway Guide Regional Partners
- STARRS (St. Louis Area Regional Response System)
- St. Charles Transit Agency
- St. Clair County Transit District
- St. Clair County Highway Department
- St. Louis City Street Department
- St. Louis City Airport Authority
- St. Louis City Fire Department
- St. Louis City Police Department
- St. Louis County Department of Highways and Traffic
- St. Louis County Police Traffic Safety Division
- St. Peters Traffic Department

Along with those referenced several "general" placeholders and terminators were used to symbolize typical interconnections with other agencies not directly referenced by name in the architecture. Some of these general placeholders follow, along with agencies represented by these general placeholders:

- Financial Institutions
- Missouri County Agencies
  - Franklin County 911/Fire/EMS
  - Jefferson County 911/Fire/EMS
  - South County 911/Fire/EMS
  - North Central County 911/Fire/EMS
  - St. Charles County 911/Fire/EMS
- Illinois County Agencies
  - Madison County Sheriff/ESDA
  - Monroe County Sheriff/ESDA
  - St. Clair County 911/Sheriff/ESDA
- Fire District
  - Mehlville Fire District
- Local Media
  - KMOV-Channel 4
  - KSDK-Channel 5
  - KTVI-Channel 2
- Local Public Safety Agency (non-municipal)
- Illinois Public Works Department
  - Alton Public Works Department
  - Belleville Public Works Department
  - Columbia Public Works Department
  - East St. Louis Public Works Department
  - Edwardsville Public Works Department
  - Fairview Heights Public Works Department
  - Glen Carbon Public Works Department
  - O' Fallon Public Works Department
- Missouri Public Works Department
- Missouri Municipal Agencies (Police/Fire/EMS)
  - Arnold Police Department
  - Ballwin Police Department
  - Brentwood Police Department
  - Bridgeton Police
  - Bridgeton Police Department
  - Clayton Police Department
  - Crestwood Police Department
  - Creve Coeur Police Department
  - Des Peres Department of Public Safety
  - Fairview Police Department
  - Florissant Police Department
  - Frontenac Police Department
  - Pevely Police Department/Herculaneum Police Department
  - Richmond Heights Police Department
  - St. Charles Police Department
  - Sunset Hills Police Department
  - Union Police Department
  - University City Police Department
  - Washington Police Department
  - Wellston Police Department
  - Wentzville Police Department
  - Wood River Police Department
  - Collinsville Fire Department
  - Fairview Fire Department
  - Frontenac Fire/EMS Department
  - Med Star/Life Force
  - Mutual Aid Network (TBD)
  - Richmond Heights Fire Department
  - Riverview Fire Protection District
  - Rock Community/Cedar Hill Fire Protection Districts
  - Rock Hill Police/Fire/EMS Departments
  - Signal Hill Fire Department/St. Clair County/Neighboring Fire and EMS Departments
  - Swansea Fire Department
  - University City Fire Department
  - Villa Hills Fire Department
  - Washington Ambulance/Fire Department
  - Waterloo Fire Department
  - Wood River Fire Department
- Illinois Municipal Agencies
  - Alton Fire Department
  - Alton Police Department
  - Belleville Fire Department
  - Belleville Police Department
  - Collinsville Fire Department
  - Collinsville Police Department
  - Columbia Fire Department
  - Columbia Police Department
  - East St. Louis ESDA
  - East St. Louis Fire Department
  - East St. Louis Police Department
  - Edwardsville Fire Department
  - Edwardsville Police Department
  - Fairview Heights Fire Department
  - Fairview Heights Police Department
  - Glen Carbon Fire Department

    - Glen Carbon Police Department
    - Granite City Police Department
    - Granite City ESDA
    - Granite City Fire Department
    - Maryville Police Department
    - Maryville Village Fire District
    - Troy Fire Department
    - Troy Police Department
- Municipal Para transit Agency
- Power Company
- Private Ambulance Service
- Private ISP
    - AAA
    - Clear Channel
    - Compu Traffic
    - Metro Networks
- Travelers
- Event Promoters
- County Police/Sheriff Dispatch
    - Monroe County
    - Jefferson County Police Department
    - Franklin County Sheriff Department
    - St. Charles County Sheriff Department
- Fire District Dispatch
    - Community Fire District
    - Mehlville Fire District
    - Cottleville Fire Protection District
- Regional Employers
- Weather Service

3 Operational Concept

The St. Louis region has many agencies with diverse operational roles and responsibilities for various transportation functions. Of those agencies most share basic information and in some situations resources to address regional transportation issues. A regional "operational concept" provides a definition to the roles each agency performs and begins the process of describing how the agencies interact.

The St. Louis regional "Operational Concept" identifies the different stakeholder agency roles as they exist now and how they are envisioned over the coming 5-year timeframe. To establish a regional concept stakeholders are first defined by their primary regional functions. Thus each stockholder's roles are more easily identified. Using this information, a basic organizational picture of how the region addresses transportation issues is developed. The combination of identifying the agency roles and interactions with other regional stakeholders completes the operational concept.

3.1 Regional Stakeholder Roles

Stakeholders represent different backgrounds and perform a range of transportation related functions. They are made up of public and private entities, which typically operate out of a control, dispatch, or other center of operations. To identify and define the different stakeholders, nine categories (based on the National ITS Architecture) were adopted, which define the primary roles of the different regional agencies. The following briefly describes each category and list the associated regional stakeholders.

Traffic Management: Agencies that operate roadway equipment and serve to improve transportation system operation efficiency and safety. Traffic management agencies typically coordinate with the other agencies by relaying pertinent traffic conditions and incidents and alerting the traveling public. Agencies that perform these functions for the St. Louis region are listed as ITS Stakeholders in Section 2.1.

Emergency Management: Agencies that operate in a public safety capacity, often coordinating efforts involving emergency response. Regional emergency management stakeholders are listed as ITS Stakeholders in Section 2.1.

Transit Management: Agencies that manage, operate, and maintain transit vehicle fleets and or coordinate other transportation service modes. Regional transit management stakeholders are listed in Section 2.1.

Media Outlet: Agencies that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media. Regional media stakeholders are listed in Section 2.1.

Information Service Provider: Agencies that assemble, process, archive, and communicate transportation related data and information to motorist or other information dissemination outlets. The information is can be provided in near real time or as a historical reference. Typical information collected and distributed includes, road conditions, weather, construction and maintenance activities, transit schedules, parking, and special event alerts. Regional information service providers are listed as ITS Stakeholders in Section 2.1.

Multi-Modal Transportation Service Provider: These represent agencies that represent or exchange information with other transportation providers typically taxi, ride sharing, transit, paratransit, rental vehicle operator, airport facilities, ferry service, and rail systems. Generally these are operators of non-roadway transportation systems. By sharing transportation information efficient movement of passengers or individuals between services is enhanced. Multi-modal transportation service providers for the region are listed as ITS Stakeholders in Section 2.1.

Emission Management: Typical emission management agencies monitor and manage air quality, which includes collecting, measuring, and sharing information on pollution levels for local and regional zones or individual vehicles. The information is used to determine acceptable levels of pollutants or engage plans to curb pollution when levels are unsafe. Regional emissions management stakeholders are listed in Section 2.1.

Commercial Vehicle Administrators: Commercial vehicle administrators perform several regulatory functions including operating facilities that monitor and track credentials and permits, process applications and regulation violations, and collect fee and tax revenue. They also perform enforcement activities to insure regulation compliance. Regional commercial vehicle administrators are listed as ITS Stakeholders in Section 2.1.

Maintenance and Construction Management: Agencies that construct and maintain the surface transportation system, including winter maintenance. This stakeholder role also includes workzone management activities. Regional maintenance and construction management stakeholders are listed in Section 2.1.

Identification of each stakeholder function in the region further facilitates understanding and translation of agency needs into the regional architecture.

3.2 Regional Stakeholder Interactions – Market Package Approach

After categorizing the agencies by their responsibilities, existing and future stakeholder interactions are identified and documented. Using the National ITS Architecture and the corresponding Market Packages as a foundation provides a simple yet effective method for describing how regional agencies are/will operate together. Market packages are a collection of systems involving center(s), roadway, vehicle, or traveler elements that work in combination to describe a transportation function. An example of this might include a dispatch center and a vehicle and the need to track a vehicles location. By themselves the center and vehicle are only elements but because market packages also detail information exchanges between these elements a better understanding of how these elements interact to address the need or function (track vehicle's location) is possible.

Through discussions with local stakeholders 55 individual market packages were identified for the St. Louis region. Those 55 packages are grouped into eight market package categories. Not all agencies participate in each market package.

To present the regional operational concept the identified market packages are presented here along with associated agencies that participate and typical system element interactions. Market packages are presented broken into eight categories, which include

advance traffic management, maintenance and construction management, advance public transportation, emergency management, advance traveler information systems, commercial vehicle operations, and archived data management.

3.3 Market Packages Utilized in Regional Operations

The following provide a description and listing of the market packages that are utilized for regional operations under the Bi-State St. Louis ITS Architecture. Not all market packages identified under the National ITS Architecture are applicable to the region. Out of a potential 85 different packages 55 are pertinent to the region. Each of these is categorized and listed below as a quick reference.

Advanced Traffic Management Systems

Advanced Traffic Management System (ATMS) market packages focus on roadway operations. Typically involved agencies include a traffic operations center that monitors roadway conditions and identifies breakdowns in traffic flow caused by planned or unplanned incidents and initiates responses necessary to moderate the impact to the traveling public. Of the market packages identified under the National ITS Architecture of fifteen are applicable to the St. Louis region and are highlighted below.

- ATMS01 - Network Surveillance
- ATMS02 – Probe Surveillance
- ATMS03 - Surface Street Control
- ATMS04 - Freeway Control
- ATMS06 - Traffic Information Dissemination
- ATMS07 - Regional Traffic Control
- ATMS08 - Incident Management System
- ATMS09 – Traffic Forecast and Demand Management
- ATMS11 - Emissions Monitoring and Management
- ATMS13 - Standard Railroad Grade Crossing
- ATMS14 – Advanced Railroad Grade Crossing
- ATMS16 – Parking Facility Management
- ATMS17 – Regional Parking Management
- ATMS18 - Reversible Lane Management
- ATMS19 – Speed Monitoring

Maintenance and Construction Systems

The Maintenance and Construction Management market packages monitor and manage roadway infrastructure construction and maintenance activities. These systems manage fleets of maintenance, construction, or special service vehicles (e.g., snow and ice control equipment). These systems also participate in incident response by deploying maintenance and construction resources to an incident scene, in coordination with other agencies. The systems manage the repair and maintenance of both non-ITS and ITS equipment including the traffic controllers, detectors, dynamic message signs, signals, and other equipment associated with the roadway infrastructure. Additional interfaces to weather information providers are also part of these systems.

- MC01 – Maintenance and Construction Vehicle and Equipment Tracking
- MC03 – Road Weather Data Collection
- MC04 - Weather Information Processing and Distribution
- MC05 – Roadway Automated Treatment
- MC06 – Winter Maintenance
- MC07 – Roadway Maintenance and Construction
- MC08 – Work Zone Management

- MC09 – Work Zone Safety Monitoring
- MC10 – Maintenance and Construction Activity Coordination

Advance Public Transportation Systems

Advance Public Transportation System (APTS) market packages address select needs and issues surrounding the public transportation industry. Issues such as locating, monitoring, operating, and maintaining vehicles are undertaken. There are 8 market packages identified under the National ITS Architecture of which all 8 apply to the St. Louis region. A description and diagram detail each packages is shown below.

- APTS01 - Transit Vehicle Tracking
- APTS02 - Transit Fixed-Route Operations
- APTS03 - Demand Response Transit Operations
- APTS04 - Transit Passenger and Fare Management
- APTS05 - Transit Security
- APTS06 - Transit Maintenance
- APTS07 - Multi-modal Coordination
- APTS08 - Transit Traveler Information

Emergency Management Systems

Emergency Management (EM) market packages typically serve the needs of law enforcement, fire, search and rescue, and HAZMAT operations. The packages also address coordination between the various agencies' personnel, vehicles, and response plans. There are several market packages identified under the National ITS Architecture of which ten apply to the St. Louis region and are highlighted below.

- EM01 - Emergency Call-Taking and Dispatch
- EM02 - Emergency Routing
- EM03 – Mayday Support
- EM04 - Roadway Service Patrols
- EM05 – Transportation Infrastructure Protection
- EM06 – Wide-Area Alert
- EM07 – Early Warning System
- EM08 – Disaster Response and Recovery
- EM09 – Evacuation and Reentry Management
- EM10 – Disaster Traveler Information

Advance Traveler Information Systems

Markets packages under the Advanced Traveler Information Systems (ATIS) category work to supply traveler with information on existing traffic conditions, weather, construction, maintenance, and special events activities that could impact their travel plans. The information could be supplied in a variety of ways including television, hardware located along the roadway, or through an electronic mechanism. Under the National ITS Architecture there are five packages that are applicable to the St. Louis region.

- ATIS01 - Broadcast Traveler Information
- ATIS02 - Interactive Traveler Information
- ATIS05 - ISP Based Route Guidance
- ATIS07 - Yellow Pages and Reservation
- ATIS08 – Dynamic Ridesharing

Commercial Vehicle Operations

Market packages under the commercial vehicle operation (CVO) category perform functions necessary to monitor and process information about various operations including regulatory and safety management and compliance. Illinois CVO market packages are addressed in the statewide ITS architecture. Under the National ITS Architecture there are currently six packages that are applicable to the St. Louis region, these include:

- CVO03 - Electronic Clearance
- CVO04 - CV Administrative Processes
- CVO06 - Weigh-in-Motion
- CVO07 - Roadside CVO Safety
- CVO08 - On-Board CVO Safety
- CVO10 - HAZMAT Management

Archived Data Management

Archived Data Management market packages perform the functions of collect, storing, and retrieving local or regional data both current and historical. The type of data collected is typically roadway or transportation system performance data such as schedules, volumes, speed, etc. There are two market packages that are currently applicable to the St. Louis region. Those market packages are the following:

- AD01 – ITS Data Mart
- AD02 - ITS Data Warehouse

3.4 Regional Market Packages Defined

Each market package identified for the St. Louis region is described in greater detail here. A short definition, typical graphic showing interconnections between system elements, and preliminary list of agencies that would participate or use the package function is provided so a greater understanding of different agency operational roles can be identified.

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3.4.1 ATMS01 - Network Surveillance

National ITS Architecture Definition:	Participating Regional Elements
This Market Package includes traffic detectors, environmental sensors, other surveillance equipment, the supporting field equipment, and wireline communications to transmit the collected data back to the Traffic Management Subsystem. The derived data can be used locally such as when traffic detectors are connected directly to a signal control system or remotely (e.g., when a CCTV system sends data back to the Traffic Management Subsystem). The data generated by this Market Package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect census data for traffic strategy development and long range planning. The collected data can also be analyzed and made available to users and the Information Service Provider Subsystem.	- Clayton MO Traffic Center - Clayton MO Traffic Center ISP - Gateway Guide Field Equipment - Gateway Guide TMC - IDOT District 8 Field Equipment - IDOT District 8 TMC - Metro Networks Operations Center - MoDOT Statewide Traveler System - Private ISP - St. Peters MO Traffic Center - St. Peters MO Traffic Center Roadside Equipment - St. Louis City Streets Department - St. Louis City Streets Dept. Roadside Equipment - St. Louis County Traffic and Highways Department - Mobility Technologies Traffic Center - Mobility Technologies Roadway Equipment

National ITS Architecture Graphic:

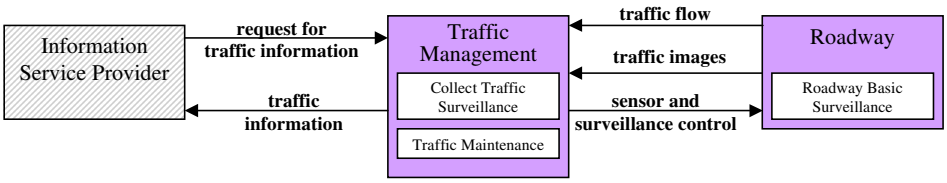

Figure 3-1: ATMS01 - Network Surveillance Market Package

3.4.2 ATMS02 – Probe Surveillance

National ITS Architecture Definition:	Participating Regional Elements
This market package provides an alternative approach for surveillance of the roadway network. Two general implementation paths are supported by this market package: 1) wide-area wireless communications between the vehicle and Information Service Provider is used to communicate current vehicle location and status, and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem. The first approach leverages wide area communications equipment that may already be in the vehicle to support personal safety and advanced traveler information services. The second approach utilizes vehicle equipment that supports toll collection, in-vehicle signing, and other short range communications applications identified within the architecture. The market package enables traffic managers to monitor road conditions, identify incidents, analyze and reduce the collected data, and make it available to users and private information providers. It requires one of the communications options identified above, roadside beacons and fixed-point to fixed-point communications for the short range communications option, data reduction software, and utilizes fixed-point to fixed-point links between the Traffic Management Subsystem and Information Service Provider Subsystem to share the collected information. Both "Opt out" and "Opt in" strategies are available to ensure the user has the ability to turn off the probe functions to ensure individual privacy. Due to the large volume of data collected by probes, data reduction techniques are required, such as the ability to identify and filter out-of-bounds or extreme data reports.	- St. Louis City Streets Department - St. Louis City Streets Department Roadside Equipment

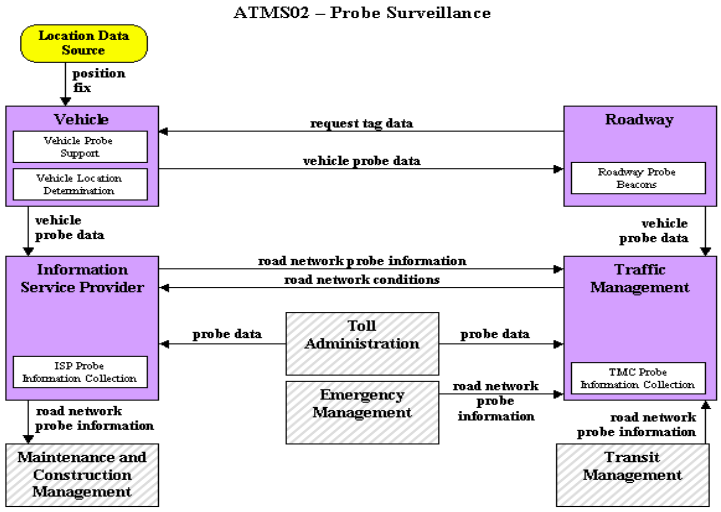

Figure 3-2: ATMS02 - Probe Surveillance Market Package

3.4.3 ATMS03 - Surface Street Control

National ITS Architecture Definition:	Participating Regional Elements
This market package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management. A range of traffic signal control systems are represented by this market package ranging from static pre-timed control systems to fully traffic responsive systems that dynamically adjust control plans and strategies based on current traffic conditions and priority requests. Additionally, general advisory and traffic control information can be provided to the driver while en-route. This market package is generally an intra-jurisdictional package that does not rely on real-time communications between separate control systems to achieve area-wide traffic signal coordination. Systems that achieve coordination across jurisdictions by using a common time base or other strategies that do not require real time coordination would be represented by this package. This market package is consistent with typical urban traffic signal control systems.	- Clayton MO Traffic Center - IDOT District 8 Field Equipment - Gateway Guide Field Equipment (MoDOT) - IDOT District 8 TMC - Madison County Highway Center - Madison County Field Equipment - Illinois Municipal Public Works Operations - Illinois Municipal Public Works Field Equipment - MoDOT Gateway Guide TMC - St. Peters MO Traffic Center - St. Peters MO Traffic Center Roadside Equipment - St. Louis City Streets Department - St. Louis City Streets Department Roadside Equipment - St. Louis County Traffic and Highways Department

National ITS Architecture Graphic:

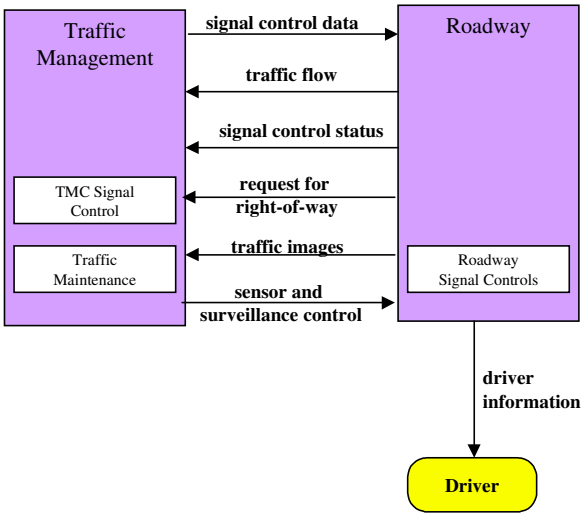

Figure 3-3: ATMS03 - Surface Street Control Market Package

3.4.4 ATMS04 - Freeway Control

National ITS Architecture Definition:	Participating Regional Elements
This market package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. Coordination and integration of ramp meters are included as part of this market package. This package is consistent with typical urban traffic freeway control systems. This package incorporates the instrumentation included in the Network Surveillance Market Package to support freeway monitoring and adaptive strategies as an option. This market package also includes the capability to utilize surveillance information for detection of incidents. Typically, the processing would be performed at a traffic management center; however, developments might allow for point detection with roadway equipment. For example, a CCTV might include the capability to detect an incident based upon image changes. Additionally, this market package allows general advisory and traffic control information to be provided to the driver while en route.	- Gateway Guide Field Equipment (MoDOT) - IDOT District 8 Field Equipment - IDOT District 8 TMC - MoDOT Gateway Guide TMC - St. Peters MO Traffic Center - St. Peters MO Traffic Center Roadside Equipment

National ITS Architecture Graphic:

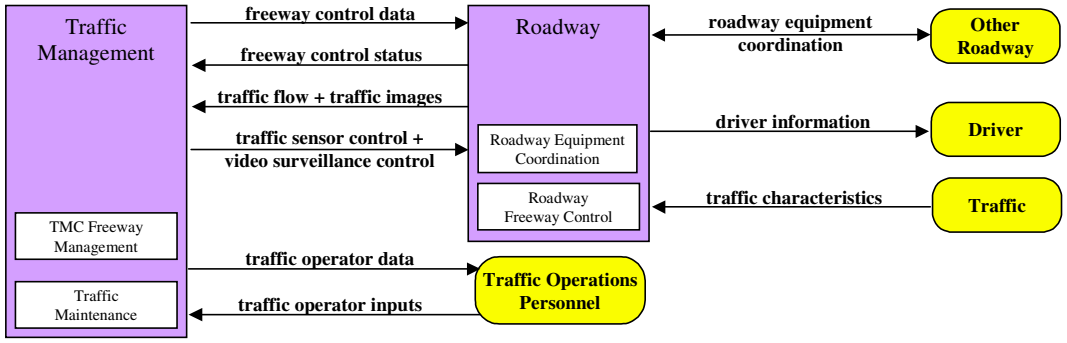

Figure 3-4: ATMS04 - Freeway Control Market Package

3.4.5 ATMS06 - Traffic Information Dissemination

National ITS Architecture Definition:	Participating Regional Elements
This market package allows traffic information to be disseminated to drivers and vehicles using roadway equipment such as dynamic message signs or highway advisory radio. This package provides a tool that can be used to notify drivers of incidents; careful placement of the roadway equipment provides the information at points in the network where the drivers have recourse and can tailor their routes to account for the new information. This package also covers the equipment and interfaces that provide traffic information from a traffic management center to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems), transit management center, emergency management center, and information service provider.	- Ambulance District Dispatch - Gateway Guide Transportation Management Center - County Fire/EMS Dispatch - County Police/Sheriff Dispatch - Fire District Dispatch - Gateway Guide Field Equipment (MoDOT) - IDOT District 8 Field Equipment - IDOT District 8 TMC - Illinois County 911 Centers - MoDOT Gateway Guide - IEMA Call Center - Il State Police Communications Center Dispatch - Madison County IL Highway Center - Madison County Transit Center - Metro Networks Operations Center - Mobility Technologies Traffic Center - Mobility Technologies Roadside Equipment - MoDOT Statewide Traveler System - Monroe County Highway Center - MSHP Dispatch - Municipal EMS Dispatch - Municipal Fire Dispatch - Municipal Paratransit Dispatch - OATS Transit Center - Police Dispatch - Private Ambulance Dispatch - Private ISP - St. Charles Transit Agency Dispatch - St. Clair County Highway Center - St. Clair County Transit Center - St. Louis MO City Fire/EMS Communications Dispatch - St. Louis City Streets Department - St. Louis City Streets Department Roadside Equipment - St. Peters MO Traffic Center - St. Peters MO Traffic Center Roadside Equipment - State DOT Roadway Conditions ISP

National ITS Architecture Graphic:

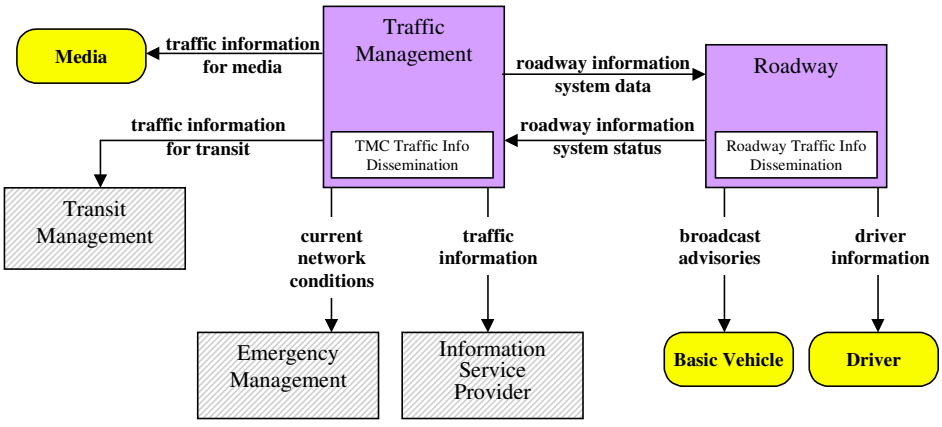

Figure 3-5: ATMS06 - Traffic Information Dissemination Market Package

3.4.6 ATMS07 - Regional Traffic Control

National ITS Architecture Definition:	Participating Regional Elements
This market package advances the Surface Street Control and Freeway Control Market Packages by adding the communications links and integrated control strategies that enable integrated Inter-jurisdictional traffic control. This market package provides for 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. This package relies principally on roadside instrumentation supported by the Surface Street Control and Freeway Control Market Packages and adds hardware, software, and wireline communications capabilities to implement traffic management strategies, which are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of control between traffic management centers.	- Clayton MO Traffic Center - Gateway Guide Field Equipment (MoDOT) - IDOT District 8 Field Equipment - IDOT District 8 TMC - MoDOT Gateway Guide TMC - MNDR Emissions Measurement Field Equipment - MoDOT Statewide Traveler System - St. Peters MO Traffic Center - St. Peters MO Traffic Center Roadside Equipment -St. Louis City Streets Department -St. Louis County Traffic and Highways Department

National ITS Architecture Graphic:

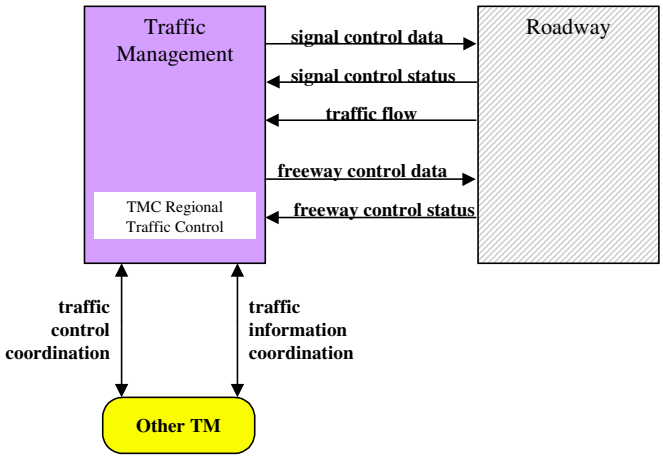

Figure 3-6: ATMS07 - Regional Traffic Control Market Package

3.4.7 ATMS08 - Incident Management System

National ITS Architecture Definition:	Participating Regional Elements
This market package manages both predicted and unexpected incidents so that the impact to the transportation network and traveler safety is minimized. Requisite incident detection capabilities are included in the freeway control market package and through the regional coordination with other traffic management and emergency management centers, weather service entities, and event promoters supported by this market package. Information from these diverse sources are collected and correlated by this market package to detect and verify incidents and implement an appropriate response. This market package provides Traffic Management Subsystem equipment that supports traffic operations personnel in developing an appropriate response in coordination with emergency management and other incident response personnel to confirmed incidents. The response may include traffic control strategy modifications and presentation of information to affected travelers using the Traffic Information Dissemination market package.	- Clayton MO Traffic Center - County 911 Call Taker - County Fire/EMS Dispatch - County Police/Sheriff Dispatch - County Police/Sheriff Dispatch Vehicles - Emergency Management Communications Hub - ESDA Dispatch - Fire District Dispatch - Gateway Guide Field Equipment (MoDOT) - MoDOT Gateway Guide TMC - IDOT Emergency Patrol - IDOT District 8 TMC - IDOT District 8 Field Equipment - IEMA Call Center - Il State Police Communications Center Dispatch - Madison County Highway Center - Metro Networks Operations Center - MoDOT Motorist Assist - MoDOT Statewide Traveler System - Monroe County Dispatch Center - MSHP Dispatch - Municipal 911 Call Taker - Municipal Fire Dispatch - Municipal Fire Dispatch Vehicles - Municipal Police/Fire/EMS Dispatch - Municipal Police/Fire/EMS Dispatch Vehicles - Municipal Public Works Dispatch - Municipal Public Works Operations - Private Ambulance Dispatch - Private Ambulance Dispatch Vehicles - St. Clair County Dispatch Center - St. Louis MO City 911 Center - St. Louis MO City Fire/EMS Comm. Dispatch - St. Louis MO City Police Vehicles - St. Louis City Streets Department - St. Louis City Streets Department Roadside Equipment - St. Louis County Traffic and Highways Department - St. Peters MO Traffic Center - State DOT Roadway Conditions ISP

National ITS Architecture Graphic:

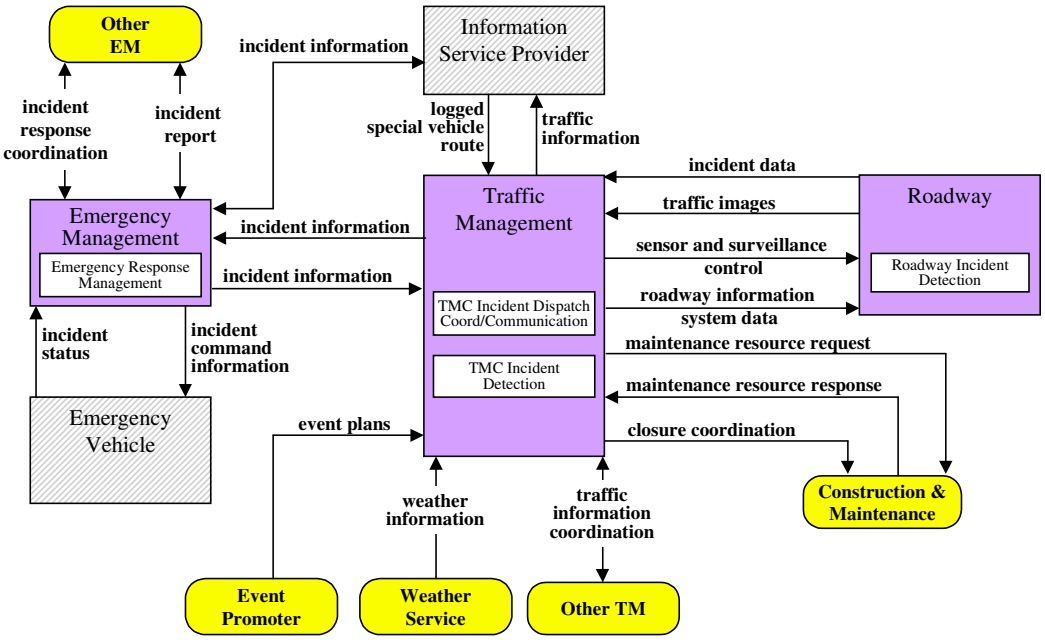

Figure 3-7: ATMS08 - Incident Management System Market Package

3.4.8 ATMS09 – Traffic Forecast and Demand Management

National ITS Architecture Definition:	Participating Regional Elements
This market package includes advanced algorithms, processing, and mass storage capabilities that support historical evaluation, real-time assessment, and forecast of the roadway network performance. This includes the prediction of travel demand patterns to support better link travel time forecasts. The source data would come from the Traffic Management Subsystem itself as well as other traffic management centers and forecasted traffic loads derived from route plans supplied by the Information Service Provider Subsystem. This market package provides data that supports the implementation of TDM programs, and policies managing both traffic and the environment. The package collects information on vehicle pollution levels, parking availability, usage levels, and vehicle occupancy to support these functions. Demand management requests can also be made to Toll Administration, Transit Management, and Parking Management Subsystems.	- MoDOT Statewide Traveler System - MoDOT Gateway Guide TMC - IDOT District 8 TMC - Metro Bi-State Development Agency - Metro Networks Operations Center - Mobility Technologies Traffic Center

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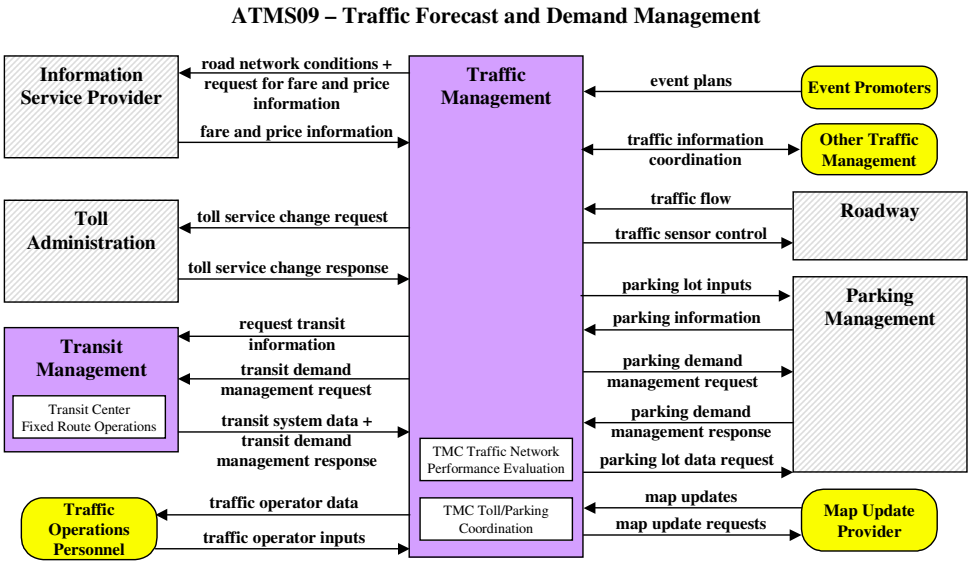

Figure 3-8: ATMS09 – Traffic Forecast and Demand Management Market Package

3.4.9 ATMS11 - Emissions Monitoring and Management

National ITS Architecture Definition:	Participating Regional Elements
This market package monitors individual vehicle emissions and provides general air quality monitoring using distributed sensors to collect the data. The collected information is transmitted to the emissions management subsystem for processing. Both area wide air quality monitoring and point emissions monitoring are supported by this market package. For area wide monitoring, this market package measures air quality, identifies sectors that are non-compliant with air quality standards, and collects, stores and reports supporting statistical data. For point emissions monitoring, this market package measures tail pipe emissions and identifies vehicles that exceed emissions standards. The gathered information can be used to implement environmentally sensitive TDM programs, policies, and regulations.	- MoDOT Gateway Guide TMC - IDOT District 8 TMC - IEPA Emissions Management System - MDNR Emissions Management System - MNDR Emissions Measurement Field Equipment - St. Peters MO Traffic Center - Media

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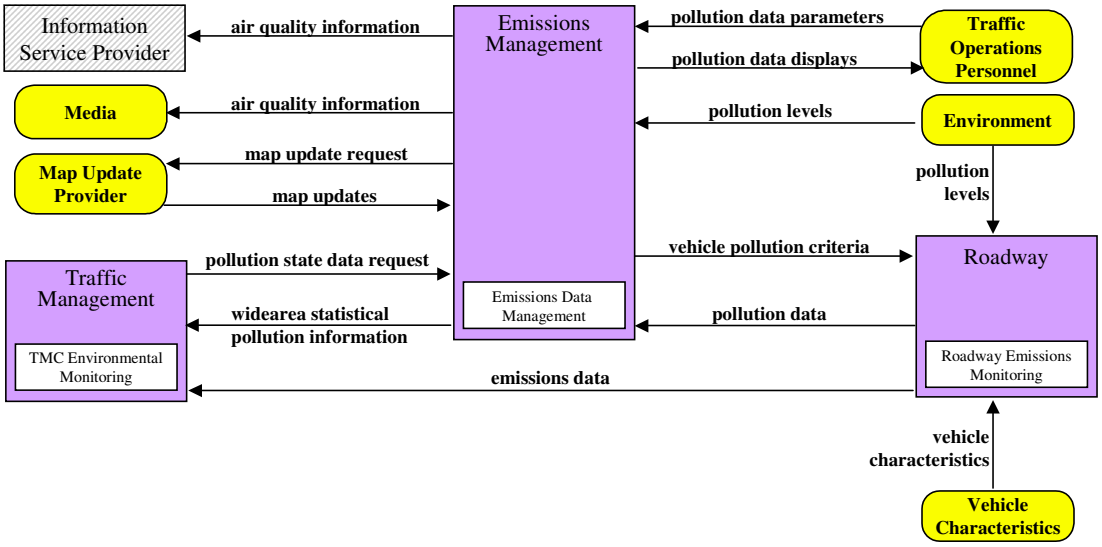

Figure 3-9: ATMS11 - Emissions Monitoring and Management Market Package

3.4.10 ATMS13 - Standard Railroad Grade Crossing

National ITS Architecture Definition:	Participating Regional Elements
This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Both passive (e.g., the crossbuck sign) and active warning systems (e.g., flashing lights and gates) are supported. (Note that passive systems exercise only the single interface between the roadway subsystem and the driver in the architecture definition.) These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported to both highway and railroad officials through wayside interfaces and interfaces to the traffic management subsystem.	- MoDOT Gateway Guide Field Equipment - MoDOT Gateway Guide TMC - IDOT District 8 Field Equipment - IDOT District 8 TMC - Municipal Public Works Operations - St. Louis Street Department - St. Louis Street Department Field Equipment - St. Peters MO Traffic Center - St. Peters MO Traffic Center Roadside Equipment

National ITS Architecture Graphic:

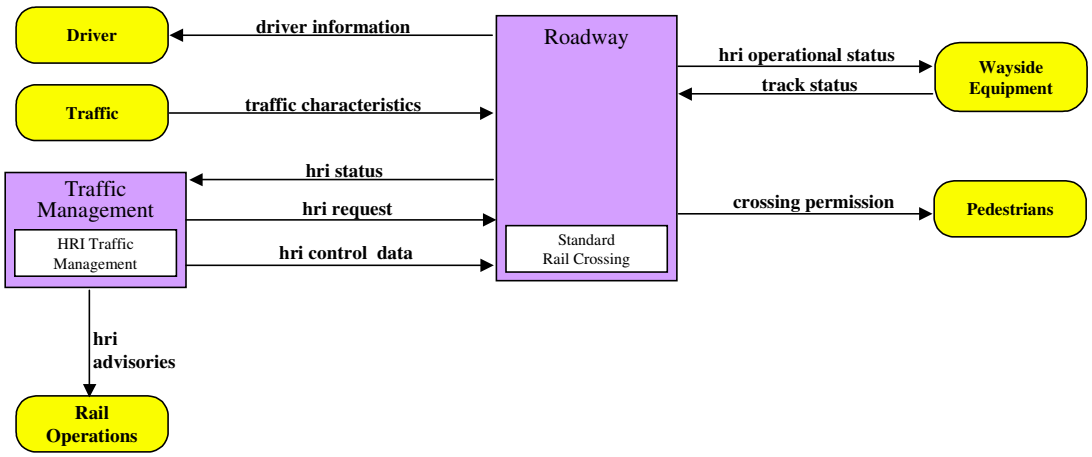

Figure 3-10: ATMS13 - Standard Railroad Grade Crossing Market Package

3.4.11 ATMS14 - Advanced Railroad Grade Crossing

National ITS Architecture Definition:	Participating Regional Elements
This market package manages highway traffic at highway-rail intersections (HRIs) where operational requirements demand advanced features (e.g., where rail operational speeds are greater than 80 miles per hour). This market package includes all capabilities from the Standard Railroad Grade Crossing Market Package and augments these with additional safety features to mitigate the risks associated with higher rail speeds. The active warning systems supported by this market package include positive barrier systems that preclude entrance into the intersection when the barriers are activated. Like the Standard Package, the HRI equipment is activated on notification by wayside interface equipment which detects, or communicates with the approaching train. In this market package, the wayside equipment provides additional information about the arriving train so that the train's direction of travel, estimated time of arrival, and estimated duration of closure may be derived. This enhanced information may be conveyed to the driver prior to, or in context with, warning system activation. This market package also includes additional detection capabilities that enable it to detect an entrapped or otherwise immobilized vehicle within the HRI and provide an immediate notification to highway and railroad officials.	- City of St. Louis Streets Department - City of St. Louis Streets Department Roadside Equipment - IDOT District 8 TMC - IDOT District 8 Field Equipment

National ITS Architecture Graphic:

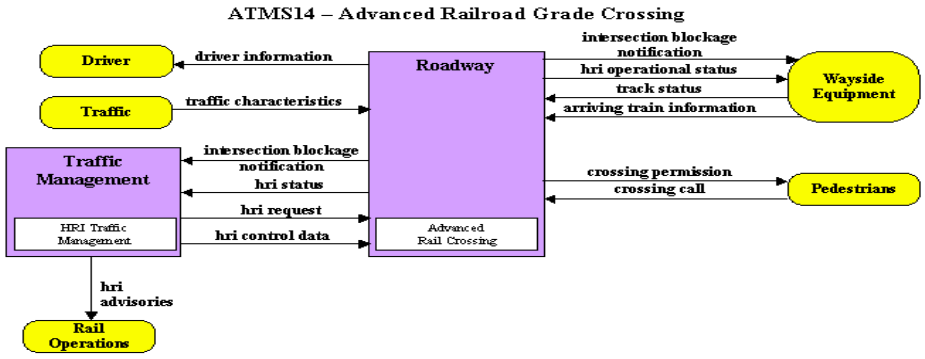

Figure 3-11: ATMS14 – Advanced Railroad Grade Crossing Market Package

3.4.12 ATMS16 – Parking Facility Management

National ITS Architecture Definition:	Participating Regional Elements
This market package provides enhanced monitoring and management of parking facilities. It assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees. This market package collects current parking status, shares this data with Information Service Providers and Traffic Management, and collects parking fees using the same in-vehicle equipment utilized for electronic toll collection or contact or proximity traveler cards used for electronic payment. Two other market packages, APTS4: Transit Passenger and Fare Management and ATMS10: Electronic Toll Collection also provide electronic payment services. These three market packages in combination provide an integrated electronic payment system for transportation services.	- Clayton Traffic Department - St. Louis Street Department - St. Peters Traffic Department - St. Louis County Traffic and Highways Department - Municipal Public Works Operations - IDOT District 8 TMC - Mobility Technologies Traffic Center - Metro Networks Operations Center - MoDOT Gateway Guide TMC - MoDOT Statewide Traveler System

National ITS Architecture Graphic:

ATMS16 – Parking Facility Management

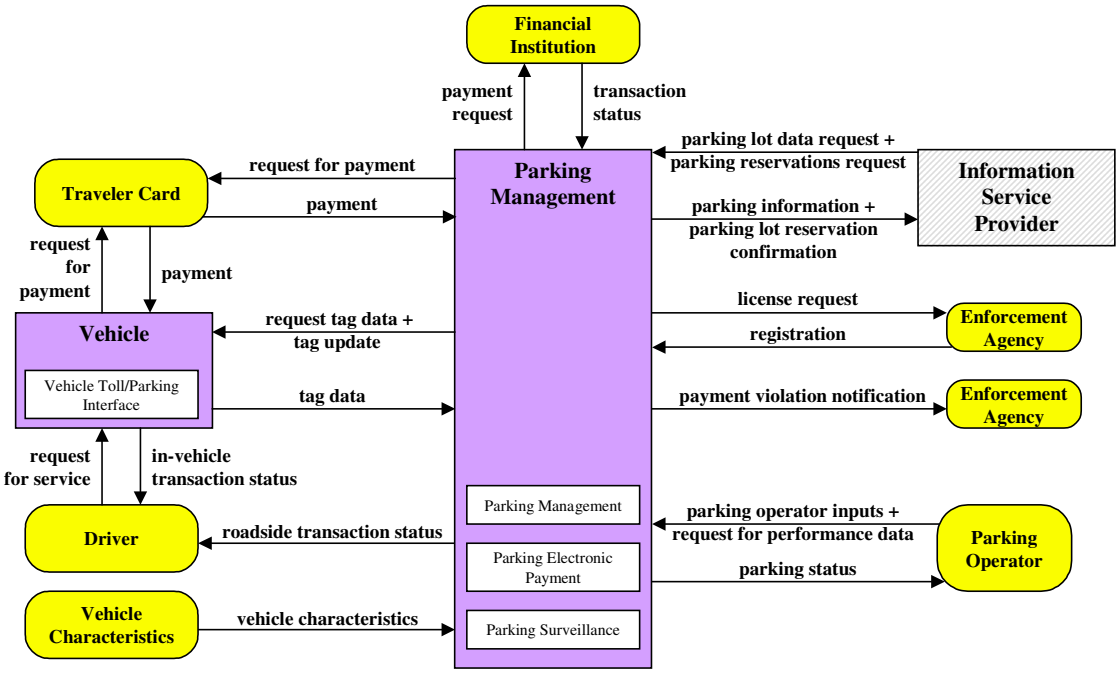

Figure 3-12: ATMS16 – Parking Facility Management Market Package

3.4.13 ATMS17 – Regional Parking Management

National ITS Architecture Definition:	Participating Regional Elements
This market package supports coordination between parking facilities to enable regional parking management strategies.	- University City Traffic Center - St. Charles Transit Agency - St. Louis Street Department - Madison County Transit Agency - St. Clair Transit Agency - Municipal Public Works Operations - IDOT District 8 TMC - METRO Bi-State Development Agency - OATS Transit Center - MoDOT Gateway Guide TMC - MoDOT Statewide Traveler System

National ITS Architecture Graphic:

ATMS17 – Regional Parking Management

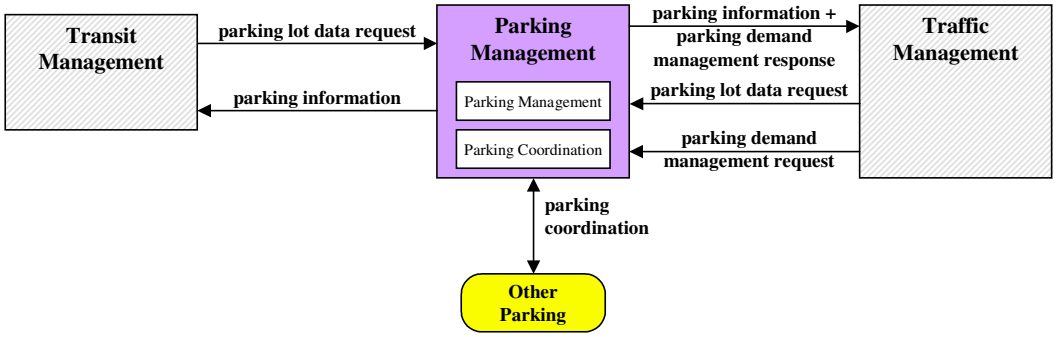

Figure 3-13: ATMS17 – Regional Parking Management Market Package

3.4.14 ATMS18 – Reversible Lane Management

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for the management of reversible lane facilities. In addition to standard surveillance capabilities, this market package includes sensory functions that detect wrong-way vehicles and other special surveillance capabilities that mitigate safety hazards associated with reversible lanes. The package includes the field equipment, physical lane access controls, and associated control electronics that manage and control these special lanes. This market package also includes the equipment used to electronically reconfigure intersections and manage right-of-way to address dynamic demand changes and special events.	- Gateway Guide Field Equipment - MoDOT Gateway Guide TMC

National ITS Architecture Graphic:

ATMS18 - Reversible Lane Management

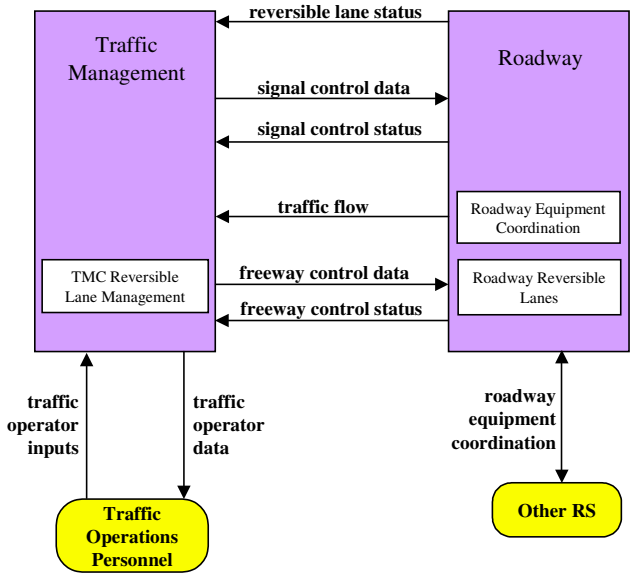

Figure 3-14: ATMS14 - Advanced Railroad Grade Crossing Market Package

3.4.15 ATMS19 – Speed Monitoring

National ITS Architecture Definition:	Participating Regional Elements
This market package monitors the speeds of vehicles traveling through a roadway system. If the speed is determine to be excessive, roadside equipment can suggest a safe driving speed. Environmental conditions may be monitored and factored into the safe speed advisories that are provided to the motorist. This service can also support notifications to an enforcement agency to enforce the speed limit on a roadway system.	- City of St. Louis Streets Department - City of St. Louis Streets Department Roadside Equipment

National ITS Architecture Graphic:

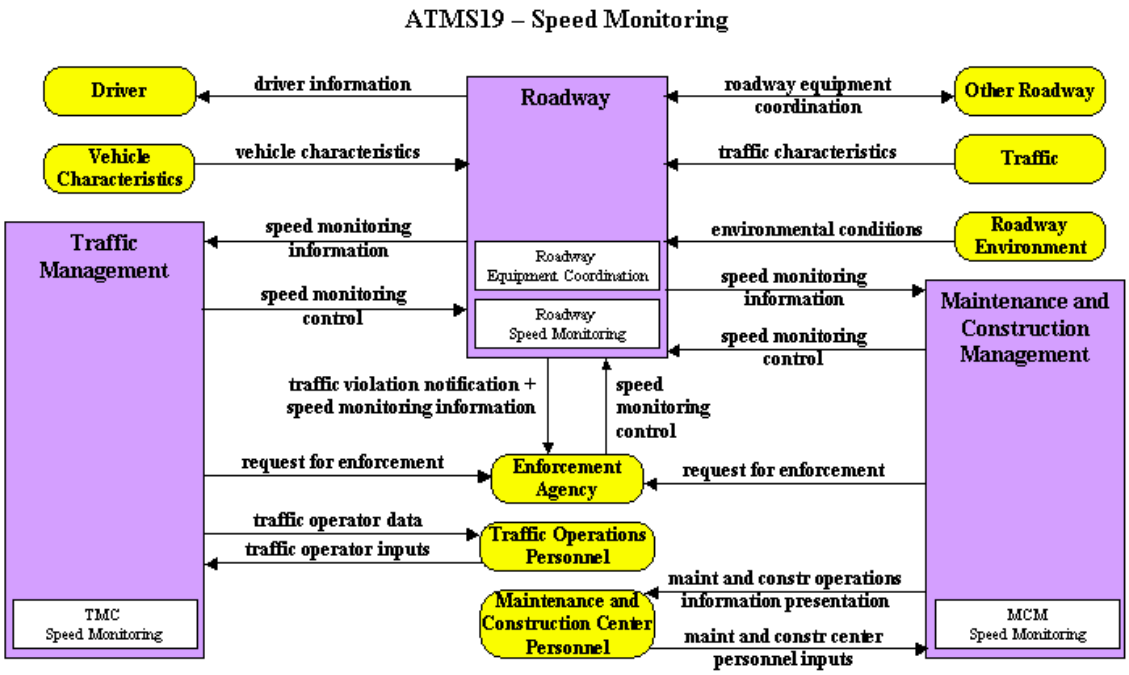

Figure 3-15: ATMS14 - Advanced Railroad Grade Crossing Market Package

3.4.16 MC01 – Maintenance and Construction Vehicle and Equipment Tracking

National ITS Architecture Definition:	Participating Regional Elements
This market package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities. These activities can include ensuring the correct roads are being plowed and work activity is being performed at the correct locations.	- St. Louis Street Department - St. Louis Street Department Vehicles - St. Louis County Traffic and Highways Department - St. Louis County Traffic and Highways Department Vehicles - Madison County Highway Center - Madison County Highway Maintenance Vehicles - Monroe County Highway Center - Monroe County Highway Maintenance Vehicles - St. Clair County Highway Center - St. Clair County Highway Maintenance Vehicles - Municipal Public Works Dispatch - Municipal Public Works Dispatch Vehicles - IDOT District 8 TMC - IDOT District 8 Maintenance Vehicles - MoDOT Maintenance Vehicles

National ITS Architecture Graphic:

MC01 - Maintenance and Construction Vehicle and Equipment Tracking

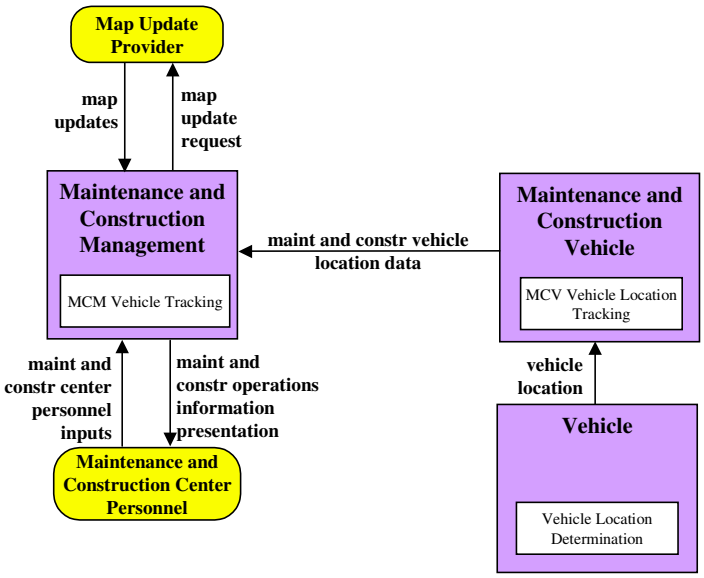

Figure 3-16: MC01 – Maintenance and Construction Vehicle and Equipment Tracking Market Package

3.4.17 MC03 – Road Weather Data Collection

National ITS Architecture Definition:	Participating Regional Elements
This market package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems). In addition to fixed sensor stations at the roadside, sensing of the roadway environment can also occur from sensor systems located on Maintenance and Construction Vehicles and on-board sensors provided by auto manufacturers. The collected environmental data is used by the Weather Information Processing and Distribution Market Package to process the information and make decisions on operations.	- St. Louis Street Department - St. Louis Street Department Field Devices - St. Peters Traffic Department - University City Traffic Center - St. Louis County Traffic and Streets Department - Madison County Highway Center - Monroe County Dispatch Center - St. Clair County Dispatch Center - County Police/Sheriff Dispatch - Municipal Police Dispatch - St. Louis County Police Department Dispatch - MoDOT Gateway Guide TMC - MoDOT Statewide Traveler Information System - Surface Transportation Weather Service - Weather Service

National ITS Architecture Graphic:

MC03 – Road Weather Data Collection

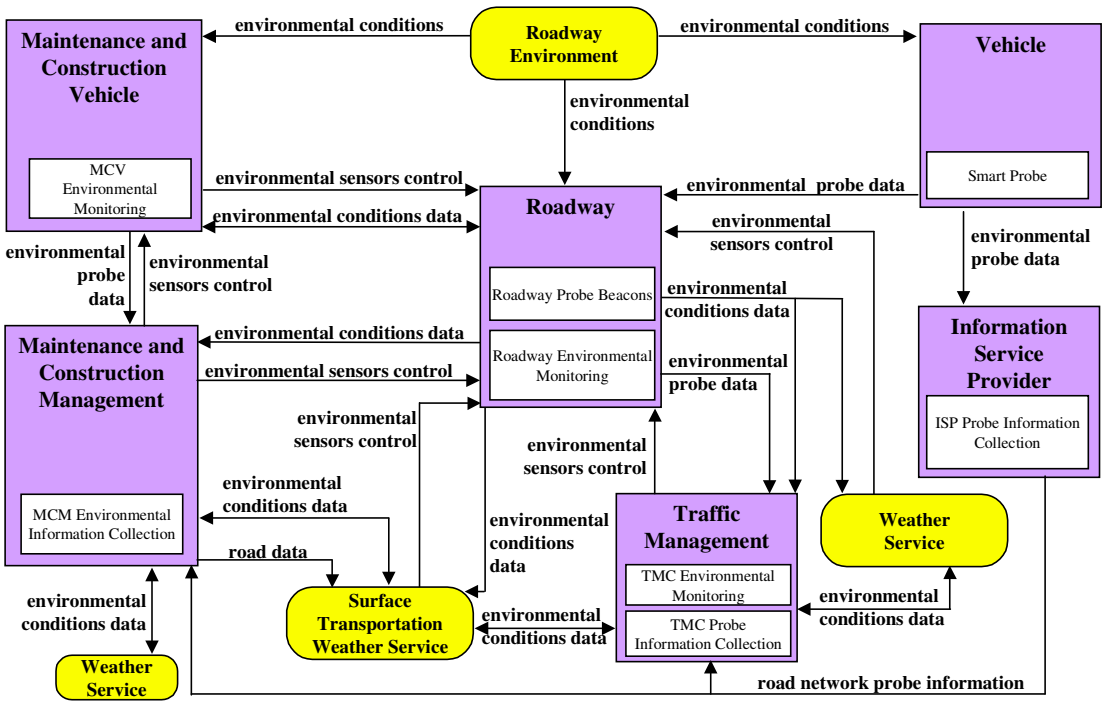

Figure 3-17: MC03 – Road Weather Data Collection Market Package

3.4.18 MC04 - Weather Information Processing and Distribution

National ITS Architecture Definition:	Participating Regional Elements
This market package 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 and decision support systems can make decision on corrective actions to take. The continuing updates of road condition information and current temperatures can be used by system operators to more effectively deploy road maintenance resources, issue general traveler advisories, issue location specific warnings to drivers using the Traffic Information Dissemination market package, and aid operators in scheduling work activity.	- MoDOT Gateway Guide TMC - IDOT District 8 TMC - MoDOT Statewide Traveler System - St. Peters MO Traffic Center - Weather Service - City of St. Louis Streets Department - St. Louis County Traffic and Highways Department - University City Traffic Center - Monroe County Highway Center - St. Clair County Highway Center - Municipal Public Works Dispatch - Surface Transportation Weather Service

National ITS Architecture Graphic:

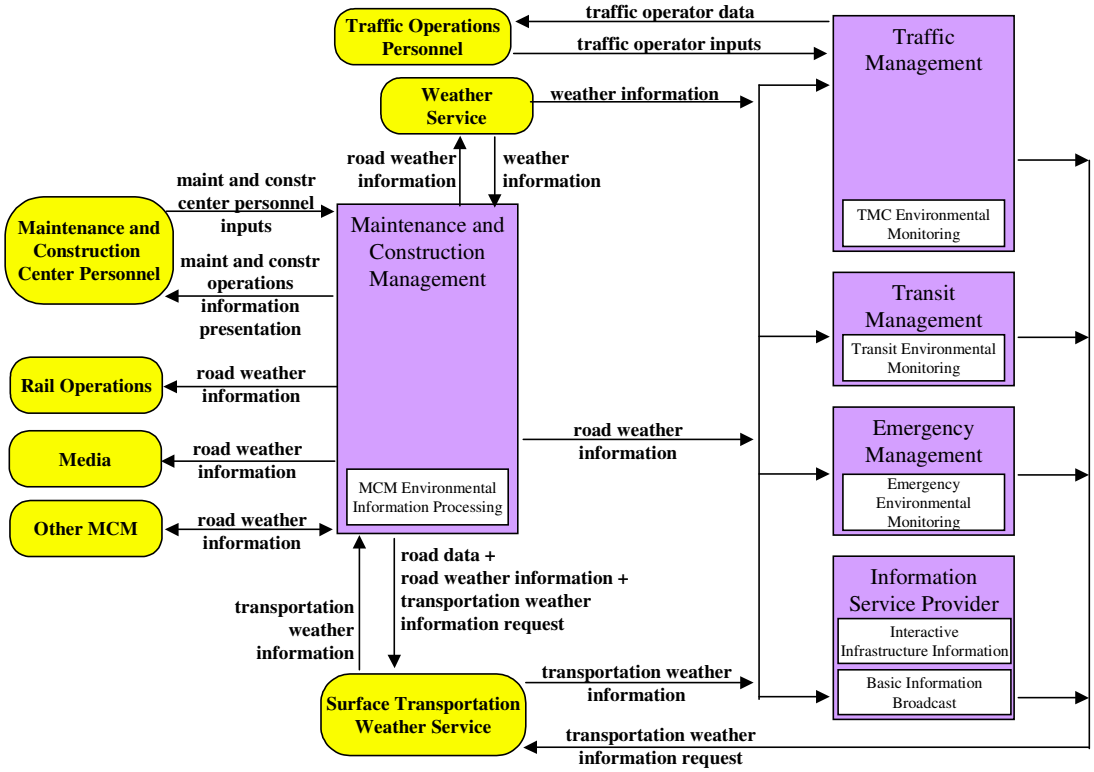

Figure 3-18: MC04 - Weather Information Processing and Distribution Market Package

3.4.19 MC05 – Roadway Automated Treatment

National ITS Architecture Definition:	Participating Regional Elements
This market package automatically treats a roadway section based on environmental or atmospheric conditions. Treatments include fog dispersion, anti-icing chemicals, etc. The market package includes the environmental sensors that detect adverse conditions, the automated treatment system itself, and driver information systems (e.g., dynamic message signs) that warn drivers when the treatment system is activated.	- City of St. Louis Streets Department - City of St. Louis Streets Department Roadside Equipment

National ITS Architecture Graphic:

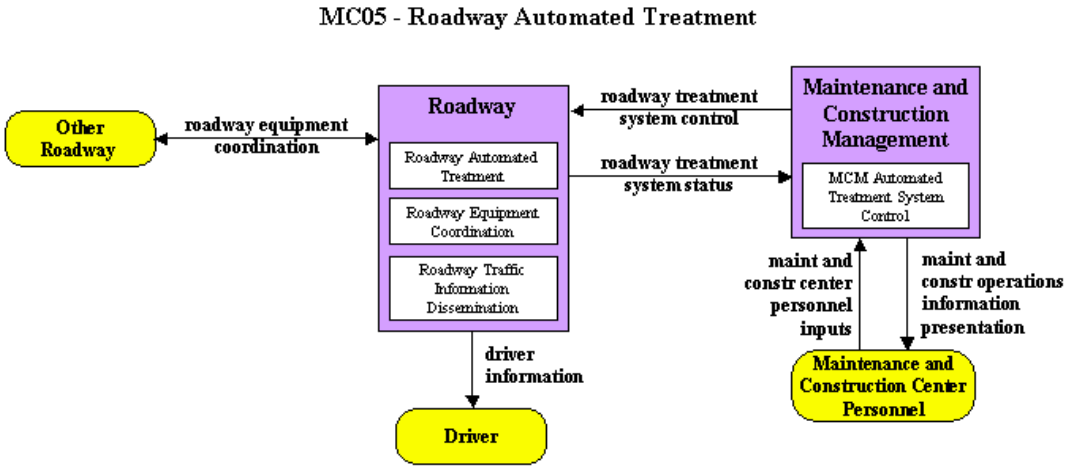

Figure 3-19: MC05 – Roadway Automated Treatment Market Package

3.4.20 MC06 – Winter Maintenance

National ITS Architecture Definition:	Participating Regional Elements
This market package supports winter road maintenance including snow plow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities. This package monitors environmental conditions and weather forecasts and uses the information to schedule winter maintenance activities, determine the appropriate snow and ice control response, and track and manage response operations.	- City of St. Louis Streets Department - City of St. Louis Streets Department Roadside Equipment - IDOT District 8 TMC - IDOT District 8 Maintenance Vehicles - Madison County Highway Center - Madison County Maintenance Vehicles - Monroe County Dispatch - Monroe County Maintenance Vehicles - MoDOT MCO Field Devices - MoDOT MCO Vehicles - Municipal Public Works Dispatch - Municipal Public Works Maintenance Vehicles - St. Clair County Dispatch - St. Clair County Maintenance Vehicles - Surface Transportation Weather Services - Weather Services

National ITS Architecture Graphic:

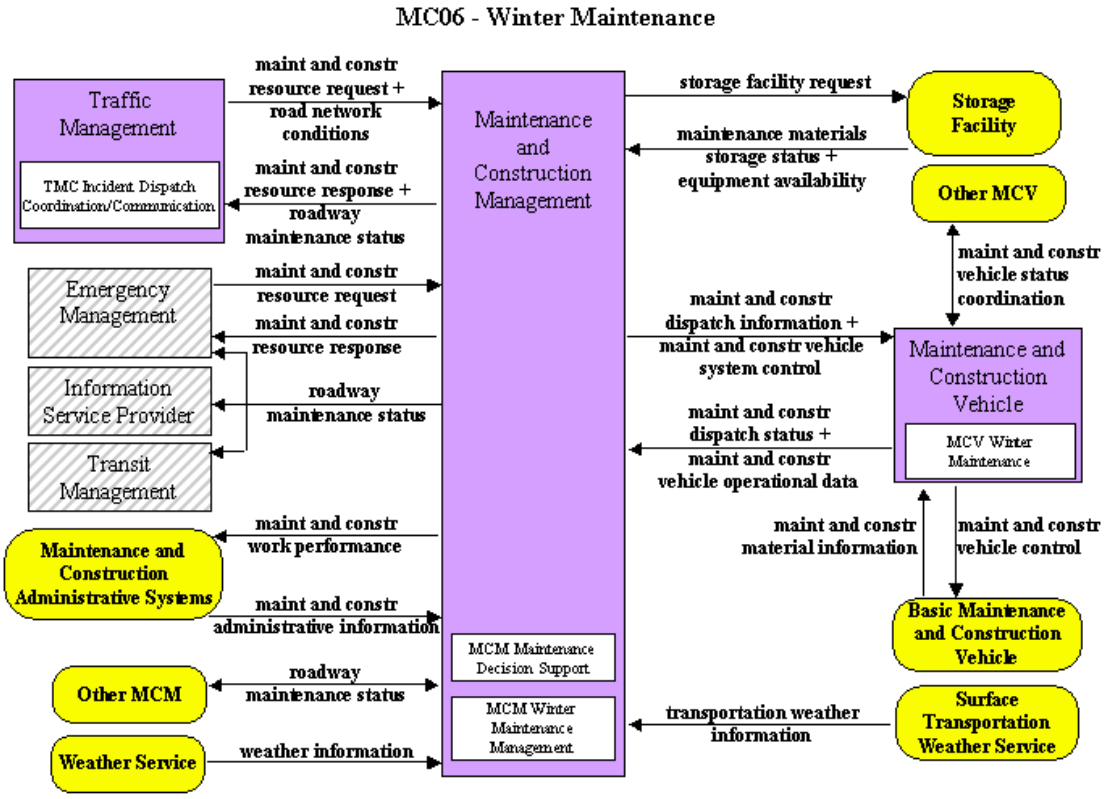

Figure 3-20: MC06 – Winter Maintenance Market Package

3.4.21 MC07 - Roadway Maintenance and Construction

National ITS Architecture Definition:	Participating Regional Elements
This market package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way. Maintenance services would include landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment on the roadway (e.g., signs, traffic controllers, traffic detectors, dynamic message signs, traffic signals, CCTV, etc.). Environmental conditions information is also received from various weather sources to aid in scheduling maintenance and construction activities.	- IDOT District 8 TMC - IDOT District 8 Maintenance Vehicles - Madison County Highway Center - Monroe County Highway Center - St. Clair County Highway Center - MoDOT Gateway Guide TMC - MoDOT District 6 MCO Vehicles - MoDOT Statewide Traveler System - Municipal Public Works Dispatch - Municipal Public Works Vehicles - St. Peters MO Traffic Center - City of St. Louis Streets Department - City of St. Louis MCO Vehicles - St. Louis County Traffic and Highways Department

National ITS Architecture Graphic:

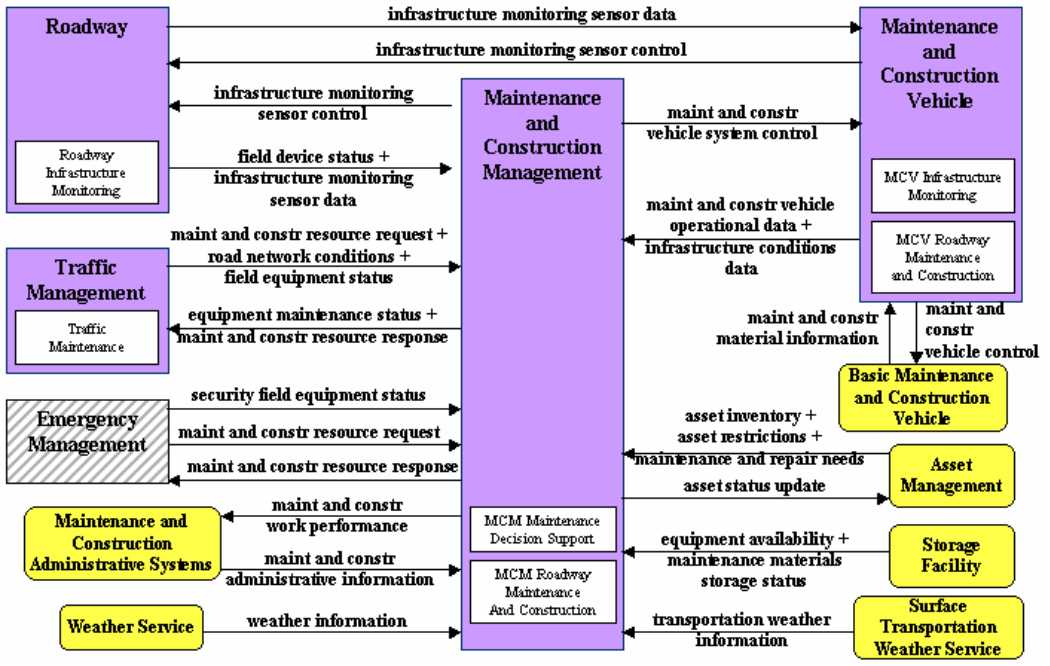

Figure 3-21: MC07 – Roadway Maintenance and Construction Market Package

3.4.22 MC08 – Work Zone Management

National ITS Architecture Definition:	Participating Regional Elements
This market package directs activity in work zones, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, traffic management, other maintenance and construction centers) for better coordination management. Work zone speeds and delays are provided to the motorist prior to the work zones.	- IDOT District 8 TMC - Municipal Public Works Dispatch - Madison County Highway Center - Monroe County Highway Center - St. Clair County Highway Center - MoDOT Gateway Guide TMC - MoDOT District 6 MCO Vehicles - MoDOT Central Office - MoDOT Statewide Traveler System - St. Peters MO Traffic Center - City of St. Louis MCO Field Devices - City of St. Louis MCO Vehicles - City of St. Louis Streets Department

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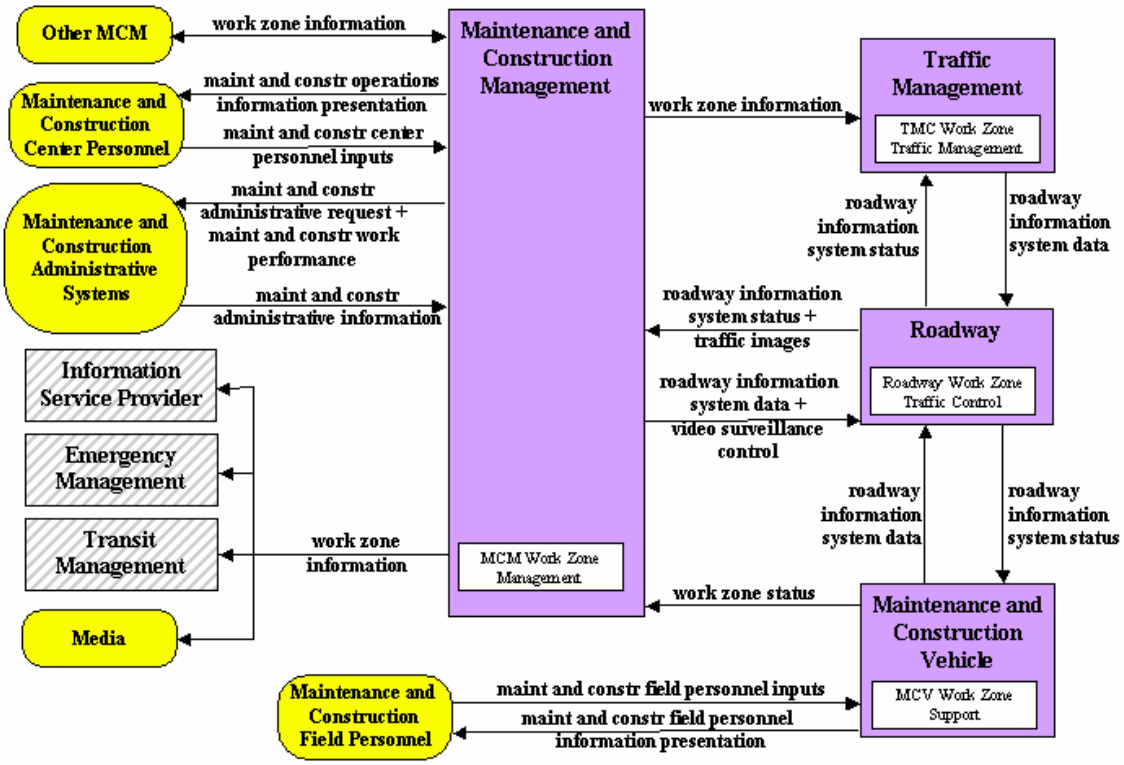

Figure 3-22: MC08 – Work Zone Management Market Package

3.4.23 MC09 – Work Zone Safety Monitoring

National ITS Architecture Definition:	Participating Regional Elements
This market package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. This market package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment or other potential safety hazards. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone. The market package supports both stationary and mobile work zones. The intrusion detection and alarm systems may be collocated or distributed, allowing systems that detect safety issues far upstream from a work zone (e.g., detection of over dimension vehicles before they enter the work zone).	- City of St. Louis Streets Department - City of St. Louis MCO Field Devices - City of St. Louis MCO Vehicles

National ITS Architecture Graphic:

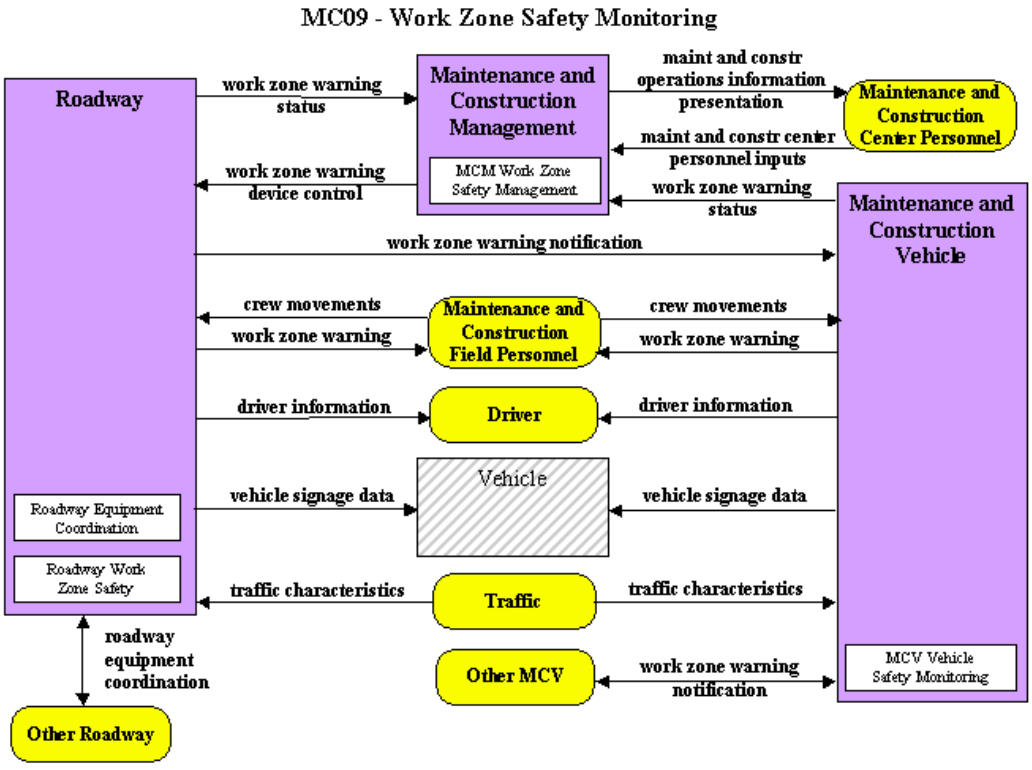

Figure 3-23: MC09 – Work Zone Safety Monitoring Market Package

3.4.24 MC10 – Maintenance and Construction Activity Coordination

National ITS Architecture Definition:	Participating Regional Elements
This market package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.	- IDOT District 8 TMC - Municipal Public Works Dispatch - Madison County Highway Center - Monroe County Dispatch - St. Clair County Dispatch - MoDOT Gateway Guide TMC - MoDOT District 6 - MoDOT Central Office - MoDOT Statewide Traveler System - St. Peters MO Traffic Center - City of St. Louis Streets Department - St. Louis County Traffic and Highways Department - Media

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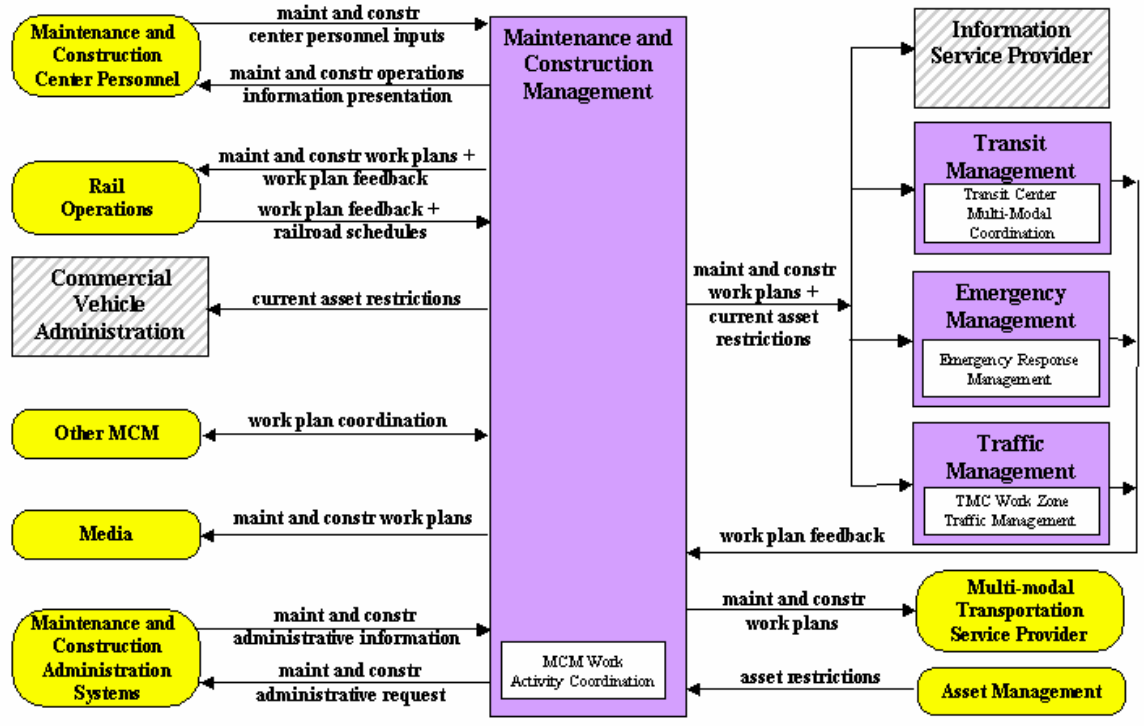

Figure 3-24: MC10 – Maintenance and Construction Activity Coordination Market Package

3.4.25 APTS01 - Transit Vehicle Tracking

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for an Automated Vehicle Location System to track the transit vehicle's real time schedule adherence and updates the transit system's schedule in real-time. Vehicle position may be determined either by the vehicle (e.g., through GPS) and relayed to the infrastructure or may be determined directly by the communications infrastructure. A two-way wireless communication link with the Transit Management Subsystem is used for relaying vehicle position and control measures. Fixed route transit systems may also employ beacons along the route to enable position determination and facilitate communications with each vehicle at fixed intervals. The Transit Management Subsystem processes this information, updates the transit schedule and makes real-time schedule information available to the Information Service Provider Subsystem via a wireline link.	- All area transit agencies - METRO St. Louis Transit Paratransit Vehicles - METRO St. Louis Transit Vehicles - METRO St. Louis Transit Center - IDOT District 8 TMC - MoDOT Gateway Guide TMC - Madison County Transit Center - Madison County Transit Paratransit Vehicles - Madison County Transit Vehicles - Municipal Paratransit Dispatch - Municipal Paratransit Vehicles - OATS Transit Center - OATS Transit Vehicles - St. Charles Transit Agency Dispatch - St. Charles Transit Agency Vehicles - St. Clair County Transit Center - St. Clair County Transit Vehicles

National ITS Architecture Graphic:

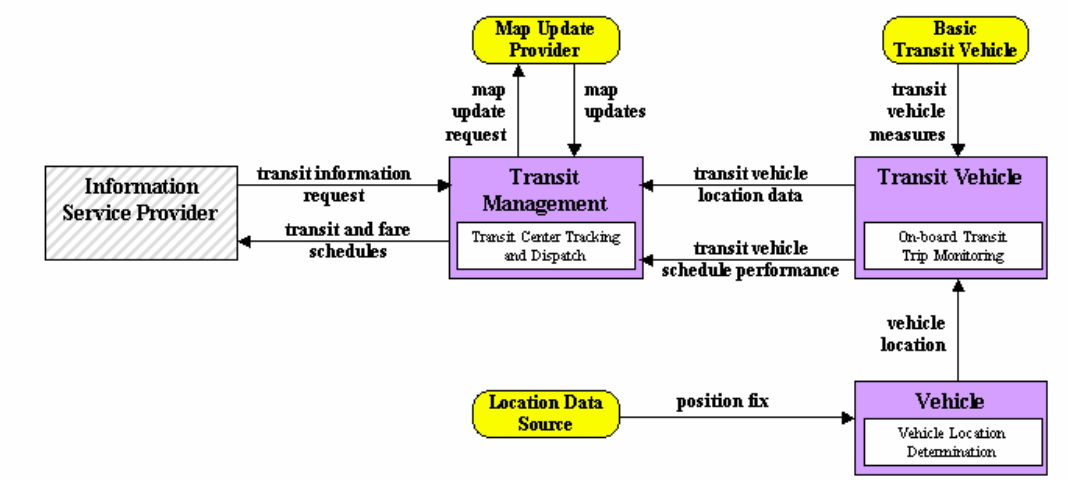

Figure 3-25: APTS01 - Transit Vehicle Tracking Market Package

3.4.26 APTS02 - Transit Fixed-Route Operations

National ITS Architecture Definition:	Participating Regional Elements
This market package performs vehicle routing and scheduling, as well as automatic driver assignment and system monitoring for fixed-route transit services. This service determines current schedule performance using AVL data and provides information displays at the Transit Management Subsystem, . Static and real time transit data is exchanged with Information Service Providers where it is integrated with that from other transportation modes (e.g. rail, ferry, air) to provide the public with integrated and personalized dynamic schedules.	- All area transit agencies - METRO Transit Vehicles - METRO St. Louis Transit Center - IDOT District 8 TMC - MoDOT Gateway Guide TMC - Madison County IL Highway Center ISP - Madison County Transit Paratransit Vehicles - St. Charles Transit Agency Dispatch - St. Charles Transit Agency Vehicles - St. Clair County Transit Center - St. Clair County Transit Vehicles

National ITS Architecture Graphic:

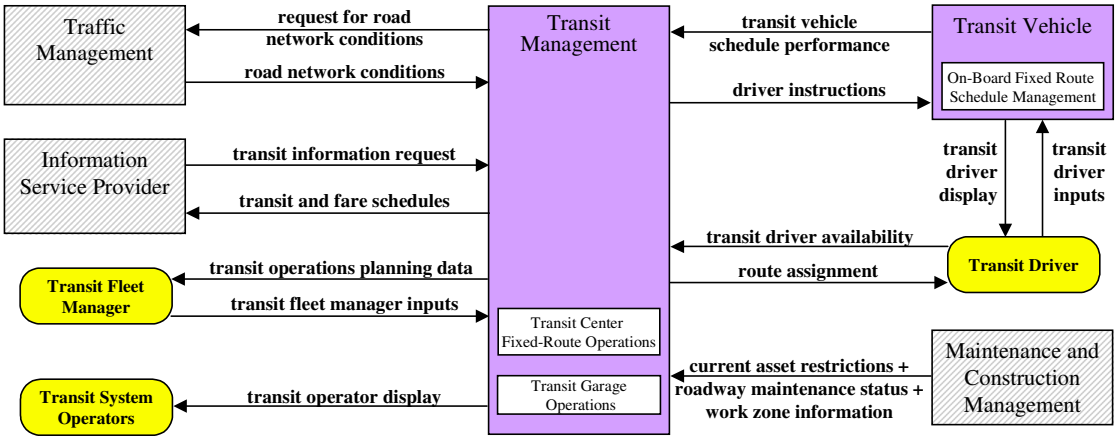

Figure 3-26: APTS02 - Transit Fixed-Route Operations Market Package

3.4.27 APTS03 - Demand Response Transit Operations

National ITS Architecture Definition:	Participating Regional Elements
This market package performs vehicle routing and scheduling as well as automatic driver assignment and monitoring for demand responsive transit services. This package monitors the current status of the transit fleet and supports allocation of these fleet resources to service incoming requests for transit service while also considering traffic conditions. The Transit Management Subsystem provides the necessary data processing and information display to assist the transit operator in making optimal use of the transit fleet. This service includes the capability for a traveler request for personalized transit services to be made through the Information Service Provider (ISP) Subsystem. The ISP may be either be operated by transit management center or be independently owned and operated by a separate service provider. In the first scenario, the traveler makes a direct request to a specific paratransit service. In the second scenario, a third party service provider determines the paratransit service is a viable means of satisfying a traveler request and makes a reservation for the traveler.	- All area transit agencies - METRO St. Louis Transit Paratransit Vehicles - METRO St. Louis Transit Center - Madison County Transit - Madison County Transit Paratransit Vehicles - Municipal Paratransit Dispatch - Municipal Paratransit Vehicles - OATS Transit Center - OATS Transit Vehicles - St. Charles Transit Agency Dispatch - St. Charles Transit Agency Vehicles - St. Clair County Transit Center - St. Clair County Transit Vehicles

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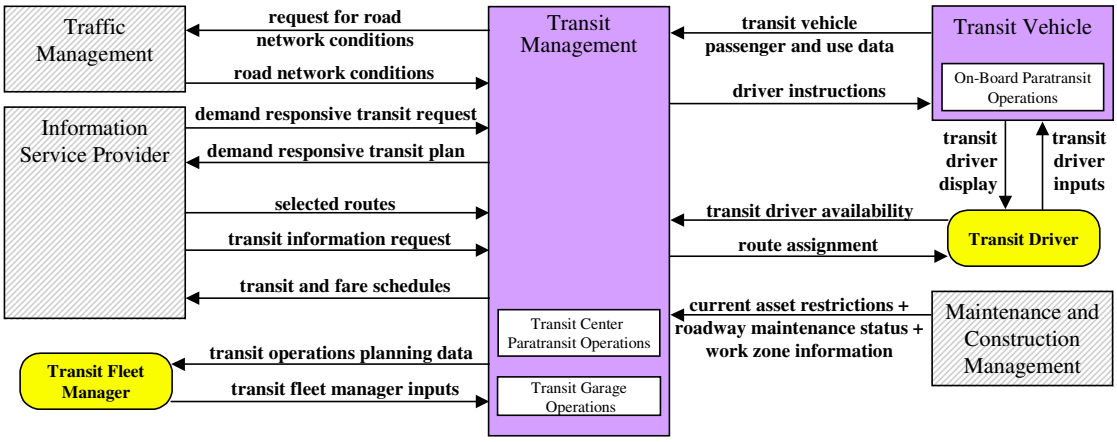

Figure 3-27: APTS03 - Demand Response Transit Operations Market Package

3.4.28 APTS04 - Transit Passenger and Fare Management

National ITS Architecture Definition:	Participating Regional Elements
This market package manages passenger loading and fare payments on-board vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device. Sensors mounted on the vehicle permit the driver and central operations to determine vehicle loads, and readers located either in the infrastructure or on-board the transit vehicles allow electronic fare payment. Data is processed, stored, and displayed on the transit vehicle and communicated as needed to the Transit Management Subsystem.	- All area transit agencies - METRO St. Louis Transit Paratransit Vehicles - METRO Transit Vehicles - METRO St. Louis Transit Center - METRO St. Louis Transit Center Kiosks - Madison County Transit Center - Madison County Transit Paratransit Vehicles - Madison County Transit Vehicles - OATS Transit Center - OATS Transit Center Vehicles - St. Clair County Transit Center - St. Clair County Electronic Fare Payment System - St. Clair County Transit Vehicles

National ITS Architecture Graphic:

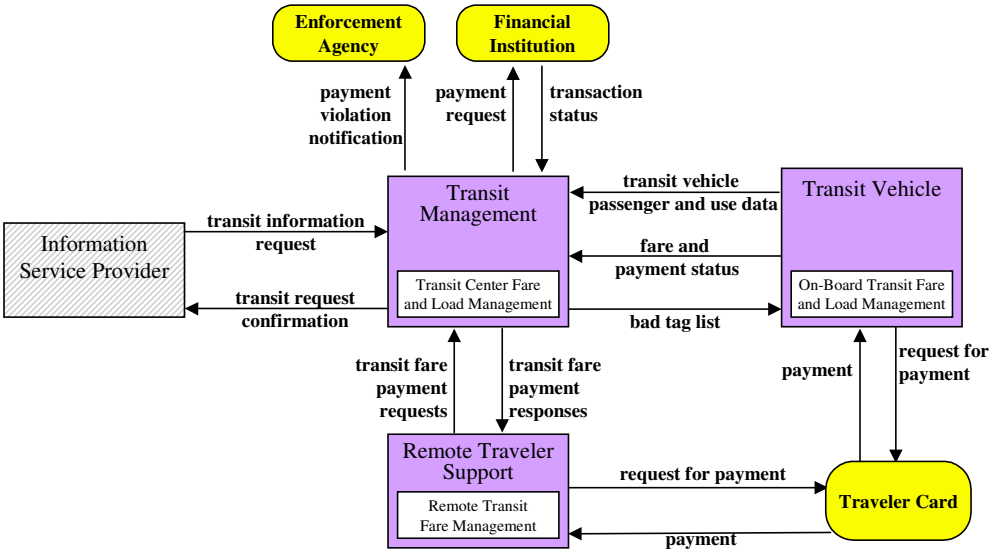

Figure 3-28: APTS04 - Transit Passenger and Fare Management Market Package

3.4.29 APTS05 - Transit Security

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for the physical security of transit passengers. An on-board security system is deployed to perform surveillance and warn of potentially hazardous situations. Public areas (e.g. stops, park and ride lots, stations) are also monitored. Information is communicated to the Transit Management Subsystem using the existing or emerging wireless (vehicle to center) or wireline (area to center) infrastructure. Security related information is also transmitted to the Emergency Management Subsystem when an emergency is identified that requires an external response. Incident information is communicated to the Information Service Provider.	- All area transit agencies - METRO St. Louis Transit Paratransit Vehicles - METRO Transit Vehicles - METRO St. Louis Transit Center - METRO St. Louis Transit Center Kiosks - Madison County Transit Center - Madison County Transit Paratransit Vehicles - Madison County Transit Vehicles - Municipal Paratransit Dispatch - Municipal Paratransit Vehicles - OATS Transit Center - OATS Transit Vehicles - St. Charles Transit Agency Dispatch - St. Charles Transit Agency Vehicles - St. Clair County Transit Center - St. Clair County Transit Vehicles

National ITS Architecture Graphic:

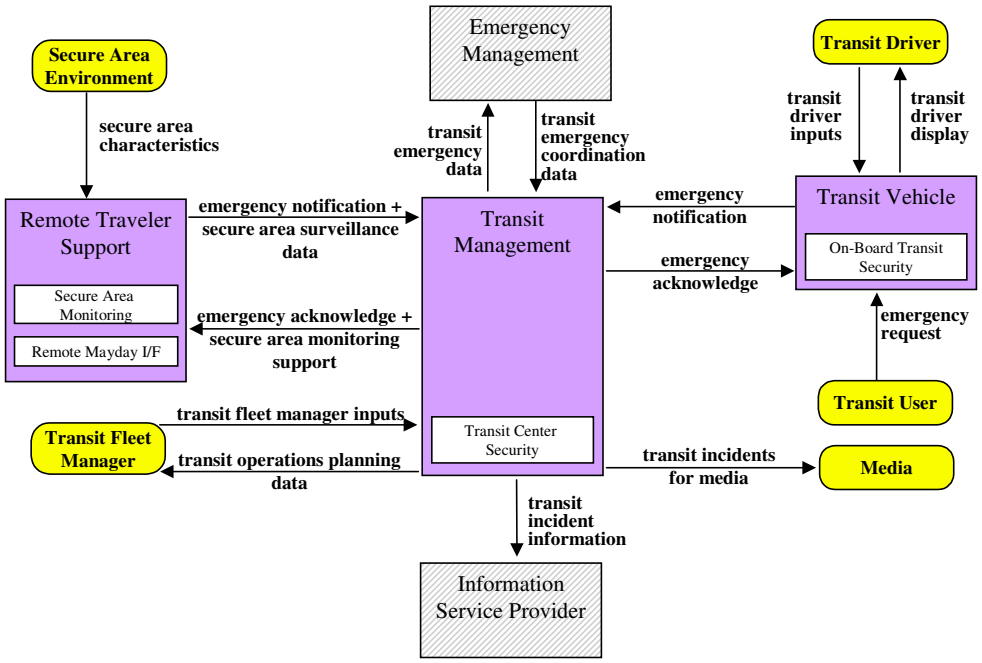

Figure 3-29: APTS05 - Transit Security Market Package

3.4.30 APTS06 - Transit Maintenance

National ITS Architecture Definition:	Participating Regional Elements
This market package supports automatic transit maintenance scheduling and monitoring. On-board condition sensors monitor system status and transmit critical status information to the Transit Management Subsystem. Hardware and software in the Transit Management Subsystem processes this data and schedules preventative and corrective maintenance.	- All area transit agencies - METRO Transit Vehicles - METRO St. Louis Transit Center - Madison County Transit Center - Madison County Transit Vehicles - St. Charles Transit Agency Dispatch - St. Charles Transit Agency Vehicles - St. Clair County Transit Center - St. Clair County Transit Vehicles

National ITS Architecture Graphic:

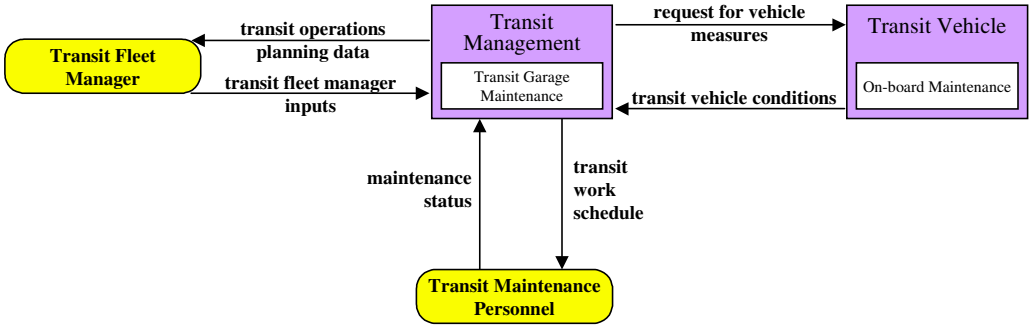

Figure 3-30: APTS06 - Transit Maintenance Market Package

3.4.31 APTS07 - Multi-Modal Coordination

National ITS Architecture Definition:	Participating Regional Elements
This market package establishes two way communications between multiple transit and traffic agencies to improve service coordination. Multi-modal coordination between transit agencies can increase traveler convenience at transfer points and also improve operating efficiency. Coordination between traffic and transit management is intended to improve on-time performance of the transit system to the extent that this can be accommodated without degrading overall performance of the traffic network. More limited local coordination between the transit vehicle and the individual intersection for signal priority is also supported by this package.	- All area transit agencies - MoDOT Gateway Guide Transportation Management Center - IDOT District 8 TMC - Lambert International Airport - Madison County Transit Center - METRO St. Louis Transit Center - Mobility Technologies Traffic Center - St. Charles Transit Agency Dispatch - St. Clair County Transit Center

National ITS Architecture Graphic:

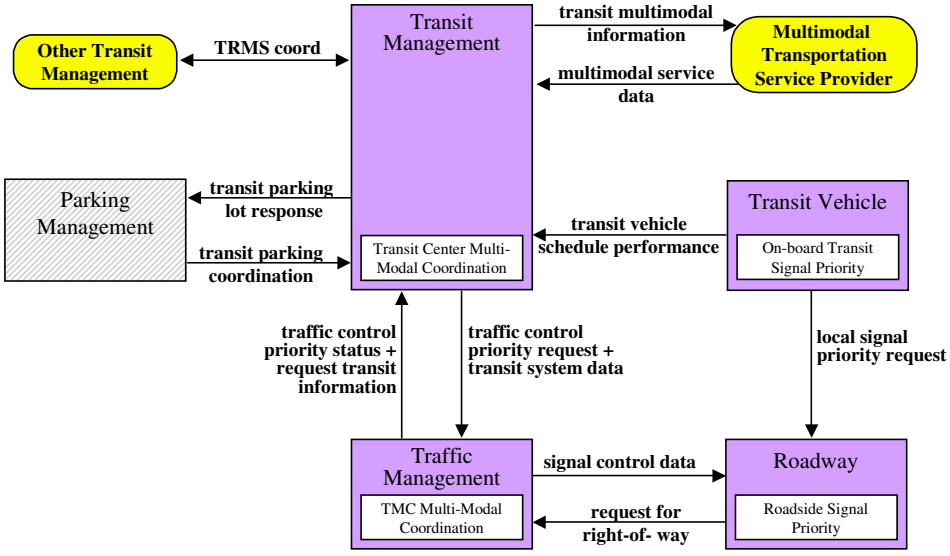

Figure 3-31: APTS07 - Multi-Modal Coordination Market Package

3.4.32 APTS08 - Transit Traveler Information

National ITS Architecture Definition:	Participating Regional Elements
This market package provides transit users at transit stops and on-board transit vehicles with ready access to transit information. The information services include transit stop annunciation, imminent arrival signs, and real-time transit schedule displays that are of general interest to transit users. Systems that provide custom transit trip itineraries and other tailored transit information services are also represented by this market package.	- METRO Transit Vehicles - METRO St. Louis Transit Center - METRO St. Louis Transit Center Kiosks - Madison County Transit Center - Madison County Transit Paratransit Vehicles - Madison County Transit Vehicles - Personal Computing Devices - St. Charles Transit Agency Dispatch - St. Charles Transit Agency Vehicles - St. Clair Transit Agency Dispatch - St. Clair Transit Agency Vehicles

National ITS Architecture Graphic:

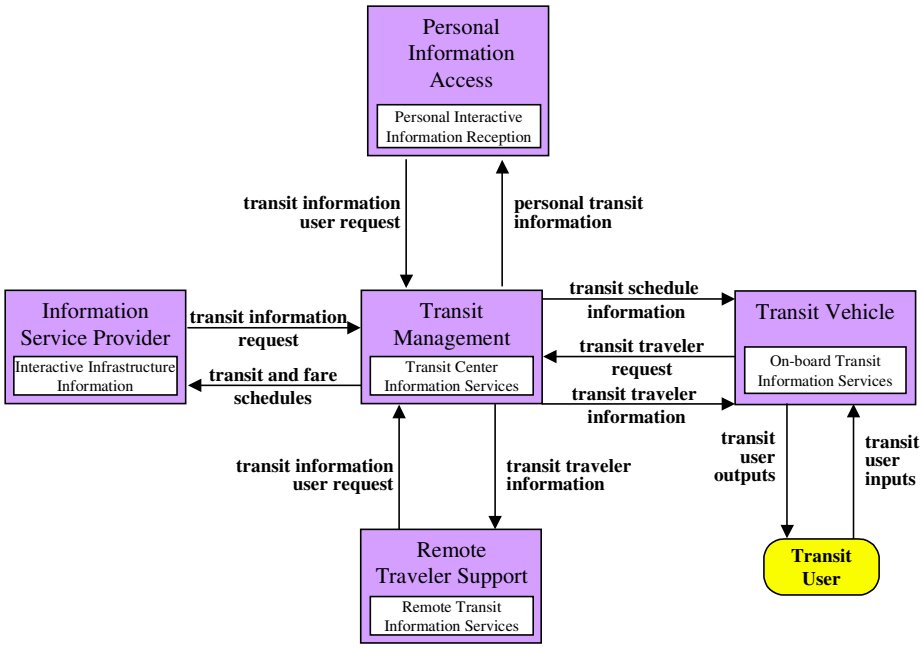

Figure 3-32: APTS08 - Transit Traveler Information Market Package

3.4.33 EM01 - Emergency Call Taking and Dispatch

National ITS Architecture Definition:	Participating Regional Elements
This market package includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency. Coordination between Emergency Management Subsystems supports emergency notification and coordinated response between agencies. Existing wide area wireless communications would be utilized between the Emergency Management Subsystem and an Emergency Vehicle to enable an incident command system to be established and supported at the emergency location. Public safety, traffic management, and many other allied agencies may each participate in the coordinated response managed by this package.	- Ambulance District Dispatch - Central County Fire Alarm Dispatch - County 911 Call Center - County EMS Vehicles - County ESDA Dispatch - County ESDA Vehicles - County Fire Vehicles - County Fire/EMS Dispatch - County Police Vehicles - County Police/Sheriff Dispatch - Emergency Management Communications Hub - Fire District Dispatch - Fire District Fire Vehicles - Fire District Vehicles - IDOT District 8 Callboxes - IDOT District 8 Emergency Patrol Vehicles - IDOT District 8 TMC - MoDOT Gateway Guide TMC - Il State Police Communications Center Dispatch - Illinois State Police Vehicles - Illinois IEMA Region Office - Illinois Statewide EOC - MSHP Dispatch - MSHP Patrol Vehicles - Municipal 911 Call Taker - Municipal EMS Dispatch - Municipal EMS Vehicles - Municipal ESDA Dispatch - Municipal ESDA Vehicles - Municipal Fire Dispatch - Municipal Fire Vehicles - Municipal Fire/EMS Dispatch - Municipal Police Vehicles - Municipal Police/Fire/EMS Dispatch - STARRS - St. Louis MO City 911 Center - St. Louis MO City EMS Vehicles - St. Louis MO City Fire Vehicles - St. Louis MO City Fire/EMS Communications Dispatch - St. Louis MO City Police Vehicles - St. Louis City Streets Department

National ITS Architecture Graphic:

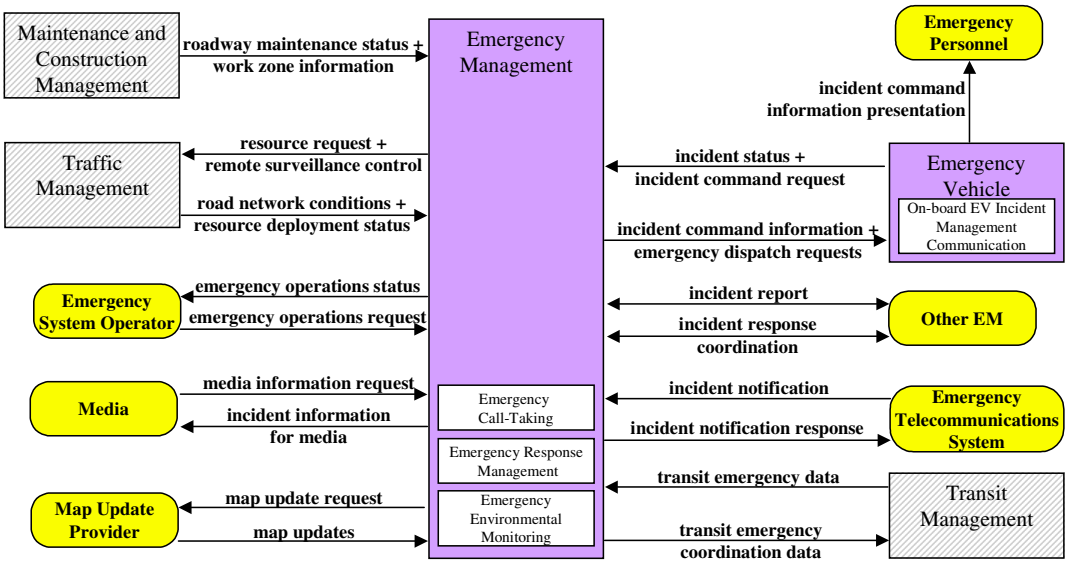

Figure 3-33: EM01 - Emergency Response Market Package

3.4.34 EM02 - Emergency Routing

National ITS Architecture Definition:	Participating Regional Elements
This market package supports automated vehicle location and dynamic routing of emergency vehicles. The service also supports coordination with the Traffic Management Subsystem, collecting detailed road network conditions and requesting special priority or other specific emergency traffic control strategies on the selected route(s). The Emergency Management Subsystem provides the routing for the emergency fleet based on real-time traffic conditions. The Emergency Vehicle may also be equipped with dedicated short range communications for local signal preemption. The service provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.	- Ambulance District Dispatch - County 911 Centers - County Fire, Police, and EMS Vehicles - County Fire/EMS Dispatch - County Police/Sheriff Dispatch - Fire District Dispatch - Fire District EMS Vehicles - Fire District Fire Vehicles - Gateway Guide Field Equipment - IDOT Emergency Patrol Vehicles - IDOT District 8 TMC - IDOT District 8 Field Equipment - MoDOT Gateway Guide TMC - Il State Police Communications Center Dispatch - Illinois State Police Vehicles - MoDOT Motorist Assist - MSHP Dispatch and Patrol Vehicles - Municipal 911 Call Taker - Municipal EMS Dispatch - Municipal EMS Vehicles - Municipal Fire Dispatch - Municipal Fire Vehicles - Municipal Fire/EMS Dispatch - Municipal Police Vehicles - Municipal Police/Fire/EMS Dispatch - St. Louis MO City 911 Center - St. Louis MO City EMS Vehicles - St. Louis MO City Fire Vehicles - St. Louis MO City Fire/EMS Communications Dispatch - St. Louis MO City Police Vehicles - St. Louis County Streets and Highway Department - STARRS

National ITS Architecture Graphic:

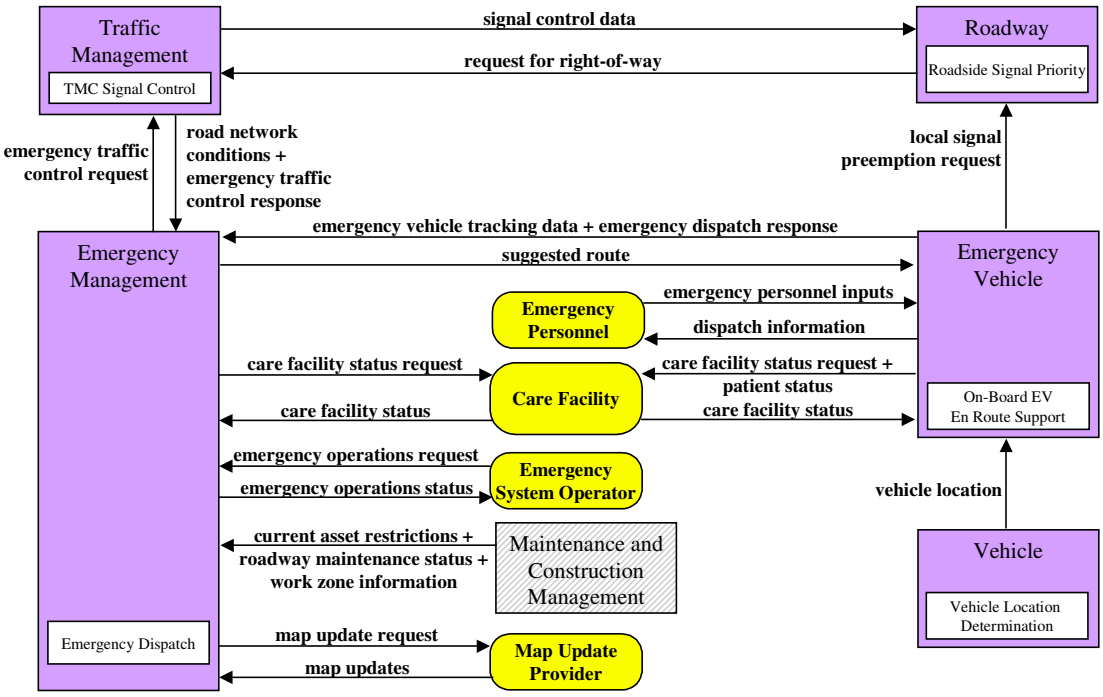

Figure 3-34: EM02 - Emergency Routing Market Package

3.4.35 EM03 – Mayday Support

National ITS Architecture Definition:	Participating Regional Elements
This market package allows the user (driver or non-driver) 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. The request for assistance may be manually initiated or automated and linked to vehicle sensors. This market package also includes general surveillance capabilities that enable the Emergency Management Subsystem to remotely monitor public areas (e.g., rest stops, parking lots) to improve security in these areas. The Emergency Management Subsystem may be operated by the public sector or by a private sector telematics service provider.	- County 911 Centers - County Fire/EMS Dispatch - County Police/Sheriff Dispatch - Municipal EMS Dispatch - Municipal Fire Dispatch - Municipal Police Dispatch - Illinois State Police Dispatch - Private Ambulance Dispatch - St. Louis County Police Dispatch - Missouri State Police Dispatch - STARRS

National ITS Architecture Graphic:

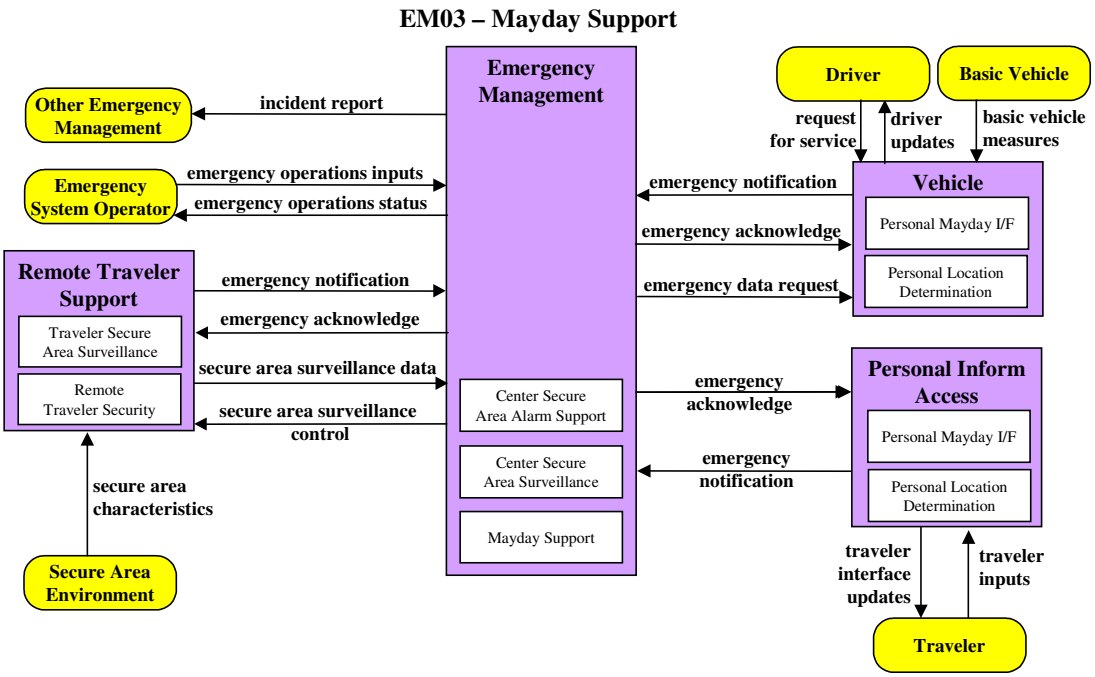

Figure 3-35: EM03 – Mayday Support Market Package

3.4.36 EM04 – Roadway Service Patrols

National ITS Architecture Definition:	Participating Regional Elements
This market package supports roadway service patrol vehicles that monitor roads that aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream. If problems are detected, the roadway service patrol vehicles will provide assistance to the motorist (e.g., push a vehicle to the shoulder or median). The market package monitors service patrol vehicle locations and supports vehicle dispatch to identified incident locations. Incident information collected by the service patrol is shared with traffic, maintenance and construction, and traveler information systems.	- IDOT Emergency Patrol Vehicles - IDOT District 8 TMC - MoDOT Gateway Guide TMC - Il State Police Communications Center Dispatch - Il State Police Vehicles - MoDOT Motorist Assist - MoDOT MCO Vehicles - MSHP Dispatch and Patrol Vehicles

National ITS Architecture Graphic:

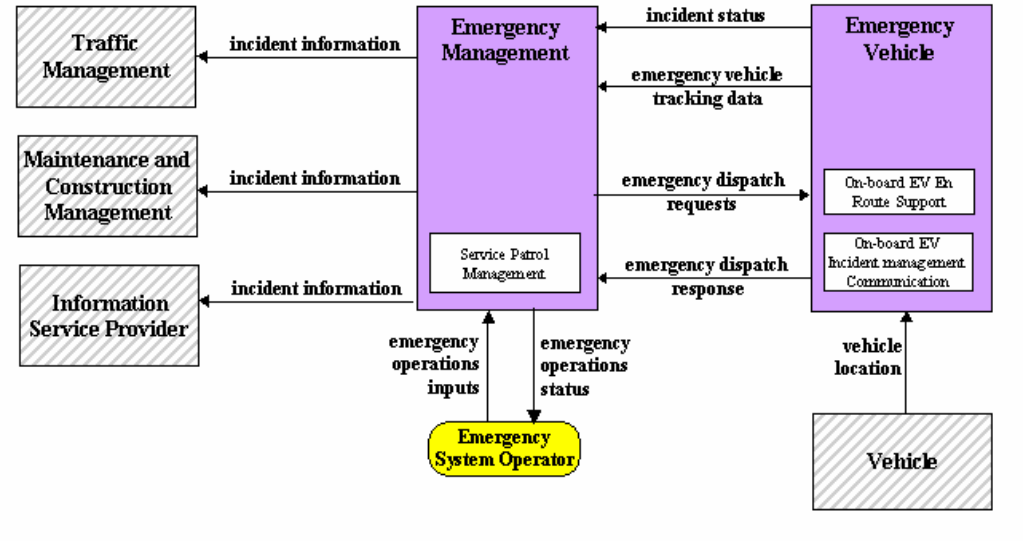

Figure 3-36: EM04 – Roadway Service Patrols Market Package

3.4.37 EM05 – Transportation Infrastructure Protection

National ITS Architecture Definition:

This market package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident. Threats can result from acts of nature (e.g., hurricanes, earthquakes), terrorist attacks or other incidents causing damage to the infrastructure (e.g., stray barge hitting a bridge support). Infrastructure may be monitored with acoustic, environmental threat (such as nuclear, biological, chemical, and explosives), infrastructure condition and integrity, motion and object sensors and video and audio surveillance equipment. Data from such sensors and surveillance equipment may be processed in the field or sent to a center for processing. The data enables operators at the center to detect and verify threats. When a threat is detected, agencies are notified. Detected threats or advisories received from other agencies result in an increased level of system preparedness. In response to threats, barrier and safeguard systems may be activated by Traffic Management Subsystems to deter an incident, control access to an area or mitigate the impact of an incident. Barrier systems include gates, barriers and other automated and remotely controlled systems that manage entry to transportation infrastructure. Safeguard systems include blast shields, exhaust systems and other automated and remotely controlled systems that mitigate impact of an incident.

Participating Regional Elements

- City of Clayton Traffic Roadside Equipment
- City of St. Louis Streets Department
- City of St. Louis Streets Department MCO Field Devices
- City of St. Louis Streets Department Roadside Equipment
- IDOT District 8 TMC
- IDOT District 8 TMC Field Equipment
- MoDOT Gateway Guide TMC
- MoDOT Gateway Guide Field Equipment
- MoDOT MCO Field Devices
- Security Monitoring Field Equipment
- STARRS
- State of Missouri DNR Emissions Management Field Equipment
- St. Louis County Traffic and Highways Department
- St. Louis County Traffic and Highways Department Roadside Equipment
- University City Traffic Center
- University City Traffic Center Field Equipment

National ITS Architecture Graphic:

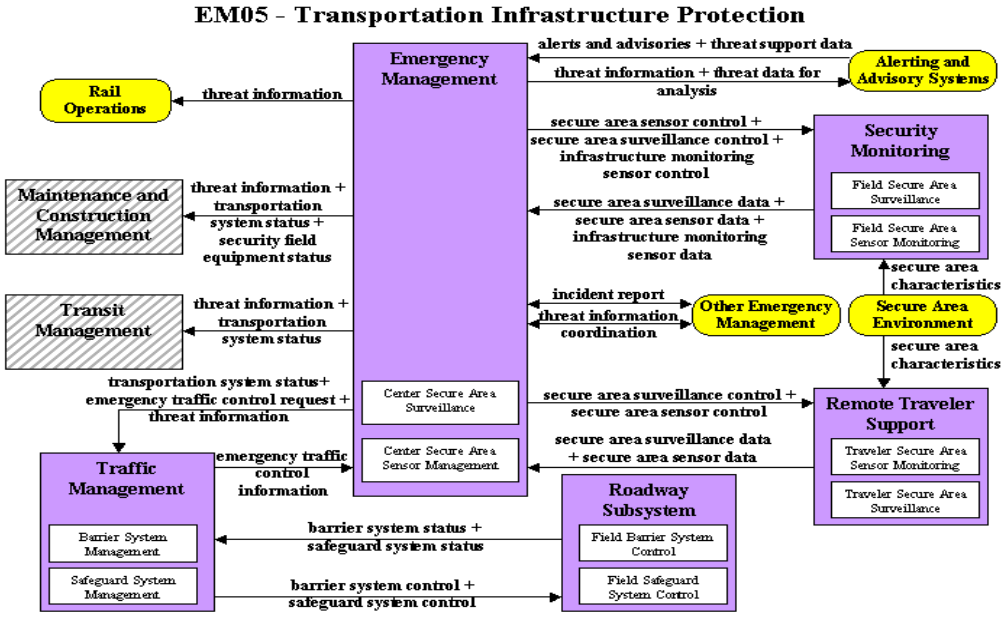

Figure 3-37: EM05 – Transportation Infrastructure Protection Market Package

3.4.38 EM06 – Wide-Area Alert

National ITS Architecture Definition:	Participating Regional Elements
This market package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The alert includes information and instructions for transportation system operators and the traveling public, improving public safety and enlisting the public's help in some scenarios. The ITS technologies will supplement and support other emergency and homeland security alert systems such as the Emergency Alert System (EAS). When an emergency situation is reported and verified and the terms and conditions for system activation are satisfied, a designated agency broadcasts emergency information to traffic agencies, transit agencies, information service providers, toll operators, and others that operate ITS systems. The ITS systems, in turn, provide the alert information to transportation system operators and the traveling public using ITS technologies such as dynamic message signs, highway advisory radios, in-vehicle displays, transit displays, 511 traveler information systems, and traveler information web sites.	- City of St. Louis Streets Department - County 911 Centers - Private ISP - IDOT District 8 TMC - IDOT District 8 Field Equipment - Illinois State Police Dispatch - MoDOT Gateway Guide TMC - MoDOT Gateway Guide Field Equipment - MoDOT Statewide Traveler Information System - MSHP Dispatch - STARRS

National ITS Architecture Graphic:

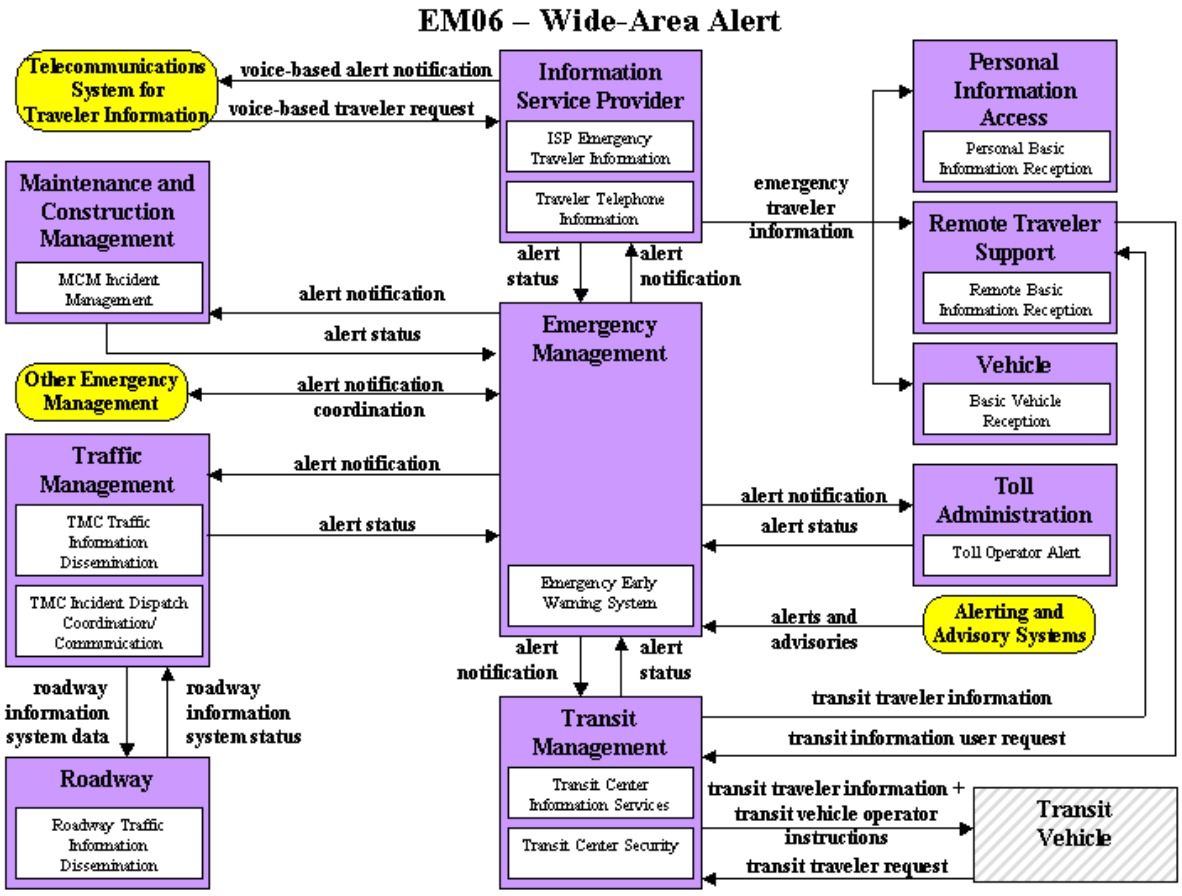

Figure 3-38: EM06 – Wide-Area Alert Market Package

3.4.39 EM07 – Early Warning System

National ITS Architecture Definition:	Participating Regional Elements
This market package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The market package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.	- City of St. Louis Streets Department - County 911 Centers - County ESDA - IEMA Region Office - IEMA Statewide EOC - Illinois State Police Dispatch - Municipal ESDA - Security Monitoring Field Equipment - STARRS - Weather Service

National ITS Architecture Graphic:

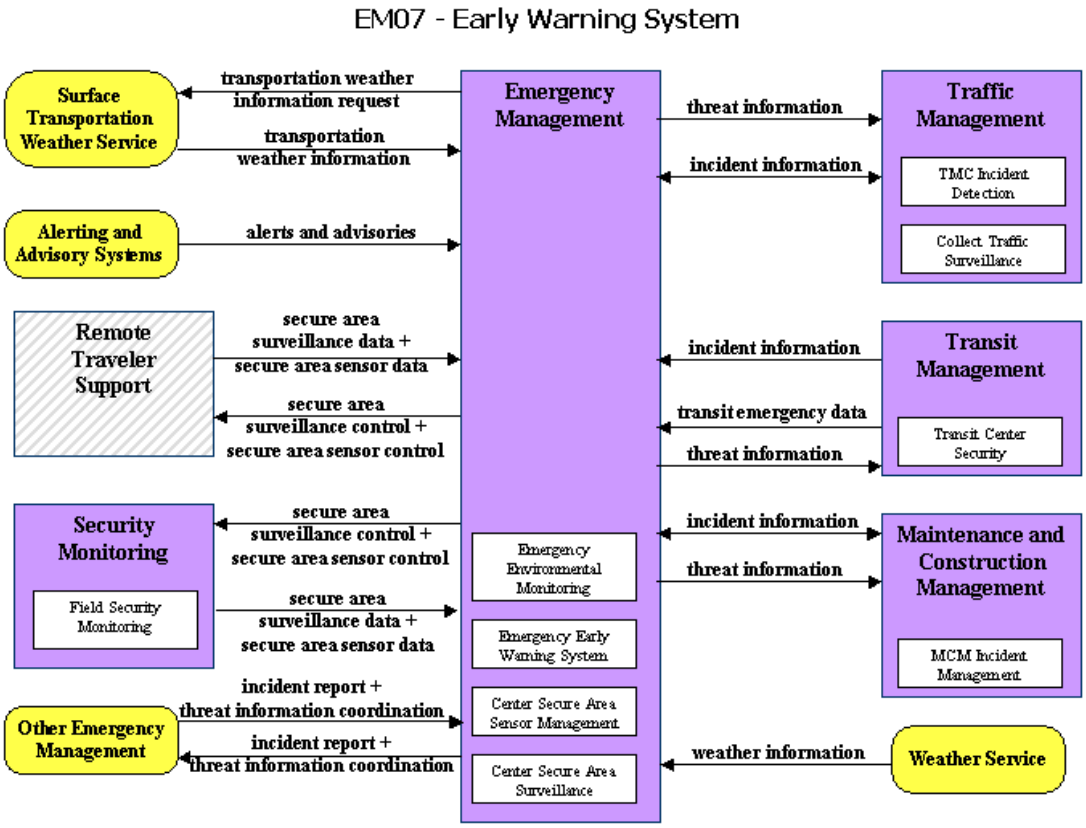

Figure 3-39: EM07 – Early Warning System Market Package

3.4.40 EM08 – Disaster Response and Recovery

National ITS Architecture Definition:	Participating Regional Elements
This market package 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. All types of disasters are addressed including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and national security emergencies such as nuclear, chemical, biological, and radiological weapons attacks). The market package supports coordination of emergency response plans, including general plans developed before a disaster as well as specific tactical plans with short time horizon that are developed as part of a disaster response. The market package provides enhanced access to the scene for response personnel and resources, provides better information about the transportation system in the vicinity of the disaster, and maintains situation awareness regarding the disaster itself. In addition, this market package tracks and coordinates the transportation resources - the transportation professionals, equipment, and materials - that constitute a portion of the disaster response. The market package identifies the key points of integration between transportation systems and the public safety, emergency management, and other allied organizations that form the overall disaster response. In this market package, the Emergency Management subsystem represents the federal, regional, state, and local Emergency Operations Centers and the Incident Commands that are established to respond to the disaster. The interface between the Emergency Management Subsystem and the other center subsystems provides situation awareness and resource coordination among transportation and other allied response agencies. In its role, traffic management implements special traffic control strategies and detours and restrictions to effectively manage traffic in and around the disaster. Maintenance and construction provides damage assessment of road network facilities and manages service restoration. Transit management provides a similar assessment of status for transit facilities and modifies transit operations to meet the special demands of the disaster. As immediate public safety concerns are addressed and disaster response transitions into recovery, this market package supports transition back to normal transportation system operation, recovering resources, managing on-going transportation facility repair, supporting data collection and revised plan coordination, and other recovery activities. This market package builds on the basic traffic incident response service that is provided by ATMS08, the Traffic Incident Management market package. This market package addresses the additional complexities and coordination requirements that are associated with the most severe incidents that warrant an extraordinary response from outside the local jurisdictions and require special measures such as the activation of one or more emergency operations centers. Many users of the National ITS Architecture will want to consider both ATMS08 and this market package since every region is concerned with both day-to-day management of traffic-related incidents and occasional management of disasters that require extraordinary response. Disaster Response and Recovery is also supported by EM10, the "Disaster Traveler Information" market package that keeps the public informed during a disaster response. See that market package for more information.	-City of St. Louis Streets Department - IEMA Region Office - IEMA Statewide EOC - STARRS

National ITS Architecture Graphic:

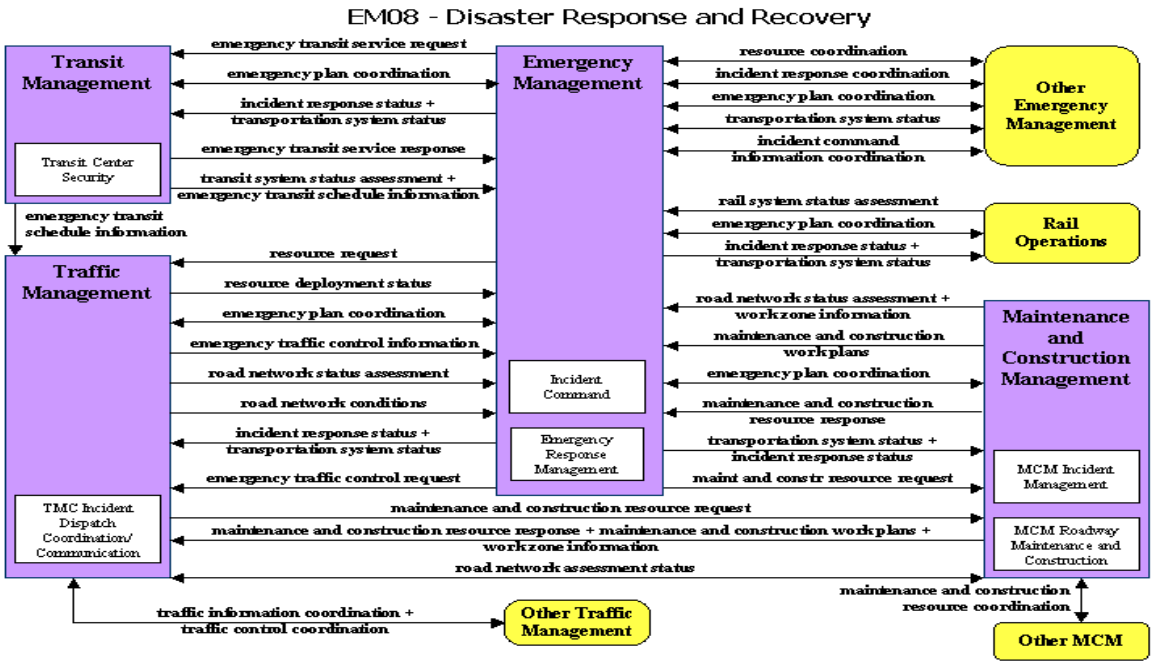

Figure 3-40: EM08 – Disaster Response and Recovery Market Package

3.4.41 EM09 Evacuation and Reentry Management

National ITS Architecture Definition:

This market package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area. The market package addresses evacuations for all types of disasters, including disasters like hurricanes that are anticipated and occur slowly, allowing a well-planned orderly evacuation, as well as disasters like terrorist acts that occur rapidly, without warning, and allow little or no time for preparation or public warning.

This market package supports coordination of evacuation plans among the federal, state, and local transportation, emergency, and law enforcement agencies that may be involved in a large-scale evacuation. All affected jurisdictions (e.g., states and counties) at the evacuation origin, evacuation destination, and along the evacuation route are informed of the plan. Information is shared with traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes. Reversible lanes, shoulder use, closures, special signal control strategies, and other special strategies may be implemented to maximize capacity along the evacuation routes. Transit resources play an important role in an evacuation, removing many people from an evacuated area while making efficient use of limited capacity. Additional shared transit resources may be added and managed in evacuation scenarios. Resource requirements are forecast based on the evacuation plans, and the necessary resources are located, shared between agencies if necessary, and deployed at the right locations at the appropriate times.

Evacuations are also supported by EM10, the "Disaster Traveler Information" market package, which keeps the public informed during evacuations. See that market package for more information.

Participating Regional Elements

- City of St. Louis Streets Department
- County 911 Centers
- IDOT District 8 TMC
- IEMA Region Office
- IEMA Statewide EOC
- Illinois State Police Dispatch

National ITS Architecture Graphic:

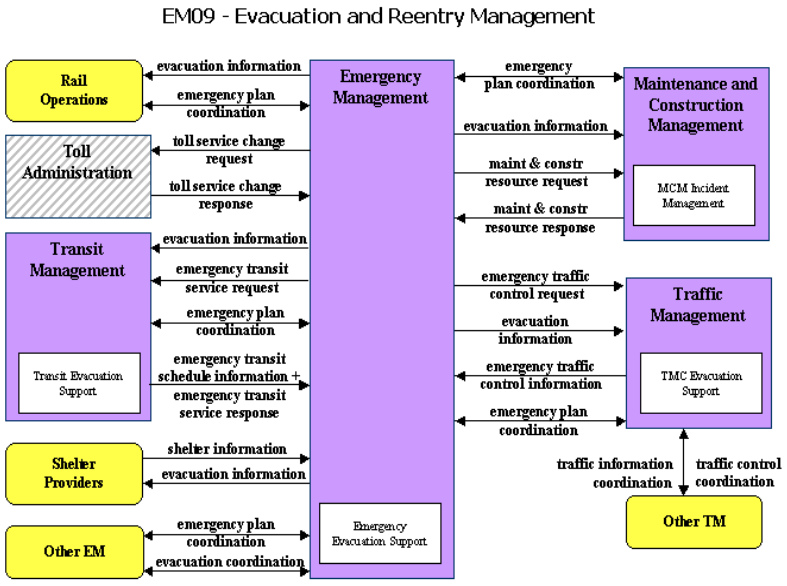

Figure 3-41: EM09 – Evacuation and Reentry Management Market Package

3.4.42 EM10 Disaster Traveler Information

National ITS Architecture Definition:	Participating Regional Elements
This market package 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. This market package collects information from multiple sources including traffic, transit, public safety, emergency management, shelter provider, and travel service provider organizations. The collected information is processed and the public is provided with real-time disaster and evacuation information using ITS traveler information systems. A disaster will stress the surface transportation system since it may damage transportation facilities at the same time that it places unique demands on these facilities to support public evacuation and provide access for emergency responders. Similarly, a disaster may interrupt or degrade the operation of many traveler information systems at the same time that safety-critical information must be provided to the traveling public. This market package keeps the public informed in these scenarios, using all available means to provide information about the disaster area including damage to the transportation system, detours and closures in effect, special traffic restrictions and allowances, special transit schedules, and real-time information on traffic conditions and transit system performance in and around the disaster. This market package also provides emergency information to assist the public with evacuations when necessary. Information on mandatory and voluntary evacuation zones, evacuation times, and instructions are provided. Available evacuation routes and destinations and current and anticipated travel conditions along those routes are provided so evacuees are prepared and know their destination and preferred evacuation route. Information on available transit services and traveler services (shelters, medical services, hotels, restaurants, gas stations, etc.) is also provided. In addition to general evacuation information, this market package provides specific evacuation trip planning information that is tailored for the evacuee based on origin, selected destination, and evacuee-specified evacuation requirements and route parameters. This market package augments the ATIS market packages that provide traveler information on a day-to-day basis for the surface transportation system. This market package provides focus on the special requirements for traveler information dissemination in disaster situations.	- City of St. Louis Streets Department - County 911 Centers - County ESDA Dispatch - County Police/Sheriff Dispatch - IDOT District 8 TMC - Illinois State Police Dispatch - MoDOT Gateway Guide TMC - MoDOT Statewide Traveler Information System - Municipal ESDA Dispatch - Municipal Police Dispatch - STARRS - User Personal Computer Devices - Vehicles

National ITS Architecture Graphic:

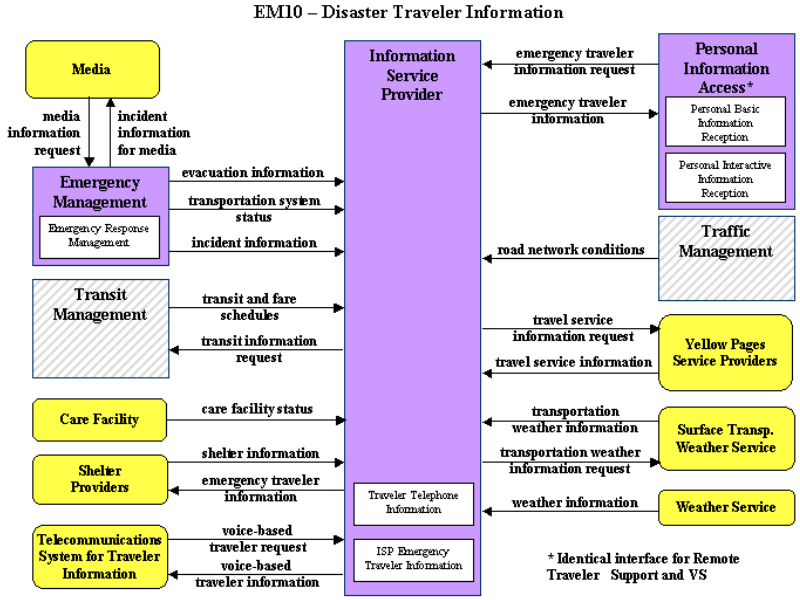

Figure 3-42: EM10 – Disaster Traveler Information Market Package

3.4.43 ATIS01 - Broadcast Traveler Information

National ITS Architecture Definition:	Participating Regional Elements
This market package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, air quality and weather information, and broadly disseminates this information through existing infrastructures and low cost user equipment (e.g., FM subcarrier, cellular data broadcast). The information may be provided directly to travelers or provided to merchants and other traveler service providers so that they can better inform their customers of travel conditions. Different from the market package ATMS6 - Traffic Information Dissemination, which provides localized HAR and DMS information capabilities, ATIS1 provides a wide area digital broadcast service. Successful deployment of this market package relies on availability of real-time traveler information from roadway instrumentation, probe vehicles or other sources.	- METRO St. Louis Transit Center - METRO St. Louis Transit Center Kiosks - Clayton MO Traffic Center, ISP, and Kiosks - County 911 Centers - County Fire/EMS Dispatch - County Police/Sheriff Dispatch - MoDOT Gateway Guide TMC - IEPA Emissions Management System - IDOT District 8 TMC - Il State Police Communications Center Dispatch - Madison County IL Highway Center - Madison County IL Highway Center ISP - Madison County Transit Center - MDNR Emissions Management System - Media - Metro Networks Operations Center - Mobility Technologies Traffic Center - MoDOT District 6 Transportation Info. Center Kiosks - MoDOT Statewide Traveler System - Monroe County Dispatch Center - MSHP Dispatch - Municipal Fire Dispatch - Municipal Paratransit Dispatch - Municipal Police/Fire/EMS Dispatch - Municipal Public Works Dispatch - OATS Transit Center - Personal Computing Devices - Private ISPs - St. Charles Transit Agency Dispatch - St. Clair County Dispatch Center - St. Clair County Transit Center - St. Louis County Police Department Dispatch - St. Louis MO City Fire/EMS Communications Dispatch - St. Louis City Streets Department - St.Peters MO Traffic Center, ISP, and Kiosks - User Personal Computing Devices - Vehicles

National ITS Architecture Graphic:

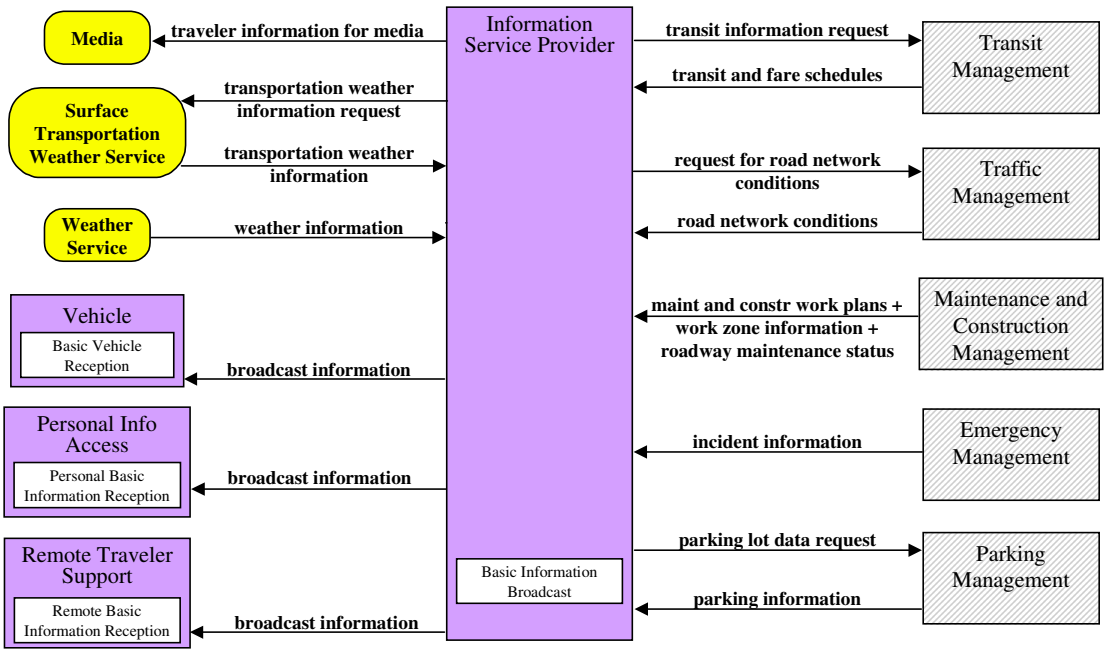

Figure 3-43: ATIS01 – Broadcast Traveler Information Market Package

3.4.44 ATIS02 - Interactive Traveler Information

National ITS Architecture Definition:	Participating Regional Elements
This market package 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, transit services, ride share/ride match, parking management, and pricing information. A range of two-way wide-area wireless and wireline communications systems may be used to support the required data communications between the traveler and Information Service Provider.	- Clayton Traffic Dept ISP - Clayton Traffic Dept Kiosks - METRO St. Louis Transit Center - METRO St. Louis Transit Center Kiosks - Financial Institutions - IDOT District 8 TMC - MoDOT Gateway Guide TMC - Lambert International Airport - Madison County Highway Center - Madison County Transit Center - Major Employment Centers - Media - Metro Networks Operations Center - Mobility Technologies Traffic Center - MoDOT District 6 Transportation Management Center Kiosks - MoDOT Statewide Traveler System - Monroe County Dispatch Center - Municipal Public Works Departments - Personal Computing Devices - Private ISP - St. Charles Transit Agency - St. Clair County Dispatch Center - St. Clair County Transit Agency - St. Louis County Traffic and Highways Department - St. Peters MO Traffic Center - St. Peters MO Traffic Center ISP - St. Peters MO Traffic Center Kiosks - University City Traffic Center - User Personal Computer Devices - Vehicles

National ITS Architecture Graphic:

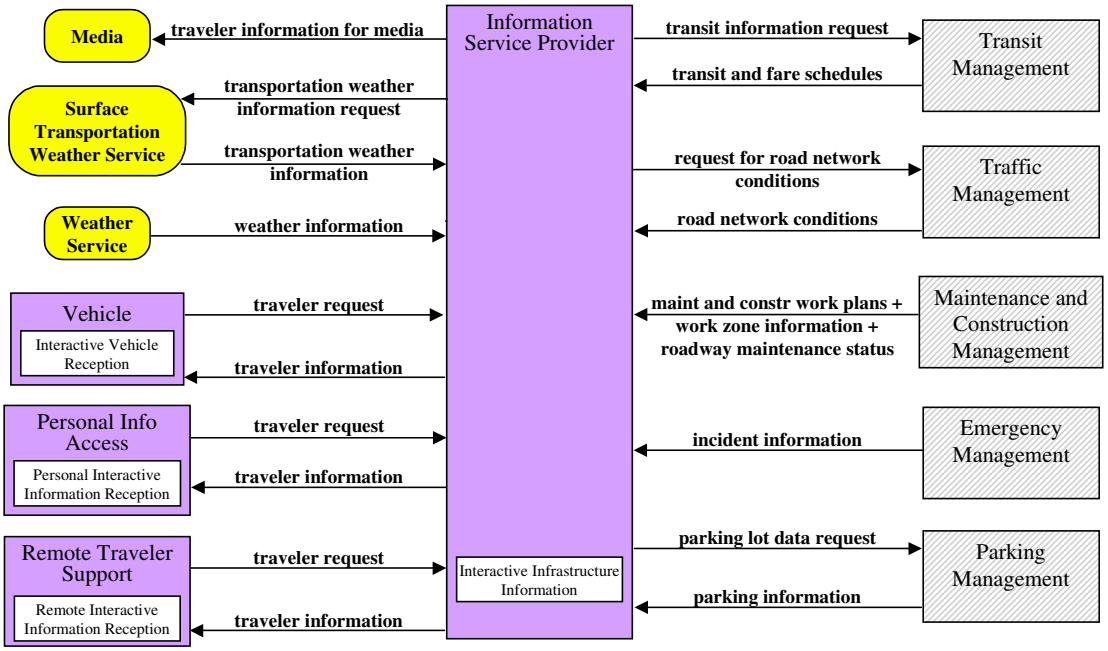

Figure 3-44: ATIS02 - Interactive Traveler Information Market Package

3.4.45 ATIS05 - ISP Based Route Guidance

National ITS Architecture Definition:	Participating Regional Elements
This market package offers the user pre-trip route planning and turn-by-turn route guidance services. Routes may be based on static information or reflect real time network conditions. Unlike ATIS3 and ATIS4, where the user equipment determines the route, the route determination functions are performed in the Information Service Provider Subsystem in this market package. This approach simplifies the user equipment requirements and can provide the infrastructure better information on which to predict future traffic. The package includes two way data communications and optionally also equips the vehicle with the databases, location determination capability, and display technology to support turn by turn route guidance.	- Metro Networks Operations Center - Private ISPs - Personal Computing Devices

National ITS Architecture Graphic:

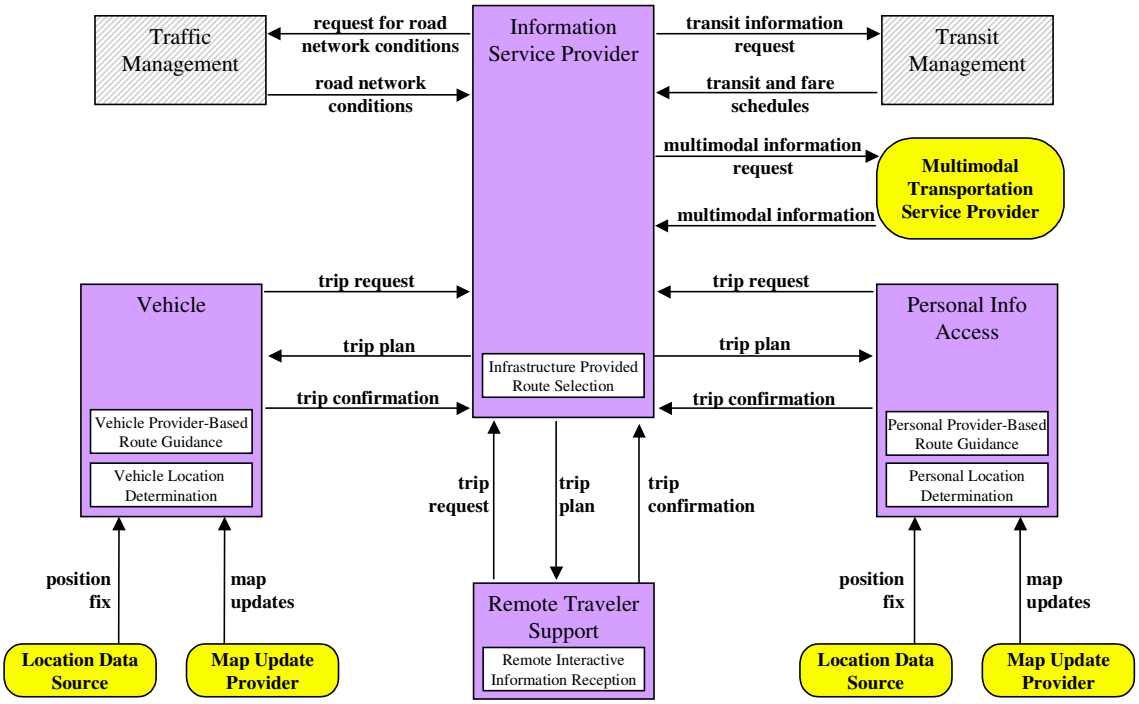

Figure 3-45: ATIS05 - ISP Based Route Guidance

3.4.46 ATIS07 - Yellow Pages and Reservation

National ITS Architecture Definition:	Participating Regional Elements
This market package provides yellow pages and reservation services to the user. These additional traveler services may be provided using the same basic user equipment used for Interactive Traveler Information. This market package provides multiple ways for accessing information either while en route in a vehicle using wide-area wireless communications or pre-trip via wireline connections.	- Metro Networks Operations Center - Private ISPs - Personal Computing Devices

National ITS Architecture Graphic:

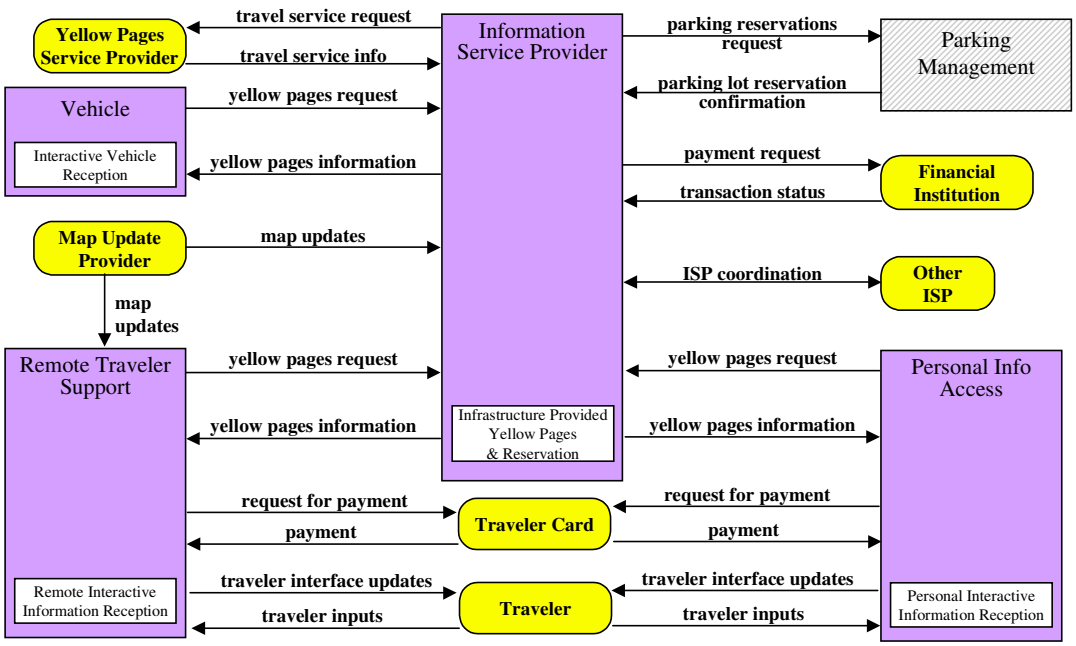

Figure 3-46: ATIS07 - Yellow Pages and Reservation

3.4.47 ATIS08 – Dynamic Ridesharing

National ITS Architecture Definition:	Participating Regional Elements
This market package provides dynamic ridesharing/ride matching services to travelers. This service could allow near real time ridesharing reservations to be made through the same basic user equipment used for Interactive Traveler Information. This ridesharing/ride matching capability also includes arranging connections to transit or other multimodal services.	- Madison County Transit Center

National ITS Architecture Graphic:

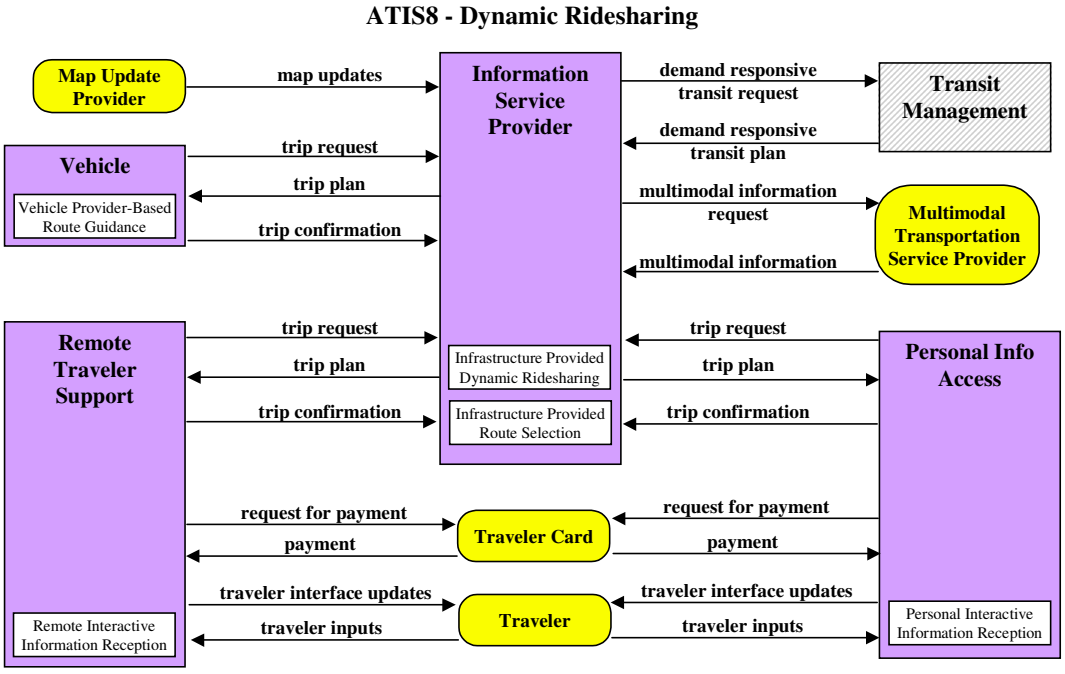

Figure 3-47: ATIS08 – Dynamic Ridesharing Market Package

3.4.48 CVO3 - Electronic Clearance

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for automated clearance at roadside check facilities. The roadside check facility communicates with the Commercial Vehicle Administration subsystem to retrieve infrastructure snapshots of critical carrier, vehicle, and driver data to be used to sort passing vehicles. This allows a good driver/vehicle/carrier to pass roadside facilities at highway speeds using transponders and dedicated short range communications to the roadside. Results of roadside clearance activities will be passed on to the Commercial Vehicle Administration. The roadside check facility may be equipped with Automated Vehicle Identification (AVI), weighing sensors, transponder read/write devices and computer workstations.	- Missouri CVISN Program - Missouri CVISN Program Inspection Facility

National ITS Architecture Graphic:

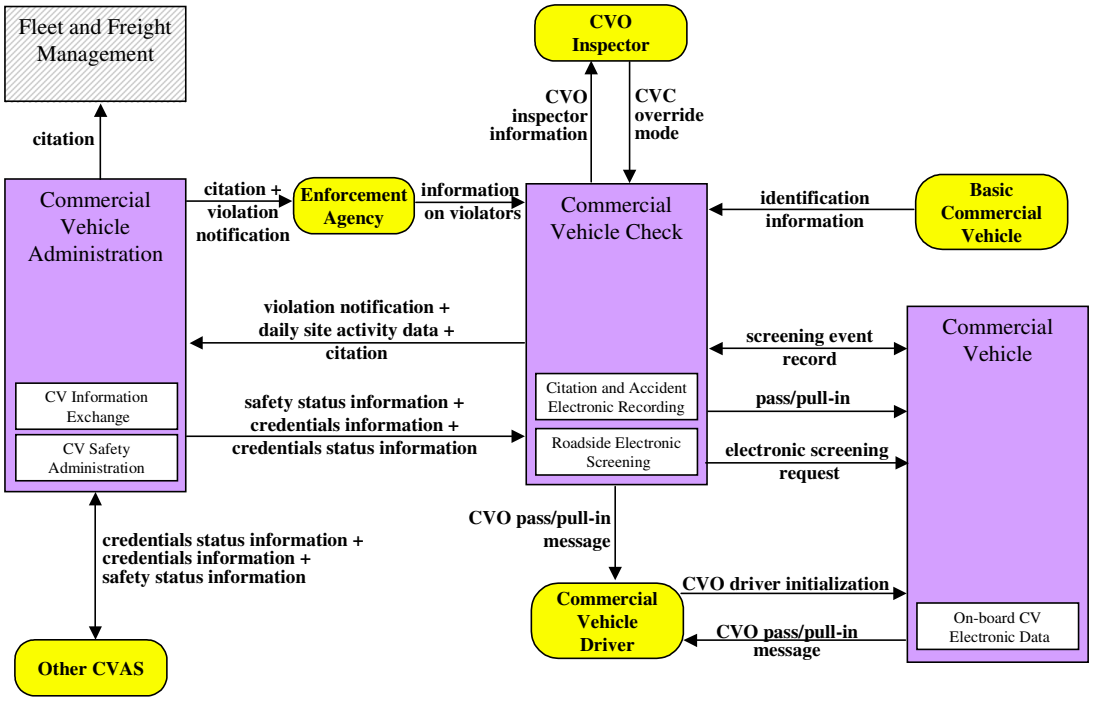

Figure 3-48: CVO03 - Electronic Clearance Market Package

3.4.49 CVO4 - CV Administrative Processes

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing. Through this process, carriers, drivers, and vehicles may be enrolled in the electronic clearance program provided by a separate market package which allows commercial vehicles to be screened at mainline speeds at roadside check facilities. Through this enrollment process, current profile databases are maintained in the Commercial Vehicle Administration subsystem and snapshots of this database are made available to the roadside check facilities at the roadside to support the electronic clearance process.	- Missouri CVISN Program

National ITS Architecture Graphic:

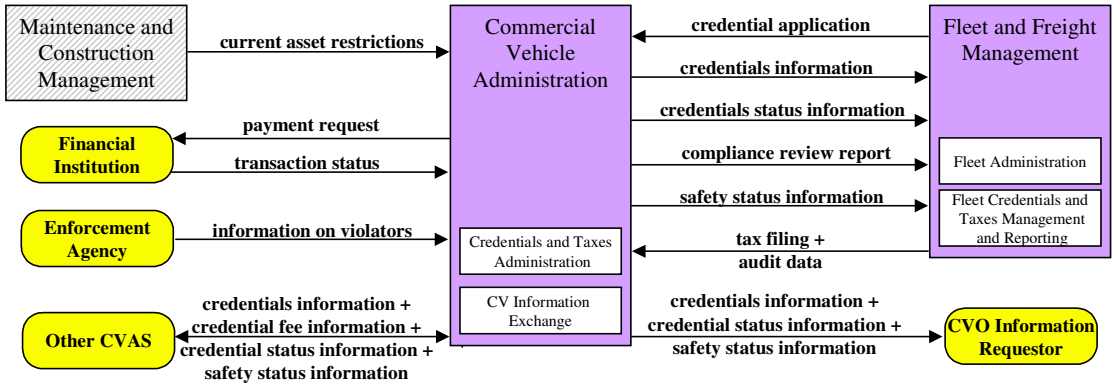

Figure 3-49: CVO04 - CV Administrative Processes Market Package

3.4.50 CVO6 - Weigh-In-Motion

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for high speed weigh-in-motion with or without Automated Vehicle Identification (AVI) capabilities. This market package provides the roadside equipment that could be used as a stand-alone system or to augment the Electronic Clearance (CVO03) market package.	- Missouri CVISN Program Inspection Facility - IDOT Weigh-in Motion Stations

National ITS Architecture Graphic:

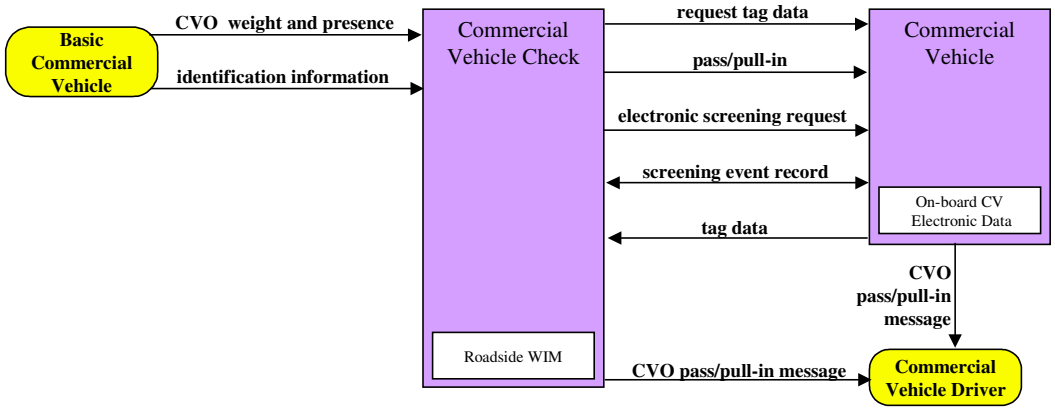

Figure 3-50: CVO06 - Weigh-In-Motion Market Package

3.4.51 CVO7 - Roadside CVO Safety

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for automated roadside safety monitoring and reporting. It automates commercial vehicle safety inspections at the roadside check facilities… The basic option, directly supported by this market package, facilitates safety inspection of vehicles that have been pulled in, perhaps as a result of the automated screening process provided by the Electronic Clearance (CVO03) Market Package…	- Missouri CVISN Program - Missouri CVISN Program Inspection Facility - MSHP Portable Units - SLPD Portable Units

National ITS Architecture Graphic:

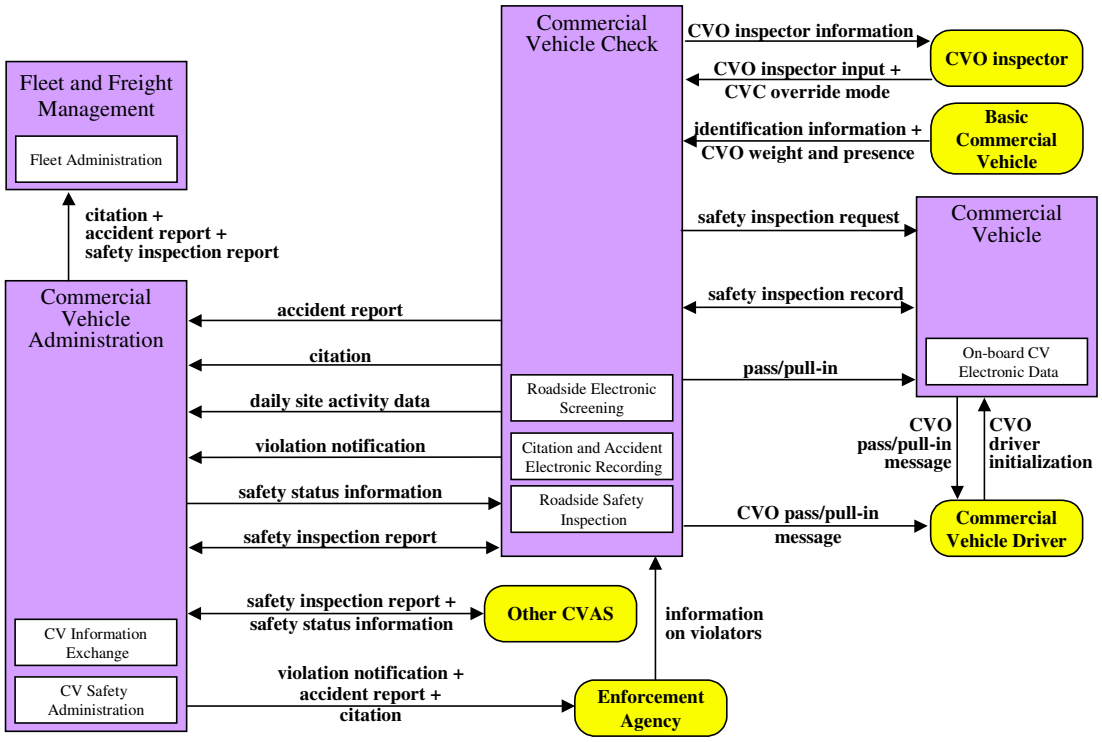

Figure 3-51: CVO07 - Roadside CVO Safety Market Package

3.4.52 CVO8 - On-board CVO Safety

National ITS Architecture Definition:	Participating Regional Elements
This market package provides for on-board commercial vehicle safety monitoring and reporting. It is an enhancement of the Roadside CVO Safety (CVO08) Market Package and includes roadside support for reading on-board safety data via tags. Safety warnings are provided to the driver as a priority with secondary requirements to notify the Commercial Vehicle Check roadside elements. This market package allows for the Fleet and Freight Management subsystem to have access to the on-board safety data.	- Missouri CVISN Program Inspection Facility - MSHP Portable Units - SLPD Portable Units

National ITS Architecture Graphic:

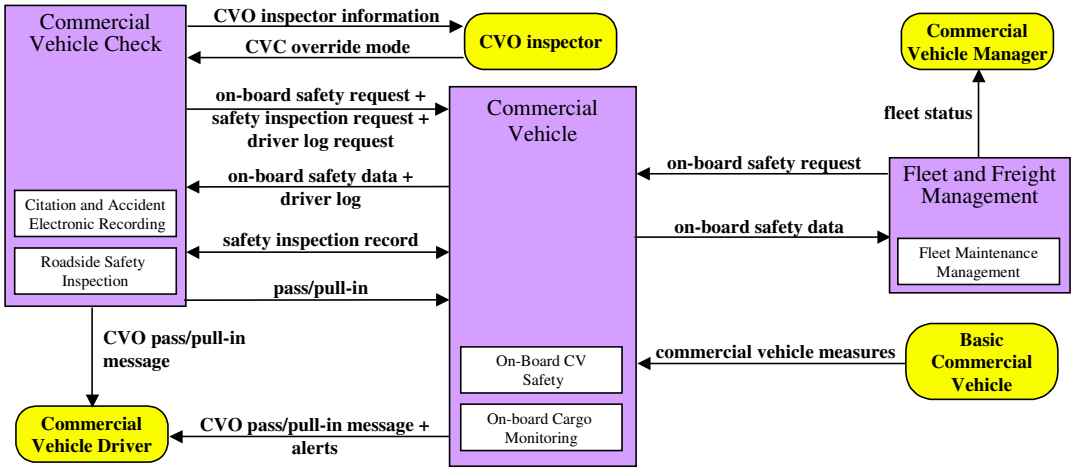

Figure 3-52: CVO08 - On-board CVO Safety Market Package

3.4.53 CVO10 - HAZMAT Management

National ITS Architecture Definition:	Participating Regional Elements
This market package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents. HAZMAT tracking is performed by the Fleet and Freight Management Subsystem. The Emergency Management subsystem is notified by the Commercial Vehicle if an incident occurs and coordinates the response. The response is tailored based on information that is provided as part of the original incident notification or derived from supplemental information provided by the Fleet and Freight Management Subsystem. The latter information can be provided prior to the beginning of the trip or gathered following the incident depending on the selected policy and implementation.	- Ambulance District Dispatch - County 911 Call Taker - County Fire/EMS Dispatch - County Police/Sheriff Dispatch - Fire District Dispatch - IDOT/MoDOT Gateway Guide - Il State Police Communications Center Dispatch - MSHP Dispatch - Municipal 911 Call Taker - Municipal EMS Dispatch - Municipal Fire Dispatch - Municipal Fire/EMS Dispatch - Municipal Police/Fire/EMS Dispatch - St. Louis MO City 911 Center - St. Louis MO City Fire/EMS Communications Dispatch - St. Louis City Streets Department

National ITS Architecture Graphic:

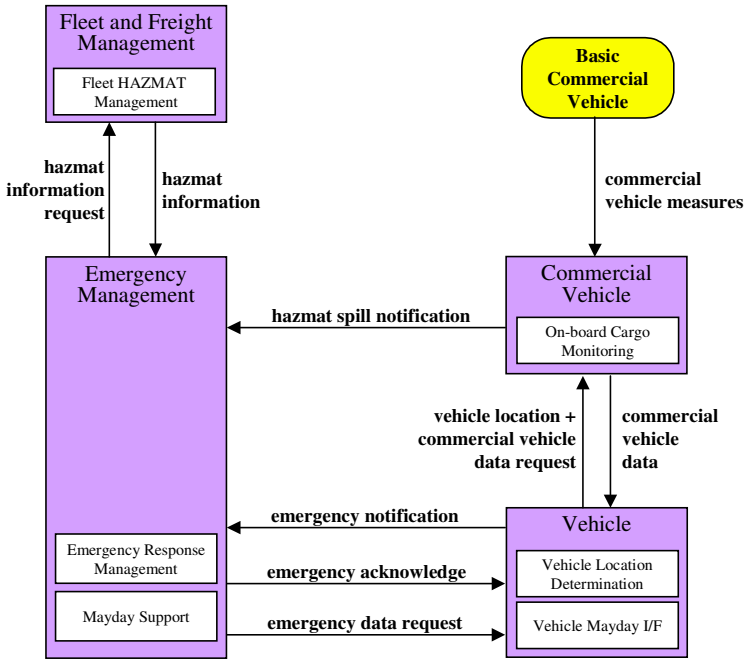

Figure 3-53: CVO10 - HAZMAT Management Market Package

3.4.54 AD01 – ITS Data Mart

National ITS Architecture Definition:	Participating Regional Elements
This market package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization. This focused archive typically includes data covering a single transportation mode and one jurisdiction that is collected from an operational data store and archived for future use. It provides the basic data quality, data privacy, and meta data management common to all ITS archives and provides general query and report access to archive data users.	- IDOT District 8 TMC - Illinois State Safety Investigation - Madison County Transit Center - MoDOT Statewide Traveler System - MoDOT Gateway Guide TMC - St. Clair County Transit Center - East-West Gateway Council of Governments Archive

National ITS Architecture Graphic:

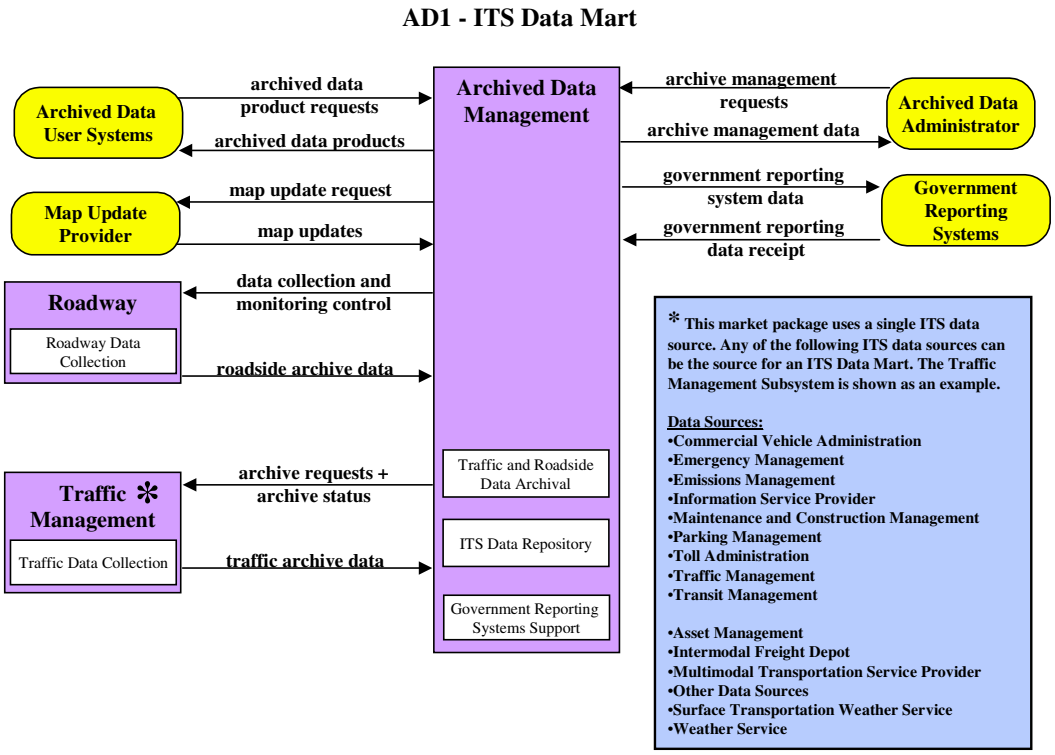

Figure 3-54: AD01 - ITS Data Mart Market Package

3.4.55 AD02 - ITS Data Warehouse

National ITS Architecture Definition:	Participating Regional Elements
This market package includes all the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries. It performs the additional transformations and provides the additional meta data management features that are necessary so that all this data can be managed in a single repository with consistent formats. The potential for large volumes of varied data suggests additional on-line analysis and data mining features that are also included in this market package in addition to the basic query and reporting user access features offered by the ITS Data Mart.	- MoDOT Statewide Traveler System - East-West Gateway Council of Governments Archive - Illinois State Safety Investigation - IDOT District 8 TMC - MoDOT Gateway Guide Archive - MoDOT Gateway Guide TMC

National ITS Architecture Graphic:

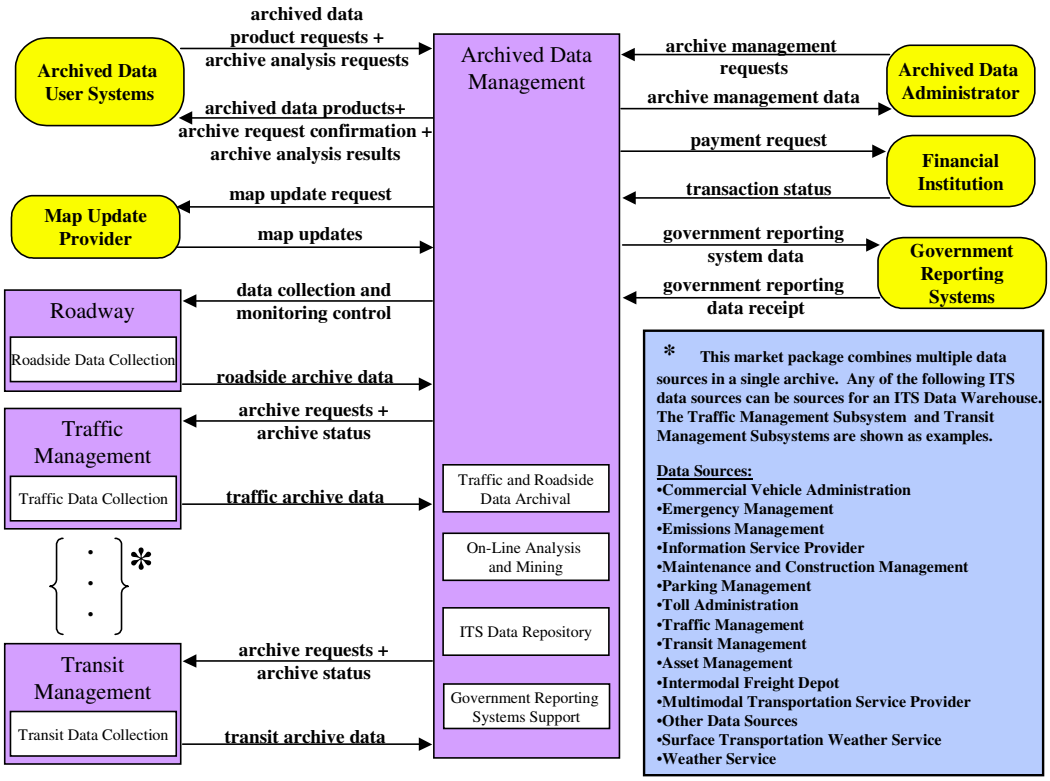

Figure 3-55: AD02 - ITS Data Warehouse Market Package

4 Agreements

Agreements among the different stakeholders, agencies and organizations are required to realize the integration shown in the Bi-State St. Louis Regional ITS architecture. The work completed as part of this architecture investigated existing agreements, memorandum of understanding and guidance established as it relates to information sharing between the Missouri Department of Transportation and various transportation stakeholders. Agreements compiled to date have been compiled and are contained in the table below. This table will be integral to maintaining the architecture and will be revised and added to as additional agreements are generated and the architecture matures.

MOU Partner	Execution Date	Term End Date	Notes
Bi-State Developing Agency (METRO)	11/25/2002	End of AVL and Mapping Project	
KTVI Channel 2 (Media)	3/22/2002	3/22/2004	MOU automatically renews unless either party gives notice 30 days prior to termination date
KMOV Channel 4 (Media)	3/22/2002	3/22/2004	MOU automatically renews unless either party gives notice 30 days prior to termination date
KSDK Channel 5 (Media)	3/22/2002	3/22/2004	MOU automatically renews unless either party gives notice 30 days prior to termination date
Mobility Technologies (Media)	3/22/2002	3/22/2004	MOU automatically renews unless either party gives notice 30 days prior to termination date
Clear Channel Radio (Media)	7/21/2003	7/21/2005	MOU does not automatically renew after the 2-year term
Metro Networks	4/16/2001	TBD	MOU does not automatically renew after the 3-year term
East-West Gateway Council of Governments	To Be Signed		MOU written, but not agreed upon by both parties
IDOT/MoDOT Mississippi River Bridge Maintenance			Blanket agreement for all Mississippi River bridges jointly owned by the DOTs
IDOT/MoDOT Mississippi River Bridge Emergency Management			Informal agreement for emergency management activities on all Mississippi River bridges jointly owned by the DOTs
IDOT/St. Clair Co. 911	2/5/05		CCTV image sharing agreement
IDOT/Various Municipalities	Various		Traffic signal maintenance and traffic signal energy charges

Table 4-1: Existing MOUs (status as of March 30, 2005)

As future guidance for the Missouri Department of Transportation the material contained in Table 4-2 provides guidance for agreements and information for long-range operations and information sharing agreements.

Type of Agreement	Description
Handshake Agreement	• Early agreement between one or more partners • Not recommended for long term operations.
Memorandum of Understanding	• Initial agreement used to provide minimal detail and usually demonstrating a general consensus. • Used to expand a more detailed agreement like a Interagency Agreement which may be broad in scope but contains all of the standard contract clauses required by a specific agency. • May serve as a means to modify a much broader Master Funding Agreement, allowing the master agreement to cover various ITS projects throughout the region and the MOUs to specify the scope and differences between the projects.
Interagency Agreement	• Between public agencies (e.g., transit authorities, cities, counties, etc.) for operations, services or funding • Documents responsibility, functions and liability, at a minimum. Intergovernmental Agreement. • Between governmental agencies *(e.g., Agreements between universities and State DOT, MPOs and State DOT, etc.)*
Operational Agreement	• Between any agency involved in funding, operating, maintaining or using the right-of-way of another public or private agency • Identifies respective responsibilities for all activities associated with shared systems being operated and/or maintained
Funding Agreement	• Documents the funding arrangements for ITS projects *(and other projects)* • Includes at a minimum standard funding clauses, detailed scope, services to be performed, detailed project budgets, etc
Master Agreements	• Standard contract and/or legal verbiage for a specific agency and serving as a master agreement by which all business is done. These agreements can be found in the legal department of many public agencies • Allows states, cities, transit agencies, and other public agencies that do business with the same agencies over and over (e.g., cities and counties) to have one *Master Agreement* that uses smaller agreements *(e.g., MOUs, Scope-of-Work and Budget Modifications, Funding Agreements, Project Agreements, etc.*) to modify or expand the boundaries of the larger agreement to include more specific language.
Contract	• Standard contract and/or legal verbiage for a specific agency and serving as an agreement by which all business is done. These agreements can be found in the legal department of many public agencies • Single document with changes made through contract amendments

Table 4-2: Types of Agreements

5 System Functional Requirements

System functional requirements are high-level detailed definitions of system utilities or resources that support ITS services. Requirements provide a list of statements that define major functions and support regional deployment and integration of various services. Functional requirement are generally provided in a text-based format as a series of statements.

Detailed system requirements are developed during ITS project scope and later integrated into the project design. When developing a regional architecture functional requirements are generic and typically developed at a high level. The purpose of the regional architecture is to determine what ITS services are needed for the region and which ITS systems support them.

5.1 System Functional Requirements – Equipment Package Approach

System functional requirements for the St. Louis region were determined by identifying existing and future ITS systems within the region and associating them with the National ITS Architecture "Market Packages". Market packages are a collection of different products and services that work together to address transportation needs or issues. To illustrate what a market package is consider an office workstation. A typical workstation has a monitor, keyboard, mouse, central processor, software, etc. Much like a market package the workstation is a collection of different products working together to address a need.

Market packages by themselves only provide a limited amount of information on what functions an ITS system provides. As in our example a workstation package does not detail what functions that system can provide. To provide more detail "equipment packages" can be used to detail the individual components that make up the overall market package. Again in our example the mouse, keyboard, and monitor are each equipment packages that make up the larger market package. Generating requirements for the monitor design or mouse configuration would provide a more detailed workstation description or essentially better system functional requirements.

The National ITS Architecture provides a list of previously identified and documented market packages as well as the equipment packages that support them for common transportation related functions. Equipment packages are further documented and defined in greater detail using process specifications (PSpec), which provide a complete set of inputs and outputs.

5.2 Regional Market Packages

To begin the process of defining the regional system requirements National ITS Architecture market packages that address local needs and issues where identified. 55 different packages covering advance traffic management, maintenance and construction management, advance public transportation, emergency management and advance traveler information systems were needed to support regional transportation functions. The market packages identified as applicable for the St. Louis region are listed below:

- ATMS01 - Network Surveillance
- ATMS02 – Probe Surveillance

- ATMS03 - Surface Street Control
- ATMS04 - Freeway Control
- ATMS06 - Traffic Information Dissemination
- ATMS07 - Regional Traffic Control
- ATMS08 - Incident Management System
- ATMS09 – Traffic Forecast and Demand Management
- ATMS11 - Emissions Monitoring and Management
- ATMS13 - Standard Railroad Grade Crossing
- ATMS14 – Advanced Railroad Grade Crossing
- ATMS16 – Parking Facility Management
- ATMS17 – Regional Parking Management
- ATMS18 - Reversible Lane Management
- ATMS19 – Speed Monitoring
- MC01 – Maintenance and Construction Vehicle and Equipment Tracking
- MC03 – Road Weather Data Collection
- MC04 - Weather Information Processing and Distribution
- MC05 – Roadway Automated Treatment
- MC06 – Winter Maintenance
- MC07- Roadway Maintenance and Construction
- MC08- Work Zone Management
- MC09 – Work Zone Safety Monitoring
- MC10 – Maintenance and Construction Coordination Activity
- APTS01 - Transit Vehicle Tracking
- APTS02 - Transit Fixed-Route Operations
- APTS03- Demand Responsive Transit Operations
- APTS04- Transit Passenger and Fare Management
- APTS05 - Transit Security
- APTS06- Transit Maintenance
- APTS07 - Multi-modal Coordination
- APTS08- Transit Traveler Information
- EM01 - Emergency Response
- EM02 - Emergency Routing
- EM03 – Mayday Support
- EM04 - Roadway Service Patrols
- EM05 – Transportation Infrastructure Protection
- EM06 – Wide-Area Alert
- EM07 – Early Warning System
- EM08 – Disaster Response and Recovery
- EM09 – Evacuation and Reentry Management
- EM10 – Disaster Traveler Information
- ATIS01 - Broadcast Traveler Information
- ATIS02 - Interactive Traveler Information
- ATIS05 - ISP Based Route Guidance
- ATIS07 - Yellow Pages and Reservation
- ATIS08 – Dynamic Ridesharing
- CVO03 - Electronic Clearance
- CVO04 - CV Administrative Processes
- CVO06 - Weigh-in-Motion
- CVO07 - Roadside CVO Safety
- CVO08 - On-Board CVO Safety
- CVO10 - HAZMAT Management
- AD01 – ITS Data Mart
- AD02 - ITS Data Warehouse

5.3 Regional Functional Requirements

Functional requirements for the region consist of identifying the agencies associated with each market package and then identifying the associated equipment packages that are applicable to the agency's operations. The process is relatively straight forward as the National ITS Architecture has already established the equipment packages associated with each market package. Furthermore, Section 3 "Operational Concept" has also associated each of the agencies with applicable market packages for the St. Louis region. Not all of the equipment packages are applicable when defining the functional requirements for each agency and they only provide a high-level functional view. However, those equipment packages that are pertinent can be further broken down using the National Architecture into Process Specifications (Pspecs) and data flows that provide a higher degree of functional detail. Agencies and their associated functional requirements are presented below:

5.3.1 Central County Fire Dispatch Functional Requirements

1-Emergency Call-Taking
Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.

2-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

3-Emergency Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

5.3.2 Clayton Traffic Department Functional Requirements

1- Collect Traffic Surveillance
This Equipment package collects, stores, and provides electronic access to the traffic surveillance data.

2- Traffic Maintenance
This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.

3-Roadway Basic Surveillance
This Equipment package provides the capabilities to monitor traffic flow in major intersections and on main highways for urban areas and to monitor road conditions using fixed equipment such as loop detectors and wireline communication.

4-Roadway Equipment Coordination
This equipment package coordinates field equipment that is distributed along the roadway by supporting direct communications between field equipment. This includes coordination between remote sensors and field devices (e.g., Dynamic Message Signs) and coordination between the field devices themselves (e.g., coordination between traffic controllers that are controlling adjacent intersections.).

5-Roadway Signal Controls
This Equipment package provides the capabilities to control traffic signals at major intersections and on main highways for urban areas. This Equipment package is generally constrained to a single jurisdiction.

6-TMC Signal Control
This Equipment package provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single traffic management subsystem. In advanced implementations, this package collects route planning information and integrates and uses this information in predicting future traffic conditions and optimizing the traffic control strategy for these conditions. These capabilities are achieved through real-time communication of logged routes from an Information Service Provider. The planned control strategies can be passed back to the Information Service Provider so that the intended strategies can be reflected in future route planning.

7-Traffic Maintenance
This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.

8-TMC Regional Traffic Control
This Equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control Equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region

9-Roadway Equipment Coordination
This equipment package coordinates field equipment that is distributed along the roadway by supporting direct communications between field equipment. This includes coordination between remote sensors and field devices (e.g., Dynamic Message Signs) and coordination between the field devices themselves (e.g., coordination between traffic controllers that are controlling adjacent intersections.).

10-Roadway Incident Detection
This Equipment package provides incident detection capability to reside at the roadside. For example, advanced CCTV's with built-in incident detection algorithms would allow the actual detection function to be roadside rather than transmitting images to a center for visual or automated detection.

11-TMC Incident Detection
This Equipment package provides the capability to traffic managers to detect and verify incident. This capability includes analyzing and reducing the collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.

12-Basic Information Broadcast
This Equipment package provides the capabilities to collect, process, store, bill, and disseminate traveler information including traveler, transit, ride matching, traffic, and parking information. The traveler information shall include maintaining a database of local area services available to travelers with up-to-the-minute information and providing an interactive connectivity between, sponsors, and providers of services. The transit information shall include the latest available information on transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence. The traffic information shall include latest available information on traffic and highway conditions, and current situation information in real-time including incidents, road construction, recommended routes, current speeds on specific routes, current parking conditions in key areas, schedules for any current or soon to

start events, and current weather situations. This Equipment package shall also provide users with real-time travel related information while they are traveling, and disseminate to assist the travelers in making decisions about transfers and modification of trips. These capabilities shall be provided using equipment such as a fixed facility with a communications system such as a data Subcarrier multiplexing device.

5.3.3 East-West Gateway Council of Governments Functional Requirements

1-TMC Regional Traffic Control

This Equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control Equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region

2-Emissions Data Management

This Equipment package assimilates and stores air quality measures and roadside collected emissions data. General air quality measures are distributed as general traveler information and also may be used for in demand management programs. Collected roadside emissions are analyzed and used to detect, identify, and notify concerned parties regarding vehicles that exceed emissions standards.

3-ITS Data Repository

This equipment package collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. This equipment package includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. This equipment package supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.

4-On-Line Analysis and Mining

This equipment package provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered by various implementations of this equipment package.

5-Traffic and Roadside Data Archival

This equipment package collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. The equipment package controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes rather than for traffic management.

6-Roadside Data Collection

This equipment package collects traffic, road, and environmental conditions information for use in transportation planning, research, and other off-line applications where data quality and completeness take precedence over real-time performance. This equipment package includes the sensors, supporting roadside infrastructure, and communications equipment that collects and transfers information to a center for archival.

7-Traffic Data Collection
This equipment package collects and stores traffic information that is collected in the course of traffic operations performed by the Traffic Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

8-Virtual Data Warehouse Services
Provides access to data from geographically dispersed archives and coordinates information exchange with a local data warehouse. Also provides the specialized publishing, directory services, and transaction management functions associated with coordinating remote archives.

5.3.4 Generic {Ambulance District Dispatch/County 911 Dispatch/County Fire and EMS Dispatch/County Police or Sheriff Dispatch/Fire District Dispatch/Municipal Fire and EMS Dispatch/Municipal Police Dispatch and Municipal/Local ESDA} Functional Requirements

1-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

2-Emergency Call-Taking
This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

3-Emergency Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

4-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

5-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

6-Mayday Support
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident

7-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

8-On-board EV En Route Support
On-board systems for gathering of dispatch and routing information for emergency vehicle personnel,

vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.

9-Emergency Evacuation Support
Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.

10-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicles, etc.

11-Center Secure Area Alarm Support
Mangement of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

5.3.5 Generic Information Service Provider (ISP) Functional Requirements

1-Basic Information Broadcast
Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event, and weather information to traveler interface systems and vehicles.

2-Interactive Infrastructure Information
Collection, processing, storage, and personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.

3-Traveler Telephone Information
Collection and distribution of traveler information and wide-area alerts to traveler telephone information systems such as 511, based on voice-based traveler requests.

4-Infrastructure Provided Route Selection
Generation of pre-trip and enroute trip plans for travelers (and vehicles) based on current traffic conditions, work zones, weather, and travelers constraints and preferences. Includes end-to-end trips using multiple modes, such as bicycle, transit, etc.

5-ISP Emergency Traveler Information
Collection and distribution of emergency information to the traveler public, including evacuation information and wide-area alerts.

5.3.6 Generic {Public Works Operations} Functional Requirements

1-TMC Signal Control
Remotely controls traffic signal controllers to implement traffic management strategies at major intersections and on main highways for urban areas, based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.

2-TMC Traffic Information Dissemination
Controls dissemination of traffic-related data to other centers, the media, and travelers via the driver information systems (DMS, HAR) that it operates.

3-TMC Regional Traffic Control
Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.

4-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

5-TMC Incident Dispatch Coordination/Communication
Center-based capability to formulate an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.

6-TMC Traffic Network Performance Evaluation
Systems to predict travel demand patterns to support traffic flow optimization, demand management, and incident management. Collects data from surveillance equipment as well as input from other management centers including emissions, event promoters, and other TMCs.

7-HRI Traffic Management
Remotely monitor and control highway-rail intersection (HRI) equipment, includes standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI.

8-Traffic Maintenance
Monitoring and remote diagnostics of field equipment - detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

9-TMC Toll/Parking Coordination
Provides the capability to gather information on regional toll, parking, and transit usage and request changes to enable dynamic pricing for demand management.

5.3.7 Generic {Public Works Dispatch} Functional Requirements

1-MCM Vehicle Tracking
Remotely tracks the location of maintenance and construction vehicles and other equipment; presented to the center personnel.

2-MCM Environmental Information Collection
Remotely controls environmental sensors and assimilates collected data with other current and forecast road conditions and surface weather information from weather service providers and transportation operations.

3-MCM Environmental Information Processing
Processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. Disseminates road weather information to other agencies and centers.

4-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.

5-MCM Maintenance Decision Support

Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

6-MCM Winter Maintenance Management
Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.

7-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

8-MCM Work Zone Management
Remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., traveler information systems, traffic management centers, other maintenance and construction centers).

9-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

5.3.8 IEMA Regional Office Functional Requirements

1-Emergency Call-Taking
Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.

2-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

3-Emergency Early Warning System
Monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies in order to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to other ITS centers to notify the traveling public. Includes support for Child Abduction notices.

4-Emergency Response Management
Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.

5-Incident Command
Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.

6-Emergency Evacuation Support
Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.

7-Emergency Environmental Monitoring
Current and forecast road and weather information assimilated from weather service providers and emergency vehicles equipped with environmental sensors; used by the operator to more effectively

manage incidents.

8-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

9-Center Secure Area Sensor Management
Management of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

10-On-board EV Incident Management Coordination
On-board systems providing the direct interface between the emergency vehicle and incident management personnel at the incident site.

5.3.9 IEMA Statewide EOC Functional Requirements

1-Emergency Call-Taking
Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.

2-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

3-Emergency Early Warning System
Monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies in order to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to other ITS centers to notify the traveling public. Includes support for Child Abduction notices.

4-Emergency Response Management
Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.

5-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

6-Emergency Evacuation Support
Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.

7-Emergency Environmental Monitoring
Current and forecast road and weather information assimilated from weather service providers and emergency vehicles equipped with environmental sensors; used by the operator to more effectively manage incidents.

8-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal

interchange facilities, on-board a transit vehicle, etc.

9-Center Secure Area Sensor Management
Management of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

5.3.10 Illinois Dept. of Transportation District 8 Functional Requirements

1-Collect Traffic Surveillance
Management of traffic sensors and surveillance (CCTV) equipment, and distribution of the collected information to other centers and operators.

2-TMC Freeway Management
Remotely controls ramp meters, mainline metering, and lane controls on freeways based on upstream and downstream traffic flow and ramp queue length algorithms.

3-TMC Traffic Information Dissemination
Controls dissemination of traffic-related data to other centers, the media, and travelers via the driver information systems (DMS, HAR) that it operates.

4-TMC Regional Traffic Control
Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.

5-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

6-TMC Incident Dispatch Coordination/Communication
Center-based capability to formulate an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.

7-Traffic Maintenance
Monitoring and remote diagnostics of field equipment - detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

8-Roadway Basic Surveillance
Field elements that monitor traffic conditions using loop detectors and CCTV cameras.

9-Roadway Signal Controls
Field elements including traffic signal controllers for use at major intersections and on main highways for urban areas; also supports pedestrian crossings.

10-Roadway Traffic Information Dissemination
Driver information systems, such as dynamic message signs and Highway Advisory Radio (HAR).

11-Roadway Incident Detection
Field elements that provide video images of traffic conditions, including advanced CCTV cameras with built-in incident detection algorithms.

12-Roadway Equipment Coordination
Field elements that control and send data to other field elements (such as environmental sensors that send data to a DMS or coordination between traffic controllers on adjacent intersections), without center control.

13-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

14-On-board EV En Route Support
On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.

15-ITS Data Repository
Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.

16-Traffic and Roadside Data Archival
Collects and archives traffic and environmental information directly from the roadside for use in off-line planning, research, and analysis.

17-Government Reporting Systems Report
Selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements.

18-On-line Analysis and Mining
Advanced data analysis and mining features to support discovery of information, patterns, and correlations in large ITS archives.

19-EM Call Taking
Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.

20-EM Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

21-EM Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

22-EM Early Warning System
Monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies in order to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to other ITS centers to notify the traveling public. Includes support for Child Abduction notices.

23-EM Response Management
Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.

24-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local

management of an incident.

25-EM Evacuation Support
Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.

26-EM Environmental Monitoring
Current and forecast road and weather information assimilated from weather service providers and emergency vehicles equipped with environmental sensors; used by the operator to more effectively manage incidents.

27-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

28-Center Secure Area Sensor Management
Management of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

29-Center Secure Area Alarm Support
Collection and response to silent and audible alarms received from travelers in secure areas (such as transit stops, rest areas, park-and-ride lots) and from on-board transit vehicles.

30-Service Patrol Management
Dispatch and communication with roadway service patrol vehicles that monitor roads to aid motorists, offering rapid response to minor incidents.

31-Emergency Data Collection
Collection and storage of information related to Emergency Management. For use by operations personnel or data archives in the region.

32-MCM Vehicle Tracking
Remotely tracks the location of maintenance and construction vehicles and other equipment; presented to the center personnel.

33-MCM Environmental Information Collection
Remotely controls environmental sensors and assimilates collected data with other current and forecast road conditions and surface weather information from weather service providers and transportation operations.

34-MCM Environmental Information Processing
Processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. Disseminates road weather information to other agencies and centers.

35-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.

36-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

37-MCM Winter Maintenance Management

Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.

38-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

39-MCM Work Zone Management
Remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., traveler information systems, traffic management centers, other maintenance and construction centers).

40-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

41-MCM Data Collection
Collection and storage of maintenance and construction information. For use by operations personnel or data archives in the region.

42-TMC Probe Information Collection
Collects, assimilates, and disseminates vehicle probe data collected from roadside beacons and centers controlling transit vehicles, emergency vehicles, toll collection points, and route-guided vehicles.

43-TMC Evacuation Support
Development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. Interfaces with emergency management and other traffic management centers.

44-TMC Traffic Network Performance Evaluation
Systems to predict travel demand patterns to support traffic flow optimization, demand management, and incident management. Collects data from surveillance equipment as well as input from other management centers including emissions, event promoters, and other TMCs.

45-TMC Environmental Monitoring
Management of environmental sensors and assimilation of collected data with other current and forecast road conditions and surface weather information from weather service providers and roadway maintenance operations.

46-HRI Traffic Management
Remotely monitor and control highway-rail intersection (HRI) equipment, includes standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI.

47-Rail Operations Coordination
Coordination between rail operations and traffic management centers - exchanging train schedules, maintenance schedules, as well as incidents and priority messages which result in highway-rail intersection (HRI). Supports advanced traffic control strategies and enhanced traveler information.

48-TMC Work Zone Traffic Management
Coordination with maintenance systems using work zone images and traveler information systems (such as DMS), and distribution of work plans so that work zones are established that have minimum traffic impact.

49-TMC Toll/Parking Coordination
Provides the capability to gather information on regional toll, parking, and transit usage and request changes to enable dynamic pricing for demand management.

50-TMC Multimodal Coordination
Provides traffic signal priority for transit vehicles based on center-to-center communications with the transit management center; also exchange traffic and transit information.

51-Traffic Data Collection
Collection and storage of traffic management data. For use by operations personnel or data archives in the region.

52-Mayday Support
Collection and response to Mayday messages received from vehicles and drivers.

5.3.11 Illinois State Police Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

2-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

3-Emergency Call-Taking
This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

4-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

5-Emergency Dispatch
This Equipment package supports efficient dispatch of emergency vehicles. It tracks emergency vehicles, dispatches these vehicles to an incident, and provides safe and efficient routes based on real-time traffic information.

6-EM Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

7-EM Early Warning System
Monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies in order to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to other ITS centers to notify the traveling public. Includes support for Child Abduction notices.

8-Incident Command

Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

9-EM Evacuation Support
Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.

10-EM Environmental Monitoring
Current and forecast road and weather information assimilated from weather service providers and emergency vehicles equipped with environmental sensors; used by the operator to more effectively manage incidents.

11-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

12-Center Secure Area Sensor Management
Management of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

13-Center Secure Area Alarm Support
Collection and response to silent and audible alarms received from travelers in secure areas (such as transit stops, rest areas, park-and-ride lots) and from on-board transit vehicles.

14-Mayday Support
Collection and response to Mayday messages received from vehicles and drivers.

5.3.12 Illinois Environmental Protection Functional Requirements

1-Emissions Data Management
This Equipment package assimilates and stores air quality measures and roadside collected emissions data. General air quality measures are distributed as general traveler information and also may be used for in demand management programs. Collected roadside emissions are analyzed and used to detect, identify, and notify concerned parties regarding vehicles that exceed emissions standards.

2-Roadway Emissions Monitoring
This Equipment package monitors emissions and general air quality and communicates the collected information back to the emissions management subsystem where it can be monitored, analyzed, and used. This equipment package supports point monitoring of individual vehicle emissions as well as general monitoring of standard air quality measures.

3-TMC Environmental Monitoring
This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support

5.3.13 Illinois State Safety Investigation Functional Requirements

1-Traffic and Roadside Data Archival
Collects and archives traffic and environmental information directly from the roadside for use in off-line planning, research, and analysis.

2-Government Reporting Systems Support
Selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements.

5.3.14 Madison County Highway Department Functional Requirements

1- MCM Vehicle Tracking
Remotely tracks the location of maintenance and construction vehicles and other equipment; presented to the center personnel.

2- MCM Environmental Information Collection
Remotely controls environmental sensors and assimilates collected data with other current and forecast road conditions and surface weather information from weather service providers and transportation operations.

3-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.

4-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

5-MCM Winter Maintenance Management
Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.

6-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

7-MCM Work Zone Management
Remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., traveler information systems, traffic management centers, other maintenance and construction centers).

8-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

9-TMC Probe Information Collection
Collects, assimilates, and disseminates vehicle probe data collected from roadside beacons and centers controlling transit vehicles, emergency vehicles, toll collection points, and route-guided vehicles.

10-TMC Signal Control
Remotely controls traffic signal controllers to implement traffic management strategies at major intersections and on main highways for urban areas, based on traffic conditions, incidents, emergency

vehicle preemptions, pedestrian crossings, etc.

11-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

12-TMC Incident Dispatch Coordination/Communication
Center-based capability to formulate an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.

13-TMC Environmental Monitoring
Management of environmental sensors and assimilation of collected data with other current and forecast road conditions and surface weather information from weather service providers and roadway maintenance operations.

14-Traffic Maintenance
Monitoring and remote diagnostics of field equipment - detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

15-TMC Work Zone Traffic Management
Coordination with maintenance systems using work zone images and traveler information systems (such as DMS), and distribution of work plans so that work zones are established that have minimum traffic impact.

5.3.15 Madison County Transit District Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

2-Transit Center Tracking and Dispatch
This Equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The Equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility.

3-On-board Transit Trip Monitoring
This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.

4-Vehicle Location Determination

This equipment package determines current location information and provides this information to other equipment packages that use the location information to provide various ITS services.

5-Transit Center Paratransit Operations

This Equipment package provides the capability to automate the planning and scheduling, allowing improvements in paratransit routes and services to develop, printing and disseminating schedules, and automatically updating customer service operator systems with the most current schedule. In addition, this Equipment package provides the capability to assign drivers to routes in a fair manner while minimizing labor and overtime services, including driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver. These capabilities shall be provided through the utilization of dispatch and fleet management software running on a workstation type processor.

6-Transit Garage Operations

This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

7-On-board Paratransit Operations

This equipment package forwards paratransit dispatch requests to the driver and forwards acknowledgements to the center. It coordinates with, and assists the driver in managing multi-stop runs associated with demand responsive, flexibly routed transit services.

8-Remote Transit Fare Management

This Equipment package provides the capability for the traveler to use a common fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified. This may be implemented as a payment instrument reader at a kiosk. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported.

9-Transit Center Fare and Load Management

This Equipment package provides the capability to accept collected data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities shall be provided through a workstation type processor with GUI, high capacity storage, ride share software housed in a building with dialup lines and wireline telephone and require integration with an existing Transit Center Tracking and Dispatch Equipment package.

10-On-board Transit Fare and Load Management

This Equipment package provides the capability to collect data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities require integration with an existing On-board Trip Monitoring Equipment package.

11-Remote Mayday I/F
This Equipment package provides the capability to report an emergency and summons assistance. The equipment includes a traveler interface that facilitates generation of a distress signal under duress and wireline communications that carries this distress signal and allows follow-up verification and determination of the nature of the emergency and the required response. This equipment package notifies either the Emergency Management or Transit Management Subsystem depending on the implementation.

12-Secure Area Monitoring
This Equipment package provides the capability to monitor the safety of travelers at Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It collects surveillance images and data and relays this information back to the Transit Management and Emergency Management Subsystems.

13-Transit Center Security
This Equipment package provides the capability to monitor key transit locations and transit vehicles with both video and audio systems automatically alerting operators and police of potential incidents and supporting traveler activated alarms. The monitoring equipment shall also include capabilities to assist in responding to terrorist incidents.

14-On-board Transit Security
This Equipment package provides the capability to monitor the safety of transit vehicles using on-board safety sensors, processors and communications from the prerequisite On-board Trip Monitoring Equipment package.

15-Transit Garage Maintenance
This Equipment package provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data from a prerequisite vehicle tracking equipment package. In addition, it provides information to proper service personnel to support maintenance activities and records and verifies that maintenance work was performed. This equipment package receives special events and real-time incident data from the traffic management subsystem and assigns operators to vehicles and transit routes. Garage maintenance also receives information about incidents involving transit vehicles from the TMC in order to dispatch tow trucks and other repair vehicles.

16-On-board Maintenance
This Equipment package provides the capability to use transit vehicle mileage data to automatically generate preventative maintenance schedules for each specific bus by utilizing vehicle tracking data and storing with a trip computer. It also provides the capability for real-time condition monitoring on board the vehicle, and transmission of this information via two-way communication to the management center.

17-Transit Center Multi-Modal Coordination
This Equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes.

18-On-board Transit Signal Priority
This Equipment package provides the capability for transit vehicles to request signal priority through short range communication directly with traffic control equipment at the roadside.

19-Interactive Infrastructure Information
This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

20-Personal Interactive Information Reception
This Equipment package shall provide the capability for travelers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, and the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Personal Information Access Subsystem equipment such as cellular telephone, interactive TV, Personal Computer, and pager with alpha display using communication medium and equipment such as two-way radio, CATV, and wireless data transceivers.

21-Remote Transit Information Services
The Equipment package furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with the latest available information on transit routes, schedules, transfer options, bicycle accessibility, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to tailored information for individual transit users, this equipment package supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.

22-Transit Center Information Services
This equipment package collects the latest available information for a transit service and makes it available to transit customers and to Information Service Providers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to general service information, tailored information (e.g, itineraries) are provided to individual transit users.

23-Transit Center Fixed-Route Operations
This equipment package enhances the planning and scheduling associated with fixed and flexible route transit services. The package allows fixed-route and flexible-route transit services to develop, print and disseminate schedules and automatically updates customer service operator systems with the most current schedule information. Current vehicle schedule adherence and optimum scenarios for schedule adjustment shall also be provided.

24-Transit Data Collection
This equipment package collects and stores transit information that is collected in the course of transit operations performed by the Transit Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

5.3.16 METRO St. Louis Transit Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

2-Transit Center Tracking and Dispatch
This Equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The Equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility.

3-On-board Transit Trip Monitoring
This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.

4-Vehicle Location Determination
This equipment package determines current location information and provides this information to other equipment packages that use the location information to provide various ITS services.

5-Transit Center Fixed-Route Operations
This Equipment package enhances the planning and scheduling associated with fixed route transit services. The package allows fixed-route services to develop, print and disseminate schedules and automatically updates customer service operator systems with the most current schedule information. Current vehicle schedule adherence and optimum scenarios for schedule adjustment shall also be provided.

6-Transit Garage Operations
This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

7-On-board Fixed Route Schedule Management
This Equipment package provides the capabilities for automated planning and scheduling, by collecting data for schedule generation. Capability shall also be provided to automatically determine optimum scenarios for schedule adjustment. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, on-board safety sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.

8-Transit Center Paratransit Operations
This Equipment package provides the capability to automate the planning and scheduling, allowing improvements in paratransit routes and services to develop, printing and disseminating schedules, and automatically updating customer service operator systems with the most current schedule. In addition, this Equipment package provides the capability to assign drivers to routes in a fair manner while minimizing labor and overtime services, including driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver. These capabilities shall be provided through the utilization of dispatch and fleet management software running on a workstation type processor.

9-Transit Garage Operations
This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

10-On-board Paratransit Operations
This equipment package forwards paratransit dispatch requests to the driver and forwards acknowledgements to the center. It coordinates with, and assists the driver in managing multi-stop runs associated with demand responsive, flexibly routed transit services.

11-Remote Transit Fare Management
This Equipment package provides the capability for the traveler to use a common fare medium for all

applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified. This may be implemented as a payment instrument reader at a kiosk. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported.

12-Transit Center Fare and Load Management
This Equipment package provides the capability to accept collected data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities shall be provided through a workstation type processor with GUI, high capacity storage, ride share software housed in a building with dialup lines and wireline telephone and require integration with an existing Transit Center Tracking and Dispatch Equipment package.

13-On-board Transit Fare and Load Management
This Equipment package provides the capability to collect data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities require integration with an existing On-board Trip Monitoring Equipment package.

14-Remote Mayday I/F
This Equipment package provides the capability to report an emergency and summons assistance. The equipment includes a traveler interface that facilitates generation of a distress signal under duress and wireline communications that carries this distress signal and allows follow-up verification and determination of the nature of the emergency and the required response. This equipment package notifies either the Emergency Management or Transit Management Subsystem depending on the implementation.

15-Secure Area Monitoring
This Equipment package provides the capability to monitor the safety of travelers at Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It collects surveillance images and data and relays this information back to the Transit Management and Emergency Management Subsystems.

16-Transit Center Security
This Equipment package provides the capability to monitor key transit locations and transit vehicles with both video and audio systems automatically alerting operators and police of potential incidents and supporting traveler activated alarms. The monitoring equipment shall also include capabilities to assist in responding to terrorist incidents.

17-On-board Transit Security
This Equipment package provides the capability to monitor the safety of transit vehicles using on-board safety sensors, processors and communications from the prerequisite On-board Trip Monitoring Equipment package.

18-Transit Garage Maintenance

This Equipment package provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data from a prerequisite vehicle tracking equipment package. In addition, it provides information to proper service personnel to support maintenance activities and records and verifies that maintenance work was performed. This equipment package receives special events and real-time incident data from the traffic management subsystem and assigns operators to vehicles and transit routes. Garage maintenance also receives information about incidents involving transit vehicles from the TMC in order to dispatch tow trucks and other repair vehicles.

19-On-board Maintenance

This Equipment package provides the capability to use transit vehicle mileage data to automatically generate preventative maintenance schedules for each specific bus by utilizing vehicle tracking data and storing with a trip computer. It also provides the capability for real-time condition monitoring on board the vehicle, and transmission of this information via two-way communication to the management center.

20-Transit Center Multi-Modal Coordination

This Equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes.

21-On-board Transit Signal Priority

This Equipment package provides the capability for transit vehicles to request signal priority through short range communication directly with traffic control equipment at the roadside.

22-Interactive Infrastructure Information

This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

23-Personal Interactive Information Reception

This Equipment package shall provide the capability for travelers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, and the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Personal Information Access Subsystem equipment such as cellular telephone, interactive TV, Personal Computer, and pager with alpha display using communication medium and equipment such as two-way radio, CATV, and wireless data transceivers.

24-Remote Transit Information Services

The Equipment package furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with the latest available information on transit routes, schedules, transfer options, bicycle accessibility, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to tailored information for individual transit users, this equipment package supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.

25-Transit Center Information Services

This equipment package collects the latest available information for a transit service and makes it available to transit customers and to Information Service Providers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to general service information, tailored information (e.g, itineraries) are provided to individual transit users.

26-Interactive Infrastructure Information

This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

27-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

28-Center Secure Area Sensor Management
Management of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

29-Center Secure Area Alarm Support
Collection and response to silent and audible alarms received from travelers in secure areas (such as transit stops, rest areas, park-and-ride lots) and from on-board transit vehicles.

5.3.17 Metro Networks Functional Requirements

1- Collect Traffic Surveillance
This Equipment package collects, stores, and provides electronic access to the traffic surveillance data.

2-Roadway Basic Surveillance
This Equipment package provides the capabilities to monitor traffic flow in major intersections and on main highways for urban areas and to monitor road conditions using fixed equipment such as loop detectors and wireline communication.

3-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

4-Basic Information Broadcast
This Equipment package provides the capabilities to collect, process, store, bill, and disseminate traveler information including traveler, transit, ride matching, traffic, and parking information. The traveler information shall include maintaining a database of local area services available to travelers with up-to-the-minute information and providing an interactive connectivity between, sponsors, and providers of services. The transit information shall include the latest available information on transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence. The traffic information shall include latest available information on traffic and highway conditions, and current situation information in real-time including incidents, road construction, recommended routes, current speeds on specific routes, current parking conditions in key areas, schedules for any current or soon to start events, and current weather situations. This Equipment package shall also provide users with real-time travel related information while they are traveling, and disseminate to assist the travelers in making decisions about transfers and modification of trips. These capabilities shall be provided using equipment such as a fixed facility with a communications system such as a data Subcarrier multiplexing device.

5-Interactive Infrastructure Information
This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

6-Personal Provider-Based Route Guidance
This Equipment package coordinates with an ISP-Based route planning service to select a suggested route plan that is tailored to the traveler's preferences. Coordination may continue during the trip so that the route plan can be modified to account for new information. Many equipment configurations are possible including systems that provide a basic route plan to the traveler as well as more sophisticated systems that can provide transition by transition guidance to the traveler along a multi-modal route plan.

7-Personal Interactive Information Reception
This Equipment package shall provide the capability for travelers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, and the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Personal Information Access Subsystem equipment such as cellular telephone, interactive TV, Personal Computer, and pager with alpha display using communication medium and equipment such as two-way radio, CATV, and wireless data transceivers.

5.3.18 Missouri CVISN Functional Requirements

1-CV Information Exchange
This equipment package supports the exchange of safety and credentials data among jurisdiction. The package also supports the exchange of safety and credentials data between agencies (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data).

2-CV Safety Administration
This Equipment package augments the Credentials and Taxes Administration Equipment package with safety data. This package ensures that safety criteria are available for automated roadside safety checks. It supports the collection and review of carrier safety data and determines the carrier safety rating.

3-Citation and Accident Electronic Recording
The equipment package documents violations and forwards the information to the Commercial vehicle if available and to the CVAS for processing as part of the normal credentials processing package

4-Roadside Electronic Screening
This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for two-way communication with approaching properly equipped commercial vehicles at mainline speeds, reading tags for automated vehicle identification and credential checking. There will be a capability to appropriately screen all vehicles, not just those that are equipped. This Equipment package shall be able to process the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed or to generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities. Support shall be provided to both interstate and intrastate carriers.

5-On-board CV Electronic Data
This Equipment package provides the Commercial Vehicle Subsystem the capability for two-way data exchange between the vehicle and the roadside facility with the transmission of information such as status of driver, vehicle, and carrier IDs and cargo information. The driver, vehicle and carrier are identified via the tag so that actual weight from roadside mainline weigh-in-motion may be checked. This includes only the equipment on the commercial vehicle including a processor/tag for identification, especially a HAZMAT identification. The actual reading and processing required for the credential checking and weigh-in-motion will be performed by the roadside.

6-Credentials and Taxes Administration
This Equipment package provides administrative capabilities for commercial vehicle operations including database management and administrator-to-roadside and administrator-to-administrator

interfaces. For example, this Equipment package would manage the electronic credentials database for a state, perform reconciliation of mileage and fuel taxes (possibly post trip), and interface with roadsides performing credential checks. This equipment package communicates with similar packages in other CVAS locations to exchange credentials database information. Example locations would be state agency or regional offices that are involved with commercial vehicle operations.

7-CV Information Exchange
This equipment package supports the exchange of safety and credentials data among jurisdiction. The package also supports the exchange of safety and credentials data between agencies (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data).

8-Fleet Administration
This Equipment package provides vehicle tracking, dispatch, and reporting capabilities to fleet management center personnel. It gathers current road conditions and traffic information, prepares vehicle routes, and provides a fleet interface for toll collection. It also provides route plan information for network performance evaluation.

9-Fleet Credentials and Taxes Management and Reporting
This Equipment package provides the Fleet and Freight Management Subsystem the capabilities to purchase credentials and file trip reports electronically by the fleet managers, to perform automated enrollment at the roadside facilities, and electronically manage the credentials checking by the roadside commercial vehicle inspectors. The electronic purchase shall be performed in accordance with developing standards such that a single integrated system for electronic payments might develop ensuring that deployment across multiple agency political boundaries is performed without degradation. Inherent to credential management shall be the management of the vehicles, with a prerequisite of the vehicle tracking software from the Fleet Administration Equipment package.

10-Roadside WIM
This Equipment package allows for roadside high speed weigh in motion. This package can be fixed to a location or mobile. It can include an interface to the credential check package and augment electronic credentials check with electronic weight check or it can be a stand alone package with display.

11-On-board CV Electronic Data
This Equipment package provides the Commercial Vehicle Subsystem the capability for two-way data exchange between the vehicle and the roadside facility with the transmission of information such as status of driver, vehicle, and carrier IDs and cargo information. The driver, vehicle and carrier are identified via the tag so that actual weight from roadside mainline weigh-in-motion may be checked. This includes only the equipment on the commercial vehicle including a processor/tag for identification, especially a HAZMAT identification. The actual reading and processing required for the credential checking and weigh-in-motion will be performed by the roadside.

12-CV Information Exchange
This equipment package supports the exchange of safety and credentials data among jurisdiction. The package also supports the exchange of safety and credentials data between agencies (for example, an administrative center and the roadside check facilities) within a single jurisdiction. Data are collected from multiple authoritative sources and packaged into snapshots (top-level summary and critical status information) and profiles (detailed and historical data).

13-CV Safety Administration
This Equipment package augments the Credentials and Taxes Administration Equipment package with safety data. This package ensures that safety criteria are available for automated roadside safety checks. It supports the collection and review of carrier safety data and determines the carrier safety rating.

14-Citation and Accident Electronic Recording
The equipment package documents violations and forwards the information to the Commercial vehicle if available and to the CVAS for processing as part of the normal credentials processing package

15-Roadside Electronic Screening
This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for two-way communication with approaching properly equipped commercial vehicles at mainline speeds, reading tags for automated vehicle identification and credential checking. There will be a capability to appropriately screen all vehicles, not just those that are equipped. This Equipment package shall be able to process the data from the commercial vehicles along with accessed database information to determine whether a pull-in message is needed or to generate random pull-in messages with provisions for facility operators and enforcement officials to have manual override capabilities. Support shall be provided to both interstate and intrastate carriers.

16-Roadside Safety Inspection
This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of use of hand held devices to rapidly inspect the vehicle and driver. In addition this Equipment package provides the Roadside Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of automated mainline speed reading of on-board safety data to rapidly screen the vehicle and driver. This Equipment package shall also provide the capabilities to collect, store, maintain, and provide safety data and access historical safety data after receiving identification from vehicles at mainline speeds or while stopped at the roadside. Results of screening and summary safety inspection can be written back onto the tag. The capabilities to process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies shall be provided. These capabilities have a prerequisite of the Roadside Electronic Screening Equipment package and shall be provided primarily through the utilization of an additional safety database. Since a vehicle may cross jurisdiction boundaries during a trip, this equipment package supports the concept of a last clearance event record (aka trip ticket) carried on the vehicle s tag. The last clearance event record reflects the results of the roadside verification action. For example, if the vehicle is pulled over in State A and undergoes credential, weight, and safety checks, the results of the clearance process are written to the vehicle s tag. If the vehicle continues the trip and passes a roadside station in State B, the State B station has access to the results of the previous pull-in because it can read the last clearance event record written by the State A roadside station.

17-On-board CV Electronic Data
This Equipment package provides the Commercial Vehicle Subsystem the capability for two-way data exchange between the vehicle and the roadside facility with the transmission of information such as status of driver, vehicle, and carrier IDs and cargo information. The driver, vehicle and carrier are identified via the tag so that actual weight from roadside mainline weigh-in-motion may be checked. This includes only the equipment on the commercial vehicle including a processor/tag for identification, especially a HAZMAT identification. The actual reading and processing required for the credential checking and weigh-in-motion will be performed by the roadside.

18-Fleet Administration
This Equipment package provides vehicle tracking, dispatch, and reporting capabilities to fleet management center personnel. It gathers current road conditions and traffic information, prepares vehicle routes, and provides a fleet interface for toll collection. It also provides route plan information for network performance evaluation.

19-Citation and Accident Electronic Recording
The equipment package documents violations and forwards the information to the Commercial vehicle if available and to the CVAS for processing as part of the normal credentials processing package

20-Roadside Safety Inspection
This Equipment package provides the Commercial Vehicle Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of use of hand held devices to rapidly inspect the vehicle and driver. In addition this Equipment package provides the Roadside Check Subsystem the capabilities for operators to automate the roadside safety inspection process including the support of automated mainline speed reading of on-board safety data to rapidly screen the vehicle and driver. This Equipment package shall also provide the capabilities to collect, store, maintain, and provide safety data and access historical safety data after receiving identification from vehicles at mainline speeds or while stopped at the roadside. Results of screening and summary

safety inspection can be written back onto the tag. The capabilities to process safety data and issue pull-in messages or provide warnings to the driver, carrier, and enforcement agencies shall be provided. These capabilities have a prerequisite of the Roadside Electronic Screening Equipment package and shall be provided primarily through the utilization of an additional safety database. Since a vehicle may cross jurisdiction boundaries during a trip, this equipment package supports the concept of a last clearance event record (aka trip ticket) carried on the vehicle s tag. The last clearance event record reflects the results of the roadside verification action. For example, if the vehicle is pulled over in State A and undergoes credential, weight, and safety checks, the results of the clearance process are written to the vehicle s tag. If the vehicle continues the trip and passes a roadside station in State B, the State B station has access to the results of the previous pull-in because it can read the last clearance event record written by the State A roadside station.

21-On-board Cargo Monitoring
This Equipment package provides the Commercial Vehicle Subsystem the capability to monitor both interstate and intrastate cargo safety such that enforcement and HAZMAT response teams can be provided with timely and accurate information. This includes only the equipment on board the cargo container such as a communication device, possibly the addition of a cell-based radio, and equipment for the processing and storage of cargo material. This can also include optional sensors for temperature, pressure, load leveling, or acceleration depending upon the items monitored. It is already expected that the cargo location devices such as GPS equipment and an integration processor already exist. These items are presented as part of the On-board Trip Monitoring Equipment package.

22-On-board CV Safety
This Equipment package provides the Commercial Vehicle Subsystem the capability to collect and process on board vehicle and driver safety information to monitor the safety status and supply this information to the roadside facilities both at mainline speeds and while stopped for inspections. The capability to alert the commercial vehicle driver whenever there is a critical safety problem or potential emergency shall also be provided. These capabilities include only the equipment on the commercial vehicle including the sensors and processors to monitor the vehicle and driver with the information stored on the vehicle. When the information is transmitted to the roadside facility or after the trip, it will utilize the communication devices already in place. The package will also support onboard driver safety log maintenance and checking.

23-Fleet Maintenance Management
This Equipment package provides the capability to use vehicle mileage data to automatically generate preventative maintenance schedules for each specific vehicle by utilizing vehicle tracking data from the prerequisite tracking Equipment package. In addition, capability to automatically ensure that proper service personnel are provided information for maintenance activities and to record and verify that maintenance work was performed shall be provided.

24-On-board Cargo Monitoring
This Equipment package provides the Commercial Vehicle Subsystem the capability to monitor both interstate and intrastate cargo safety such that enforcement and HAZMAT response teams can be provided with timely and accurate information. This includes only the equipment on board the cargo container such as a communication device, possibly the addition of a cell-based radio, and equipment for the processing and storage of cargo material. This can also include optional sensors for temperature, pressure, load leveling, or acceleration depending upon the items monitored. It is already expected that the cargo location devices such as GPS equipment and an integration processor already exist. These items are presented as part of the On-board Trip Monitoring Equipment package.

25-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

26-Mayday Support

This Equipment package receives Mayday messages, determines an appropriate response, and either uses internal resources or contacts a local agency to provide that response. The nature of the emergency is determined based on the information in the mayday message as well as other inputs. This package effectively serves as an interface between automated mobile mayday systems and the local public safety answering point for messages which require a public safety response.

27-Fleet HAZMAT Management
This Equipment package provides the Fleet and Freight Management Subsystem the capabilities to enhance the Fleet Administration Equipment package functions by adding HAZMAT tracking. The additional requirements to perform this function include enhanced processing and enhanced fleet management software. In order to effectively track HAZMAT cargo, communication interfaces to Information Service Providers, and Emergency Management Subsystems shall be provided, including additional communication software.

5.3.19 Missouri Dept. of Natural Resources Functional Requirements

1-TMC Regional Traffic Control
This Equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control Equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region

2-Emissions Data Management
This Equipment package assimilates and stores air quality measures and roadside collected emissions data. General air quality measures are distributed as general traveler information and also may be used for in demand management programs. Collected roadside emissions are analyzed and used to detect, identify, and notify concerned parties regarding vehicles that exceed emissions standards.

3-Roadway Emissions Monitoring
This Equipment package monitors emissions and general air quality and communicates the collected information back to the emissions management subsystem where it can be monitored, analyzed, and used. This equipment package supports point monitoring of individual vehicle emissions as well as general monitoring of standard air quality measures.

4-TMC Environmental Monitoring
This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support

5.3.20 Missouri State Patrol Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as

coordinating response with all appropriate cooperating agencies

2-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

3-Emergency Call-Taking
This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

4-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

5-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

6-Emergency Dispatch
This Equipment package supports efficient dispatch of emergency vehicles. It tracks emergency vehicles, dispatches these vehicles to an incident, and provides safe and efficient routes based on real-time traffic information.

5.3.21 MoDOT Statewide Transportation Management System Functional Requirements

1-ITS Data Repository
This equipment package collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. This equipment package includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. This equipment package supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.

2-On-Line Analysis and Mining
This equipment package provides advanced data analysis, summarization, and mining features that facilitate discovery of information, patterns, and correlations in large data sets. Multidimensional analysis, selective summarization and expansion of data details, and many other advanced analysis services may be offered by various implementations of this equipment package.

3-Traffic and Roadside Data Archival

This equipment package collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. The equipment package controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes rather than for traffic management.

4-Traffic Data Collection
This equipment package collects and stores traffic information that is collected in the course of traffic operations performed by the Traffic Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

5-Virtual Data Warehouse Services
Provides access to data from geographically dispersed archives and coordinates information exchange with a local data warehouse. Also provides the specialized publishing, directory services, and transaction management functions associated with coordinating remote archives.

5.3.22 MoDOT Statewide Traveler System Functional Requirements

1- Collect Traffic Surveillance
This Equipment package collects, stores, and provides electronic access to the traffic surveillance data.

2- Traffic Maintenance
This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.

3-Roadway Basic Surveillance
This Equipment package provides the capabilities to monitor traffic flow in major intersections and on main highways for urban areas and to monitor road conditions using fixed equipment such as loop detectors and wireline communication

4-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

5-TMC Regional Traffic Control
This Equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control Equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region

6-TMC Environmental Monitoring
This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support.

7-Interactive Infrastructure Information
This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast

Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

8- TMC Traffic Information Dissemination
This equipment package provides the capability to disseminate traffic and road conditions information to travelers. Information is provided to drivers using DMS, HAR, and in-vehicle signing equipment. Information is provided to other travelers by making current road network conditions information available to information service providers and the media.

9- TMC Signal Control
Remotely controls traffic signal controllers to implement traffic management strategies at major intersections and on main highways for urban areas, based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc**.**

10-TMC Freeway Management
Remotely controls ramp meters, mainline metering, and lane controls on freeways based on upstream and downstream traffic flow and ramp queue length algorithms.

11-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

5.3.23 MoDOT District 6 Functional Requirements (Including the Gateway Guide Program Functions)

1- Emergency Call-Taking
Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.

2-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

3-Emergency Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

4-Emergency Early Warning System
Monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies in order to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to other ITS centers to notify the traveling public. Includes support for Child Abduction notices.

5-Emergency Response Management
Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.

6-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

7-Emergency Evacuation Support
Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.

8-Emergency Environmental Monitoring
Current and forecast road and weather information assimilated from weather service providers and emergency vehicles equipped with environmental sensors; used by the operator to more effectively manage incidents.

9-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

10-Center Secure Area Sensor Management
Management of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

11-Mayday Support
Collection and response to Mayday messages received from vehicles and drivers.

12-Basic Information Broadcast
Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event, and weather information to traveler interface systems and vehicles.

13-Interactive Infrastructure Information
Collection, processing, storage, and personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.

14-Traveler Telephone Information
Collection and distribution of traveler information and wide-area alerts to traveler telephone information systems such as 511, based on voice-based traveler requests.

15-ISP Emergency Traveler Information
Collection and distribution of emergency information to the traveler public, including evacuation information and wide-area alerts.

17-MCM Vehicle Tracking
Remotely tracks the location of maintenance and construction vehicles and other equipment; presented to the center personnel.

18-MCM Vehicle and Equipment Maintenance Management
Monitors vehicle and equipment condition, tracks maintenance history, and schedules routine and corrective maintenance.

19-MCM Environmental Information Processing
Processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. Disseminates road weather information to other agencies and centers.

20-MCM Automated Treatment System Control
Remotely controls automated roadway treatment systems (to disperse anti-icing chemicals, etc.) directly, or via control of the environmental sensors that activate the treatment systems automatically in the field.

21-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response

resources, and coordinate overall incident situation and response among allied response organizations.

22-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

23-MCM Winter Maintenance Support
Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.

24-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

25-MCM Work Zone Management
Remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., traveler information systems, traffic management centers, other maintenance and construction centers).

26-MCM Speed Monitoring
Remotely monitors vehicle speeds, and informs an enforcement agency if excessive speeds are detected; primarily used in work zones.

27-MCM Work Zone Safety Management
Remotely monitors work zone safety systems that detect vehicle intrusions in work zones and warn crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.

28-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

29-Collect Traffic Surveillance
Management of traffic sensors and surveillance (CCTV) equipment, and distribution of the collected information to other centers and operators.

30-TMC Signal Control
Remotely controls traffic signal controllers to implement traffic management strategies at major intersections and on main highways for urban areas, based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.

31-TMC Traffic Information Dissemination
Controls dissemination of traffic-related data to other centers, the media, and travelers via the driver information systems (DMS, HAR) that it operates.

32-TMC Regional Traffic Control
Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.

33-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

34-TMC Incident Dispatch Coordination/Communication
Center-based capability to formulate an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.

35-TMC Evacuation Support
Development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. Interfaces with emergency management and other traffic management centers.

36-TMC Environmental Monitoring
Management of environmental sensors and assimilation of collected data with other current and forecast road conditions and surface weather information from weather service providers and roadway maintenance operations.

37-HRI Traffic Management
Remotely monitor and control highway-rail intersection (HRI) equipment, includes standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI.

38-Barrier System Management
Remotely controls barrier systems such as gates and other systems that manage entry to roadways, transportation facilities and infrastructure.

39-Safeguard System Management
Remotely controls safeguard systems such as blast shields and tunnel exhaust systems that are used to mitigate the impact of incidents on transportation infrastructure.

40-Traffic Maintenance
Monitoring and remote diagnostics of field equipment - detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

41-TMC Work Zone Traffic Management
Coordination with maintenance systems using work zone images and traveler information systems (such as DMS), and distribution of work plans so that work zones are established that have minimum traffic impact.

42-Roadway Basic Surveillance
Field elements that monitor traffic conditions using loop detectors and CCTV cameras.

43-Roadway Signal Controls
Field elements including traffic signal controllers for use at major intersections and on main highways for urban areas; also supports pedestrian crossings.

44-Roadway Signal Priority
Field elements that provide the capability to receive vehicle signal priority requests and control traffic signals accordingly.

45-Roadway Traffic Information Dissemination
Driver information systems, such as dynamic message signs and Highway Advisory Radio (HAR).

46-Roadway Incident Detection
Field elements that provide video images of traffic conditions, including advanced CCTV cameras with built-in incident detection algorithms.

47-Standard Rail Crossing
Field elements at highway-rail intersections (HRIs) where operational requirements do not dictate advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Includes

traditional HRI warning systems augmented with other standard traffic management devices.

48-Roadway Equipment Coordination
Field elements that control and send data to other field elements (such as environmental sensors that send data to a DMS or coordination between traffic controllers on adjacent intersections), without center control.

49-Roadway Reversible Lanes
Traffic sensors, surveillance, and automated reversible lane equipment and lane control signals to control traffic in reversible lanes.

50-Roadway Infrastructure Monitoring
Sensors that monitor the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts), under maintenance center and maintenance vehicle control.

51-Roadway Work Zone Traffic Control
Field elements in a work zone that manage traffic conditions using CCTV cameras and driver information systems (such as DMS) to provide information directly to drivers affected by the work zone activity.

52-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

53-On-board EV En Route Support
On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.

54-Emissions Data Management
Assimilation and storage of air quality measures and roadside collected emissions data; distribution for general traveler information or for use in demand management programs.

55-ITS Data Repository
This equipment package collects data and data catalogs from one or more data sources and stores the data in a focused repository that is suited to a particular set of ITS data users. This equipment package includes capabilities for performing quality checks on the incoming data, error notification, and archive to archive coordination. This equipment package supports a broad range of implementations, ranging from simple data marts that collect a focused set of data and serve a particular user community to large-scale data warehouses that collect, integrate, and summarize transportation data from multiple sources and serve a broad array of users within a region.

56-Traffic and Roadside Data Archival
This equipment package collects and archives traffic, roadway, and environmental information for use in off-line planning, research, and analysis. The equipment package controls and collects information directly from equipment at the roadside, reflecting the deployment of traffic detectors that are used primarily for traffic monitoring and planning purposes rather than for traffic management.

57-Government Reporting System Support
Selects and formats data residing in an ITS archive to facilitate local, state, and federal government data reporting requirements.

58-Roadside Data Collection
This equipment package collects traffic, road, and environmental conditions information for use in transportation planning, research, and other off-line applications where data quality and completeness take precedence over real-time performance. This equipment package includes the sensors, supporting roadside infrastructure, and communications equipment that collects and transfers information to a center for archival.

59-Traffic Data Collection
This equipment package collects and stores traffic information that is collected in the course of traffic operations performed by the Traffic Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

60-Virtual Data Warehouse Services
Provides access to data from geographically dispersed archives and coordinates information exchange with a local data warehouse. Also provides the specialized publishing, directory services, and transaction management functions associated with coordinating remote archives.

61-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

62-MCM Winter Maintenance Management
Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.

63-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

64-MCV Winter Maintenance
On-board systems that support snow plow operations and other roadway treatments (e.g., salt spraying and other material applications). Supports platooning of snow plows.

65-MCV Infrastructure Monitoring
On-board systems to monitor the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts). Includes vehicle-based sensors and communications with roadway-based infrastructure monitoring sensors.

5.3.24 Missouri State Highway Patrol Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

3-Emergency Call-Taking
This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

4-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which

provide real-time information to emergency response personnel in the field.

5-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

6-Emergency Dispatch
This Equipment package supports efficient dispatch of emergency vehicles. It tracks emergency vehicles, dispatches these vehicles to an incident, and provides safe and efficient routes based on real-time traffic information.

5.3.25 Mobility Technologies Functional Requirements

1-Roadway Basic Surveillance
Field elements that monitor traffic conditions using loop detectors and CCTV cameras.

2-Roadway Data Collection
Field elements to collect traffic, road, and environmental conditions information for use in transportation planning, research, and other off-line applications. Includes the sensors, supporting roadside infrastructure, and communications equipment.

3-Basic Information Broadcast
Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event, and weather information to traveler interface systems and vehicles.

5.3.26 Monroe County Highway Department Functional Requirements

1-MCM Vehicle Tracking
Remotely tracks the location of maintenance and construction vehicles and other equipment; presented to the center personnel.

2-MCM Environmental Information Collection
Remotely controls environmental sensors and assimilates collected data with other current and forecast road conditions and surface weather information from weather service providers and transportation operations.

3-MCM Environmental Information Processing
Processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. Disseminates road weather information to other agencies and centers.

4-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.

5-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

6-MCM Winter Maintenance Management
Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment

(e.g., salt spraying and other material applications) based on weather information.

7-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

8-MCM Work Zone Management
Remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., traveler information systems, traffic management centers, other maintenance and construction centers).

9-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

5.3.27 Mutual Aid Network Functional Requirements

1-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

2-Emergency Call-Taking
This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

3-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

4-Emergency Dispatch
This Equipment package supports efficient dispatch of emergency vehicles. It tracks emergency vehicles, dispatches these vehicles to an incident, and provides safe and efficient routes based on real-time traffic information.

5.3.28 Older Adult Transportation Service Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function

minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

2-Transit Center Tracking and Dispatch
This Equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The Equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility.

3-On-board Transit Trip Monitoring
This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.

4-Vehicle Location Determination
This equipment package determines current location information and provides this information to other equipment packages that use the location information to provide various ITS services.

5-Transit Center Paratransit Operations
This Equipment package provides the capability to automate the planning and scheduling, allowing improvements in paratransit routes and services to develop, printing and disseminating schedules, and automatically updating customer service operator systems with the most current schedule. In addition, this Equipment package provides the capability to assign drivers to routes in a fair manner while minimizing labor and overtime services, including driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver. These capabilities shall be provided through the utilization of dispatch and fleet management software running on a workstation type processor.

6-Transit Garage Operations
This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

7-On-board Paratransit Operations
This equipment package forwards paratransit dispatch requests to the driver and forwards acknowledgements to the center. It coordinates with, and assists the driver in managing multi-stop runs associated with demand responsive, flexibly routed transit services.

8-Remote Mayday I/F
This Equipment package provides the capability to report an emergency and summons assistance. The equipment includes a traveler interface that facilitates generation of a distress signal under duress and wireline communications that carries this distress signal and allows follow-up verification and determination of the nature of the emergency and the required response. This equipment package notifies either the Emergency Management or Transit Management Subsystem depending on the implementation.

9-Secure Area Monitoring
This Equipment package provides the capability to monitor the safety of travelers at Remote Traveler

Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It collects surveillance images and data and relays this information back to the Transit Management and Emergency Management Subsystems.

10-Transit Center Security
This Equipment package provides the capability to monitor key transit locations and transit vehicles with both video and audio systems automatically alerting operators and police of potential incidents and supporting traveler activated alarms. The monitoring equipment shall also include capabilities to assist in responding to terrorist incidents.

11-On-board Transit Security
This Equipment package provides the capability to monitor the safety of transit vehicles using on-board safety sensors, processors and communications from the prerequisite On-board Trip Monitoring Equipment package.

5.3.29 St. Charles Transit Agency Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

2-Transit Center Tracking and Dispatch
This Equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The Equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility.

3-On-board Transit Trip Monitoring
This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.

4-Vehicle Location Determination
This equipment package determines current location information and provides this information to other equipment packages that use the location information to provide various ITS services.

5-Transit Center Fixed-Route Operations
This Equipment package enhances the planning and scheduling associated with fixed route transit services. The package allows fixed-route services to develop, print and disseminate schedules and automatically updates customer service operator systems with the most current schedule information. Current vehicle schedule adherence and optimum scenarios for schedule adjustment shall also be provided.

6-Transit Garage Operations
This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or

service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

7-On-board Fixed Route Schedule Management
This Equipment package provides the capabilities for automated planning and scheduling, by collecting data for schedule generation. Capability shall also be provided to automatically determine optimum scenarios for schedule adjustment. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, on-board safety sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.

8-Transit Center Paratransit Operations
This Equipment package provides the capability to automate the planning and scheduling, allowing improvements in paratransit routes and services to develop, printing and disseminating schedules, and automatically updating customer service operator systems with the most current schedule. In addition, this Equipment package provides the capability to assign drivers to routes in a fair manner while minimizing labor and overtime services, including driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver. These capabilities shall be provided through the utilization of dispatch and fleet management software running on a workstation type processor.

9-Transit Garage Operations
This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

10-On-board Paratransit Operations
This equipment package forwards paratransit dispatch requests to the driver and forwards acknowledgements to the center. It coordinates with, and assists the driver in managing multi-stop runs associated with demand responsive, flexibly routed transit services.

11-Remote Mayday I/F
This Equipment package provides the capability to report an emergency and summons assistance. The equipment includes a traveler interface that facilitates generation of a distress signal under duress and wireline communications that carries this distress signal and allows follow-up verification and determination of the nature of the emergency and the required response. This equipment package notifies either the Emergency Management or Transit Management Subsystem depending on the implementation.

12-Secure Area Monitoring
This Equipment package provides the capability to monitor the safety of travelers at Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It collects surveillance images and data and relays this information back to the Transit Management and Emergency Management Subsystems.

13-Transit Center Security
This Equipment package provides the capability to monitor key transit locations and transit vehicles with both video and audio systems automatically alerting operators and police of potential incidents and supporting traveler activated alarms. The monitoring equipment shall also include capabilities to assist in responding to terrorist incidents.

14-On-board Transit Security
This Equipment package provides the capability to monitor the safety of transit vehicles using on-board safety sensors, processors and communications from the prerequisite On-board Trip Monitoring Equipment package.

15-Transit Garage Maintenance

This Equipment package provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data from a prerequisite vehicle tracking equipment package. In addition, it provides information to proper service personnel to support maintenance activities and records and verifies that maintenance work was performed. This equipment package receives special events and real-time incident data from the traffic management subsystem and assigns operators to vehicles and transit routes. Garage maintenance also receives information about incidents involving transit vehicles from the TMC in order to dispatch tow trucks and other repair vehicles.

16-On-board Maintenance

This Equipment package provides the capability to use transit vehicle mileage data to automatically generate preventative maintenance schedules for each specific bus by utilizing vehicle tracking data and storing with a trip computer. It also provides the capability for real-time condition monitoring on board the vehicle, and transmission of this information via two-way communication to the management center.

17-Transit Center Multi-Modal Coordination

This Equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes.

18-On-board Transit Signal Priority

This Equipment package provides the capability for transit vehicles to request signal priority through short range communication directly with traffic control equipment at the roadside.

19-Interactive Infrastructure Information

This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

20-Personal Interactive Information Reception

This Equipment package shall provide the capability for travelers to interface with the ISP Subsystem Infrastructure Equipment packages including the Interactive Infrastructure Information Equipment package, and the Infrastructure Provided Route Selection, Yellow Pages and Reservation, and Dynamic Ridesharing Equipment packages. These capabilities shall be provided using the Personal Information Access Subsystem equipment such as cellular telephone, interactive TV, Personal Computer, and pager with alpha display using communication medium and equipment such as two-way radio, CATV, and wireless data transceivers.

21-Remote Transit Information Services

The Equipment package furnishes transit users with real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas. It provides transit users with the latest available information on transit routes, schedules, transfer options, bicycle accessibility, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to tailored information for individual transit users, this equipment package supports general annunciation and/or display of imminent arrival information and other information of general interest to transit users.

22-Transit Center Information Services

This equipment package collects the latest available information for a transit service and makes it available to transit customers and to Information Service Providers for further distribution. Customers are provided information at transit stops and other public transportation areas before they embark and on-board the transit vehicle once they are enroute. Information provided can include the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events. In addition to general service information, tailored information (e.g, itineraries) are provided to individual transit users.

23-Transit Center Fare and Load Management
This equipment package provides the capability to accept collected data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This equipment package also supports the capability for two-way voice communication between the transit vehicle operator and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These equipment package builds on basic capabilities provided by the Transit Center Tracking and Dispatch equipment package.

24-Transit Data Collection
This equipment package collects and stores transit information that is collected in the course of transit operations performed by the Transit Management Subsystem. This data can be used directly by operations personnel or it can be made available to other data users and archives in the region.

5.3.30 St. Clair County Highway Department Functional Requirements

1-MCM Vehicle Tracking
Remotely tracks the location of maintenance and construction vehicles and other equipment; presented to the center personnel.

2-MCM Environmental Information Collection
Remotely controls environmental sensors and assimilates collected data with other current and forecast road conditions and surface weather information from weather service providers and transportation operations.

3-MCM Environmental Information Processing
Processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. Disseminates road weather information to other agencies and centers.

4-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.

5-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

6-MCM Winter Maintenance Management
Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.

7-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

8-MCM Work Zone Management
Remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., traveler information systems, traffic

management centers, other maintenance and construction centers).

9-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

10-MCM Data Collection
Collection and storage of maintenance and construction information. For use by operations personnel or data archives in the region.

11-TMC Probe Information Collection
Collects, assimilates, and disseminates vehicle probe data collected from roadside beacons and centers controlling transit vehicles, emergency vehicles, toll collection points, and route-guided vehicles.

12-TMC Traffic Information Dissemination
Controls dissemination of traffic-related data to other centers, the media, and travelers via the driver information systems (DMS, HAR) that it operates.

13-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

14-TMC Incident Dispatch Coordination/Communication
Center-based capability to formulate an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.

15-TMC Environmental Monitoring
Management of environmental sensors and assimilation of collected data with other current and forecast road conditions and surface weather information from weather service providers and roadway maintenance operations.

16-Traffic Maintenance
Monitoring and remote diagnostics of field equipment - detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

17-TMC Work Zone Traffic Management
Coordination with maintenance systems using work zone images and traveler information systems (such as DMS), and distribution of work plans so that work zones are established that have minimum traffic impact.

5.3.31 St. Clair County Transit District Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

2-Transit Center Tracking and Dispatch
This Equipment package provides the capabilities for monitoring transit vehicle locations and determining vehicle schedule adherence. The Equipment package shall also furnish users with real-time travel related information, continuously updated with real-time information from each transit system

within the local area of jurisdiction, inclusive of all transportation modes, from all providers of transportation services, and provide users with the latest available information on transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents conditions, weather conditions, and special events. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility.

3-On-board Transit Trip Monitoring
This Equipment package provides the capabilities to support fleet management with automatic vehicle location and automated mileage and fuel reporting and auditing. This package may also record other special events resulting from communication with roadside equipment. This includes only the equipment on board the vehicle to support this function including the vehicle location devices such as GPS equipment, communication interfaces, a processor to record trip length, and the sensors/actuators/interfaces necessary to record mileage and fuel usage.

4-Vehicle Location Determination
This equipment package determines current location information and provides this information to other equipment packages that use the location information to provide various ITS services.

5-Transit Center Fixed-Route Operations
This Equipment package enhances the planning and scheduling associated with fixed route transit services. The package allows fixed-route services to develop, print and disseminate schedules and automatically updates customer service operator systems with the most current schedule information. Current vehicle schedule adherence and optimum scenarios for schedule adjustment shall also be provided.

6-Transit Garage Operations
This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

7-On-board Fixed Route Schedule Management
This Equipment package provides the capabilities for automated planning and scheduling, by collecting data for schedule generation. Capability shall also be provided to automatically determine optimum scenarios for schedule adjustment. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, on-board safety sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired.

8-Transit Center Paratransit Operations
This Equipment package provides the capability to automate the planning and scheduling, allowing improvements in paratransit routes and services to develop, printing and disseminating schedules, and automatically updating customer service operator systems with the most current schedule. In addition, this Equipment package provides the capability to assign drivers to routes in a fair manner while minimizing labor and overtime services, including driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver. These capabilities shall be provided through the utilization of dispatch and fleet management software running on a workstation type processor.

9-Transit Garage Operations
This Equipment package automates and supports the assignment of transit vehicles and drivers to enhance the daily operation of a transit service. It provides the capability to assign drivers to routes or service areas in a fair manner while minimizing labor and overtime services, considering driver preferences and qualifications, and automatically tracking and validating the number of work hours performed by each individual driver.

10-On-board Paratransit Operations
This equipment package forwards paratransit dispatch requests to the driver and forwards acknowledgements to the center. It coordinates with, and assists the driver in managing multi-stop runs associated with demand responsive, flexibly routed transit services.

11-Remote Transit Fare Management
This Equipment package provides the capability for the traveler to use a common fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified. This may be implemented as a payment instrument reader at a kiosk. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported.

12-Transit Center Fare and Load Management
This Equipment package provides the capability to accept collected data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities shall be provided through a workstation type processor with GUI, high capacity storage, ride share software housed in a building with dialup lines and wireline telephone and require integration with an existing Transit Center Tracking and Dispatch Equipment package.

13-On-board Transit Fare and Load Management
This Equipment package provides the capability to collect data required to determine accurate ridership levels and implement variable and flexible fare structures. Support shall be provided for the traveler for use of a fare medium for all applicable surface transportation services, to pay without stopping, have payment media automatically identified as void and/or invalid and eligibility verified, and allow for third party payment. In addition, capability to provide expansion into other uses for payment medium such as retail and telephone and for off-line billing for fares paid by agencies shall be supported. This Equipment package also supports the capability for two-way voice communication between the transit vehicle driver and a facility, two-way data communication between the transit vehicles and a facility, sensor data to be transmitted from the transit vehicles to a facility, and data transmission from individual facilities to a central facility for processing/analysis if desired. These capabilities require integration with an existing On-board Trip Monitoring Equipment package.

14-Remote Mayday I/F
This Equipment package provides the capability to report an emergency and summons assistance. The equipment includes a traveler interface that facilitates generation of a distress signal under duress and wireline communications that carries this distress signal and allows follow-up verification and determination of the nature of the emergency and the required response. This equipment package notifies either the Emergency Management or Transit Management Subsystem depending on the implementation.

15-Secure Area Monitoring
This Equipment package provides the capability to monitor the safety of travelers at Remote Traveler Subsystem locations such as transit stations, rest areas, tourist centers, park and ride lots, and other locations frequented by travelers. It collects surveillance images and data and relays this information back to the Transit Management and Emergency Management Subsystems.

16-Transit Center Security
This Equipment package provides the capability to monitor key transit locations and transit vehicles with both video and audio systems automatically alerting operators and police of potential incidents and supporting traveler activated alarms. The monitoring equipment shall also include capabilities to assist in responding to terrorist incidents.

17-On-board Transit Security
This Equipment package provides the capability to monitor the safety of transit vehicles using on-board safety sensors, processors and communications from the prerequisite On-board Trip Monitoring Equipment package.

18-Transit Garage Maintenance
This Equipment package provides advanced maintenance functions for the transit property. It collects operational and maintenance data from transit vehicles, manages vehicle service histories, and monitors drivers and vehicles. It collects vehicle mileage data and uses it to automatically generate preventative maintenance schedules for each vehicle by utilizing vehicle tracking data from a prerequisite vehicle tracking equipment package. In addition, it provides information to proper service personnel to support maintenance activities and records and verifies that maintenance work was performed. This equipment package receives special events and real-time incident data from the traffic management subsystem and assigns operators to vehicles and transit routes. Garage maintenance also receives information about incidents involving transit vehicles from the TMC in order to dispatch tow trucks and other repair vehicles.

19-On-board Maintenance
This Equipment package provides the capability to use transit vehicle mileage data to automatically generate preventative maintenance schedules for each specific bus by utilizing vehicle tracking data and storing with a trip computer. It also provides the capability for real-time condition monitoring on board the vehicle, and transmission of this information via two-way communication to the management center.

20-Transit Center Multi-Modal Coordination
This Equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes.

21-On-board Transit Signal Priority
This Equipment package provides the capability for transit vehicles to request signal priority through short range communication directly with traffic control equipment at the roadside.

5.3.32 St. Louis City Airport Authority Functional Requirements

1-Transit Center Multi-Modal Coordination
This Equipment package provides the transit management subsystem the capability to determine the need for transit priority on routes and at certain intersections and request transit vehicle priority at these locations. It also supports schedule coordination between transit properties and coordinates with other surface and air transportation modes.

2-Interactive Infrastructure Information
This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

5.3.33 St. Louis City Fire Department Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as

coordinating response with all appropriate cooperating agencies

2-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

3-Emergency Call-Taking
This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

4-Emergency Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

5-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

6-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

7-Mayday Support
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

8-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

9-On-board EV En Route Support
On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.

5.3.34 St. Louis City Police Department Functional Requirements

1-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

2-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

3-Emergency Call-Taking
This Equipment package supports the emergency call-taker, collecting available information about the caller and the reported emergency, and forwarding this information to other equipment packages that formulate and manage the emergency response. This equipment package receives 9-1-1, 7-digit local access, and motorist call-box calls and interfaces to other agencies to assist in the verification and assessment of the emergency and to forward the emergency information to the appropriate response agency.

4-Emergency Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

5-Emergency Response Management
This Equipment package develops and stores emergency response plans and manages overall coordinated response to emergencies. It tracks the availability of resources and assists in the appropriate allocation of these resources for a particular emergency response. This Equipment package provides coordination between multiple allied agencies before and during emergencies to implement emergency response plans and track progress through the incident. It provides vital communications linkages which provide real-time information to emergency response personnel in the field.

6-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

7-Mayday Support
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

8-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident management personnel.

9-On-board EV En Route Support
On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.

10-Roadside Electronic Screening
Roadside check facility equipment to communicate with commercial vehicles at mainline speeds - reading tag data, identification, weight and vehicle characteristics, and credential checking. Determines whether a pull-in message should be generated, allowing for inspectors to override.

11-Roadside Safety and Security Inspection
Roadside check facility equipment to provide the capabilities to automate the roadside safety inspection process including use of hand held devices to rapidly inspect the vehicle and driver.

12-Citation and Accident Electronic Recording
Roadside check facility equipment to records results of roadside inspections and forwards information to the commercial vehicle administration center. Includes accident reports, violations, citations, and the daily site activity data.

5.3.35 St. Louis City Street Department Functional Requirements

1- Emergency Call-Taking
Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.

2-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

3-Emergency Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

4-Emergency Early Warning System
Monitors alerting and advisory systems, information collected by ITS surveillance and sensors, and reports from other agencies in order to identify potential, imminent, or in-progress major incidents or disasters. Notification is provided to other ITS centers to notify the traveling public. Includes support for Child Abduction notices.

5-Emergency Response Management
Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.

6-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

7-Emergency Evacuation Support
Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.

8-Emergency Environmental Monitoring
Current and forecast road and weather information assimilated from weather service providers and emergency vehicles equipped with environmental sensors; used by the operator to more effectively manage incidents.

9-Center Secure Area Surveillance
Management of security surveillance devices and analysis of that data to detect potential threats. Areas under surveillance may include transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

10-Center Secure Area Sensor Management
Management of security sensors, analysis of sensor data, correlation with surveillance data and alerts from other agencies to detect potential threats, and dissemination of threat information to other agencies. Sensors may be placed in areas such as transit stops, transit stations, rest areas, park and ride lots, modal interchange facilities, on-board a transit vehicle, etc.

11-Mayday Support
Collection and response to Mayday messages received from vehicles and drivers.

12-Basic Information Broadcast
Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event, and weather information to traveler interface systems and vehicles.

13-Interactive Infrastructure Information
Collection, processing, storage, and personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.

14-Traveler Telephone Information
Collection and distribution of traveler information and wide-area alerts to traveler telephone information systems such as 511, based on voice-based traveler requests.

15-ISP Emergency Traveler Information
Collection and distribution of emergency information to the traveler public, including evacuation information and wide-area alerts.

16-ISP Probe Information Collection
Collection and aggregation of vehicle probe data, including calculation and dissemination of route travel times and usage. Includes environmental probe data collection, aggregation and dissemination.

17-MCM Vehicle Tracking
Remotely tracks the location of maintenance and construction vehicles and other equipment; presented to the center personnel.

18-MCM Vehicle and Equipment Maintenance Management
Monitors vehicle and equipment condition, tracks maintenance history, and schedules routine and corrective maintenance.

19-MCM Environmental Information Processing
Processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. Disseminates road weather information to other agencies and centers.

20-MCM Automated Treatment System Control
Remotely controls automated roadway treatment systems (to disperse anti-icing chemicals, etc.) directly, or via control of the environmental sensors that activate the treatment systems automatically in the field.

21-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.

22-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

23-MCM Winter Maintenance Support
Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.

24-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

25-MCM Work Zone Management
Remotely monitors and supports work zone activities, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., traveler information systems, traffic management centers, other maintenance and construction centers).

26-MCM Speed Monitoring
Remotely monitors vehicle speeds, and informs an enforcement agency if excessive speeds are detected; primarily used in work zones.

27-MCM Work Zone Safety Management
Remotely monitors work zone safety systems that detect vehicle intrusions in work zones and warn crew workers and drivers of imminent encroachment. Crew movements are also monitored so that the crew can be warned of movement beyond the designated safe zone.

28-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

29-Collect Traffic Surveillance
Management of traffic sensors and surveillance (CCTV) equipment, and distribution of the collected information to other centers and operators.

30-TMC Probe Information Collection
Collects, assimilates, and disseminates vehicle probe data collected from roadside beacons and centers controlling transit vehicles, emergency vehicles, toll collection points, and route-guided vehicles.

31-TMC Signal Control
Remotely controls traffic signal controllers to implement traffic management strategies at major intersections and on main highways for urban areas, based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.

32-TMC Traffic Information Dissemination
Remotely controls traffic signal controllers to implement traffic management strategies at major intersections and on main highways for urban areas, based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.

33-TMC Regional Traffic Control
Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.

34-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

35-TMC Incident Dispatch Coordination/Communication
Center-based capability to formulate an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.

36-TMC Evacuation Support
Development, coordination, and execution of special traffic management strategies during evacuation and subsequent reentry of a population in the vicinity of a disaster or major emergency. Interfaces with emergency management and other traffic management centers.

37-TMC Environmental Monitoring
Management of environmental sensors and assimilation of collected data with other current and forecast road conditions and surface weather information from weather service providers and roadway maintenance operations.

38-HRI Traffic Management

Remotely monitor and control highway-rail intersection (HRI) equipment, includes standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI.

39-TMC Speed Monitoring
Remotely monitors vehicle speeds, and informs an enforcement agency if excessive speeds are detected; primarily used in work zones.

40-Barrier System Management
Remotely controls barrier systems such as gates and other systems that manage entry to roadways, transportation facilities and infrastructure.

41-Safeguard System Management
Remotely controls safeguard systems such as blast shields and tunnel exhaust systems that are used to mitigate the impact of incidents on transportation infrastructure.

42-Traffic Maintenance
Monitoring and remote diagnostics of field equipment - detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

43-TMC Work Zone Traffic Management
Coordination with maintenance systems using work zone images and traveler information systems (such as DMS), and distribution of work plans so that work zones are established that have minimum traffic impact.

44-Roadway Basic Surveillance
Field elements that monitor traffic conditions using loop detectors and CCTV cameras.

45-Roadway Probe Beacons
Field elements to collect traffic and road conditions from passing vehicles; both anonymous toll/parking tag readings for link time calculations and smart probe data supported.

46-Roadway Signal Controls
Field elements including traffic signal controllers for use at major intersections and on main highways for urban areas; also supports pedestrian crossings.

47-Roadway Signal Priority
Field elements that provide the capability to receive vehicle signal priority requests and control traffic signals accordingly.

48-Roadway Traffic Information Dissemination
Driver information systems, such as dynamic message signs and Highway Advisory Radio (HAR).

49-Roadway Incident Detection
Field elements that provide video images of traffic conditions, including advanced CCTV cameras with built-in incident detection algorithms.

50-Standard Rail Crossing
Field elements at highway-rail intersections (HRIs) where operational requirements do not dictate advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Includes traditional HRI warning systems augmented with other standard traffic management devices.

51-Roadway Equipment Coordination
Field elements that control and send data to other field elements (such as environmental sensors that send data to a DMS or coordination between traffic controllers on adjacent intersections), without center control.

52-On-board EV Incident Management Communication
This Equipment package provides a direct interface between the emergency vehicle and incident

management personnel.

53-On-board EV En Route Support
On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.

5.3.36 St. Louis County Traffic and Highways Functional Requirements

1-Emergency Dispatch
Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units; includes requests for signal preemption.

2-Emergency Routing
Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.

3-Emergency Response Management
Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.

4-Incident Command
Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.

5-Emergency Environmental Monitoring
Current and forecast road and weather information assimilated from weather service providers and emergency vehicles equipped with environmental sensors; used by the operator to more effectively manage incidents.

6-Basic Information Broadcast
Collection, processing, storage, and broadcast dissemination of traffic, transit, maintenance and construction, event, and weather information to traveler interface systems and vehicles.

7-Interactive Infrastructure Information
Collection, processing, storage, and personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.

8-MCM Environmental Information Processing
Processes current and forecast weather data, road condition information, local environmental data, and uses internal models to develop specialized detailed forecasts of local weather and surface conditions. Disseminates road weather information to other agencies and centers.

9-MCM Incident Management
Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.

10-MCM Maintenance Decision Support
Maintenance Decision Support Systems recommend courses of action based on current and forecast environmental and road conditions (filtered and fused for specific time horizons) and additional application specific information. Recommendations and dispatch instructions are generated based on this integrated information.

11-MCM Roadway Maintenance and Construction
Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.

12-MCM Work Activity Coordination
Disseminates work activity schedules to other agencies. Work schedules are coordinated, factoring in the needs and activities of other agencies and adjacent jurisdictions.

13-Collect Traffic Surveillance
Management of traffic sensors and surveillance (CCTV) equipment, and distribution of the collected information to other centers and operators.

14-TMC Signal Control
Remotely controls traffic signal controllers to implement traffic management strategies at major intersections and on main highways for urban areas, based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.

15-TMC Regional Traffic Control
Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.

16-TMC Incident Detection
Remotely controls traffic and video sensors to support incident detection and verification; exchange information with other agencies including emergency management, maintenance and construction, alerting and advisory systems, event promoters, intermodal freight depots, and traveler information systems.

17-TMC Incident Dispatch Coordination/Communication
Center-based capability to formulate an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies.

18-TMC Environmental Monitoring
Management of environmental sensors and assimilation of collected data with other current and forecast road conditions and surface weather information from weather service providers and roadway maintenance operations.

19-Traffic Maintenance
Monitoring and remote diagnostics of field equipment - detect failures, issue problem reports, and track the repair or replacement of the failed equipment.

20-TMC Work Zone Traffic Management
Coordination with maintenance systems using work zone images and traveler information systems (such as DMS), and distribution of work plans so that work zones are established that have minimum traffic impact.

5.3.37 St. Peters Traffic Department Functional Requirements

1- Collect Traffic Surveillance
This Equipment package collects, stores, and provides electronic access to the traffic surveillance data.

2- Traffic Maintenance

This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.

3-Roadway Basic Surveillance
This Equipment package provides the capabilities to monitor traffic flow in major intersections and on main highways for urban areas and to monitor road conditions using fixed equipment such as loop detectors and wireline communication.

4-Roadway Equipment Coordination
This equipment package coordinates field equipment that is distributed along the roadway by supporting direct communications between field equipment. This includes coordination between remote sensors and field devices (e.g., Dynamic Message Signs) and coordination between the field devices themselves (e.g., coordination between traffic controllers that are controlling adjacent intersections.).

5-Roadway Signal Controls
This Equipment package provides the capabilities to control traffic signals at major intersections and on main highways for urban areas. This Equipment package is generally constrained to a single jurisdiction.

6-TMC Signal Control
This Equipment package provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single traffic management subsystem. In advanced implementations, this package collects route planning information and integrates and uses this information in predicting future traffic conditions and optimizing the traffic control strategy for these conditions. These capabilities are achieved through real-time communication of logged routes from an Information Service Provider. The planned control strategies can be passed back to the Information Service Provider so that the intended strategies can be reflected in future route planning.

7-Traffic Maintenance
This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.

8-Roadway Equipment Coordination
This equipment package coordinates field equipment that is distributed along the roadway by supporting direct communications between field equipment. This includes coordination between remote sensors and field devices (e.g., Dynamic Message Signs) and coordination between the field devices themselves (e.g., coordination between traffic controllers that are controlling adjacent intersections.).

9-TMC Freeway Management
Control system for efficient freeway management including integration of surveillance information with freeway road geometry, vehicle control such as ramp metering, CMS, HAR. Interface to coordinated traffic subsystems for information dissemination to the public.

10-Traffic Maintenance
This Equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment

11-TMC Incident Dispatch Coordination/Communication
This Equipment package provides the capability for an incident response formulation function minimizing the incident potential, incident impacts, and/or resources required for incident management including proposing and facilitating the dispatch of emergency response and service vehicles as well as coordinating response with all appropriate cooperating agencies

12-TMC Regional Traffic Control
This Equipment package provides capabilities in addition to those provided by the TMC Basic Signal Control Equipment package for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for wide area optimization integrating control of a network signal system with

control of freeway, considering current demand as well as expected demand with a goal of providing the capability for real-time traffic adaptive control while balancing inter-jurisdictional control issues to achieve regional solutions. These capabilities are best provided using a Traffic Management Center (TMC) to monitor and manage freeway ramp meters and intersection traffic signals and software to process traffic information and implement traffic management measures (e.g., ramp metering, signalization, and traffic coordination between both local and regional jurisdiction). The TMC shall be able to communicate with other TMCs in order to receive and transmit traffic information on other jurisdictions within the region

13-Roadway Equipment Coordination
This equipment package coordinates field equipment that is distributed along the roadway by supporting direct communications between field equipment. This includes coordination between remote sensors and field devices (e.g., Dynamic Message Signs) and coordination between the field devices themselves (e.g., coordination between traffic controllers that are controlling adjacent intersections.).

14-Roadway Incident Detection
This Equipment package provides incident detection capability to reside at the roadside. For example, advanced CCTV's with built-in incident detection algorithms would allow the actual detection function to be roadside rather than transmitting images to a center for visual or automated detection.

15-TMC Incident Detection
This Equipment package provides the capability to traffic managers to detect and verify incident. This capability includes analyzing and reducing the collected data from traffic surveillance equipment, including planned incidents and hazardous conditions.

16-TMC Environmental Monitoring
This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support

17-Standard Rail Crossing
This Equipment Package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate advanced features (e.g., where rail operational speeds are less than 80 miles per hour). Either passive (e.g., the crossbuck sign) or active warning systems (e.g., flashing lights and gates) are supported depending on the specific requirements for each intersection. These traditional HRI warning systems may also be augmented with other standard traffic management devices. The warning systems are activated on notification by interfaced wayside equipment of an approaching train. The equipment at the HRI may also be interconnected with adjacent signalized intersections so that local control can be adapted to highway-rail intersection activities. Health monitoring of the HRI equipment and interfaces is performed; detected abnormalities are reported through interfaces to the wayside interface equipment and the traffic management subsystem.

18-HRI Traffic Management
This equipment package monitors highway-rail intersection (HRI) equipment at the roadside which manages highway traffic. Various levels of roadside equipment may be interfaced to, and supported by, this equipment package to include standard speed active warning systems and high speed systems which provide additional information on approaching trains and detect and report on obstructions in the HRI. This equipment package remotely monitors and reports the status of this roadside equipment. A two way interface supports explicitly status requests or remote control plan updates to be generated by this equipment package. Status may also be received periodically in the absence of a request or asynchronously in the event of a detected failure or other unsafe condition at the intersection.

19-TMC Environmental Monitoring
This equipment package assimilates current and forecast road conditions and surface weather information using a combination of weather service provider information and an array of environmental sensors deployed on and about the roadway. The collected environmental information is monitored and

presented to the operator. This information can be used to more effectively deploy road maintenance resources, issue general traveler advisories, and support location specific warnings to drivers. Other equipment packages process the collected information and provide decision support.

20-Interactive Infrastructure Information
This Equipment package shall have as prerequisite the capabilities of the Basic Information Broadcast Equipment package. This Equipment package augments the Basic Information Broadcast Equipment package by providing the capabilities for interactive traveler information.

21-TMC Traffic Information Dissemination
Controls dissemination of traffic-related data to other centers, the media, and travelers via the driver information systems (DMS, HAR) that it operates.

Appendix A contains each specific equipment packages referenced in this section and supplies additional detail including lists of Pspecs that would support their deployment. Additional information on Pspecs and equipment packages can be found by referencing the National ITS Architecture.

6 Interface Requirements

Interface requirements for the St. Louis region involve detailed diagrams of agency interactions and information exchanges. There are three types of diagrams that describe at various levels the connections and associations between the various regional agency stakeholder elements. Each diagram is explained here in greater detail with each stakeholder's representative diagrams illustrated in Appendix B.

6.1 Sausage Diagram

The "Sausage Diagram" is considered the top-level interconnect diagram for the National ITS Architecture. It illustrates how different subsystems interface and the communication methods that facilitate the data exchanges between them. As a top-level diagram it only shows the interconnection between different subsystems, and does not providing specific details on the exact information and data exchanged. The following is the sausage diagram for the St. Louis region.

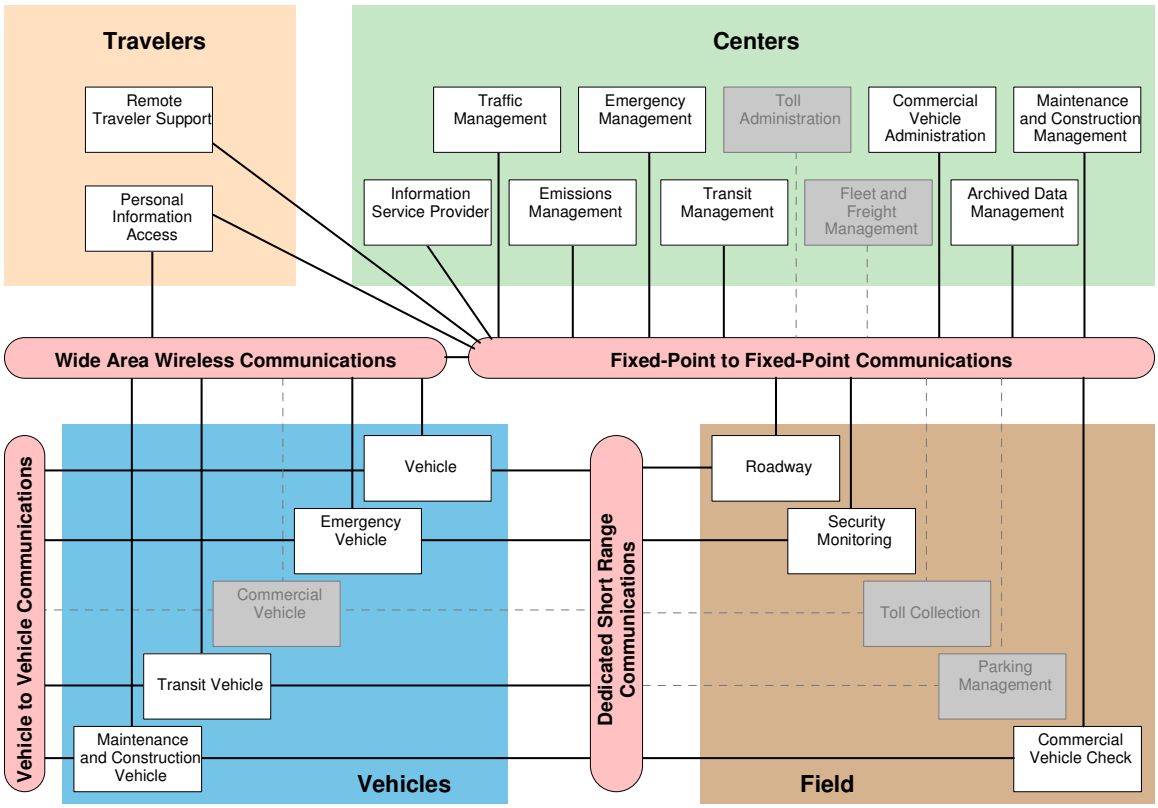

Figure 6-1: Sausage Diagram of St. Louis Regional ITS Elements

6.2 Interconnect Flow Diagram

The interconnect flow diagram highlights the communication interaction between multiple subsystems or between a subsystem and terminators. The diagram details communication paths between the architecture elements showing how information is routed. The type of communications system reflected by the interconnect flow can be one of four types that include wireline, wide area wireless, dedicated short range, or vehicle to vehicle. Additional communications types such as human and physical/environmental interfaces can also be represented by interconnect flows.

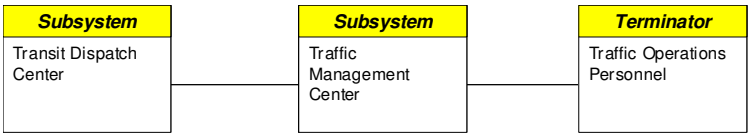

Figure 6-2: Typical Interconnect Diagram

Each St. Louis regional stakeholder has a representative interconnect diagram with details the other agency subsystems they currently or will connect to in the future. These diagrams can be found in Appendix B.

6.3 Architecture Flow Diagram

The architecture flow diagram further elaborates on the information provided by the interconnect flow diagram. Whereas, the interconnect diagram indicates the communication path between elements the architecture flow diagram details the information exchanged on that path. Typically a single interconnect flow represent one or more architecture flows, which detail the type and direction information exchanges on the interconnect take between subsystems or terminators in the system.

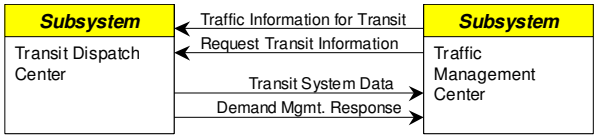

Figure 6-3: Typical Architecture Flow Diagram

Each St. Louis regional stakeholder has a representative architecture flow diagram with details the other agency subsystems they communicate now or in the future along with the information to be exchanged. See the Bi-State St. Louis Architecture Turbo file for Architecture flow information for each subsystem.

7 Standards

ITS Standards are fundamental to the establishment of an open ITS environment that achieves the goals originally envisioned by the U.S. Department of Transportation. Standards facilitate deployment of interoperable systems at local, regional, and national levels without impeding innovation as technology advances and new approaches evolve.

Standards help create competition, better products, and lower prices. The example that best exhibits this is the telecommunications and computer industries. The openness of the ITS Architecture standards allow considerable latitude in the selection of technologies for use in systems, and also urges manufactures to continually improve their products and develop new ones. ITS standards:

- Facilitate interoperability of basic functionality
- Promote system integration
- May be linked to federal funding in the future

Standards can be applied to the different elements of intelligent transportation systems:

- ITS Standards
- Communication standards
- Data standards
- Message set standards
- Equipment Standards
- Software Standards

7.1 Standard Development Organizations

The U.S. Department of Transportation's ITS Joint Program Office is supporting SDOs (Standards Development Organizations) with an extensive, multi-year program of accelerated standards development to facilitate successful ITS deployment. The program supports and accelerates the ITS consensus-based volunteer standards processes that are underway in the U.S.

The following is a list of the current standard development organizations working on developing ITS standards:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Electronic Industries Alliance (EIA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Transportation Engineers (ITE)
- Society of Automotive Engineers (SAE)
- National Transportation Communications for ITS Protocol (NTCIP)

NTCIP is a joint product of the National Electronics Manufacturers Association (NEMA), the American Association of State Highway and Transportation Officials (AASHTO), and the Institute of Transportation Engineers (ITE).

7.2 NTCIP Standards

NTCIP is a family of standards that provides both the rules for communicating (called protocols) and the vocabulary (called objects) necessary to allow electronic traffic control equipment from different manufacturers to operate with each other as a system. NTCIP

is the first set of standards for the transportation industry that allows traffic control systems to be built using a "mix and match" approach with equipment from different manufacturers. Therefore, NTCIP standards reduce the need for reliance on specific equipment vendors and customized one-of-a-kind software. To assure both manufacturer and user community support, NTCIP is jointly developed by NEMA, AASHTO, and ITE.

7.3 Applicable Standards for Bi-State St. Louis Regional ITS Architecture

Looking at the ITS Standards as a foundation for building the systems identified in the regional architecture, Table 7-1 highlights the applicable standards for the Bi-State St. Louis Regional ITS Architecture and indicates its status.

Table 7-1: St. Louis Regional ITS Standards

Lead SDO	Standard Name	Document ID
AASHTO/ITE/NEMA	Global Object Definitions	NTCIP 1201
AASHTO/ITE/NEMA	Object Definitions for Actuated Traffic Signal Controller Units	NTCIP 1202
AASHTO/ITE/NEMA	Object Definitions for Dynamic Message Signs	NTCIP 1203
AASHTO/ITE/NEMA	Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	NTCIP 1204
AASHTO/ITE/NEMA	Data Dictionary for Closed Circuit Television (CCTV)	NTCIP 1205
AASHTO/ITE/NEMA	Data Collection & Monitoring Devices	NTCIP 1206
AASHTO/ITE/NEMA	Ramp Meter Controller Objects	NTCIP 1207
AASHTO/ITE/NEMA	Object Definitions for Video Switches	NTCIP 1208
AASHTO/ITE/NEMA	Transportation System Sensor Objects	NTCIP 1209
AASHTO/ITE/NEMA	Objects for Signal Systems Master	NTCIP 1210
AASHTO/ITE/NEMA	Objects for Signal Control Priority	NTCIP 1211
AASHTO/ITE/NEMA	Message Set for Weather Reports	NTCIP 1301
AASHTO/ITE/NEMA	TCIP - Common Public Transportation (CPT) Business Area Standard	NTCIP 1401
AASHTO/ITE/NEMA	TCIP - Incident Management (IM) Business Area Standard	NTCIP 1402
AASHTO/ITE/NEMA	TCIP - Passenger Information (PI) Business Area Standard	NTCIP 1403
AASHTO/ITE/NEMA	TCIP - Scheduling/Runcutting (SCH) Business Area Standard	NTCIP 1404
AASHTO/ITE/NEMA	TCIP - Spatial Representation (SR) Business Area Standard	NTCIP 1405
AASHTO/ITE/NEMA	TCIP - Onboard (OB) Business Area Standard	NTCIP 1406
AASHTO/ITE/NEMA	TCIP - Control Center (CC) Business Area Standard	NTCIP 1407
AASHTO/ITE/NEMA	TCIP - Fare Collection (FC) Business Area Standard	NTCIP 1408
AASHTO/ITE/NEMA	NTCIP Center-to-Center Standards Group	
	Base Standard: Octet Encoding Rules (OEC)	NTCIP 1102
	CORBA Naming Convention	NTCIP 1104
	CORBA Security Service	NTCIP 1105
	CORBA Near-Real Time Data Service	NTCIP 1106
	Subnet Profile for Ethernet	NTCIP 2104
	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
	Application Profile for File Transfer Protocol (FTP)	NTCIP 2303
	Application Profile for Data Exchange ASN.1 (DATEX)	NTCIP 2304
	Application Profile for Common Object Request Broker Architecture (CORBA)	NTCIP 2305
	Information Profile for DATEX	NTCIP 2501
	Information Profile for CORBA	NTCIP 2502
AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group	
	Simple Transportation Management Framework (STMF)	NTCIP 1101
	Base Standard: Octet Encoding Rules (OER)	NTCIP 1102
	Simple Transportation Management Protocol (STMP)	NTCIP 1103
	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	NTCIP 2101
	Subnet Profile for PMPP Over FSK modems	NTCIP 2102
	Subnet Profile for Point-to-Point Protocol using RS 232	NTCIP 2103
	Subnet Profile for Ethernet	NTCIP 2104
	Transportation Transport Profile	NTCIP 2201
	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
	Application Profile for Simple Transportation Management Framework (STMF)	NTCIP 2301
	Application Profile for Trivial File Transfer Protocol	NTCIP 2302
	Application Profile for File Transfer Protocol (FTP)	NTCIP 2303
ANSI	Commercial Vehicle Safety Reports	ANSI TS284
ANSI	Commercial Vehicle Safety and Credentials Information Exchange	ANSI TS285
ANSI	Commercial Vehicle Credentials	ANSI TS286
ASTM	Standard Specification for 5.9 HGz Data Link Layer	ASTM 5 GHz Data Link
ASTM	Standard Specification for 5.9 HGz Physical Layer	ASTM 5 GHz Phys
ASTM	ADMS Data Dictionary Specifications	ASTM DD 17.54.00.2
ASTM	Dedicated Short Range Communication at 915 MHz Standards Group	
	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band	ASTM E2158-01
	Standard Provisional Specification for Dedicated Short Range Communication (DSRC) Data Link Layer	ASTM PS 105-99
ASTM	Standard Specification for Archiving ITS Generated Traffic Monitoring Data	ASTM E2259-xx
EIA/CEA	Data Radio Channel (DARC) System	CEA/EIA-794
EIA/CEA	Subcarrier Traffic Information Channel (STIC) System	CEA/EIA-795
IEEE	Incident Management Standards Group	
	Standard for Traffic Incident Management Message Sets for Use by EMCs	IEEE 1512.1-2003
	Standard for Hazardous Material IMMS for use by EMCs	IEEE 1512.3-2002
	Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	IEEE 1512-2000
	Standard for Public Safety IMMS for use by EMCs	IEEE P1512.2

Lead SDO	Standard Name	Document ID
IEEE	Standard for Emergency Management Data Dictionary	IEEE P1512.a
IEEE	Security/Privacy of Vehicle/RS Communications including Smart Card Communications	IEEE P1556
ITE	Standard for Functional Level Traffic Management Data Dictionary (TMDD)	ITE TM 1.03
ITE	Message Sets for External TMC Communication (MS/ETMCC)	ITE TM 2.01
ITE	TCIP - Traffic Management (TM) Business Area Standard	ITE TS 3.TM
SAE	ISP-Vehicle Location Referencing Standard	SAE J1746
SAE	Data Dictionary for Advanced Traveler Information Systems (ATIS)	SAE J2353
SAE	Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group	
	Location Referencing Message Specification (LRMS)	SAE J2266
	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354
	Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	SAE J2369
	Rules for Standardizing Street Names and Route IDs	SAE J2529
	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540
	RDS (Radio Data System) Phrase List	SAE J2540-1
	ITIS (International Traveler Information Systems) Phrase Lists	SAE J2540-2
	National Names Phrase List	SAE J2540-3
	Converting ATIS Message Standards from ASN.1 to XML	SAE J2630
SAE	Advanced Traveler Information Systems (ATIS) General Use Standards	
	Location Referencing Message Specification (LRMS)	SAE J2266
	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354
	Rules for Standardizing Street Names and Route IDs	SAE J2529
	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540
	RDS (Radio Data System) Phrase List	SAE J2540-1
	ITIS (International Traveler Information Systems) Phrase Lists	SAE J2540-2
	National Names Phrase List	SAE J2540-3
	Converting ATIS Message Standards from ASN.1 to XML	SAE J2630
SAE/IEEE	Dedicated Short Range Communication at 5.9 MHz Standards Group	
	Resource Manager for DSRC 5.9 GHz	IEEE 1609.1
	Application Services (Layers 6,7) for DSRC 5.9 GHz	IEEE 1609.2
	Communications Services (Layers 4,5) for DSRC 5.9 GHz (Future Standard)	IEEE 1609.3
	Medium Access Control (MAC) Extension & the MAC Extension Management Entity for DSRC 5.9 GHz	IEEE 1609.4
	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 802.11
	Logical Link (Layer 2) for DSRC 5.9 GHz	IEEE 802.2
	Networking Services (Layer 3) for DSRC 5.9 GHz	ISO 21210

8 Project Sequencing

Both the traditional planning process and the regional ITS architecture process have the same goal: to use a local knowledge and consensus process to determine the best sequence of projects to create a transportation network that best meets the needs of the region. The regional ITS architecture is implemented with many individual ITS projects, stakeholders, and private sector initiatives over several years. The architecture assists in this process by establishing a sequence, or ordering, of ITS projects that contributes to the integrated regional transportation system. This system is what is depicted in the regional ITS architecture. For the St. Louis region, a sequence of projects defined in the short term is defined in the architecture and those projects defined in the following sequencing table.

Project	Legacy	Expansion	Begin Date	End Date
FREEWAY MANAGEMENT				
I-270 including some I-255 and I-64 (38 mi)		X		December-04
Fwy-Fwy interchanges and river crossings	X			July-03
I-70 downtown to Wentzville (48 mi)		X		July-06
Rt. 364 (from I-270 to Rte. 94)		X	June-03	December-04
Rte. 367		X	September-03	December-08
ATMS applications		X	February-04	February-05
Existing Illinois equipment (CCTV, DMS, HAR, RWIS, VIDS, WIM)	X			
Rest Area Emergency Phones/Surveillance	X			
IDOT I-64 (near I-255)		X		
IDOT I-255 CCTV		X		
IDOT '3-I' I-55/I-255/I-70 interchange		X		
Regional Map		X	December-03	December-04
Integrate CAD with police agencies		X	December-03	December-05
Hwy 370 & Spencer Road interchange		X		
IDOT TMC Renovation		X	June-04	January-05
I-64 from Rte. 141 to Rte. K		X	June-05	June-06
I-44 from downtown to Allenton		X	May-06	May-07
I-55 Phase 1		X	May-07	June-08
ITIP Deployment (various routes)		X	May-05	February-06
ARTERIAL MANAGEMENT				
US 67/61 signals back to MoDOT TMC (6 mi)	X			December-04
Cave Springs and I-79 (City of St. Peters)		X		
Mid-Rivers				
Lindbergh Tunnel	X			September-04
City of St. Peters Closed Loops	X	X		
City of St. Peters SDMS		X		
City of St. Peters CCTV		X		
Humbert Road Signal System (Madison Co.)		X	TBD	
Emergency vehicle preemption (St. Clair Co.)		X	TBD	
Rte. 15 traffic signals, congestion mitigation	X		TBD	
Highland, Poplar St. traffic signals	X		2005	2005
IL 4 at I-64 Traffic Signals	X		2006	2006
Accessible Pedestrian Signals (APS)		X	TBD	
Rte. 141 Phase 1		X	June-05	March-06
INCIDENT MANAGEMENT				
Motorist Assist out of MoDOT TMC 24/7	X			November-03
AVL and GPS on emergency response vehicles		X	October-03	TBD
Mobile Data Terminal (MDT) on emergency response vehicles		X	TBD	
Radio interface with MSHP	X	X	January-03	
Lindbergh Tunnel	X		September-03	
Event Management Program	X	X	June-92	
IDOT Call Box System (70 mi)	X	X		
IDOT Emergency Patrol	X			
I-70 incident management plan		X	July-03	July-04

Project	Legacy	Expansion	Begin Date	End Date
EMERGENCY MANAGEMENT				
St. Louis Area Regional Response System (STARRS)	X	X		
Emergency Management Response System		X		
Emergency Alert System	X	X		
CENCOM (St. Clair County 911) Relocation		X	2004	August-05
St. Clair County Radio Upgrade		X	2004	August-05
IEMA Region 8 Communications Vehicle and Mobile Command Units		X	TBD	
TRANSIT				
Metro Buses - auto passenger counters (10%)	X	X		
Metro Buses - CCTV installed on some buses	X	X		
Metro LRT - auto passenger counters (100%)	X			
Metro LRT - FO along all track (30 mi, +8 mo)				
CAD/AVL and real-time signage	X	X		
IDOT advance parking mgmt for LRT lots	X			
IDOT real-time DMS prior to river crossings	X			
GPS on paratransit vehicles	X?	X?		
Transit Radio Upgrade (Madison Co. Transit)		X	TBD	
Mobile Data Terminal (MDT) on transit vehicles (Madison Co. Transit)		X	TBD	
Smart Cards (Madison Co. Transit)		X	TBD	
Passenger Counters (Madison Co. Transit)		X	TBD	
Paratransit Hotline/Intelligent Voice Recognition (Madison Co. Transit)		X	TBD	
ADVANCED TRAVELER INFORMATION SYSTEMS				
Metro Networks moving an operator into MoDOT TMC	X		May-03	
Upgrading of the Gatewayguide.com		X	December-03	August-04
800# progressing to 511		X	January-03	January-05
TV and radio - local media coverage	X		August-03	
E-alerts for cell phones, pagers, email…	X		September-03	
Gateway Guide TV		X		October-04
CITY OF ST. PETER TMC				
Cable channel shown at peak times		X		
Website being developed		X		
OTHER MISCELLANEOUS				
MARTS (weather conditions)	X	X		
Statewide work zone program	X	X		

9 Architecture Maintenance Plan

The Bi-State St. Louis ITS Architecture is a dynamic framework for the planning, development, and deployment of ITS in the region. As such, the architecture will need to be periodically updated as ITS projects are implemented and as the ITS needs and services evolve within the region. The FHWA/FTA has emphasized the importance of this step in its Final Rule/Final Policy, stating that "The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region."

In order to define these procedures, the following three questions are addressed in the maintenance plan for the St. Louis Regional Architecture:

- Who will maintain the architecture?
- What will be maintained?
- How will it be maintained?

The following subsections demonstrate how the three primary questions of architecture maintenance will be addressed in the St. Louis region.

9.1 Who Will Maintain the Architecture?

The East-West Gateway Council of Governments, with assistance from the Missouri and Illinois Departments of Transportation (MoDOT and IDOT, respectively), will maintain the St. Louis Regional ITS Architecture. As the primary transportation planning and coordinating agency within the geographic area of the Bi-State St. Louis Architecture (which matches the metropolitan planning area), East-West Gateway is well suited to serve this role. In addition, the periodic updating of the architecture will coincide with East-West Gateway's other transportation planning activities, namely, the regular updates to the Regional Transportation Improvement Plan. IDOT's and MoDOT's familiarity with the Turbo Architecture® software tool and broad role in transportation matters for the region emphasize the importance of their involvement in architecture maintenance.

An ITS Working Group will review any requested architecture changes. This Working Group will then be responsible for recommending changes to the regional ITS architecture to the East-West Gateway Executive Advisory Committee (EAC). The ITS Working Group shall consist of the following three members:

- ITS Planner - EWGCG
- Traffic Engineering Specialist - MoDOT, District 6
- ITS Engineer - IDOT, District 8

9.2 What Will Be Maintained?

The Bi-State St. Louis ITS Architecture consists of two components: this architecture document and the Turbo Architecture® database. Architecture changes approved by the ITS Working Group should be reflected in both.

9.3 How Will It Be Maintained?

Maintenance of the architecture is a multi-step process. First, the change must be identified by regional stakeholders. Next, the change request must be reviewed by the ITS Working Group, EAC, and East-West Gateway Board of Directors to determine if an architecture change is in order. If the change is approved, it is to be documented in the list of changes for the next architecture update and then implemented.

Change Request Identification

Architecture change requests may come from members of the ITS Working Group or any additional transportation agencies in the region that have participated in the development of the Bi-State ITS Architecture (see Section 2.1 for a complete listing) via the architecture website. Change requests must use the Change Request Form found at the conclusion of this section. This form includes:

- Change identification,
- Request date,
- Change description,
- Rationale for change,
- Request originator contact information, and
- Administrative fields.

All change request forms will be catalogued by the East-West Gateway Council of Governments in the Change Database.

Change Request Review

Each requested change will be reviewed by the ITS Working Group to ensure that the request warrants a change in the architecture. The following are examples of circumstances that could lead to an architecture change request:

1. Change in description of the region
2. Stakeholders added, deleted, or revised
3. Change in service scope or change to the National ITS Architecture
4. Changes to adjacent or overlapping regional ITS architectures
5. Changes in status of systems or services
6. Changes in ITS standards
7. Interagency agreements added, deleted, or revised
8. Changes in project priority, including new ITS-related projects
9. Changes to existing regional transportation plans, including the Transportation Improvement Plan (TIP), the Long Range Transportation Plan, or the state ITS Strategic Plans

For change requests concerning ITS-related projects, the ITS Working Group will determine if a proposed project is, in fact, an intelligent transportation systems project. Next, the Working Group will determine if the Bi-State St. Louis ITS Architecture already includes the requested item. If the project is not yet reflected in the architecture, the ITS Working Group will vote to determine if it should be forwarded to the EAC for inclusion in the architecture.

Change Request Approval

In order for an architecture change to be recommended by the ITS Working Group, all three members of the Working Group must agree to forward the change request to the EAC. This vote could be made via an ITS Working Group meeting, or email/telephone.

Once the ITS Working Group has voted to forward an architecture change, the change request will be carried forward to the EAC and East-West Gateway Board of Directors for their approval. Approval will be granted in accordance with current procedures. If the change request is rejected by the Working Group, within two weeks the request originator will be informed of the decision (and the reason(s) for the decision) and will be invited to resubmit a change request if deemed appropriate by the maintainer.

All requested changes will be documented in the Bi-State St. Louis Regional ITS Architecture Change Database. Below is a sample Change Database Entry which highlights the information that would be taken from the Change Request forms and entered into the Change Database.

Change Number	Change Description	Request Originator	Change Decision	Decision Date	Decision Comment	Architecture Components Affected	Change Type
XX-YY*	Expanded description of the requested change	Name of request originator	Accept, reject, or defer	Date decision is made	Pertinent details associated with change decision	Listing of affected architecture components	Minor or major

* XX = year and YY = chronological value

Change Implementation

Formal implementation of changes to the Bi-State Regional ITS Architecture will occur on an annual basis, beginning in January of 2006. The East-West Gateway Council of Governments will implement the approved changes from the Change Database at that time. The maintainer should ensure that updates are consistent with the most recent version of the National ITS Architecture and Turbo Architecture®. To properly track updates to the Bi-State Regional ITS Architecture, the maintainer should update the Document Revision History table at the front of this document and the Change Log in Turbo Architecture®.

Once the architecture update process is complete, the maintainer shall submit the updated architecture document and Turbo Architecture® file to the ITS Working Group for approval. The updated architecture will then undergo the same review and approval process as described above for individual architecture change requests.

Bi-State Regional ITS Architecture Change Request Form

Change Identification:			Request Date:	
Change Description:				
Rationale for Change:				
Request Originator Contact Information:	Name:			
	Agency:			
	Address:			
	Telephone:			
	Fax:			
	Email:			
To be filled out by Architecture Maintainer				
Change Number*:				
Change Decision:	Accept	Reject	Defer	
Decision Comments:				
Decision Date:				
Architecture Components Affected:				
Change Type:	Minor	Major		

* XX-YY, where XX = year and YY = chronological value, e.g., the first change request of 2006 would be '06-01'