

EASTGATE

ITS Architecture Update and Strategic Plan

Submitted to:

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EASTGATE ITS ARCHITECTURE UPDATE AND STRATEGIC PLAN

Prepared for:

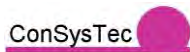


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Eastgate ITS Architecture Update and Strategic Plan Framework

Executive Summary

Overview

The *Eastgate Regional Council of Governments (Eastgate) Intelligent Transportation Systems (ITS) Architecture Update and Strategic Plan Framework* Project was undertaken to provide Eastgate with a regional plan for Intelligent Transportation System projects and an ITS architecture. This ITS plan and architecture will:

- Provide Eastgate and other agencies with tools to ensure that the planning, deployment and integration of ITS systems throughout the state is done with a common framework through ITS architecture and standards development.
- Bring the region into compliance with requirements defined by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) for development of ITS projects.
- And ultimately, assist in the maintenance and operations of the regional transportation network.

Purpose of the ITS Architecture

The architecture defines possible integration opportunities between agencies within the region and identifies how cooperation between the agencies in the deployment of ITS systems can be used to satisfy transportation needs. By defining what currently exists in the area of ITS deployments, the regional ITS architecture can be used to identify gaps in needed ITS services and can identify how these gaps could be addressed. The architecture can then be used to efficiently structure implementations of ITS technologies. By creating a long range plan for the implementation of these systems and technologies, agencies can:

- Prepare for future expansion
- Leverage funding
- Identify standard interfaces

Deliverables

The following components were developed as part of this project and are now available on the internet:

- **Eastgate Regional ITS Architecture Turbo Architecture Database.** Our team has used this FHWA developed software tool to capture the details of the architecture including definition of stakeholders, inventory, market packages, interconnects, interfaces, functional requirements, and standards.
- **Eastgate Regional ITS Architecture Website.** A website has been developed and posted, which provides, in an easily accessible hyperlinked format, the same detailed descriptions of stakeholders, elements, interfaces, and functional requirements found in the Turbo Architecture database; and where the project documentation can be found, including meeting minutes and stakeholder comments. The website currently resides at <http://consystec.com/ohio/eastgate/>.
- **Eastgate Regional ITS Architecture Documentation (this document).** Describes the stakeholders, elements, interfaces, information flows, services, and requirements that comprise the Eastgate Regional ITS Architecture. It also summarizes the regional projects that have been identified, existing and potential agreements, and the plan for using and maintaining the Eastgate Regional ITS Architecture.
- **Strategic Plan Framework.** Forecasts possible ITS projects that major stakeholders in the area would like to pursue. It is broken into two major time frames, 0-5 years and 6+ years. It provides a description of the projects, lead agency capital costs; as well as operation and maintenance costs and the type of service the project will provide, so that it can be easily tied to the existing ITS architecture.

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1.0 Introduction

The **Eastgate Regional Council of Governments (Eastgate) Intelligent Transportation Systems (ITS) Architecture** is a roadmap for transportation systems integration in Mahoning and Trumbull counties over the next 15 years. The architecture has been developed through a cooperative effort by the region's transportation agencies, covering all modes and all roads in the region. The architecture represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region. The Eastgate ITS Architecture is not fiscally constrained.

The architecture is an important tool that will be used by:

- Planning Agencies to better reflect integration opportunities and operational needs into the transportation planning process.
- Operating Agencies to recognize and plan for transportation integration opportunities in the region.
- Other organizations and individuals that use the transportation system in the Eastgate region.

The architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationship between individual transportation projects and ways to cost-effectively build an integrated transportation system over time. The architecture, a Turbo Architecture database, is described by this document and by a hyperlinked website that can be found at <http://consystec.com/ohio/eastgate/>.

1.1 Document Overview

This document is organized into thirteen sections. **Section 1** provides introductory information on the project and discusses the scope of the architecture. **Section 2** describes the process used to develop the regional ITS architecture. The stakeholders are identified in **Section 3**, while their systems are inventoried in **Section 4**. The needs addressed by ITS and the services used to address those needs are covered in **Section 5**. The interfaces and information exchanges are described in **Section 6**. Functional requirements are covered in **Section 7**, standards in **Section 8**, regional projects in **Section 9**, and agreements in **Section 10**. **Section 11** provides guidance on using the regional ITS architecture and **Section 12** presents the architecture maintenance plan. Finally, in **Section 13**, the strategic plan framework is presented.

1.2 Description of the Region

The Eastgate region considered in the development of the regional ITS architecture includes two counties in Ohio: Mahoning and Trumbull. The region covers the area served by the Eastgate Regional Council of Governments.

This update to the regional ITS architecture reduced the timeframe from a twenty year horizon to a fifteen year outlook. Several stakeholders expressed that their strategic plans only look five years into the future and agreed that a fifteen year horizon would be easier to make a realistic plan for. The architecture addresses existing ITS systems as well as those planned for development over the next fifteen years. It represents a snapshot of the currently anticipated projects based on information from stakeholders. As such, the architecture will require regular updates to ensure that it maintains accurate representation of the region.

The architecture covers services across a broad range of ITS, including traffic management, transit management, traveler information, emergency services, archived data management, maintenance and construction operations, and electronic payment. Commercial vehicle services are covered as they relate to regional integration, but a more complete coverage of these would be provided at a statewide architecture level.

2.0 Regional ITS Architecture Development Process

2.1 Process Used to Create the Architecture

Development of the Eastgate Regional ITS Architecture relied heavily on stakeholder input to ensure that the ITS architecture reflected local and regional needs and plans. A five-step process was used to develop the ITS architecture: 1) review the 2004 Youngstown-Warren Regional ITS Plan and update the regional ITS architecture, including the inventory of architecture elements and the set of customized ITS Services to be provided, 2) conduct stakeholder outreach through a one day workshop, 3) create a draft ITS architecture for review, 4) conduct stakeholder review of the draft ITS architecture, and 5) finalize the ITS architecture based on review comments.

1) Create Initial Inventory and Services

The initial draft set of ITS elements for the architecture was created based on a previously created regional ITS architecture database and interviews with key stakeholders. The architecture database was created prior to an architecture workshop held in Youngstown on December 9, 2010. To supplement this information, interviews were held in October 2010 with the following agencies:

- City of Warren
- City of Youngstown
- Mahoning County
- Ohio Department of Transportation (ODOT)
- Trumbull County
- WRTA

The Eastgate architecture elements identified through this review were mapped to National ITS Architecture Version 6.1 entities (subsystems and terminators). The existing and planned ITS projects were used to establish an initial list of services that the elements of the architecture would provide. The elements and their mapping to National ITS Architecture entities were entered into the software tool, Turbo Architecture (Version 5.0). For each existing or future service expected in the region, the market package diagram for that service from the National ITS Architecture was edited so that each National ITS Architecture subsystem or terminator was associated with the local stakeholder element name. In some cases, multiple instances of the market package were developed where the service has more than one instance in the region. This set of customized market packages using the draft elements was created in preparation for the stakeholder outreach workshop.

2) Stakeholder Outreach Workshop

A wide array of stakeholders across all aspects of surface transportation in the region were invited to a one-day workshop held on December 9, 2010. A key objective of the workshop was that the resultant Regional ITS Architecture should be a *consensus architecture*, that is, each of the participants *understands and agrees* to the ITS elements and specific information exchanges between the ITS elements identified in the architecture that they participated in defining. The workshop also incorporated training in the National ITS Architecture and regional ITS architecture so that stakeholders would understand and more fully participate in the ITS Architecture development process. The morning of the workshop focused on refinement of the draft inventory, with each participant's ITS elements being discussed and clarified. In addition the services planned at local, regional, and statewide levels were discussed. During the second half of the workshop these customized market packages were reviewed with the stakeholders to identify which elements are associated with each market package (or transportation service), and to identify the interconnections associated with the market packages. Workshop materials are included in **Appendix A**.

3) Create a Draft Architecture for Review

During the workshop, a draft architecture was updated. Using the customized market package diagrams (as modified during the workshop), the Turbo Architecture database was completed to create a draft ITS architecture. This involved the following activities:

- Updating the ITS inventory
- Revising the customized market packages
- Updating a Turbo Architecture database that represents the sum of all of the customized market packages.

In addition to creating the Turbo Architecture database, a hypertext version of the complete Turbo Architecture database was placed on a generally accessible website (www.consystem.com). This website described each ITS element of the ITS architecture and all of its interconnections with other elements of the architecture. Stakeholders were notified by email that a review period has commenced. They were encouraged to review the regional ITS architecture on the website, and were encouraged to provide feedback electronically.

4) Conduct stakeholder review of the draft ITS architecture

In addition to the stakeholder website review, a draft ITS architecture review meeting was held on February 10, 2011. At the workshop, stakeholders reviewed the customized market packages that were changed or were not covered during the Stakeholder Outreach Workshop. Planned ITS projects were also discussed. There was then a discussion on how to use and maintain the regional ITS architecture. Materials from this workshop are included in **Appendix A**.

5) Finalize the architecture based on review comments.

Following the architecture review workshop, the draft architecture was revised based on comments from the workshop and a new version of the website was generated. Additional architecture aspects such as operational concepts, functional requirements, project sequencing, and agreements were refined and additional stakeholder review comments were solicited. The information has been compiled in this draft final report.

In recognition of the dynamic nature of ITS activities (i.e. ITS elements and interfaces that are at one time designated *planned* and later become *existing*) and because stakeholder requirements in a region that drive an ITS architecture will evolve; a maintenance plan was developed to provide a systematic means of keeping the architecture updated.

2.2 Requirements of the Final FHWA Rule and FTA Policy on Architecture

The FHWA Final Rule (23CFR 940) and FTA Policy on Intelligent Transportation System Architecture and Standards, which took effect on April 8, 2001 defines a set of requirements that regional ITS architectures should meet. **Exhibit 1**, below shows how the requirements of the rule are met by the outputs developed for the Eastgate Regional ITS Architecture.

Exhibit 1. Mapping of Requirements to Architecture Outputs

Regional ITS Architecture Requirements	Where Requirements documented
Description of region	Geographic definition, as well as timeframe and scope of services are given in Section 1.2 of this document.
Identification of participating agencies and other stakeholders	Listing of stakeholders and their definitions is given in Section 3 of this document. An inventory of the elements operated by the stakeholders is contained in Section 4 of this document. The same information is also available in the hyperlinked website and in the Turbo Architecture database.
An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders	The operational concept is defined in Section 3.2 of this document.
A list of any agreements (existing or new) required for operations	A discussion of existing and needed new agreements is given in Section 10 of this document

Regional ITS Architecture Requirements	Where Requirements documented
System functional requirements	The functional requirements of the ITS systems are described in an overview in Section 7 of this document, and are provided in detail in the hyperlinked website.
Interface requirements and information exchanges with planned and existing systems and subsystems	The Interfaces and information flows are described in an overview in Section 6 of the document, and are described in detail in the hyperlinked website and in the Turbo Architecture database.
Identification of ITS standards supporting regional and national interoperability	An overview of the ITS standards is given in Section 8 of the document. The detailed listing of ITS standards applicable to each interface in the architecture is described in the hyperlinked website and in the Turbo Architecture database.
The sequence of projects required for implementation	Projects and their sequencing are covered in Section 9 of this document.

3.0 Identification of Stakeholders

3.1 Regional Stakeholders

Stakeholder coordination and involvement is one of the key elements of the development of a regional ITS architecture. Because ITS often transcends traditional transportation infrastructure, it is important to consider a range of stakeholders beyond the traditional traffic, transit, and maintenance areas. In addition, it is important to consider stakeholders at a statewide level or stakeholders in adjoining regions.

A group of core stakeholders was involved through the development of the architecture, from initial interviews to the two workshops. These core stakeholders included:

- City of Canfield
- City of Hubbard
- City of Newton Falls
- City of Warren
- City of Youngstown
- Community Bus Service
- Eastgate Council of Governments
- Howland Township
- Mahoning County
- Ohio Department of Transportation (ODOT)
- Trumbull County
- Village of Lordstown
- WRTA
- Youngstown State University

The Eastgate Regional ITS architecture includes a wide range of stakeholders. **Exhibit 2** identifies the stakeholders and provides a description of the agency, department, or organization represented by the stakeholder.

Exhibit 2. Stakeholders

Stakeholder Name	Stakeholder Description
Air Force Reserve Command	The Air Force Reserve Command is a major command of the US Air Force.
Archive data users	Represents agencies and individuals who use the various forms of archive data in the region.
City of Niles	Represents departments of City of Niles.
City of Niles Engineer	Department of City of Niles responsible for roadway maintenance.
City of Niles Public Safety Department	Includes Police, fire, and EMS. Emergency Management Coordinator is in this department
City of Warren	Departments of the City of Warren
City of Warren Operations Department	Will be responsible for the future TMC. Are responsible for coordinating maintenance work that is contracted out.
City of Warren Public Service and Safety Department	Includes Police and Fire. Coordinates with OSHP.
City of Youngstown	Departments of City of Youngstown.
City of Youngstown Street Department	Performs maintenance of 10-12 vehicles per day.
Commercial Fleet Owners	Represents private companies that operate commercial vehicle fleets.
Community Action Rural Transit System (CARTS)	Community Action Rural Transit System (CARTS) provides demand response transit to Columbiana County with connections to other regional transit systems
County Government	County government of the counties that border the region (Lake, Portage and Stark in Ohio; Lawrence and Mercer in Pennsylvania).
County Sheriff	Represents Sheriff Departments for counties bordering the region - Lake, Portage, Stark, Mercer, and Lawrence.
Crash Record Users	Agencies that use crash records.

Stakeholder Name	Stakeholder Description
Eastgate Council of Governments	MPO for Mahoning and Trumbull Counties.
Financial Institutions	Financial companies that handle electronic transactions.
General Public	Private travelers.
Mahoning County	Departments of Mahoning County
Mahoning County Emergency Management Agency	Provides at the county level the coordination of emergency services including 9-1-1, hazardous materials, and disaster planning.
Mahoning County Traffic Department	Responsible for traffic operations of county.
Mercer County Regional Council of Governments	The Mercer County Regional Council of Governments (COG) is a voluntary, intergovernmental agency that consists of twenty-one (21) member local governments, all of which are located within Mercer County, western Pennsylvania
National Weather Service	US Agency responsible for national and local weather forecasting
New Castle Area Transit Authority	Transit Authority serving New Castle, Shenango Township, Union Township, Neshannock Township and Lawrence County.
Niles-Trumbull Transit System (NiTTS)	A demand-response public transit system operating throughout Trumbull County for people without transportation for medical appointments, shopping, and other needs. They contract with Community Busing Service to operate the system.
ODOT	Ohio Department of Transportation
Ohio Department of Public Safety	Statewide agency responsible for emergency operations.
Ohio Public Utilities Commission	The Ohio Public Utilities Commission Transportation Department regulates railroad, trucking, bus and watercraft companies across a broad range of activities.
Ohio State Highway Patrol (OSHP)	Agency responsible for public safety of freeways, toll road, and state owned arterials.
Ohio Turnpike Commission (OTC)	Agency responsible for operation and maintenance of the Ohio toll road.
Other Municipalities and Townships	Represents municipal and township government not named in specific elements. The major municipalities and townships covered by this include for Mahoning County: Boardman township, Austintown township, Poland township, and Struthers city; for Trumbull County: Howland township, Liberty township, Lordstown village, Girard city, and Brookfield township - assign to counties above-City of Hubbard, City of Newton Falls and City of Canfield
Paratransit Service Providers	Private and public providers of Paratransit services in the region.
Penn DOT	Pennsylvania DOT
Pennsylvania State Police	Pennsylvania statewide agency responsible for emergency operations.
Portage Area Regional Transit Authority	Portage Area Regional Transit Authority (PARTA) provides fixed route and dial a ride transit to Portage County with connections to other regional transit systems
Private Ambulance Companies	Private companies providing EMS services.
Private Maintenance Contractor	Private companies that provide maintenance services.
Private Tow/Wrecker Companies	Represents private towing companies operating in the region.

Stakeholder Name	Stakeholder Description
Private Weather Service Provider	Private companies that provide weather information tailored for transportation purposes.
Railroad Operators	Regional freight rail organizations
Regional Event Organizations	Organizations holding events in the region.
Regional Hospital Organizations	Represents hospitals and trauma centers in the region.
Regional Public Safety	Represents public safety agencies at the state, county, and municipal level.
School Districts	Regional school districts
Social Networking Firms	Represents private firms that maintain websites and other social networking firms that gathers and distributes traveler information.
Special Police Departments	Represents public safety agencies for special districts like parks, schools, etc.
Stark Area Regional Transit Authority	Stark Area Regional Transit Authority (SARTA) provides fixed route transit to Stark County with connections to other regional transit systems
Trumbull Community Action Program (TCAP)	The Trumbull Community Action Program operates the CATS (Community Action Transportation System), which provides public transportation for the city of Warren.
Trumbull County	Represents departments of Trumbull County
Trumbull County Emergency Management	Provides at the county level the coordination of emergency services including 9-1-1, hazardous materials, and disaster planning.
Trumbull County Engineer	Department responsible for traffic and maintenance activities in the county.
TV and Radio Stations	Television, Radio, and Print Media. Includes TV network affiliates
Western Reserve Port Authority	The Western Reserve Port Authority operates the Youngstown-Warren Regional Airport.
Western Reserve Transit Authority (WRTA)	WRTA provides transit service within the City of Youngstown, with bus service to outlying suburban shopping centers in Boardman, Austintown, Girard, and Liberty Townships. The WRTA transit system services all of the major activity centers inside the City of Youngstown, including shopping centers, hospitals, Youngstown State University and all Youngstown high schools. Their service area is approximately 150 square miles. WRTA serves over 365,000 people.
Youngstown Area Community Action Council (YACAC)	The Youngstown Area Community Action Council (YACAC) is a non-profit agency administering community programs in Ashtabula, Trumbull, Mahoning, and Columbiana counties including Dial a Ride Transportation Services. This service offers free transportation to all eligible customers residing in the Mahoning County area.
Youngstown State University	This stakeholder represents departments at Youngstown State University that perform research in transportation.

The stakeholders listed in **Exhibit 2** represent a mix of specific agencies or organizations and generic names used to represent a variety of stakeholders. An example of a specific agency would be WRTA. An example of a generic stakeholder name would be Cities and Counties, which represents any of the municipal or county agencies in the region that have ITS elements.

3.2 Operational Concept

An Operational Concept documents each stakeholder’s current and future roles and responsibilities in the operation of the regional ITS systems across a range of transportation services. The services covered are:

- Traffic Signal Control: the operation of signaling systems that react to changing traffic conditions and provide coordinated intersection timing over a corridor, an area, or multiple jurisdictions.
- Freeway Control: the operation of systems to monitor freeway (or tollway) traffic flow and roadway conditions, and provide strategies such as ramp metering or lane access control to improve the flow of traffic on the freeway. Includes systems to provide information to travelers on the roadway.
- Incident Management: the operation of systems to provide rapid and effective response to incidents. Includes systems to detect and verify incidents, along with coordinated agency response to the incidents.
- Transit Management: the operation of systems to more efficiently manage fleets of transit vehicles or transit rail. Includes systems to provide transit traveler information both pre-trip and during the trip.
- Traveler Information: the operation of systems to provide static and real time transportation information to travelers.
- Emergency Management: the operation of systems to provide emergency call taking, public safety dispatch, and emergency operations center operations.
- Maintenance and Construction Management: the operation of systems to manage the maintenance of roadways in the region, including winter snow and ice clearance. Includes the managing of construction operations.
- Archive Data Management: the operation of systems to collect transportation data for use in non-operational purposes (e.g. planning and research).
- Commercial Vehicle Operations (CVO): the development of systems to administer permits, check credentials and safety information, and enforce commercial vehicle regulations throughout the state, so as to make it safer to operate a private or commercial vehicle on the state roadways.
- Electronic Payment: the development of electronic fare payment systems for use by transit and other agencies (e.g. parking).

Exhibit 3 identifies the roles and responsibilities of key stakeholders for a delivery of a range of transportation services.

Exhibit 3. Stakeholder Roles and Responsibilities

Transportation Services	Stakeholder	Roles/Responsibilities
Surface Street Management	City of Niles Engineer	Interconnect with signal systems operated by municipalities adjoining the city
		Operate traffic signal systems for City of Niles
		Provide intersection signal preemption for City of Niles Fire and EMS
	City of Warren Operations Department	Interconnect with signal systems operated by municipalities adjoining the city (future)
		Operate traffic signal systems for City of Warren
		Provide intersection signal preemption for City of Warren Fire and EMS
	City of Youngstown Street Department	Interconnect with signal systems operated by Mahoning County and municipalities adjoining the city (future)
		Operate traffic signal systems for City of Youngstown including future integration of traffic control system
	Mahoning County Traffic Department	Interconnect with signal systems operated by municipalities and counties adjoining the Mahoning County systems
		Operate traffic signal systems for Mahoning County
ODOT	Interconnect with signal systems operated by counties or	

Transportation Services	Stakeholder	Roles/Responsibilities
		municipalities adjoining the ODOT systems
		Operate traffic signal systems on state owned arterials
		Other Municipalities and Townships
	Trumbull County Engineer	Interconnect with signal systems in adjacent jurisdictions
		Operate traffic signal systems for arterials owned by municipalities or townships
		Provide intersection signal pre-emption for emergency vehicles.
Freeway Management	ODOT	Interconnect with signal systems operated by municipalities and counties adjoining the Trumbull County systems
		Operate traffic signal systems for Trumbull County
		Monitor traffic sensors on expressways
		Operate lane control system
Incident Management	City of Niles Engineer	Operate traffic information devices on expressways (eg DMS and Highway Advisory Radios- HAR)
		Provide traffic information report to other agencies
		Operate Dynamic Message Signs on City of Niles arterials to inform travelers of incidents (future)
	City of Niles Public Safety Department	Perform incident detection and verification for arterial streets in the City of Niles through video surveillance (future)
		Provide incident information to traffic and public safety agencies
		Coordinate incident response with Trumbull County Sheriff
		Dispatch Police, Fire, and EMS to incidents within the City and adjacent communities
	City of Warren Operations Department	Receive emergency calls for incidents within the City of Niles
		Coordinate incident response with, City of Warren Public Safety (Police, Fire, and EMS), and Trumbull County Sheriff
	City of Warren Public Service and Safety Department	Perform incident detection and verification for arterial streets in the City of Warren through video surveillance (future)
		Dispatch Police, Fire, and EMS to incidents within the City
		Provide incident information to traffic and public safety agencies
	City of Youngstown	Receive emergency calls for incidents within the City of Warren
		Coordinate incident response with Mahoning County Sheriff
		Dispatch Police, Fire, and EMS to incidents within the City and adjacent communities
		Provide incident information to traffic and public safety agencies
City of Youngstown Street Department	Receive emergency calls for incidents within the City of Youngstown	
	Coordinate incident response with Mahoning County Sheriff and City of Youngstown Public Safety (Police, Fire, and EMS)	
County Sheriff	Operate portable Dynamic Message Signs on City of Youngstown arterials to inform travelers of incidents	
	Dispatch Police, Fire, and EMS to incidents within the County	

Transportation Services	Stakeholder	Roles/Responsibilities	
		Provide incident information to traffic and public safety agencies Receive emergency calls for incidents within the County	
	Mahoning County	Receive emergency calls for incidents within the Mahoning County	
	Other Municipalities and Townships	Coordinate incident response for incidents within the municipality Dispatch Police, Fire, and EMS to incidents within the municipalities or townships	
		Receive landline emergency calls for incidents (for those municipalities and townships with 9-1-1 centers)	
	ODOT	Perform limited network surveillance for detection and verification of incidents Operate Freeway Service Vehicles (future)	
		Provide incident information to travelers via traffic information devices on expressways (eg DMS and Highway Advisory Radios- HAR)	
		Ohio State Highway Patrol (OSHP)	Coordinate incident response with ODOT, county sheriff and municipal public safety Dispatch State Highway Patrol vehicles for incidents on expressways and Tollway
	Provide incident information to traffic and public safety agencies Receive emergency calls from cellphones for incidents within the region		
	Ohio Turnpike Commission (OTC)		Coordinate incident response with local municipalities and counties (at ramps), and Pennsylvania Turnpike
	WRTA		Provide incident information (originating from vehicle operators) to county and municipal public safety agencies
	Electronic Toll Collection	Ohio Turnpike Commission (OTC)	Operate toll roads in Ohio
	Parking Management	ODOT	Collect parking information from ODOT rest areas and truck stops
Maintenance and Construction	City of Niles Engineer	Provide maintenance of arterials in the city including snow and ice control and pavement maintenance Maintain signalized intersection equipment	
		City of Warren Operations Department	Maintain signalized intersection equipment. Provide maintenance of arterials in the city including snow and ice control and pavement maintenance
	City of Youngstown Street Department		Maintain signalized intersection equipment. Provide maintenance of arterials in the city including snow and ice control and pavement maintenance
		Mahoning County	Provide maintenance of County roads including snow and ice control and pavement maintenance Provide traffic and maintenance information for Mahoning County to the public via website.
	Other Municipalities		Provide maintenance of municipal roads including snow and ice

Transportation Services	Stakeholder	Roles/Responsibilities
	and Townships	control and pavement maintenance
	ODOT	Provide maintenance of state highways in the region including snow and ice control and pavement maintenance
		Track maintenance vehicles
	Ohio Turnpike Commission (OTC)	Provides maintenance of tollways including snow and ice control and pavement maintenance
	Private Maintenance Contractor	Contracted by municipalities and counties in the region
		Provide maintenance of signals, DMS, HAR, and lighting systems
Trumbull County Engineer	County contracts private company to perform the traffic signal maintenance	
	Provide maintenance of County roads including snow and ice control and pavement maintenance	
Transit Services	Niles-Trumbull Transit System (NiTTS)	Coordinate services with WRTA (future)
		Provide demand response services to Trumbull County
	Paratransit Service Providers	Provide paratransit services throughout the region
		Coordinate with other transportation services (future)
	School Districts	Provide fixed route school bus services to the region
	Trumbull Community Action Program (TCAP)	Provide fixed route and demand response services in City of Warren (future)
	WRTA	Coordinate services with NiTTS
Provide demand response service for Youngstown and parts of Mahoning County		
Provide fixed route bus service for Youngstown and suburban areas of Mahoning County, with services connecting to Trumbull County		
Provide paratransit service throughout Mahoning County		
	Provide transit passenger electronic fare payment capabilities on all transit vehicles and include smart card fare coordination with other regional transit agencies.	
Youngstown Area Community Action Council (YACAC)	Provide demand response transit services in Youngstown	
Traveler Information	City of Niles	Provide traffic and maintenance information for City of Niles to the public via website
	City of Warren	Provide traffic and maintenance information for City of Warren to the public via website
	City of Youngstown	Provide traffic and maintenance information for City of Youngstown to the public via website
	Mahoning County	Provide traffic and maintenance information for Mahoning County to the public via website
	ODOT	Provide traffic and maintenance information for region to the public via Buckeye Traffic
Provide traveler information through DMS, including CVO		

Transportation Services	Stakeholder	Roles/Responsibilities
		information (future)
		Provide traveler information to other private sector information providers
	Ohio Turnpike Commission (OTC)	Provide traffic and maintenance information for OTC to the public via website
	Trumbull County	Provide traffic and maintenance information for Trumbull Counties to the public via website
	TV and Radio Stations	Provide traffic, incident, and construction/ road maintenance information to traveling public
	WRTA	Provide transit information for WRTA Services for the public via website, telephone notification, smart phone technology, and new and emerging technology
Commercial Vehicle Operations	Ohio Public Utilities Commission	Provide Electronic Clearance for Commercial Vehicles Provide Weigh in Motion
	Western Reserve Port Authority	Operate Youngstown Regional Inland Port
Emergency Management	City of Niles Public Safety Department	Dispatch City of Niles police, fire, and EMS
		Coordinate emergency response with OSHP, county sheriff and municipal public safety
		Provide emergency call taking (9-1-1) for City of Niles
	City of Warren Public Service and Safety Department	Coordinate emergency response with OSHP, county sheriff and municipal public safety
		Dispatch police, fire and EMS for City of Warren
		Provide emergency call taking (9-1-1) for City of Warren
	City of Youngstown	Coordinate emergency response with OSHP, county sheriff and municipal public safety
		Dispatch police, fire and EMS for City of Youngstown and adjacent communities
		Provide emergency call taking (9-1-1) for City of Youngstown
	County Sheriff	Coordinate emergency response with OSHP, other county sheriff and municipal public safety
		Dispatch County Sheriff, fire and EMS for unincorporated parts of county
		Provide emergency call taking (9-1-1) for unincorporated parts of county
Mahoning County Emergency Management Agency	Coordinate emergency operations with OSHP, county sheriff and municipal public safety	
	Develop county wide emergency preparedness plan	
	Provide Emergency Operations Center for Mahoning County responsible for directing emergency operations during major emergencies and disasters	
Other Municipalities	Coordinate emergency response with OSHP, county sheriff and other	

Transportation Services	Stakeholder	Roles/Responsibilities
	and Townships	municipal public safety
		Dispatch police, fire and EMS for municipalities and townships in the region
		Provide emergency call taking (9-1-1) for municipalities and townships in the region
	Ohio State Highway Patrol (OSHP)	Coordinate emergency response with ODOT, county sheriff and municipal public safety
		Dispatch State Highway Patrol vehicles for emergencies on expressways and Tollway
		Receive emergency calls from cellphones for incidents within the region
	Trumbull County Emergency Management	Coordinate emergency operations with OSHP, county sheriff and municipal public safety
		Develop county wide emergency preparedness plan
		Provide Emergency Operations Center for Trumbull County responsible for directing emergency operations during major emergencies and disasters
Archived Data Systems	Eastgate Council of Governments	Collect and archive traffic count data for Mahoning and Trumbull County
	Other Municipalities and Townships	Collect and archive traffic count data for municipalities in the region
	ODOT	Collect traffic counts and vehicle classification using Automatic Traffic Recorders (ATR) located at various sites along select freeways
	Youngstown State University	Collect and archive traffic data from regional municipalities, counties, and from ODOT

4.0 Inventory

Each stakeholder agency, company, or group owns, operates, maintains, or plans ITS systems in the region. A regional ITS architecture inventory is a list of “elements” that represent all existing and planned ITS systems in a region as well as non-ITS systems that provide information to, or get information from, the ITS systems. The focus of the inventory is on those systems that support, or may support, interfaces that cross stakeholder boundaries (e.g., inter-agency interfaces, public/private interfaces).

The vast majority of the inventory represents ITS systems in the two-county region, but the inventory does contain elements that represent systems that exist in adjoining regions or at a statewide level. An example of an element in an adjoining region would be the Pennsylvania State Police Troop D, which represents the state police dispatch system in one of the adjoining areas of Pennsylvania. It would interface with public safety elements in the region. An example of a statewide element is the Buckeye Traffic Website, which is found at www.buckeyetraffic.org and represents an element that is used by the entire state.

Each element in the inventory is described by a name, the associated stakeholder, a description, general status (e.g. existing or planned), and the associated subsystems or terminators from the National ITS Architecture. The architecture is based on Version 6.1 of the National ITS Architecture.

4.1 Systems by Stakeholder

Exhibit 4 sorts the inventory by stakeholder so that each stakeholder can easily identify all the relevant elements that are defined in the architecture. For each element in the inventory, the table provides an element description and an indication of whether the element exists or is planned.

The majority of elements in the inventory represent a specific existing or planned system. Some examples of specific systems are the “City of Warren Traffic Signal System” and “ODOT District 4 Maintenance Garages”.

Some of the elements represent sets of devices, rather than a single specific system or device. An example of this type of element is the element “ODOT District 4 Field Equipment”. This element represents all of the ITS field equipment, such as traffic detectors, CCTV, Dynamic Message Signs (DMS) or Highway Advisory Radio (HAR) that are or will be operated by ODOT District 4.

A third type of element in the inventory is a “generic” element that represents all of the systems of a certain type in the region. An example of this type of element is “Other Municipality or Township Public Safety Dispatch”, which represents the many municipal public safety answering points (PSAPs) in the region. The description of this element lists many of the specific systems that were uncovered during technical meetings. These generic elements have been created for two primary reasons. First, they represent elements with similar types of interfaces; so from a standardization standpoint, describing how one of the major elements in the region (e.g. the ODOT District 4 Signal Control System) interfaces with various PSAPs would be the same. Second, describing many systems (there are over 50 PSAPs in the region) with a single element helps keep the architecture from growing to an unmanageable level.

Exhibit 4. Inventory sorted by Stakeholder

Stakeholder	Element Name	Element Description	Status
Air Force Reserve Command	Youngstown-Warren Air Reserve Station	The Youngstown-Warren Air Reserve Station, located at the Youngstown-Warren Regional Airport, is the home of the 910th Airlift Wing, an Air Force Reserve Command.	Existing
Archive data users	Archive Data User Systems	Agencies and systems that use archived data	Planned
City of Niles	City of Niles Maintenance Dispatch	Each department maintains their own vehicles and does their own traffic control.	Existing
City of Niles	City of Niles Maintenance Vehicles	Includes snow plows and other roadway maintenance vehicles operated by the City of Niles.	Existing
City of Niles	City of Niles Website	http://www.cityofniles.com/pages/1/index.htm	Existing
City of Niles Engineer	City of Niles Field Equipment	City of Niles field equipment includes traffic signals (including emergency preemption) and loop detectors.	Existing
City of Niles Engineer	City of Niles Traffic Signal System	Traffic Operations for the City of Niles	Existing
City of Niles Public Safety Department	City of Niles Emergency Vehicles	Represents the ITS equipment (e.g. mobile data terminals) in police, fire, and EMS vehicles owned and operated by City of Niles.	Existing
City of Niles Public Safety Department	City of Niles Public Safety Dispatch	Represents the dispatch center for police, fire, and EMS serving the City of Niles	Existing
City of Warren	City of Warren Website	http://www.warren.org/	Existing
City of Warren Operations Department	City of Warren Field Equipment	City of Warren field equipment includes traffic signals (including emergency preemption), loop detectors	Existing
City of Warren Operations Department	City of Warren Maintenance Dispatch	Dispatch of maintenance vehicles for the City of Warren.	Existing
City of Warren Operations Department	City of Warren Maintenance Vehicles	Includes snow plows and other roadway maintenance vehicles operated by the City of Warren.	Existing
City of Warren Operations Department	City of Warren Traffic Signal System	Traffic Operations for City of Warren.	Existing
City of Warren Public Service and Safety Department	City of Warren Emergency Vehicles	Represents the ITS equipment (e.g. mobile data terminals) in the police, fire, and EMS vehicles owned and operated by City of Warren	Existing
City of Warren Public Service and Safety Department	City of Warren Public Safety Dispatch	Represents the dispatch center for police, fire, and EMS serving the City of Warren	Existing
City of Youngstown	City of Youngstown Emergency Vehicles	Represents the ITS equipment (e.g. mobile data terminals) in the City of Youngstown police, fire, and EMS vehicles.	Existing

Stakeholder	Element Name	Element Description	Status
City of Youngstown	City of Youngstown Public Safety Dispatch	Represents the dispatch centers for police, fire, and EMS serving the City of Youngstown	Existing
City of Youngstown	City of Youngstown Website	City of Youngstown website- www.xxx	Existing
City of Youngstown Street Department	City of Youngstown Field Equipment	City of Youngstown field equipment includes traffic signals, loop detectors, and dynamic message signs.	Existing
City of Youngstown Street Department	City of Youngstown Maintenance Dispatch	Dispatch of maintenance vehicles for roadway and equipment maintenance.	Existing
City of Youngstown Street Department	City of Youngstown Maintenance Vehicles	Includes snow plows and other roadway maintenance vehicles operated by the City of Youngstown. City has 17 snow plows that operate on fixed routes.	Existing
City of Youngstown Street Department	City of Youngstown Traffic Signal System	Traffic Operations for City of Youngstown	Existing
Commercial Fleet Owners	Commercial Vehicles	Commercial vehicles that interact with the transportation elements for weight in motion and Hazmat reporting.	Existing
Commercial Fleet Owners	CV/Truck Traveler Information System	Future traveler information system providing traffic information, including future real-time information, for commercial vehicles.	Planned
Commercial Fleet Owners	Fleet and Freight Management	Commercial fleet owners dispatch functions and interfaces to government agencies.	Existing
Community Action Rural Transit System (CARTS)	CARTS Transit Operations	CARTS Transit Operations provide demand response transit to Columbiana County with connections to other regional transit systems.	Existing
County Government	Other County Maintenance Garages	Represents county maintenance garages and dispatch in the counties that border the region (Ashtabula, Columbiana, Lake, Portage, Stark, Mercer, and Lawrence).	Existing
County Government	Other County Traffic Engineering	Traffic engineering departments and traffic signal systems for counties bordering the region (Ashtabula, Columbiana, Lake, Portage, Stark, Mercer, and Lawrence).	Existing
County Sheriff	County Emergency Vehicles	Sheriff vehicles for counties in the region - Mahoning and Trumbull.	Existing
County Sheriff	Other County Public Safety	Represents County sheriff and county PSAPs for counties bordering on the region (Ashtabula, Columbiana, Lake, Portage and Stark in Ohio and Lawrence and Mercer in Pennsylvania).	Existing
Crash Record Users	Crash Records Database Users	Agencies and systems that access crash record databases	Planned
Eastgate Council of Gov.	Eastgate Regional Data Archive	Archive of transportation information for the region.	Planned

Stakeholder	Element Name	Element Description	Status
Eastgate Council of Governments	Youngstown Region Inland Port	Inland port possibly near the junction of 176/80 for screening of commercial vehicles. Possibly FAST screening and/or security seal checks	Planned
Financial Institutions	Financial Institutions	Systems of financial companies involved in electronic payment transactions.	Planned
General Public	Traveler Information Device	Personal devices used by the traveling public. Includes PCs, pagers, etc.	Planned
General Public	Traveler Vehicles	Represents the ITS equipment inside private vehicles	Existing
Mahoning County	Mahoning County Commercial Vehicle Check	Systems for collecting commercial vehicle information, such as size, weight, cargo, destination for safety purposes.	Planned
Mahoning County	Mahoning County Maintenance Dispatch	Vehicles are dispatched from the 3 district garages. The main garage is at the County Engineer's building. All vehicles communicate with the garages by 2-way radios.	Existing
Mahoning County	Mahoning County Maintenance Vehicles	86 on-road vehicles and 41 off-road vehicles for maintenance and snow removal. Vehicles communicate with the garage via 2-way radio. Vehicles gas up at the Sanitary Department pumps where they input their mileage before fueling. All vehicles receive service in main garage every 3000-5000 miles when called in by mechanics. GIS capability planned for trucks.	Existing
Mahoning County	Mahoning County Website	http://www.mahoningcountygov.com/	Planned
Mahoning County Emergency Management Agency	Mahoning County 9-1-1 Center	Mahoning County has seven 911 call taking and dispatch centers. They are located in Youngstown, Austintown, Canfield, Sebring, Boardman, Beaver, and at the County. Centers are transitioning to CAD.	Existing
Mahoning County Emergency Management Agency	Mahoning County Emergency Management	AMBER Alert Authority for Mahoning County. Center includes 90 phone lines, crisis rooms for meetings. Direct link to radio stations to distribute information.	Existing
Mahoning County Traffic Department	Mahoning County Field Equipment	3 RWIS units (owned/maintained by ODOT, but connected to Mahoning County) installed in 2003 (Western Reserve/South, Mahoning/Bailey, and Snow in Smith Township). Will also have movable cameras and traffic counting devices installed. County owns 4 mobile message boards (2 large and 2 small). Message boards are programmable via cell phone and are used for special events, construction, and major incidents. Would like to see	Existing

Stakeholder	Element Name	Element Description	Status
		permanent message boards on the west and east end of I-80 and I-76 to alert traffic of any incidents in Youngstown.	
Mahoning County Traffic Department	Mahoning County Signal Control System	Mahoning County maintains 42 signals. 20 in Boardman, 17 in Austintown, 2 in Smith Township, and 3 in Jackson Township. 32 are part of closed loop systems. 2 have emergency vehicle preemption (Boardman and Austintown), more emergency preemption is planned. 3 sites where signals are within 200' of RR crossing (South, Southern, SR 224) but only 1 or 2 trains per day (garbage trains - suppose to run at night).	Existing
Mercer County Regional Council of Governments	Shenango Valley Shuttle Service Dispatch	Fixed Route transit service serving Mercer County Pa, with connections into Ohio.	Existing
National Weather Service	National Weather Service	Publically provided weather information- NWS, Accuweather, etc.	Existing
New Castle Area Transit Authority	New Castle Transit Dispatch	Fixed route transit system operating in Lawrence County Pa.	Existing
Niles-Trumbull Transit System (NiTTS)	NiTTS Demand Response Dispatch	Dispatch function of new Niles-Trumbull Transit System.	Existing
Niles-Trumbull Transit System (NiTTS)	NiTTS Demand Response Vehicles	NiTTS Vehicles, currently provided by Community Busing Service.	Existing
Niles-Trumbull Transit System (NiTTS)	NiTTS Website	Website containing transit schedules for the NiTTS transit system.	Planned
ODOT	Buckeye Traffic Website	Represents ODOT's website that provides transportation information.	Existing
ODOT	ODOT Central Office	Central statewide traffic operations center for ODOT. Manages the BuckEyeTraffic.org website. For redundancy, able to remotely operate district traffic management centers.	Existing
ODOT	ODOT Connected Vehicles Roadside Equipment	This element represents the roadside equipment that provides vehicle-to-infrastructure communications. This data communication is used for data collection from Connected Vehicle-equipped vehicles and to provide information to Connected Vehicle-equipped vehicles.	Planned
ODOT	ODOT District 11 Maintenance Garages	Represents the dispatch function of the maintenance garages in District 11, which borders the region.	Existing
ODOT	ODOT District 11 Office	Responsible for traffic and maintenance for District 11, which includes Columbiana County and other counties that adjoin the region.	Existing

Stakeholder	Element Name	Element Description	Status
ODOT	ODOT District 12 Maintenance Garages	Dispatch function for ODOT roadway and equipment maintenance vehicles. These garages are county based. Provide roadway and equipment maintenance for ODOT assets in the district.	Existing
ODOT	ODOT District 4 Field Equipment	Road weather information system, Portable DMS, ODOT signals, Automatic Traffic Recorder (ATR) stations which include Weigh In Motion (WIM), HAR planned.	Existing
ODOT	ODOT District 4 Maintenance Garages	County based garages responsible for roadway and equipment maintenance.	Existing
ODOT	ODOT District 4 Maintenance Vehicles	District maintenance vehicles, including snow plows. District is considering GPS units for tracking	Existing
ODOT	ODOT District 4 Office	Primary traffic management point for ODOT managed roads in District 4.	Existing
ODOT	ODOT District 4 Outposts	ODOT Storage facilities	Existing
ODOT	ODOT District 4 Signal Control System	329 signals maintained by District 4. 71 are in Trumbull County and 77 are in Mahoning County.	Existing
ODOT	ODOT Freeway Service Patrol Vehicles	Freeway Service patrols.	Existing
ODOT	ODOT Infrastructure Monitoring Equipment	Real-time stress monitoring Sensors that monitor the infrastructure and the communications necessary to report this data to a center or vehicle-based maintenance system.	Planned
ODOT	ODOT Regional Traffic Operations Center	Represents the major regional Traffic Operations Center that manages the ODOT field equipment in the region.	Existing
ODOT	ODOT Rest Area Traveler Information Centers	Represents traveler interface equipment at ODOT rest areas.	Planned
ODOT	ODOT Rest Areas/Truck Stops	Parking management system at rest areas and truck stops to measure parking availability.	Planned
Ohio Department of Public Safety	Ohio DPS Crash Records Database	State Highway Patrol collects information and sends to this DB	Existing
Ohio Department of Public Safety	Ohio Statewide EOC	State Emergency Operations Center. Located in Columbus	Existing
Ohio Public Utilities Commission	Ohio Commercial Vehicle Administrative Systems	Safety records, administrative functions for CVO.	Existing
Ohio State Highway Patrol (OSHP)	Ohio State Highway Patrol District 10	OSHP post for the Ohio Turnpike.	Existing

Stakeholder	Element Name	Element Description	Status
Ohio State Highway Patrol (OSHP)	Ohio State Highway Patrol Posts	One in Trumbull County. One in Mahoning County. Each operates the 911 cell call center for their respective county.	Existing
Ohio State Highway Patrol (OSHP)	OSHP Motor Carrier Enforcement Unit	Enforcement of commercial vehicles.	Planned
Ohio State Highway Patrol (OSHP)	OSHP Vehicles	ITS equipment in OSHP Vehicles.	Existing
Ohio State Highway Patrol (OSHP)	OSHP Weigh-In-Motion Stations	OSHP operates fixed and mobile stations.	Existing
Ohio Turnpike Commission (OTC)	OTC Central Dispatch	Dispatch maintenance and incident management (private tow/wreckers, local/municipal fire/EMS). (Collocated with Highway Patrol). Dispatch contractors for construction and sometimes maintenance.	Existing
Ohio Turnpike Commission (OTC)	OTC E-ZPass Tag	Vehicle transponder or smart card used for electronic payment of toll and other.	Existing
Ohio Turnpike Commission (OTC)	OTC Toll Administration	Toll administration offices for the electronic toll collection. Reconciliation center.	Planned
Ohio Turnpike Commission (OTC)	OTC Toll Collection Equipment	Electronic toll collection roadway equipment. E.g., tag readers, toll booth equipment, lane curtains, etc.	Planned
Ohio Turnpike Commission (OTC)	OTC Website	Website containing traveler information for OTC, including toll information and road maintenance.	Existing
Other Municipalities and Townships	Other Municipality or Township Emergency Vehicles	Emergency vehicles, support signal preemption, include ITS equipment that provides the sensory, processing, storage, and communications functions necessary to support safe and efficient emergency response.	Existing
Other Municipalities and Townships	Other Municipality or Township EOC	Represents EOCs at the municipal level.	Planned
Other Municipalities and Townships	Other Municipality or Township Field Equipment	This includes the signal controllers, cameras, and signal preemption equipment for each municipality. Also includes roadside equipment that helps blind people cross streets (pushbutton has beeper, closed loop systems, audible voice indicating road is clear to cross).	Existing
Other Municipalities and Townships	Other Municipality or Township Maintenance Garages	This element represents the dispatch function for roadway and equipment maintenance at the municipal level and for those counties not explicitly broken out with separate elements.	Existing

Stakeholder	Element Name	Element Description	Status
Other Municipalities and Townships	Other Municipality or Township Maintenance Vehicles	Represents the snow plows and other maintenance vehicles that are owned and operated by municipalities in both Mahoning and Trumbull Counties.	Existing
Other Municipalities and Townships	Other Municipality or Township Public Safety Dispatch	This element represents the police, fire, and EMS emergency dispatch functions at the municipal level. This general element also represents each of the community public safety answering points in the region. The major municipalities and townships covered by this include for Mahoning County: Boardman township, Austintown township, Poland township, and Struthers city; and for Trumbull County: Howland township, Liberty township, Girard city, and Brookfield township.	Existing
Other Municipalities and Townships	Other Municipality or Township Security Cameras	Represents CCTV used for security purposes, for example at bridges.	Planned
Other Municipalities and Townships	Other Municipality or Township Security Sensors	Represents municipal security sensors such as fire sensors.	Planned
Other Municipalities and Townships	Other Municipality or Township Traffic Count Data Archives	This element represents the historical traffic count archives maintained by municipalities, townships or villages not called out by name in the architecture.	Existing
Other Municipalities and Townships	Other Municipality or Township Traffic Signal Systems	This element represents the traffic signal systems of municipalities, townships (and villages) in the region.	Existing
Other Municipalities and Townships	Other Municipality or Township Website	Website for municipalities, containing information such as construction projects and traveler information.	Planned
Paratransit Service Providers	Paratransit Service Vehicles	Represents vehicles of numerous small public and private paratransit systems in the region.	Existing
Paratransit Service Providers	Paratransit Services Dispatch	Private and public transit systems that provide service to elderly, disabled riders and other eligible clients.	Existing
Penn DOT	Penn DOT District 1	Represents traffic and maintenance operations of Penn DOT District 1.	Existing
Penn DOT	Penn DOT District 11	Represents traffic and maintenance operations of Penn DOT District 11.	Existing
Pennsylvania State Police	Pennsylvania State Police Troop D	Penn State Police Troop operating in Mercer and Lawrence Counties.	Existing
Portage Area Regional Transit Authority	PARTA Transit Operations	PARTA Transit Operations provide fixed route service to Portage County with connections to other regional transit systems.	Existing

Stakeholder	Element Name	Element Description	Status
Private Ambulance Companies	Private Ambulance Dispatch	Vehicle dispatch function of private ambulance companies in the region.	Existing
Private Maintenance Contractor	Private Maintenance Contractor Dispatch	Dispatch function for private maintenance contractors who provide equipment maintenance.	Existing
Private Tow/Wrecker Companies	Private Towing Dispatch	Dispatch function for private tow/ wrecker companies in the region.	Existing
Private Weather Service Provider	Private Weather Service Systems	Systems that provide customized transportation weather forecasts or road weather information.	Existing
Railroad Operators	Railroad Operations Center	Source of information for train crossing times/durations for coordination to reroute vehicles (passenger, commercial, transit, emergency) around RR tracks. CSX, Norfolk Southern & Lake Erie railroads are in the region.	Existing
Railroad Operators	Railroad Wayside Equipment	Active highway/rail interfaces (flashing lights and gates when train is detected)	Existing
Regional Event Organizations	Regional Event Operations	Venues that have events affecting traffic in the region. E.g. Youngstown State University.	Existing
Regional Hospital Organizations	Regional Hospital Trauma Centers	Hospitals and trauma centers in the region.	Existing
Regional Public Safety	Warren-Youngstown Regional Incident and Mutual Aid Network	Regional public safety communications network.	Planned
School Districts	School Buses	School buses operated by area school districts	Existing
School Districts	School District Dispatch	Dispatching systems for school districts' buses	Existing
Social Networking Firms	Social Networking Sites	Represents social networking sites that can be used as a venue for distribution of traveler information. Includes Google Transit.	Existing
Special Police Departments	Special Police Dispatch	Dispatch of public safety for special jurisdictions. E.g. Youngstown State University, park police, hospital police.	Existing
Special Police Departments	Special Police Vehicles	Police vehicles operated by Special Police forces	Existing
Stark Area Regional Transit Authority	SARTA Transit Operations	SARTA Transit Operations provide fixed route service to Stark County with connections to other regional transit systems.	Existing
Trumbull Community Action Program (TCAP)	TCAP Community Action Transportation System (CATS)	Fixed route transit system in the City of Warren and paratransit for Trumbull County.	Existing

Stakeholder	Element Name	Element Description	Status
Trumbull County	Trumbull County Commercial Vehicle Check	Systems for collecting commercial vehicle information, such as size, weight, cargo, destination for safety purposes.	Planned
Trumbull County	Trumbull County Field Equipment	Includes traffic signals, which are not currently centrally connected. County has 8 portable message signs on trailers (4 large, 4 small) used mainly for construction. Possible video surveillance in the future for incident management.	Existing
Trumbull County	Trumbull County Maintenance Dispatch	One main garage at County Engineer's building and one other in Cortland. Maintenance crews split between the 2 garages. Keep records of mileage and date of maintenance and driver must bring vehicle in for service. 23 salt runs and 25 plow runs performed by the county - supervisor must check roads in person and determine if plowing/salting is necessary, if so, drivers are paged to come in.	Existing
Trumbull County	Trumbull County Maintenance Vehicles	Trumbull County has ~40-45 maintenance trucks, ~30 can be used for snow removal. Vehicles communicate with the garage via 2-way radio and cell phones. May have portable hand-held GPS units in the future.	Existing
Trumbull County	Trumbull County Website	Planned for late 2003. Major road maintenance notifications will be posted there.	Planned
Trumbull County Emergency Management	Trumbull County 9-1-1 Center	911 landline call and dispatch centers. (For Police, Sheriff, Fire and EMS.)	Existing
Trumbull County Emergency Management	Trumbull County Emergency Management Center	EOC for Trumbull County	Existing
Trumbull County Emergency Management	Trumbull County Emergency Management Website	http://www.homelandsecurity.co.trumbull.oh.us/index.htm	Existing
Trumbull County Engineer	Trumbull County Signal Control System	Most signals are not coordinated. There is time-based coordination along Larchmont. County contracts out maintenance of signals. There is no traffic engineer on staff.	Existing
TV and Radio Stations	TV and Radio Stations	Local TV (e.g. WFMJ), radio, and newspapers.	Existing
Western Reserve Port Authority	Youngstown-Warren Regional Airport	Regional Airport with limited commercial and private services.	Existing

Stakeholder	Element Name	Element Description	Status
Western Reserve Transit Authority (WRTA)	Transit Reciprocity Network	The reconciliation service that allows the exchange of information and payments between agencies that are affiliated with the regional smart electronic payment card. Reciprocity among the participating agencies allows regional smart card users to maintain an account with one agency while using the facilities of all the agencies. Reimbursements will be handled between the agencies involved, making the transaction transparent to the customer.	Planned
Western Reserve Transit Authority (WRTA)	WRTA Administration Office	Houses dispatch center and link to AVL information. Buses are stored here and maintenance activities and fueling occurs at this location. Future link to live security camera feeds.	Existing
Western Reserve Transit Authority (WRTA)	WRTA Automated Maintenance Scheduling System	All data is now downloaded to laptops at the base with Dadac (motor) and Altec (trans). Automatic download is planned for 2005. Also, en-route alert monitoring is planned. Want hubometer reader installed at the base. Have automatic detection for fuel leaks.	Planned
Western Reserve Transit Authority (WRTA)	WRTA Downtown Passenger Terminal	Represents information signs or kiosks at the terminal.	Existing
Western Reserve Transit Authority (WRTA)	WRTA EasyGo Dispatch	Dispatch function for Easy Go Demand Response transit system.	Existing
Western Reserve Transit Authority (WRTA)	WRTA EasyGo Vehicles	ITS elements in Easy Go vehicles.	Existing
Western Reserve Transit Authority (WRTA)	WRTA Fixed Route Dispatch	Dispatch of WRTA fixed route vehicles.	Existing
Western Reserve Transit Authority (WRTA)	WRTA Fixed Route Vehicles	Operate 26 routes, 6 days per week. 19 routes are standard and 7 are every route which operates between 7:15 PM and midnight. AVL on the 41 fixed route buses. Manager can access information from home.	Existing
Western Reserve Transit Authority (WRTA)	WRTA Security	WRTA contracts with a security company to provide security at their administration office. The element represents the security systems and personnel at the Administration office that monitor security equipment and provide interface to other public safety agencies. Some of the security equipment includes cameras at Federal Station. Work is underway to link the two security systems so there is a live feed to the Administration Office. All buses are equipped with panic buttons which trigger a "please call 911" sign on outside of the bus. Plan for en-route alert monitoring for vehicles.	Planned

Stakeholder	Element Name	Element Description	Status
Western Reserve Transit Authority (WRTA)	WRTA Security Equipment	CCTV and traveler activated alarms.	Planned
Western Reserve Transit Authority (WRTA)	WRTA Smart Card	Planned Electronic Fare Media	Planned
Western Reserve Transit Authority (WRTA)	WRTA Special Service Transportation (SST) Dispatch	WRTA paratransit service.	Existing
Western Reserve Transit Authority (WRTA)	WRTA Special Service Transportation (SST) Vehicles	It is used to supplement the fixed route service by providing public transit for individuals with disabilities and/or senior citizens. The SST service area encompasses all areas 3/4 miles or less from the existing fixed route service line. Service is curb to curb. Initiated in 1978.	Existing
Western Reserve Transit Authority (WRTA)	WRTA Website	http://wrtaonline.com/ Website has general information and route detour information. Existing route information and real-time bus schedules are not online.	Existing
Youngstown Area Community Action Council (YACAC)	YACAC Dial-A-Ride	Demand response transit system operated by YACAC.	Existing
Youngstown State University	Youngstown State Transportation Archive	This element represents a future capability to collect regional transportation data to be used as part of transportation research.	Planned

4.2 Systems by Architecture Entity

Each element in the regional architecture inventory is mapped to one or more entities from the National ITS Architecture. The architecture is based upon Version 6.1 of the National ITS Architecture, which defines 95 entities. These 22 subsystems and 76 terminators describe a wide array of systems that provide ITS services, or interface with systems that provide ITS services. The mapping of regional architecture elements to National ITS Architecture entities has two primary benefits. First it allows the full set of information flows contained in the National ITS Architecture to be used in the description of regional ITS architecture interfaces, and second, it allows the elements of the regional architecture to be grouped by like entity.

Exhibit 5 provides just such a sorting of inventory elements by entity. This table allows the users of the architecture to immediately identify all the elements that have functions relating to transit management or traffic management.

The Eastgate Regional ITS Architecture inventory contains the following number of elements mapped to different types of entities:

- Archived Data Management: 4
- Emergency Management: 27
- Information Service Providers: 15
- Maintenance and Construction Management: 18
- Roadway: 9
- Traffic Management: 15
- Transit Management: 17

Exhibit 5. Inventory Sorted by Entity

Associated Entity	Element Name	Stakeholder	Status
Alerting and Advisory Systems	Mahoning County Emergency Management	Mahoning County Emergency Management Agency	Existing
Alerting and Advisory Systems	Trumbull County Emergency Management Center	Trumbull County Emergency Management	Existing
Archived Data Management Subsystem	Eastgate Regional Data Archive	Eastgate Council of Governments	Planned
Archived Data Management Subsystem	Ohio DPS Crash Records Database	Ohio Department of Public Safety	Existing
Archived Data Management Subsystem	Other Municipality or Township Traffic Count Data Archives	Other Municipalities and Townships	Existing
Archived Data Management Subsystem	Youngstown State Transportation Archive	Youngstown State University	Planned
Archived Data User Systems	Archive Data User Systems	Archive data users	Planned
Archived Data User Systems	Crash Records Database Users	Crash Record Users	Planned
Care Facility	Regional Hospital Trauma Centers	Regional Hospital Organizations	Existing
Commercial Vehicle Administration	Ohio Commercial Vehicle Administrative Systems	Ohio Public Utilities Commission	Existing
Commercial Vehicle Check	Mahoning County Commercial Vehicle Check	Mahoning County	Planned
Commercial Vehicle Check	OSHP Weigh-In-Motion Stations	Ohio State Highway Patrol (OSHP)	Existing
Commercial Vehicle Check	Trumbull County Commercial Vehicle Check	Trumbull County	Planned
Commercial Vehicle Check	Youngstown Region Inland Port	Eastgate Council of Governments	Planned
Commercial Vehicle Subsystem	Commercial Vehicles	Commercial Fleet Owners	Existing

Associated Entity	Element Name	Stakeholder	Status
Emergency Management	City of Niles Public Safety Dispatch	City of Niles Public Safety Department	Existing
Emergency Management	City of Warren Public Safety Dispatch	City of Warren Public Service and Safety Department	Existing
Emergency Management	City of Youngstown Public Safety Dispatch	City of Youngstown	Existing
Emergency Management	Mahoning County 9-1-1 Center	Mahoning County Emergency Management Agency	Existing
Emergency Management	Mahoning County Emergency Management	Mahoning County Emergency Management Agency	Existing
Emergency Management	NiTTTS Demand Response Dispatch	Niles-Trumbull Transit System (NiTTTS)	Existing
Emergency Management	ODOT District 4 Maintenance Garages	ODOT	Existing
Emergency Management	ODOT District 4 Office	ODOT	Existing
Emergency Management	ODOT Regional Traffic Operations Center	ODOT	Existing
Emergency Management	Ohio State Highway Patrol Posts	Ohio State Highway Patrol (OSHP)	Existing
Emergency Management	Ohio Statewide EOC	Ohio Department of Public Safety	Existing
Emergency Management	OTC Central Dispatch	Ohio Turnpike Commission (OTC)	Existing
Emergency Management	Other County Public Safety	County Sheriff	Existing
Emergency Management	Other Municipality or Township EOC	Other Municipalities and Townships	Planned
Emergency Management	Other Municipality or Township Public Safety Dispatch	Other Municipalities and Townships	Existing
Emergency Management	Pennsylvania State Police Troop D	Pennsylvania State Police	Existing
Emergency Management	Private Ambulance Dispatch	Private Ambulance Companies	Existing
Emergency Management	Private Towing Dispatch	Private Tow/Wrecker Companies	Existing
Emergency Management	Special Police Dispatch	Special Police Departments	Existing
Emergency Management	Trumbull County 9-1-1 Center	Trumbull County Emergency Management	Existing
Emergency Management	Trumbull County Emergency Management Center	Trumbull County Emergency Management	Existing
Emergency Management	WRTA Administration Office	Western Reserve Transit Authority (WRTA)	Existing
Emergency Management	WRTA EasyGo Dispatch	Western Reserve Transit Authority (WRTA)	Existing
Emergency Management	WRTA Fixed Route Dispatch	Western Reserve Transit Authority (WRTA)	Existing
Emergency Management	WRTA Security	Western Reserve Transit Authority (WRTA)	Planned
Emergency Management	WRTA Special Service Transportation (SST) Dispatch	Western Reserve Transit Authority (WRTA)	Existing
Emergency Management	Youngstown-Warren Air Reserve Station	Air Force Reserve Command	Existing

Associated Entity	Element Name	Stakeholder	Status
Emergency Vehicle Subsystem	City of Niles Emergency Vehicles	City of Niles Public Safety Department	Existing
Emergency Vehicle Subsystem	City of Warren Emergency Vehicles	City of Warren Public Service and Safety Department	Existing
Emergency Vehicle Subsystem	City of Youngstown Emergency Vehicles	City of Youngstown	Existing
Emergency Vehicle Subsystem	County Emergency Vehicles	County Sheriff	Existing
Emergency Vehicle Subsystem	ODOT Freeway Service Patrol Vehicles	ODOT	Existing
Emergency Vehicle Subsystem	OSHP Vehicles	Ohio State Highway Patrol (OSHP)	Existing
Emergency Vehicle Subsystem	Other Municipality or Township Emergency Vehicles	Other Municipalities and Townships	Existing
Emergency Vehicle Subsystem	Special Police Vehicles	Special Police Departments	Existing
Enforcement Agency	Ohio State Highway Patrol District 10	Ohio State Highway Patrol (OSHP)	Existing
Enforcement Agency	OSHP Motor Carrier Enforcement Unit	Ohio State Highway Patrol (OSHP)	Planned
Event Promoters	Regional Event Operations	Regional Event Organizations	Existing
Financial Institution	Financial Institutions	Financial Institutions	Planned
Fleet and Freight Management	Fleet and Freight Management	Commercial Fleet Owners	Existing
Information Service Provider	Buckeye Traffic Website	ODOT	Existing
Information Service Provider	City of Niles Website	City of Niles	Existing
Information Service Provider	City of Warren Website	City of Warren	Existing
Information Service Provider	City of Youngstown Website	City of Youngstown	Existing
Information Service Provider	CV/Truck Traveler Information System	Commercial Fleet Owners	Planned
Information Service Provider	Mahoning County Website	Mahoning County	Planned
Information Service Provider	NiTTS Website	Niles-Trumbull Transit System (NiTTS)	Planned
Information Service Provider	ODOT Central Office	ODOT	Existing
Information Service Provider	ODOT District 4 Office	ODOT	Existing
Information Service Provider	OTC Website	Ohio Turnpike Commission (OTC)	Existing
Information Service Provider	Other Municipality or Township Website	Other Municipalities and Townships	Planned
Information Service	Social Networking Sites	Social Networking Firms	Existing

Associated Entity	Element Name	Stakeholder	Status
Provider			
Information Service Provider	Trumbull County Emergency Management Website	Trumbull County Emergency Management	Existing
Information Service Provider	Trumbull County Website	Trumbull County	Planned
Information Service Provider	WRTA Website	Western Reserve Transit Authority (WRTA)	Existing
Intermodal Freight Depot	Youngstown Region Inland Port	Eastgate Council of Governments	Planned
Maintenance and Construction Management	Buckeye Traffic Website	ODOT	Existing
Maintenance and Construction Management	City of Niles Maintenance Dispatch	City of Niles	Existing
Maintenance and Construction Management	City of Warren Maintenance Dispatch	City of Warren Operations Department	Existing
Maintenance and Construction Management	City of Youngstown Maintenance Dispatch	City of Youngstown Street Department	Existing
Maintenance and Construction Management	Mahoning County Maintenance Dispatch	Mahoning County	Existing
Maintenance and Construction Management	ODOT Central Office	ODOT	Existing
Maintenance and Construction Management	ODOT District 11 Maintenance Garages	ODOT	Existing
Maintenance and Construction Management	ODOT District 11 Office	ODOT	Existing
Maintenance and Construction Management	ODOT District 12 Maintenance Garages	ODOT	Existing
Maintenance and Construction Management	ODOT District 4 Maintenance Garages	ODOT	Existing
Maintenance and Construction Management	ODOT District 4 Office	ODOT	Existing
Maintenance and Construction Management	OTC Central Dispatch	Ohio Turnpike Commission (OTC)	Existing
Maintenance and Construction Management	Other County Maintenance Garages	County Government	Existing
Maintenance and Construction Management	Other Municipality or Township Maintenance Garages	Other Municipalities and Townships	Existing
Maintenance and Construction Management	Penn DOT District 1	Penn DOT	Existing
Maintenance and Construction Management	Penn DOT District 11	Penn DOT	Existing
Maintenance and Construction Management	Private Maintenance Contractor Dispatch	Private Maintenance Contractor	Existing
Maintenance and Construction Management	Trumbull County Maintenance Dispatch	Trumbull County	Existing
Maintenance and Construction Vehicle	City of Niles Maintenance Vehicles	City of Niles	Existing

Associated Entity	Element Name	Stakeholder	Status
Maintenance and Construction Vehicle	City of Warren Maintenance Vehicles	City of Warren Operations Department	Existing
Maintenance and Construction Vehicle	City of Youngstown Maintenance Vehicles	City of Youngstown Street Department	Existing
Maintenance and Construction Vehicle	Mahoning County Maintenance Vehicles	Mahoning County	Existing
Maintenance and Construction Vehicle	ODOT District 4 Maintenance Vehicles	ODOT	Existing
Maintenance and Construction Vehicle	Other Municipality or Township Maintenance Vehicles	Other Municipalities and Townships	Existing
Maintenance and Construction Vehicle	Trumbull County Maintenance Vehicles	Trumbull County	Existing
Media	TV and Radio Stations	TV and Radio Stations	Existing
Multimodal Transportation Service Provider	Youngstown-Warren Regional Airport	Western Reserve Port Authority	Existing
Other Emergency Management	Warren-Youngstown Regional Incident and Mutual Aid Network	Regional Public Safety	Planned
Parking Management	ODOT Rest Areas/Truck Stops	ODOT	Planned
Personal Information Access	Traveler Information Device	General Public	Planned
Rail Operations	Railroad Operations Center	Railroad Operators	Existing
Remote Traveler Support	ODOT Rest Area Traveler Information Centers	ODOT	Planned
Remote Traveler Support	WRTA Downtown Passenger Terminal	Western Reserve Transit Authority (WRTA)	Existing
Remote Traveler Support	WRTA Security Equipment	Western Reserve Transit Authority (WRTA)	Planned
Roadway Subsystem	City of Niles Field Equipment	City of Niles Engineer	Existing
Roadway Subsystem	City of Warren Field Equipment	City of Warren Operations Department	Existing
Roadway Subsystem	City of Youngstown Field Equipment	City of Youngstown Street Department	Existing
Roadway Subsystem	Mahoning County Field Equipment	Mahoning County Traffic Department	Existing
Roadway Subsystem	ODOT Connected Vehicles Roadside Equipment	ODOT	Planned
Roadway Subsystem	ODOT District 4 Field Equipment	ODOT	Existing
Roadway Subsystem	ODOT Infrastructure Monitoring Equipment	ODOT	Planned
Roadway Subsystem	Other Municipality or Township Field Equipment	Other Municipalities and Townships	Existing
Roadway Subsystem	Trumbull County Field Equipment	Trumbull County	Existing
Security Monitoring Subsystem	Other Municipality or Township Security Cameras	Other Municipalities and Townships	Planned
Security Monitoring Subsystem	Other Municipality or Township Security Sensors	Other Municipalities and Townships	Planned
Storage Facility	ODOT District 4 Outposts	ODOT	Existing

Associated Entity	Element Name	Stakeholder	Status
Surface Transportation Weather Service	Private Weather Service Systems	Private Weather Service Provider	Existing
Toll Administration	OTC Toll Administration	Ohio Turnpike Commission (OTC)	Planned
Toll Collection	OTC Toll Collection Equipment	Ohio Turnpike Commission (OTC)	Planned
Traffic Management	City of Niles Traffic Signal System	City of Niles Engineer	Existing
Traffic Management	City of Warren Traffic Signal System	City of Warren Operations Department	Existing
Traffic Management	City of Youngstown Traffic Signal System	City of Youngstown Street Department	Existing
Traffic Management	Mahoning County Signal Control System	Mahoning County Traffic Department	Existing
Traffic Management	ODOT Central Office	ODOT	Existing
Traffic Management	ODOT District 11 Office	ODOT	Existing
Traffic Management	ODOT District 4 Office	ODOT	Existing
Traffic Management	ODOT District 4 Signal Control System	ODOT	Existing
Traffic Management	ODOT Regional Traffic Operations Center	ODOT	Existing
Traffic Management	OTC Central Dispatch	Ohio Turnpike Commission (OTC)	Existing
Traffic Management	Other County Traffic Engineering	County Government	Existing
Traffic Management	Other Municipality or Township Traffic Signal Systems	Other Municipalities and Townships	Existing
Traffic Management	Penn DOT District 1	Penn DOT	Existing
Traffic Management	Penn DOT District 11	Penn DOT	Existing
Traffic Management	Trumbull County Signal Control System	Trumbull County Engineer	Existing
Transit Management	CARTS Transit Operations	Community Action Rural Transit System (CARTS)	Existing
Transit Management	New Castle Transit Dispatch	New Castle Area Transit Authority	Existing
Transit Management	NiTTS Demand Response Dispatch	Niles-Trumbull Transit System (NiTTS)	Existing
Transit Management	Paratransit Services Dispatch	Paratransit Service Providers	Existing
Transit Management	PARTA Transit Operations	Portage Area Regional Transit Authority	Existing
Transit Management	SARTA Transit Operations	Stark Area Regional Transit Authority	Existing
Transit Management	School District Dispatch	School Districts	Existing
Transit Management	Shenango Valley Shuttle Service Dispatch	Mercer County Regional Council of Governments	Existing
Transit Management	TCAP Community Action Transportation System (CATS)	Trumbull Community Action Program (TCAP)	Existing
Transit Management	Transit Reciprocity Network	Western Reserve Transit Authority (WRTA)	Planned
Transit Management	WRTA Administration Office	Western Reserve Transit Authority (WRTA)	Existing

Associated Entity	Element Name	Stakeholder	Status
Transit Management	WRTA Automated Maintenance Scheduling System	Western Reserve Transit Authority (WRTA)	Planned
Transit Management	WRTA EasyGo Dispatch	Western Reserve Transit Authority (WRTA)	Existing
Transit Management	WRTA Fixed Route Dispatch	Western Reserve Transit Authority (WRTA)	Existing
Transit Management	WRTA Security	Western Reserve Transit Authority (WRTA)	Planned
Transit Management	WRTA Special Service Transportation (SST) Dispatch	Western Reserve Transit Authority (WRTA)	Existing
Transit Management	YACAC Dial-A-Ride	Youngstown Area Community Action Council (YACAC)	Existing
Transit Vehicle Subsystem	NiTTS Demand Response Vehicles	Niles-Trumbull Transit System (NiTTS)	Existing
Transit Vehicle Subsystem	Paratransit Service Vehicles	Paratransit Service Providers	Existing
Transit Vehicle Subsystem	School Buses	School Districts	Existing
Transit Vehicle Subsystem	WRTA EasyGo Vehicles	Western Reserve Transit Authority (WRTA)	Existing
Transit Vehicle Subsystem	WRTA Fixed Route Vehicles	Western Reserve Transit Authority (WRTA)	Existing
Transit Vehicle Subsystem	WRTA Special Service Transportation (SST) Vehicles	Western Reserve Transit Authority (WRTA)	Existing
Traveler Card	OTC E-ZPass Tag	Ohio Turnpike Commission (OTC)	Existing
Traveler Card	WRTA Smart Card	Western Reserve Transit Authority (WRTA)	Planned
Vehicle	Traveler Vehicles	General Public	Existing
Wayside Equipment	Railroad Wayside Equipment	Railroad Operators	Existing
Weather Service	National Weather Service	National Weather Service	Existing

5.0 Needs and Services

5.1 Needs Identification

Transportation needs identify the transportation problems that can be solved by ITS services. They also represent a link to transportation planning efforts that define the strategies used to address transportation problems. These strategies involve capital improvements as well as operational improvements. ITS solutions usually involve services that improve the efficiency, scope, or safety of operations. A survey of stakeholders during the stakeholder meeting held on December 9, 2010 was used to identify an initial set of high priority user needs. These high priority needs were reviewed by the stakeholders in the draft architecture document and modified/augmented to capture inputs from all key stakeholder groups. The summary of these user needs is described below. The needs summary below identifies high priority needs and maps these to stakeholder groups.

The eight groups whose needs were recorded were:

- WRTA
- Trumbull County
- Howland Township
- Youngstown State University (YSU)
- Mahoning County
- City of Canfield
- Niles-Trumbull Transit System (NiTTS)
- ODOT

Exhibit 6 provides a summary of the high priority transportation needs along with the group(s) that expressed these needs as high priority.

Exhibit 6. Summary of Transportation Needs (H=High, M=Medium, L=Low, N/A=Not a Need)

Need Area	Specific ITS Need	Overall Priority	Trumbull County	Mahoning County	Howland Township	City of Canfield	WRTA	NiTTs	YSU	ODOT
			Eng	Eng						
Incident Management	Need improved incident detection, management and coordination	Medium	N/A	M	M	M	M	H	L	H
	Need to reduce delays due to accidents or construction	Medium	L	H	H	N/A	M	H	L	H
	Need to identify alternate routes for the traveling public	High	L	M	H	M	H	H	H	H
	Improve HAZARDOUS cargo tracking and routing	Medium	N/A	N/A	L	M	N/A	M	N/A	L
Traffic Management	Need to improve traffic congestion mitigation	Medium	L	M	H	H	H	H	L	M
	Need to improve traffic mitigation on the east-west corridors	Medium	L	H	M	H	H	M	N/A	M
	Need to provide early warning of poor visibility conditions (sun, fog, thunderstorms, etc.)	Medium	N/A	L	L	L	M	H	M	N/A
	Need to improve traffic signal interconnect and coordination to improve mobility	Medium	M	H	M	H	H	L	M	M
	Need traffic signal preemption for emergency vehicles (needs to be expanded)	Medium	L	M	L	H	H	N/A	M	L
	Need advanced warning of flash flood areas	Low	L	N/A	L	L	L	M	N/A	N/A
	Need to enhance communications and information sharing between regional agencies	Medium	M	L	L	M	H	H	L	M
	Need to interconnect with neighboring regions	Medium	L	M	M	M	M	H	L	M
	Need to know travel times on major routes	Medium	N/A	N/A	L	N/A	M	M	L	H
	Need to know delays on major routes	Medium	M	N/A	L	L	H	H	M	H
	Need for traffic signal priority for transit vehicles	Low	N/A	N/A	L	N/A	H	L	L	L
	Need to implement parking management systems (downtown and special events)	Low	N/A	N/A	N/A	L	L	N/A	H	L
	Need to alert drivers of speeding (automated alert systems)	Low	N/A	N/A	L	L	M	M	L	L
Need for remote monitoring for infrastructure and at intersections	Medium	L	M	L	N/A	M	M	M	L	
Emergency Management	Need to improve emergency notification/dispatch and response times	Medium	M	N/A	L	M	H	M	H	L
	Need to improve traffic safety	Medium	M	M	L	M	H	M	H	H
	Need to expand remote traveler support services (information plus roadside assistance)	Low	L	N/A	N/A	L	M	L	M	L
	Need to improved tracking of emergency vehicles	Medium	N/A	N/A	L	L	M	L	H	M
	Need to identify alternate routes for emergency vehicles	High	H	N/A	M	M	H	L	H	H
	Need to improve evacuation planning	Medium	N/A	N/A	L	N/A	H	L	M	N/A
	Need to monitor the transportation infrastructure for security purposes	Medium	L	N/A	L	M	H	M	L	L
Public	Need to improve/enhance rural traveler service	Medium	L	N/A	L	N/A	H	N/A	M	L

Need Area	Specific ITS Need	Overall Priority	Trumbull County	Mahoning County	Howland Township	City of Canfield	WRTA	NiTTs	YSU	ODOT
			Eng	Eng						
Transportation	Need to improve urban traveler service	Medium	N/A	N/A	L	N/A	M	M	H	M
	Need to improve transit coordination among city/county/tribal governments	High	N/A	N/A	H	N/A	H	H	H	L
	Need to better communicate with transit customers	Medium	N/A	N/A	L	N/A	H	M	M	N/A
	Need to encourage major employers to implement transit use incentives	Medium	N/A	N/A	L	N/A	H	L	H	N/A
	Need automated maintenance system for transit fleets	Medium	N/A	N/A	L	N/A	M	H	L	L
	Need to improve efficiency of demand-responsive transit (enhanced information)	Medium	N/A	N/A	L	N/A	M	H	M	M
	Need to improve schedule operations for fixed-route transit vehicles	Medium	N/A	N/A	L	N/A	M	N/A	M	L
	Need for interactive ITS services (transit-related)	Medium	N/A	N/A	L	N/A	H	H	L	M
	Need to deploy AVL on regional transit vehicles	Medium	N/A	N/A	L	N/A	H	H	L	N/A
Maintenance Operations	Need to improve vehicle routing and detours/information	Medium	M	L	L	M	M	H	H	M
	Need advanced and up-to-date road closure and construction zone information	Medium	M	L	L	M	H	H	H	M
	Need to reduce delays due to accidents or construction	Medium	L	L	M	L	H	H	H	H
	Need to know location of maintenance vehicles	Medium	N/A	H	M	L	M	L	N/A	N/A
	Need to improve work zone safety (alert drivers of wrong-way movements)	Medium	L	N/A	L	N/A	H	L	H	L
	Need for improved wind/dust monitoring	Low	N/A	N/A	N/A	N/A	L	L	N/A	N/A
	Need to collect roadway conditions data, such as icing, from vehicle sensors	Medium	L	L	M	M	M	H	H	H
	Need to monitor the transportation infrastructure for maintenance purposes	Medium	L	L	M	L	H	N/A	M	L
	Need improved flood monitoring	Low	L	N/A	M	L	M	L	N/A	N/A
Traveler Information	Need real-time roadway and traffic conditions information	High	M	N/A	L	M	H	H	H	H
	Need real-time information about weather conditions/location	High	M	L	H	M	H	H	H	H
	Need easier access to traveler services information (locations, types of services, etc.)	Medium	L	L	L	M	H	M	L	L
	Need special event traffic information	Medium	L	L	L	N/A	M	H	M	L
	Need to have traveler information accessible at employment sites	Medium	N/A	N/A	N/A	N/A	H	M	H	L
Information Management	Need to collect transportation information for use by planners	Medium	M	M	L	M	H	M	L	H
	Need to share archived data between agencies	Medium	M	H	L	M	H	H	L	M
	Need park-and-ride information	Low	N/A	L	N/A	N/A	H	L	L	L

5.2 Services

The ITS systems in the region currently provide a few transportation services and that list will grow as more systems are developed or upgraded. The services are described by the set of market packages that are shown in **Exhibit 7**. For each market package this table provides the status (is it currently provided or planned) and the primary elements associated with the market package.

Exhibit 7. Regional Market Packages

Market Package	Market Package Name	Status
AD1	ITS Data Mart	Planned
APTS01	Transit Vehicle Tracking	Existing
APTS02	Transit Fixed-Route Operations	Existing
APTS03	Demand Response Transit Operations	Existing
APTS04	Transit Fare Collection Management	Planned
APTS05	Transit Security	Existing
APTS06	Transit Fleet Management	Planned
APTS07	Multi-modal Coordination	Planned
APTS08	Transit Traveler Information	Planned
APTS09	Transit Signal Priority	Planned
APTS10	Transit Passenger Counting	Planned
ATIS01	Broadcast Traveler Information	Existing
ATMS01	Network Surveillance (Monitoring)	Planned
ATMS03	Surface Street Control	Existing
ATMS04	Freeway Control	Existing
ATMS06	Traffic Information Dissemination	Existing
ATMS07	Regional Traffic Management	Planned
ATMS08	Traffic Incident Management System	Planned
ATMS10	Electronic Toll Collection	Existing
ATMS13	Standard Railroad Grade Crossing	Existing
ATMS14	Advanced Railroad Grade Crossing	Planned
ATMS15	Railroad Operations Coordination	Planned
ATMS16	Parking Facility Management	Planned
CVO01	Fleet Administration	Planned
CVO03	Electronic Clearance	Planned
CVO06	Weigh-In-Motion	Planned
CVO10	HAZMAT Management	Planned
EM01	Emergency Call-Taking and Dispatch	Planned

Market Package	Market Package Name	Status
EM02	Emergency Routing	Planned
EM04	Roadway Service Patrols	Planned
EM05	Transportation Infrastructure Protection	Planned
EM06	Wide-Area Alert	Planned
EM08	Disaster Response and Recovery	Planned
EM09	Evacuation and Reentry Management	Planned
EM10	Disaster Traveler Information	Planned
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Planned
MC02	Maintenance and Construction Vehicle Maintenance	Planned
MC03	Road Weather Data Collection	Planned
MC04	Weather Information Processing and Distribution	Planned
MC06	Winter Maintenance	Planned
MC07	Roadway Maintenance and Construction	Planned
MC08	Work Zone Management	Planned
MC09	Work Zone Safety Monitoring	Planned
MC10	Maintenance and Construction Activity Coordination	Planned

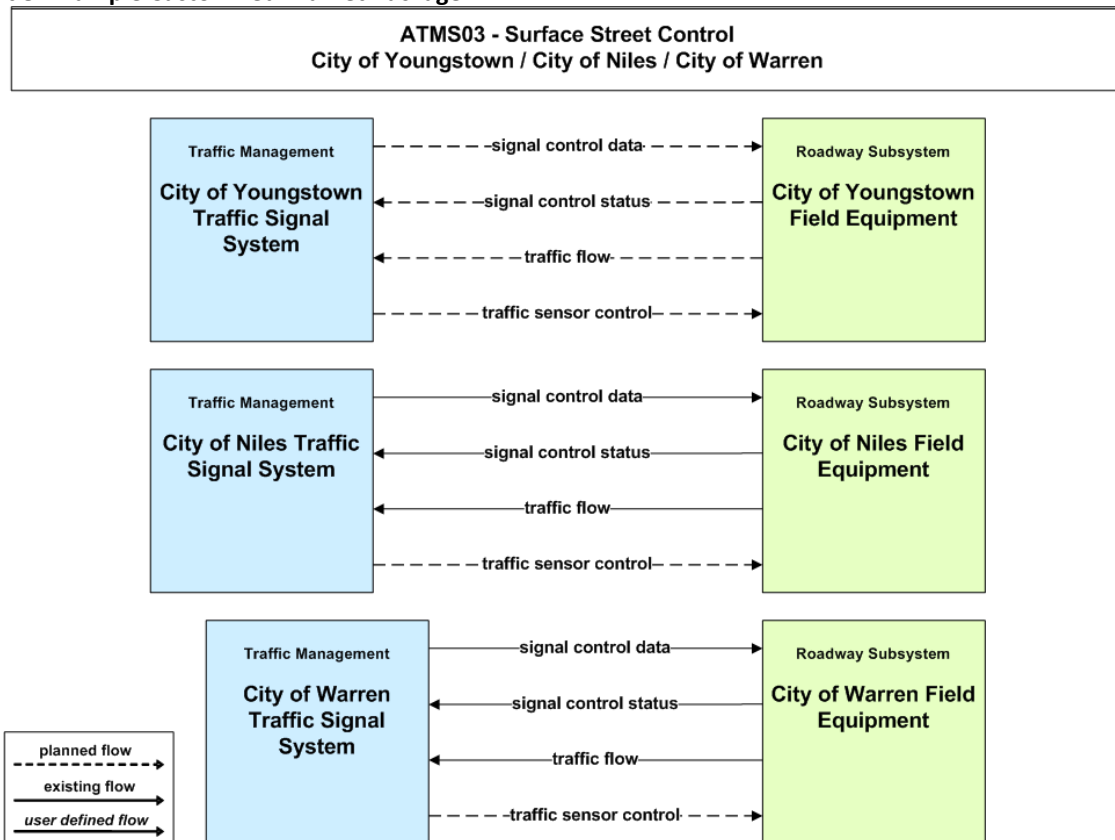
6.0 Interfaces and Information Exchanges

6.1 Customized Market Packages

The market packages of the National ITS Architecture were customized to reflect the unique systems and connections of the Eastgate region. Each market package is shown graphically with the market package name, the entity from the National ITS Architecture, and the specific Eastgate elements associated with the entity. In addition the market packages show the information flows that move between elements.

Exhibit 8 is an example of an ATMS market package for Surface Street Control that has been customized for the region. This market package shows the two subsystems, Traffic Management and Roadway, and the associated elements. Information flows (called “architecture flows” in the National ITS Architecture) between the subsystems indicate what information is being shared. The customized market packages can be found on the Eastgate webpage by selecting the “Services” button. Market packages are grouped by functional areas (e.g. Traffic Management, Maintenance and Construction, and Public Transportation) and each set of customized market packages can be viewed by clicking on the Market Package Identifier under the Market Package heading. It is important to note that while the market package table on the web page shows all of the market packages from the National ITS Architecture, only those selected for the Eastgate region are hyperlinked. A second listing of the customized market packages, organized by stakeholder is under the “Services—By stakeholder” button. This page has the stakeholders listed alphabetically, and has hyperlinks to individual customized market packages that contain elements mapped to the stakeholder. Note that in some cases the stakeholder element is not central to the market package, but exchanges information with the main element in the market package. The complete set of customized market packages for an individual stakeholder is available by clicking on the PDF icon to the left of the individual market packages.

Exhibit 8. Example Customized Market Package



6.2 Regional Architecture Information Flows

While it is important to identify the various systems and stakeholders as part of a regional ITS architecture, a primary purpose of the architecture is to identify the connectivity between transportation systems in the region. The customized market packages represent services that can be deployed as an integrated capability, and the market package diagrams show the information flows between the elements within the region that are most important to the operation of the market packages. How these systems interface with each other is an integral part of the overall architecture.

There are 141 different elements identified as part of the Eastgate Regional ITS Architecture. These elements include city, county, and state traffic operations centers, transit centers, transit vehicles, public safety dispatch centers, media outlets, and others—all of the existing and planned physical components that contribute to the regional intelligent transportation system). Interfaces have been defined for each element in the architecture. For example, the ODOT District 4 Signal Control System has interfaces with 28 other elements in the region ranging from field equipment to transit centers. Some of the interfaces are far less complex. For example the NiTTS Demand Response Vehicles element has an interface with only one other element in the architecture.

Elements and their interfaces are accessible via the Eastgate Regional ITS Architecture website by clicking on the “Inventory by Entity” button. On the web page, the elements are organized by ITS area (e.g. Traffic Management) and within the area the elements are listed alphabetically in the column on the right. By clicking on (selecting) an element, the element detail page comes up where the user can view the element definition, who the stakeholder is, the current status of the element, and the other elements with which the selected element interfaces with. See **Exhibit 9** for an example of the element details for the City of Youngstown Traffic Signal System. Clicking on an interfacing element provides more detailed information about the particular interface (i.e. architecture flows). A second way to access the interface information is through the “Inventory By Stakeholder” button. This contains an alphabetical list of stakeholders in the left column and a list of elements mapped to that stakeholder. Clicking on any of the elements will bring up the same Element Detail page discussed above.


Exhibit 9. Example of Element Detail Showing Interfaces

Youngstown-Warren Regional Architecture

ITS Element: City of Youngstown Traffic Signal System

[Send Your Comments](#)

Description:	Traffic Operations for City of Youngstown
Status:	Existing
Stakeholder:	City of Youngstown Street Department
Mapping:	Traffic Management Other Traffic Management
Interfaces:	City of Youngstown Field Equipment City of Youngstown Maintenance Dispatch City of Youngstown Public Safety Dispatch City of Youngstown Website Eastgate Regional Data Archive Mahoning County 9-1-1 Center Mahoning County Emergency Management Mahoning County Signal Control System Mahoning County Website ODOT District 4 Signal Control System Other Municipality or Township Traffic Signal Systems Railroad Operations Center Regional Event Operations School District Dispatch TV and Radio Stations WRTA EasyGo Dispatch WRTA Fixed Route Dispatch

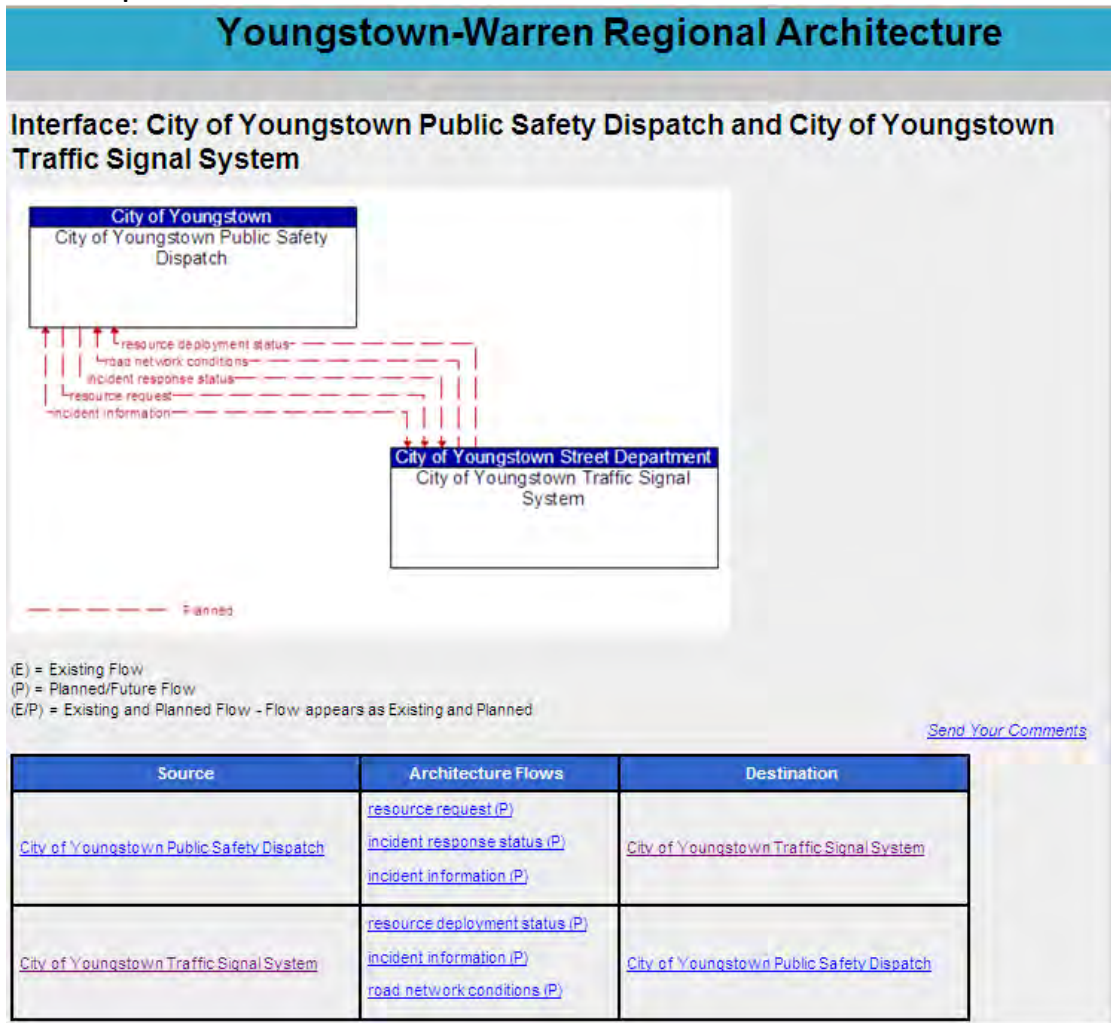


Architecture flows between the elements define specific information that is exchanged by the elements. Each architecture flow has a direction, name, and definition. These architecture flows define the interface requirements between the various elements in the regional architecture. Most of the architecture flows match ones from the National ITS Architecture (the mapping of elements to National ITS Architecture entities allowed the developers to match the architecture flows to the appropriate interfaces). In some cases, new “user defined” flows have been created for interfaces or connections that are not expressed in the National ITS Architecture. User defined flows can be identified by the extension “_ud” at the end.

An example of the architecture flows between two elements is shown in **Exhibit 10**, below. In this interface, the flows that go between the City of Youngstown Traffic Signal System and the City of Youngstown Public Safety Dispatch are shown. Although both the City of Youngstown Traffic Signal System and the City of Youngstown Public Safety Dispatch are existing ITS elements, all of the architecture flows on this interface are shown as planned. This signifies these two elements, although existing, do not currently share data communications

Note that these interface diagrams show all the information flows that go from one element to another covering all relevant market packages. The customized market packages (described in **Section 6.1**) represent another way to identify information flows, in this case in support of a single ITS service.

Exhibit 10. Example of Architecture Flows between Elements



7.0 Functional Requirements

Functional requirements are a description of the functions or activities that are currently performed by the ITS elements or that are planned to be performed in the future. For the Eastgate Regional ITS Architecture, these functions have been developed by using the functional assignments underlying the National ITS Architecture and the mapping from transportation services to elements.

In the National ITS Architecture, a market package is defined by subsystems, equipment packages, and architecture flows, all of which operate together to perform a particular transportation service. Equipment Packages represent pieces of a subsystem that perform a single function. (Note: there are no equipment packages defined for the Terminators of the National ITS Architecture, since they represent systems on the boundary of the architecture and do not have functional descriptions within the architecture.) For example, the Surface Street Control (ATMS03) market package is composed of the two Traffic Management Subsystem equipment packages; TMC Signal Control and Traffic Maintenance; and the two Roadway Subsystem with its two equipment packages; Roadway Signal Control and Roadway Equipment Coordination. The definitions of these four equipment packages, copied from version 6.1 of the National ITS Architecture are:

- 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.
- Traffic Maintenance – This equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issue problem reports, and track the repair or replacement of the failed equipment.
- 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.
- 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.).

The approach used in the Eastgate Regional ITS Architecture was to begin with the mapping of equipment packages to market packages to elements as an initial definition of the functions being performed by each element. Then this mapping is tailored to provide a more accurate picture of the functions performed by the element.

The mapping of elements to the basic functions (equipment packages) is provided on the hyperlinked web site version of the architecture. The detail page for each element (which is accessed by clicking on the hyperlinked element name within the “Inventory”, “Inventory by Stakeholder” or “Inventory by Entity” tabs) has a list of the equipment packages assigned to the element. Sometimes the user may need to scroll down to see the equipment packages.

For example, the Eastgate Regional Data Archive element has the following equipment packages assigned to it:

- Government Reporting Systems
- ITS Data Repository

This represents a first level of detail that can be obtained in the hyperlinked web site in connection with functionality. The additional level of detail, or detailed functional requirements, can be found underneath the equipment package. Using the above example, viewing the Eastgate Regional Data Archive element detail page, the user can see the equipment packages listed above. If the user were to select one of the equipment packages (all listed as hyperlinks), the equipment package detail page would appear. There it lists the detailed functional requirements for that equipment package, along with a full description of what this equipment package contains, as well as a listing of all elements that are associated with this equipment package.

8.0 Standards

8.1 Discussion of Key Standards in the Region

ITS standards establish a common way in which devices connect and communicate with one another. This allows transportation agencies to implement systems that cost-effectively exchange pertinent data and accommodate equipment replacement, system upgrades, and system expansion. Standards benefit the traveling public by providing products that will function consistently and reliably throughout the region. ITS standards contribute to a safer and more efficient transportation system, facilitate regional interoperability, and promote an innovative and competitive market for transportation products and services.

Use of ITS standards is very important to project development in the Eastgate region. **Exhibit 11**, below identifies the ITS standards that are potentially applicable to the region. This table was created by taking the standards information available in the Turbo Architecture database (which identifies standards applicable to each architecture flow) and taking the total set of standards that result from all of the selected flows.

The following section explains how to identify the specific applicable standards for an individual interface. The table lists Standards Development Organization (SDO) in the first column, the standard title in the second column, and the number of the standard in the third column. Regular updates of SDO activities will help ensure that the latest standards are utilized. The SDOs listed in the following table include:

- American Association of State Highway and Transportation Officials (AASHTO)
- American National Standards Institute (ANSI)
- American Public Transportation Association (APTA)
- American Society for Testing and Materials (ASTM)
- Electronic Industries Alliance/Consumer Electronic Association (EIA/CEA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Transportation Engineers (ITE)
- Society of Automotive Engineers (SAE)

Exhibit 11. Applicable ITS Standards

SDO	Standard Title	Standard Doc ID
AASHTO/ITE	Traffic Management Data Dictionary and Message Sets for External TMC Communication (TMDD and MS/ETMCC)	ITE TMDD 3.0
AASHTO/ITE/NEMA	NTCIP Center-to-Center Standards Group	(see below)
AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group	(see below)
AASHTO/ITE/NEMA	Global Object Definitions	NTCIP 1201
AASHTO/ITE/NEMA	Object Definitions for Actuated Traffic Signal Controller (ASC) Units	NTCIP 1202
AASHTO/ITE/NEMA	Object Definitions for Dynamic Message Signs (DMS)	NTCIP 1203
AASHTO/ITE/NEMA	Object Definitions for Environmental Sensor Stations (ESS)	NTCIP 1204
AASHTO/ITE/NEMA	Object Definitions for Closed Circuit Television (CCTV) Camera Control	NTCIP 1205
AASHTO/ITE/NEMA	Object Definitions for Closed Circuit Television (CCTV) Switching	NTCIP 1208
AASHTO/ITE/NEMA	Data Element Definitions for Transportation Sensor Systems (TSS)	NTCIP 1209
AASHTO/ITE/NEMA	Field Management Stations (FMS) - Part 1: Object Definitions for Signal System Masters	NTCIP 1210
AASHTO/ITE/NEMA	Object Definitions for Signal Control and Prioritization (SCP)	NTCIP 1211

SDO	Standard Title	Standard Doc ID
AASHTO/ITE/NEMA	Object Definitions for Conflict Monitor Units (CMU)	NTCIP 1214
APTA	Standard for Transit Communications Interface Profiles	APTA TCIP-S-001 3.0.0
ASTM	Standard Specification for Dedicated Short Range Communications (DSRC) Physical Layer using Microwave in the 902-928 Mhz Band	ASTM E2158-01
ASTM	Standard Practice for Metadata to Support Archived Data Management Systems	ASTM E2468-05
ASTM	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data	ASTM E2665-08
ASTM/IEEE/SAE	Dedicated Short Range Communication at 5.9 GHz Standards Group	(see below)
IEEE	Standard for Message Sets for Vehicle/Roadside Communications	IEEE 1455-1999
IEEE	Standard for Common Incident Management Message Sets for use by Emergency Management Centers	IEEE 1512 -2006
IEEE	Standard for Traffic Incident Management Message Sets for Use by Emergency Management Centers	IEEE 1512.1-2006
IEEE	Standard for Public Safety Traffic Incident Management Message Sets for Use by Emergency Management Centers	IEEE 1512.2-2004
IEEE	Standard for Hazardous Material Incident Management Message Sets for Use by Emergency Management Centers	IEEE 1512.3-2006
IEEE	Standard for the Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	IEEE 1570-2002
IEEE	Standard for Common Traffic Incident Management Message Sets for Use in Entities External to Centers	IEEE P1512.4
SAE	Advanced Traveler Information Systems (ATIS) General Use Standards Group	
SAE	Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group	
SAE	Dedicated Short Range Communications (DSRC) Message Set Dictionary	SAE J2735

Notes: The following definitions come from Version 6.1 of the National ITS Architecture. For a more up to date description of the following standards groups, please refer to the National ITS Architecture website.

NTCIP C2F: NTCIP Center-to-Field Standards Group

The table above specifies the NTCIP Center-to-Field Standards Group, which addresses the communications protocols between a center and the ITS field devices it manages. The family includes the communications profiles that cover the interfaces between a traffic management center and dynamic message signs, ramp meters, environmental sensors, or CCTVs under its control. These protocols are common across all Center-to-Field interfaces in the National ITS Architecture, and rather than repeat the entire list for each architecture flow, we have created this summary entry – the NTCIP C2F Group of communications standards.

The “vocabulary” (objects) is specific to the actual architecture flow in the National ITS Architecture and is therefore mapped to the corresponding Data Object standard (In the example above, the “Object Definitions for Dynamic Message Signs” standard would be mapped to the specific control and data flows between the Traffic Management Subsystem and the Roadway DMS equipment).

In order to satisfy a wide spectrum of system and regional communications requirements, Center-to-Field ITS deployments should each implement the combinations of the following NTCIP C2F communications protocols that best meet their needs.

This Group includes the following Standards Activities:

- NTCIP 1101: Simple Transportation Management Framework (STMF)
- NTCIP 1102: Base Standard: Octet Encoding Rules (OER)
- NTCIP 1103: Simple Transportation Management Protocol (STMP)
- NTCIP 2101: Point to Multi-Point Protocol Using RS-232 Subnetwork Profile
- NTCIP 2102: Subnet Profile for PMPP Over FSK modems
- NTCIP 2103: Subnet Profile for Point-to-Point Protocol using RS 232
- NTCIP 2104: Subnet Profile for Ethernet
- NTCIP 2201: Transportation Transport Profile
- NTCIP 2202: Internet (TCP/IP and UDP/IP) Transport Profile
- NTCIP 2301: Application Profile for Simple Transportation Management Framework (STMF)
- NTCIP 2302: Application Profile for Trivial File Transfer Protocol
- NTCIP 2303: Application Profile for File Transfer Protocol (FTP)

NTCIP C2C: NTCIP Center-to-Center Standards Group

The table above specifies the NTCIP Center-to-Center (NTCIP C2C) Group of Standards, which address the communications protocols between two centers (e.g. two traffic management centers exchanging information to facilitate regional coordination of traffic signals). Some of the communication protocols covered by this family are XML, DATEX-ASN and FTP. These protocols are common across all Center-to-Center interfaces in the National ITS Architecture, and rather than repeat the entire list for each architecture flow, we have created this summary entry – the NTCIP C2C Group of communications standards.

The standards that describe the “vocabulary” (data elements and messages) are mapped to specific architecture flows rather than the entire set of NTCIP C2C interfaces (In the regional traffic coordination example above, the “Traffic Management Data Dictionary” and the “Message Set for External TMC Communications” standards would be mapped to the specific flows between two Traffic Management Subsystems).

In order to satisfy a wide spectrum of system and regional communications requirements, Center-to-Center ITS deployments should each implement the combinations of the following NTCIP C2C communications protocols that best meet their needs.

This Group includes the following Standards Activities:

- NTCIP 1102: Base Standard: Octet Encoding Rules (OER)
- NTCIP 1104: Center-to-Center Naming Convention Specification
- NTCIP 2104: Subnet Profile for Ethernet
- NTCIP 2202: Internet (TCP/IP and UDP/IP) Transport Profile
- NTCIP 2303: Application Profile for File Transfer Protocol (FTP)
- NTCIP 2304: Application Profile for Data Exchange ASN.1 (AP-DATEX)
- NTCIP 2306: Application Profile for XML Message Encoding and Transport (C2C XML)
- NTCIP 2501: Information Profile for DATEX

Dedicated Short Range Communication at 5.9 GHz Standards Group

Dedicated Short Range Communications (DSRC) is a general purpose RF communications link between the vehicle and the roadside, or between two vehicles. The set of standards developed to support this interface provide a short to medium range communications service for a variety of applications, including public safety (obstacle detection, collision warnings and avoidance, intersection safety), commercial vehicle applications (weigh-in-

motion/inspection clearances, border crossing), electronic toll collection, parking lot payment, in-vehicle signing, and many others.

There are two groups of standards supporting DSRC applications, each operating in a different frequency band: 915 MHz and 5.9 GHz. A set of 915 MHz DSRC standards was completed several years ago and is primarily used in commercial vehicle applications, electronic toll collection, and other applications. The set of 5.9 GHz DSRC standards, the majority of which were approved in 2006 or have been voted on and are undergoing revision for approval, are designed to support a larger variety of applications, including collision avoidance, advanced vehicle control, traveler information, increased freight/cargo transport support, transit, parking, and traffic management as well as supporting other private applications (this DSRC 5GHz Standards Group).

The DSRC 5GHz Standards Group includes standards covering the protocols for communicating between in-vehicle ITS systems and roadside equipment, or between two vehicles. The standard that describes the vocabulary (called data elements and messages) is currently available from SAE and is entitled "SAE J2735: Dedicated Short Range Communications (DSRC) Message Set Dictionary". Since it is specific to certain architecture flows, it will only be mapped to the relevant flows.

The standards within the DSRC 5GHz Standards Group offer a significantly higher information capacity than DSRC in the 915 MHz band, and have a longer range. Although envisioned primarily for public safety applications, the possible ITS uses for this spectrum vary widely including vehicle-to-vehicle communications, automated vehicle maintenance record downloads to ITS systems in transit garages, work zone or highway-rail intersection warnings to drivers, road condition warnings, electronic toll collection, and so forth. The equipment required to support 5.9 GHz DSRC is different from that required for 915 MHz DSRC, and therefore early deployment and migration decisions should be made. Many of the ITS standards in this group are already published or well under development since they are based on IEEE's wireless LAN industry standard 802.11.

- ASTM E2213-03: Standard Specification for Telecommunications and Information Exchange Between Roadside and Vehicle Systems - 5 GHz Band Dedicated Short Range Communications (DSRC) Medium Access Control (MAC) and Physical Layer (PHY) Specifications
- IEEE 802.11p: Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part II: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification
- IEEE 1609.4-2006: Standard for Wireless Access in Vehicular Environments (WAVE) - Multi-Channel Operation
- IEEE 1609.3: Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services
- IEEE 1609.2-2006: Standard for Wireless Access in Vehicular Environments (WAVE) - Security Services for Applications and Management Messages
- IEEE 1609.1-2006: Standard for Wireless Access in Vehicular Environments (WAVE) - Resource Manager
- IEEE P1609.0: Standard for Wireless Access in Vehicular Environments (WAVE) - Architecture

ATIS General Use: Advanced Traveler Information Systems (ATIS) General Use Standards Group

The Advanced Traveler Information Systems (ATIS) General Use family of standards, created by the SAE standards development organization, is for general exchange of data independent of bandwidth limitations. This standards group addresses primarily the interfaces between the Information Service Provider and travelers via the Personal Information Access Subsystem (personal), Remote Traveler Support (public), and Vehicle subsystems. Portions of this standard may also be used between the Information Service Provider and other ITS centers such as traffic management centers, transit management centers, etc., and is therefore mapped to the relevant architecture flows in the National ITS Architecture. This group provides the vocabulary (called data elements and messages) necessary to exchange information between these ITS systems. We have created this summary entry - Advanced Traveler Information Systems (ATIS) General Use Group of standards - to identify the main standards applicable to this interface.

This Group includes the following Standards Activities:

- SAE J2354: Message Set for Advanced Traveler Information System (ATIS)
- SAE J2540: Messages for Handling Strings and Look-Up Tables in ATIS Standards
- SAE J2540/1: RDS (Radio Data System) Phrase Lists
- SAE J2540/2: ITIS (International Traveler Information Systems) Phrase Lists
- SAE J2540/3: National Names Phrase List
- SAE J2266: Location Referencing Message Specification (LRMS)

ATIS Low Bandwidth: Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group

The Advanced Traveler Information Systems (ATIS) Bandwidth Limited family of standards, created by the SAE standards development organization, applies to reduced bandwidth interfaces (such as wide-area-wireless interfaces). This standards group addresses primarily the interfaces between the Information Service Provider and travelers via the Personal Information Access Subsystem (personal), Remote Traveler Support (public), and Vehicle subsystems and is therefore mapped to the relevant architecture flows in the National ITS Architecture. This group provides the vocabulary (called data elements and messages) necessary to exchange information between these ITS systems. We have created this summary entry - Advanced Traveler Information Systems (ATIS) Bandwidth Limited Group of standards - to identify the main standards applicable to this interface.

This Group includes the following Standards Activities:

- SAE J2354: Message Set for Advanced Traveler Information System (ATIS)
- SAE J2369: Standard for ATIS Message Sets Delivered Over Reduced Bandwidth Media
- SAE J2540: Messages for Handling Strings and Look-Up Tables in ATIS Standards
- SAE J2540/1: RDS (Radio Data System) Phrase Lists
- SAE J2540/2: ITIS (International Traveler Information Systems) Phrase Lists
- SAE J2540/3: National Names Phrase List
- SAE J2266: Location Referencing Message Specification (LRMS)

8.2 Reference to the Detailed Standards Information on the Web Site

The previous section provides a general discussion of the standards environment in the region. However, the architecture does contain a far more detailed standards view, one that maps applicable standards to the individual information flows that go from one element to another. This detailed information is contained in the hyperlinked web site and can be accessed in two different ways. Each element description page has a set of links that describe the information flowing to and from the element to other elements of the architecture. Selecting any of these interface links brings the user an interface page. For example, the interface between the planned Eastgate Regional Data Archive and the Archived Data User Systems is shown in **Exhibit 12**. The information flows in the diagram are defined at the bottom of the web page. Selecting the architecture flow will provide the applicable standards for the flow. An example for the archived data products flow is shown in **Exhibit 13**. Another way to access standards information on the web site is to select the Standards button on the left side of the page. The standards web page has a list of standards organized by SDO, with each of the standards title being a hot link to a detail page. **Exhibit 14** shows an example of a portion of the web page the user sees when they select the standard NTCIP 1203: Object Definitions for Dynamic Message Signs.

Exhibit 12. Example of Interface

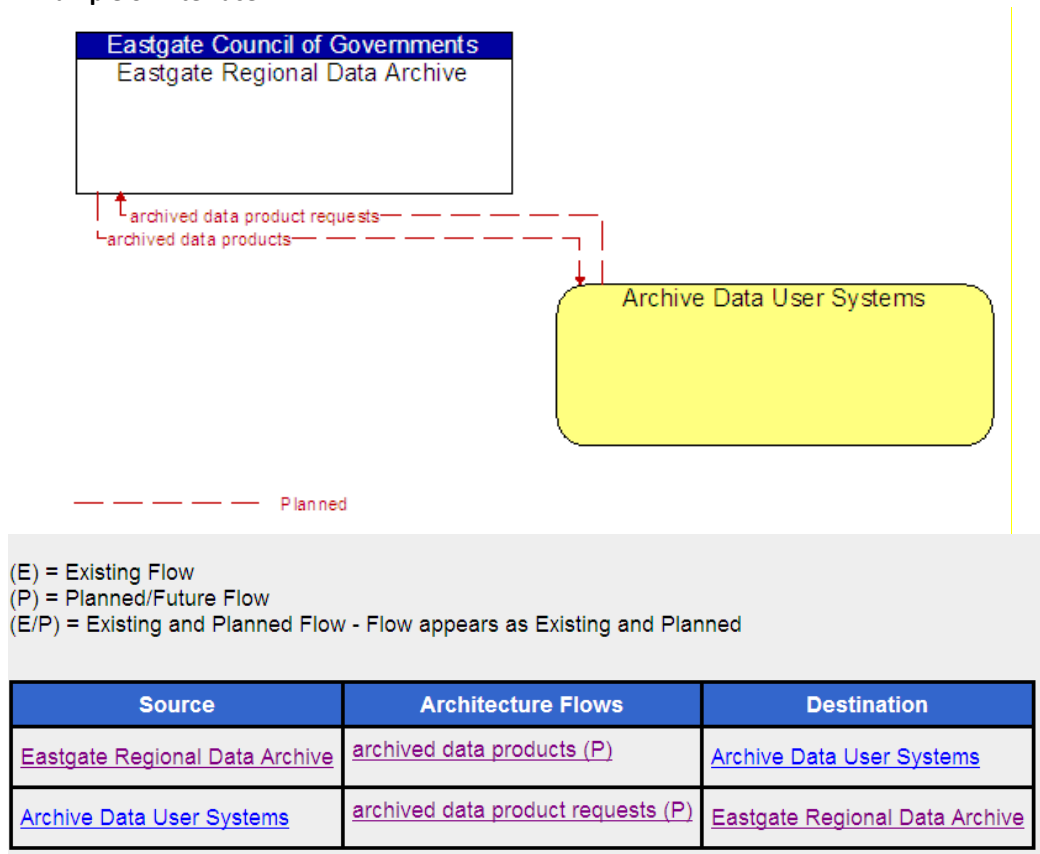


Exhibit 13. Example of Standards Mapping Page

ITS Standards Support for archived data product flow

Communications Standards:			
NTCIP C2C	AASHTO-17	File Transfer Protocol (FTP) Application Profile	NTCIP 2303
NTCIP C2C	AASHTO-20	Application Profile for DATEX-ASN (AP-DATEX)	NTCIP 2304
NTCIP C2C	AASHTO-21	Octet Encoding Rules (OER) Base Protocol	NTCIP 1102
NTCIP C2C	AASHTO-28	Ethernet Subnetwork Profile	NTCIP 2104
NTCIP C2C	AASHTO-39	Center-to-Center Naming Convention Specification	NTCIP 1104
NTCIP C2C	AASHTO-XML	Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications (C2C XML)	NTCIP 2306
NTCIP C2C	S-88	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
Message Standards:			
ADMS TM	ADMS TM	Standard Specifications for Archiving ITS-Generated Traffic Monitoring Data	ASTM WK7604
ITE-TMDD21	ITE-TMDD21	Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)	ITE TMDD

Exhibit 14. Example of Standards Mapping

NTCIP 1203: Object Definitions for Dynamic Message Signs (DMS)

Source Element	Destination Element	Flow
City of Niles Field Equipment	City of Niles Maintenance Dispatch	roadway information system status
City of Niles Maintenance Dispatch	City of Niles Field Equipment	roadway information system data
City of Warren Field Equipment	City of Warren Maintenance Dispatch	roadway information system status
City of Warren Maintenance Dispatch	City of Warren Field Equipment	roadway information system data
City of Youngstown Field Equipment	City of Youngstown Maintenance Dispatch	roadway information system status
City of Youngstown Maintenance Dispatch	City of Youngstown Field Equipment	roadway information system data
Mahoning County Field Equipment	Mahoning County Maintenance Dispatch	roadway information system status
Mahoning County Maintenance Dispatch	Mahoning County Field Equipment	roadway information system data
ODOT District 4 Field Equipment	ODOT District 4 Maintenance Garages	roadway information system status
	ODOT Regional Traffic Operations Center	roadway information system status
ODOT District 4 Maintenance Garages	ODOT District 4 Field Equipment	roadway information system data
ODOT Regional Traffic Operations Center	ODOT District 4 Field Equipment	roadway information system data

9.0 Regional Projects

The regional ITS architecture defines a number of planned elements, interfaces, and information flows. As regional plans are developed these parts of the regional ITS architecture will be implemented by a series of projects. **Exhibit 15** provides a summary of regional projects that have been identified. These represent a very small percentage of the interfaces of the Regional ITS Architecture. Over time, additional projects will be developed to address further aspects of the architecture. In general terms, the projects listed in **Exhibit 15** are not implemented independently of each other, but have a sequencing that relates to the dependencies of the projects.

The S/L column represents the following information about when the project is planned for implementation:

- S = Short Term: 0-5 years
- M = Medium Term: 5-10 years
- L = Long Term: 10+ years

Exhibit 15. Regional Projects

Project	Description	S/M/L
ODOT Service Patrols	Purchase and operate one freeway service patrol vehicle.	M
ODOT Maintenance Vehicle Upgrade	Automatic Vehicle Location for maintenance vehicles.	L
ODOT Install snow and ice detection management and advanced snow plow systems.	Road weather information systems integrated with advanced technology snow plows. These systems provide early warning of icing and snow, and meter the amount of chemical and/or sand applied based on surface conditions, including amount of chemical already applied.	L
ODOT Work Zone Safety Improvements	Improvements to work zones to reduce collisions. Ability to alert drivers of a construction zone, roadway hazard, or speed change.	M
Highway-Rail Intersection Advanced Safety Systems	Install advanced Highway-Rail Safety Systems at key crossings. A study must be conducted to identify the crossings and the preferred system.	L
ODOT Traveler Information Delivery Methods	Implement traveler information dissemination methods which may include personalized traveler information on a subscription basis delivered to cell phones, pagers, personal computing devices. Information gathered through various detection methods could also be displayed on BuckeyeTraffic.org. The key public sector cost element will be in infrastructure to enable providing enhanced content to the private sector.	M
Signal System Upgrades and Evacuation Plan Updates (Eastgate/County)	Signal upgrade and coordination along the major evacuation routes. Also involves the study and development of plan to evacuate Trumbull and Mahoning Counties in case of an emergency affecting mass area.	L
Commercial Vehicle Ops	System collecting data carried in trucks traveling on specific routes within Mahoning and Trumbull Counties.	L
Signal pre-emption	Pre-emption signal system for emergency vehicles	L
Computer Aided Dispatch to Emergency Vehicles	Integrating the computer aided dispatch to the emergency management center that will allow the operators to dispatch emergency response vehicles to the scene more rapidly.	L
Trumbull County Maintenance Vehicle Upgrade	Automatic Vehicle Location for Trumbull County maintenance vehicles.	M

Project	Description	S/M/L
The North River Road/Elm Road Safety Enhancement Project	This project will consist of constructing a skid resistant surface course, upgrading pavement markings, improving traffic lane alignments, and upgrading the existing traffic signals to optimize traffic timing and flow. Access management will also be considered within the projects limits of 150 feet in all directions.	S
Warren Sharon Road/Howland Wilson Road Intersection Project	This intersection improvement project will consist of a signal improvement and the addition of left turn lanes at the intersection of Warren Sharon Road and Howland Wilson Road in Howland Township.	S
City of Newton Falls Signal Pre-emption	Pre-emption will be provided on all approaches for four signalized intersections including W. Broad at Ridge/Windham, W. Broad at Canal, Broad at Center, and E. Broad at Milton. Seventeen emergency vehicles, including fire, EMS, and police, will be retrofitted with the proper equipment.	S
City of Newton Falls Traffic Signal Upgrade	This project will consist of the replacement and upgrade of traffic signals along SR 534 with interconnect communication.	S
WRTA Passenger Management System	System that provides fare reconciliation between peer agencies using a common travel card.	S
WRTA Surveillance Control	To include CCTV at certain locations to provide surveillance at stations and surrounding areas for security purposes	M
WRTA Kiosks at Transfer Points	WTRA to establish kiosk at key locations to provide bus route information and trip planning	M
WRTA Bus Traffic Signal Priority	Study key transit corridors for applicability of bus traffic signal priority to improve transit travel time. Implement transit signal priority on traffic signals on identified corridors.	M
Transit Vehicle Updates (NiTTS/WRTA)	Installation of Wireless Internet Feed on buses, automated signs, and annunciators.	S
NiTTS AVL System	Installation of AVL on all NiTTS vehicles.	M
NiTTS Google Transit	NiTTS will pair with Google to feed information on Google transit.	S
NiTTS Advanced Para-Transit Scheduling and Dispatch System	Implement an advanced para-transit scheduling and dispatch system at NiTTS coordinated with WRTA.	S
YSU Research Program	Establish a research program, in conjunction with ODOT, to test new implementation concepts such as crash mitigation or work zone operations systems.	M
YSU Research Program: Real-Time Stress Monitoring of Highway Bridges with a Secured Wireless Sensor Network	This collaborative research aims to develop a real-time stress monitoring system for highway bridges with a secured wireless sensor network. The program monitors the stress of highway bridges in Mahoning County with a light-weight and reliable wireless sensor network by applying state of the art technologies in wireless networks, sensor technologies, peer-peer communications, embedded systems, and power managements. The near term goal is to collect wireless sensor data under different traffic patterns from local highway bridges. The long term goal is to build a non-destructive structural health monitoring system and derive a structural health index to predict the remaining life span of a highway bridge in order to save human lives, avoid costly failure, provide timely restoration, prevent unnecessary reconstructions, and minimize disruptions of traffic.	S
Connection of Private Providers	Private providers to work with ODOT to establish links with private providers to deliver traffic information to more people in different facets.	L

Project	Description	S/M/L
Connected Vehicle	Deployment of <i>Connected Vehicle</i> infrastructure, including roadside equipment and controller modifications, to implement vehicle-to-infrastructure (V2I) communications in the 2014-2020 timeframe (as vehicles are equipped). <i>Connected Vehicle</i> is a suite of technologies and applications that use wireless communications to provide connectivity that can deliver transformational safety, mobility, and environmental improvements in surface transportation. Applications provide connectivity with and among vehicles, between vehicles and the roadway infrastructure, and among vehicles, infrastructure, and wireless devices (consumer electronics, such as cell phones and PDAs) that are carried by drivers, pedestrians, and bicyclists.	L

10.0 Agreements

10.1 Types of Agreements

There are several types of arrangements associated with the interfaces included when deploying ITS projects within the region. This section gives a brief introduction to agreements. The complete discussion of possible future agreements may be found in **Section 10.2** of this document. Data exchanges between systems require agreements on the transmission protocol and data formats to ensure compatibility. Coordinating field device operations owned by different agencies requires defined procedures for submitting message requests and rules governing when such requests can be honored. Such coordination can be done with informal arrangements such as a Memorandum of Understanding (MOU). On the other hand sharing control of field devices operated by different agencies involves more liability issues, which require more formal agreements. Coordinated incident response may also require formal agreements, but also requires group training of personnel from various agencies. While all interfaces involve agreements for data compatibility, agreements for procedure and operation, as well as training can also be critical elements to optimizing the benefits of the architecture. **Exhibit 16** identifies types of potential agreements that could be used by agencies in the region. Some agreement examples are included in **Appendix B**.

Exhibit 16. Types of 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 an 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.

Type of Agreement	Description
	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.

During the initial review of the Eastgate Regional ITS Architecture, and at the stakeholder workshops held throughout the region, stakeholders identified a list of agreements that currently exist in the region. In addition to these existing agreements, the Eastgate Regional ITS Architecture was used to determine a set of agreements that may need to be put into place in order to implement the interconnections described by the architecture. This output, along with a listing of existing agreements throughout the region, can be found as tables in the following section for the Eastgate region.

10.2 Potential Agreements

The practice and preference of agencies in the Eastgate region has been to cooperate through simplified agreements such as letters and MOUs. Through a history of good working relationships, agencies have developed trust for one another. This has allowed them to proceed with jointly sponsored projects using simplified agreements that document the level of funding for each agency.

The Regional ITS Architecture can be used to determine a set of agreements that may need to be put into place in order to implement the interconnections described by the architecture. **Exhibit 17** identifies agreements that may be needed between pairs of stakeholders to implement the projects described in **Section 9.0**. The table was created by identifying element interfaces in the planned projects where the elements are owned, operated, or maintained by different stakeholders.

Exhibit 17. Potential Institutional Agreements

Project	Potential Parties to Agreement		Reason for agreement
ODOT Install snow and ice detection management and advanced snow plow systems.	ODOT	PennDOT	Provide roadway maintenance status
	ODOT	Ohio State Highway Patrol	Provide roadway maintenance status
	ODOT	County Emergency Management	Provide roadway maintenance status
Highway-Rail Intersection Advanced Safety Systems	ODOT	Rail Operators	Exchange of safety related information
Signal System Upgrades and Evacuation Plan Updates (Eastgate/County)	ODOT/Counties/Municipalities	Other Agencies	Signal Interconnection
Commercial Vehicle Ops	Eastgate Council of Governments	Ohio Public Utilities Commission	Exchange of commercial vehicle information
WRTA Bus Traffic Signal Priority	WRTA	City of Youngstown, Mahoning County, ODOT	Coordination for signal priority
Connection of Private Providers	ODOT	Private Traveler Information Providers	Traffic Data Sharing

The potential parties listed in **Exhibit 17** can engage in any of the types of agreements listed in **Exhibit 15**. The complexity of the agreement will dictate which type of agreement will be selected. For information sharing, a handshake agreement is typically adequate. For more complex arrangements, where one agency is allowing another agency control of their equipment or systems, more official agreements are recommended. **Appendix B** provides eight (8) sample agreements, including memorandums of understanding, license agreements and master agreement that can be used as examples for potential agreements.

11.0 Using the Regional ITS Architecture

As our nation's freeways became more congested, transportation officials looked at new technologies to help ease the burden on highways and lessen the frustrations of motorists. Emerging from this search are new methods of traffic technology, collectively known as Intelligent Transportation Systems (ITS). Once a regional ITS architecture has been created, it's important that it be used as a key reference in the transportation planning process. This will ensure all proposed ITS projects are consistent with the regional ITS architecture and additional integration opportunities are considered, leading to more efficient implementations.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) formalized a Federal program to research, develop, and operationally test ITS and to promote their implementation. As a result, a National ITS Architecture was established to guide the deployment of intelligent transportation systems in the United States.

In 1999 Eastgate collaborated with ODOT and a variety of public and private stakeholders to complete the Mahoning-Trumbull County ITS Early Deployment effort. The overall goal of this project was to develop of plan for deploying ITS technologies in Eastgate's two county regional area. To reach this goal, the project team developed a planning process that would incorporate specific advanced technologies to future transportation projects, through the TIP and other funding mechanisms, to improve the quantity and quality of travel and traffic information available to visitors and residents of the Mahoning Valley.

This plan was then incorporated into Eastgate's primary planning document, the 2030 Long Range Transportation Plan. Last updated in April 2005, the Plan is a long-range, comprehensive multimodal transportation-planning document for the two county Eastgate Region. It defines the overarching goals for transportation in our region, establishes existing and future transportation needs of the region, and allocates projected revenue to transportation programs and projects that address those needs. An update for this plan is ongoing.

The Plan functions long-range in that it recommends major projects, systems, policies, and strategies designed to maintain the existing transportation system and serve the region's future travel needs. Upon completion of the Eastgate Regional ITS Architecture, the Transportation Improvement Program (TIP) should be updated to reflect the information gathered and the regional ITS needs. Projects that emerge from the planning process can benefit from the use of the regional ITS architecture in their definition and development.

The Eastgate Regional ITS Architecture defines and supports the ITS project development cycle. This cycle begins with project definition, followed by procurement, leading to implementation. Properly maintained, the information in the Regional ITS Architecture can assist in all three of these cycles of the project development process.

In summary, the Regional ITS Architecture represents a detailed plan for the evolution of the ITS systems in the region and will be used to support regional transportation planning efforts and project development efforts.

11.1 Using ITS Architecture in Project Definition

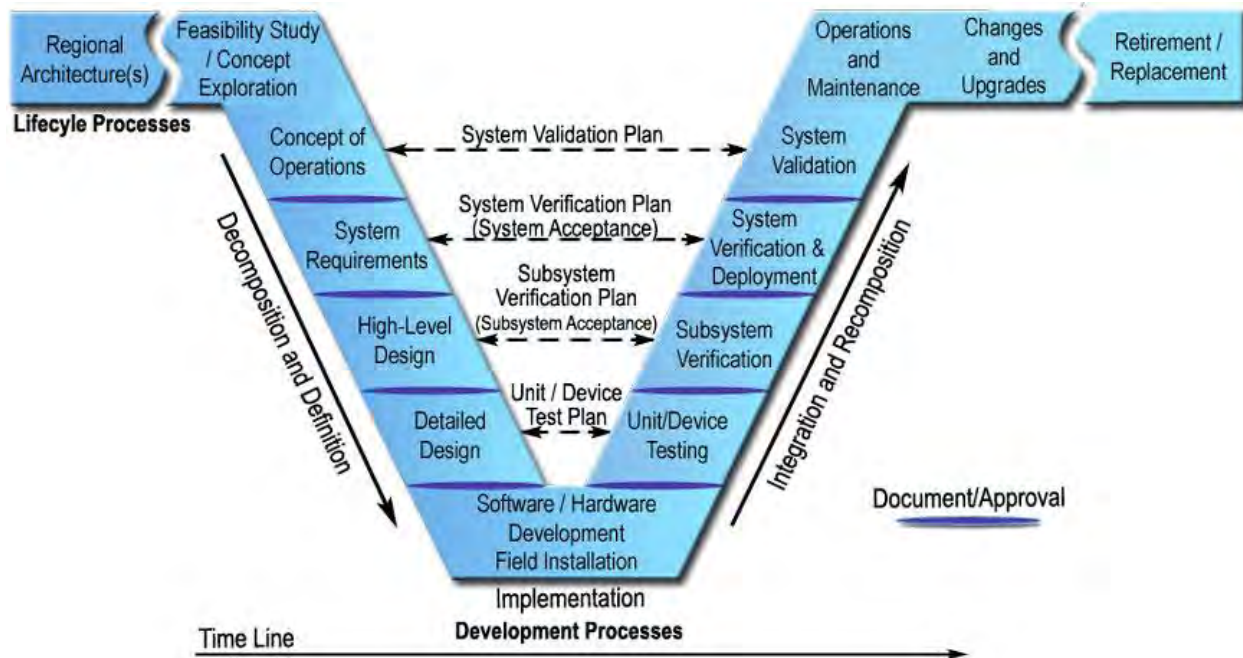
Project definition may occur at several levels of detail. Early in the planning process, a project may be defined only in terms of the transportation services it will provide, or by the major system pieces it contains. Prior to the beginning of implementation, the details of the project must be developed. The detail system definition will also include the interface with the systems or parts of systems which will make up the project, establish the interconnections the project entails, and define the information needs which are to flow across the system interconnections. The definition may go through multiple levels of detail, starting with very high-level description of project functions and moving toward system specifications. By identifying the portions of the Regional ITS Architecture that define the project, the Regional ITS Architecture outputs can be used to create key aspects of the project definition.

The areas that a Regional ITS Architecture can assist in project definition are:

- The identification of agency roles and responsibilities (including inter-agency cooperation) can come from the operational concept developed as part of the Regional ITS Architecture. This operational concept can either serve as a starting point for a more detailed definition, or possibly provide all the needed information.
- Requirements can be completely or partly defined by using the Regional ITS Architecture functional requirements applicable to the project.
- The Regional ITS Architecture includes a map to ITS standards, and project mapping to the Regional ITS Architecture can extract the applicable ITS standards for the project.

Project implementation should follow a systems engineering process. **Exhibit 18** shows the general systems engineering process for use with deploying ITS projects.

Exhibit 18. Project Implementation Process



This process can be used to systematically deploy ITS while reducing the risks associated with deployments. The systems engineering process is more than just steps in systems design and implementation, it is a life-cycle process. The process recognizes that many projects are deployed incrementally and expand over time. US DOT Rule 940 requires that a systems engineering analysis, which contains key elements of the general process, be used for ITS projects that are funded with federal funds.

Applying the systems engineering process to ITS project development is a key new requirement that must be addressed by stakeholders using federal funds. Some key references that stakeholders can access to assist in using this process that can be found in **Appendix A**.

There are similarities between the systems engineering process defined in **Exhibit 18** and the project development process generally used by transportation agencies. The project development process is maybe similar to the following:

- Project Selection
- Authorization to Proceed
- Project Definition

- Purpose and Need
- Project Scoping
- Conceptual Design
- Project Design
 - Preliminary Plan Development
 - Semi-Final Plan Development
 - Final Plan Development
- Construction
 - Testing
- Operation and Maintenance

Exhibit 19 shows the relationship between the project development process above and the FHWA systems engineering process.

Exhibit 19. Project Development Process Relation to FHWA Systems Engineering Process

Project Development Process	Relation	Systems Engineering Process
Project Definition Purpose and Need Project Scoping Conceptual Design	→	Concept of Operations
		High Level Requirements
		Detailed Requirements
Project Design Preliminary Plan Development Semi-Final Plan Development Final Plan Development	→	High Level Design
		Detailed Design
Construction Testing	→	Implementation
		Integration & Test
		Subsystem Verification
		System Verification
Operation and Maintenance	→	Operations & Maintenance

The ITS architecture can be used to support development of the concept of operations, requirements, and high level design in the systems engineering process. In deploying an ITS related project, the ITS architecture should be used as the starting point for developing a project concept of operations (not to be confused with operational concepts, which define the roles and responsibilities of the stakeholders). The concept of operations shows at a high level how the systems involved in a project operate in conjunction with the other systems of the region. According to the NHI course “Introduction to Systems Engineering for Advanced Transportation”, a concept of operations includes the following information:

- Identification of stakeholders,
- Development of a vision for the project,
- Description of where the system(s) will be used,
- Description of organizational procedures or practices appropriate to the system(s), definition of critical performance parameters associated with the systems(s),
- Description of the utilization environment (conditions under which various parts of the system(s) will be used),
- Definition of performance measures used to evaluate the effectiveness of the system(s),
- Considerations of life cycle expectations, and
- Conditions under which the system(s) must operate (e.g. environmental conditions).

The customized market package diagrams tailored by Eastgate’s stakeholders can also assist in definition of requirements for ITS systems involved in a specific project. The ITS architecture contains high level functional

requirements for all ITS elements in the Eastgate region. These high level requirements can be the starting point for developing more detailed requirements.

The ITS architecture can also support high level system design. The ITS architecture can be used by system designers to identify the ITS standards that are applicable for the interfaces included in the architecture.

While the above discussion relates the architecture to the general systems engineering process, Rule 940 does have a specific set of systems engineering analysis requirements that apply to all ITS projects that use funds from the Highway Trust Fund. The required systems engineering analysis steps are:

- Identification of portions of the regional ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the National ITS Architecture);
- Identification of participating agencies’ roles and responsibilities;
- Requirements definitions;
- Analysis of alternative system configurations and technology options to meet requirements;
- Procurement options;
- Identification of applicable ITS standards and testing procedures; and
- Procedures and resources necessary for operations and management of the system.

The Eastgate Regional ITS Architecture provides inputs to a number of these steps as shown in **Exhibit 20**.

Exhibit 20. Systems Engineering Requirements Supported by ITS Architecture

Systems Engineering Requirements	ITS Architecture Output
Identification of portions of the regional ITS architecture being implemented	Mapping project to the elements and interfaces of the regional ITS architecture
Identification of participating agencies’ roles and responsibilities (this relates to the Concept of Operations described earlier.	Use operational concepts as a starting point
Requirements definitions	Use functional requirements as a starting point.
Identification of applicable ITS standards and testing procedures	Use regional architecture standards outputs as a starting point for the standards definition.

Finding ITS Architecture Outputs to support ITS Systems Engineering Analysis

This discussion will identify where to find architecture information to support the required systems engineering analysis. The discussion below considers two cases:

1. The project is in the list of projects in the architecture update (Section 9 of this document)
2. The project is not currently on the list of projects.

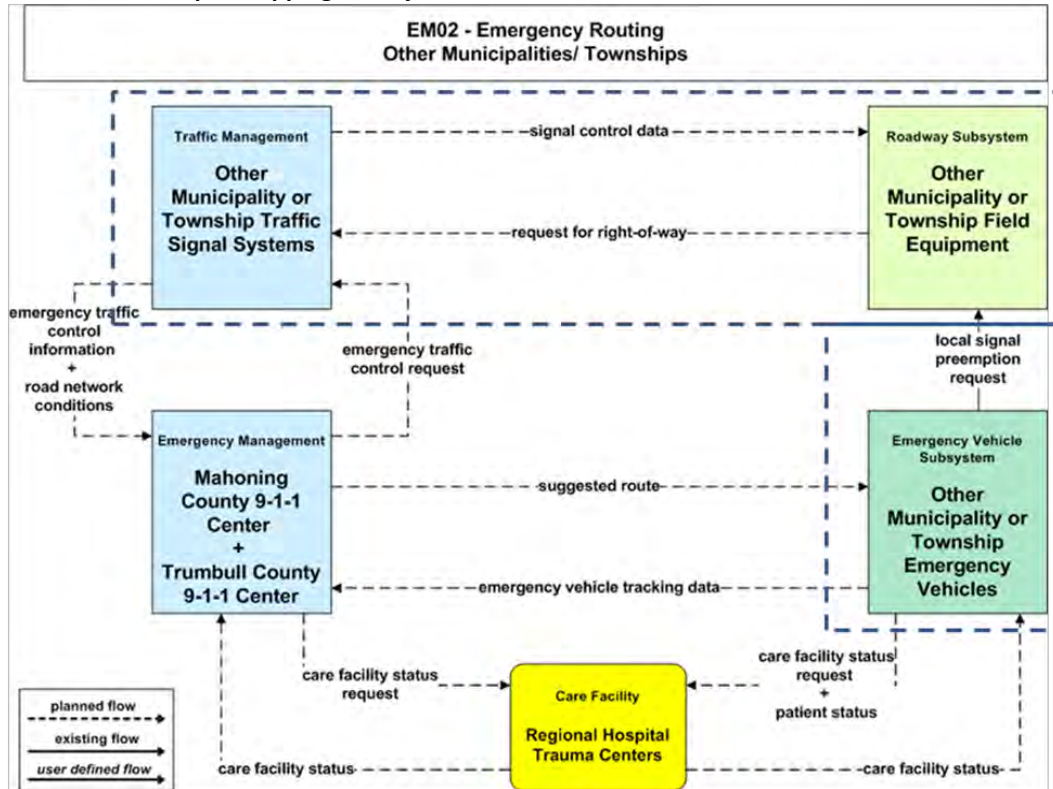
Project in the current list of Projects:

In this case all key architecture information relevant to the project is contained on the Project web pages. The information is arranged alphabetically by Project or by key stakeholder. Each project detail page has the following information pulled from the architecture:

- Stakeholders
- Elements
- Operational Concept Roles and Responsibilities
- Customized Market Packages
- Interfaces
- Functional areas (Equipment Packages) and functional requirements
- Relevant Standards

In order to identify the portion of the architecture being implemented, click on the Customized market package(s), copy the .gif file shown and using a drawing tool such as PowerPoint or Visio mark up the diagrams to describe the portion of the diagram that relates to the project. As an example, the project City of Newton Falls Signal Preemption will likely consider the portions of the customized market package diagram shown in the dotted boxed of Exhibit 21.

Exhibit 21. Example Mapping of Project to Architecture



Project NOT in the current list of Projects:

In this case the best approach is usually to start with the ITS service(s) provided by the project. Look on the website’s Services (or Services by Stakeholder) tab to identify the service(s) that most directly cover the project. If you are uncertain of what the different services cover, you can review their description on the Services-Descriptions tab. Once the service has been identified, review the customized market packages related to that service to see if any are a close match to the project. Select those that are and proceed as in the previous example. Using the services diagrams, identify the key elements that are involved in the project. Then go to the Inventory (or Inventory by Stakeholder) tab and review the element details pages, which will provide interfaces (which will map to standards) and functional areas/functional requirements. Finally, review the Operational Concept tab to identify any Roles and Responsibilities relevant to the project.

11.2 Using ITS Architecture for Procurement

Once a project is defined and funding for it is committed, the implementation process can commence with the generation of a Request for Proposal (RFP), which is the common governmental practice for initiating a contract with the private sector to implement a project. Once a contract is in place, project implementation begins and moves through design, development, integration, and testing.

The Regional ITS Architecture and the products produced during its development can support this RFP generation. First, the project definition described above forms the basis for what is being procured. Mapping the project to

the Regional ITS Architecture allows bidders to have a clear understanding of the scope of the project and of the interfaces that need to be developed. The functional requirements created as part of the Regional ITS Architecture can be used to describe the functional requirements for the project. In addition, a subset of the ITS Standards identified as part of the Regional ITS Architecture development can be specified in the RFP. Because ITS projects involve systems and their interconnections, it is very important to follow a systems engineering approach to designing and implementing the project. While the exact process followed is at the discretion of the local agency, the ITS projects funded through the highway trust fund must follow their specific procedures.

11.3 Issues/Challenges

One of the challenges of using the ITS architecture to facilitate the systems engineering process in the implementation of a project is educating stakeholders about the benefits of the process and the process itself. The systems engineering process is not a new process to many organizations. It may not be called the systems engineering process, but various stakeholders' processes may map to the systems engineering process very well. Making these types of linkages between processes makes it easier to incorporate the ITS architecture as a tool in the process.

Another challenge is engaging a broader stakeholder base on a project when the ITS architecture indicates that possibility. For example, a project might map to a specific customized market package that contains ten elements owned by eight stakeholders. Yet the initial project definition is for three elements owned by two stakeholders. Might the project, to provide the service shown in the architecture, include more elements owned by additional stakeholders? The entire activity of seeking integration opportunities is more institutional than technical. There will be instances where getting more stakeholders involved in a project will increase its complexity or cross jurisdictional boundaries that may not have been considered in the initial scope. It is important to explore these integration opportunities so that, at the very least, they are accounted for and supported in the project design even though they may not be implemented with that specific project. The ultimate goal is to make ITS deployment as economical as possible. One way this can be accomplished is by deploying projects across institutional boundaries where different stakeholders get benefit from the ITS deployment.

12.0 Maintaining the Regional ITS Architecture

The Eastgate Regional ITS Architecture is not a static set of outputs. It must change as plans change, ITS projects are implemented, and as ITS needs and services evolve in the region. This section describes the maintenance plan for maintaining the Eastgate Regional ITS Architecture. The plan covers the following four key areas:

- Who will be involved in the maintenance of the architecture
- When will the architecture be updated
- What will be maintained
- How it will be maintained (i.e. what configuration control process will be used)

The Regional ITS Architecture is created as a consensus view of what ITS systems the stakeholders in the state have currently implemented and what systems they plan to implement in the future. The Regional ITS Architecture will need to be updated to reflect changes resulting from project implementation or resulting from the planning process itself. Types of changes may include:

- **Changes for Project Definition.** When actually defined, a project may add, subtract, or modify elements, interfaces, or information flows from the Regional ITS Architecture. Because the Regional ITS Architecture is meant to describe the current (as well as future) implementation of ITS, it must be updated to correctly reflect how the developed projects integrate into the state or specific regions.
- **Changes for Project Addition/Deletion.** Occasionally a project will be added or deleted through the planning process and some aspects of the Regional ITS Architecture that are associated with the project may be expanded, changed, or removed.
- **Changes in Project Priority.** Due to funding constraints, or other considerations, the planned project sequencing may change. Delaying a project may have a ripple effect on other projects that depend on it. Raising the priority for a project's implementation may also impact the priority of other projects that are dependent upon it.
- **Changes in Regional Needs.** Transportation planning is done to address regional needs. Over time these needs can change and the corresponding aspects of the Regional ITS Architecture that addresses these needs may need to be updated.

In addition, when new stakeholders come to the table, the Regional ITS Architecture will need to be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows.

Finally, the National ITS Architecture may be expanded and updated from time to time to include new user services or better define how existing elements satisfy the user services. These changes should also be considered as the Regional ITS Architecture is updated. The National ITS Architecture may have expanded to include a user service that has been discussed in a region, but not included in the Regional ITS Architecture, or included in only a very cursory manner.

12.1 Issues/Challenges

Responsibility for maintenance of the Eastgate ITS Architecture lies with the Eastgate Regional Council of Governments, since they are the primary planning organization for the region, and are one of the primary users of the architecture. A group of core stakeholders shall act as an "institutional framework" to review proposed changes to the architecture, and may also oversee the update of the Eastgate ITS Strategic Plan. This group of core stakeholders is important because the Regional ITS Architecture is a consensus framework for integrating ITS systems. As it was a consensus driven product in its initial creation, so it should remain a consensus driven product as it is maintained. This section defines the stakeholders and their roles and responsibilities for the maintenance of the Eastgate Regional ITS Architecture.

12.2 Definitions

The following groups or persons have a role in the maintenance of the architecture:

- **Stakeholders** – Any government agency or private organization that has a role in providing transportation services in the region.
- **Responsible Agency** – The stakeholder agency with primary responsibility for maintenance of the architecture.
- **Maintenance Manager** – The person responsible for overseeing and guiding the maintenance efforts.

12.3 Stakeholders

Stakeholders are any government agency or private organization that is involved with or has an interest in providing transportation services in the state. Each stakeholder owns, operates, and/or maintains one or more ITS element in the state and therefore the architecture.

The success of the change management process outlined in this Maintenance Plan is highly dependent on the participation of the stakeholders identified in the architecture. Without stakeholders participation in tracking the development of their ITS systems and properly updating the architecture, the change management process will not succeed and the usefulness of the architecture will diminish over time.

The primary responsibility of the stakeholder agencies is to submit changes to the Eastgate Regional ITS Architecture brought on by new plans or projects that are being planned or deployed for the stakeholder agency. The stakeholder agency must submit the changes in the Regional ITS Architecture to the Maintenance Manager.

12.4 Responsible Agency

The Responsible Agency is the government agency that formally maintains the architecture. The Responsible Agency assigns resources for making the physical changes to the architecture baseline and for coordinating the maintenance of the architecture. The Responsible Agency for the Eastgate Regional ITS Architecture is Eastgate, since they are the metropolitan planning organization for the two County region and will be primary users of the architecture.

12.5 Maintenance Manager

The Responsible Agency will appoint a person to the role of Maintenance Manager to coordinate the maintenance activities of the Eastgate Regional ITS Architecture. The Maintenance Manager is the coordinator and main point of contact for all maintenance activities, including receiving Change Requests forms, tracking Change Requests, and distributing documentation.

The Maintenance Manager has the following responsibilities:

- Collecting and compiling proposed changes and updates to the architecture from stakeholder agencies.
- Evaluating each proposed change from a technical standpoint, and reaching a consensus on the proposed change (this may require contacting additional stakeholders if one or more of their systems are affected).
- Approving changes to the architecture.
- Distribute the baseline documents and outputs of the architectures to stakeholders
- Maintain the “official” records of the Eastgate Regional ITS Architecture, including the baseline documents, meeting minutes, the Change Request Database, and the list of Points of Contacts for the Stakeholder
- Ensures the status of each Change Request are properly updated in the Change Request Database

- Maintains a complete contact list of all stakeholders within the region as well as maintains a list of all stakeholders outside the region along with the maintenance schedule for their perspective ITS Architectures
- Making any institutional or policy related decisions that arise in the maintenance of the architecture.

Some of these responsibilities may be delegated to staff or consultants.

12.6 Timetable for Maintenance

How often will the Regional ITS Architecture be modified or updated? What events or timetable will be used for making updates or changes to the architecture? There are two basic approaches that Eastgate will utilize for maintaining the architecture:

- **Periodic Maintenance** – Update the architecture based upon one of the recurring activities of the transportation planning process. For example, it's natural that the ITS architecture would be updated at the same frequency as the Transportation Improvement Program is updated (at least every two years). The update of the architecture will occur several months prior to the transportation planning document update, so that the revised architecture could serve as an input to the planning update. Publication and versioning costs are minimized for the periodic maintenance approach since there is a new version only once in the maintenance cycle.
- **Exception Maintenance** – This approach will be followed if there is an urgent need to make a change or if a minor change is desired to address a stakeholders need. In this case the change can be initiated as needed. Publication and versioning costs are dependent on the frequency of changes made to the Regional ITS Architecture.

12.7 Major Updates

A comprehensive architecture update will occur every four years, concurrent with every other formal update of the Long Range Transportation Plan. This is a natural result of the Eastgate Regional ITS Architecture being a component of the regional transportation planning process. The update is necessary to ensure the architecture continues to accurately represent the regional view of ITS Systems. The comprehensive update may include adding new stakeholders, reviewing transportation needs and services for the region, updating the status of projects, and reflecting new goals and strategies as appropriate. Operational concepts, system functional requirements, project sequencing, ITS standards, and the list of agency agreements may also be updated at this time.

12.8 Event-Driven Updates

Between major updates of the architecture, the architecture will be updated on an “as needed” basis. A stakeholder may submit a Change Request Form to the Maintenance Manager and request review and approval of the request prior to the next scheduled update of the Regional ITS Architecture. This may be necessary if a stakeholder suddenly requires federal funding for a previously unplanned ITS project, and needs the ITS project to be included in the Regional ITS Architecture.

The Maintenance Plan will also be reviewed during the annual updates for required changes to the Maintenance Plan. Use of the Regional ITS Architecture and modifications to it may differ from what was anticipated during the initial development of the Maintenance Plan. Revising the Maintenance Plan will ensure that the change management process defined is effective.

12.9 Architecture Baseline

Establishing an architecture baseline requires clear identification of the architecture products to be maintained, including specific format and version information. For the Eastgate Regional ITS Architecture the following are identified as the architecture baseline:

- Eastgate ITS Architecture Document (this document)
- ITS Strategic Plan for the State of Ohio (document)
- Set of Customized Market Packages (visio file)
- Turbo Architecture Database
- Eastgate ITS Architecture Web pages
- Change Request Database
- Stakeholder List

Regarding the Architecture, ITS Strategic Plan, and Standards Plan documents; the original source document, in Microsoft Word format, will be held by the maintenance manager while a PDF version of the documents will be available for general distribution. In addition, a version number and date will be included inside the cover page.

Regarding the set of customized market packages, the Visio file will be maintained by the maintenance manager.

Regarding the Turbo Architecture Database, the maintenance manager will maintain a zipped version of the final delivered Eastgate Regional ITS Architecture database. The name, date, and size of the database file inside the zipped file will be entered into an architecture log as version 1.0 of the architecture.

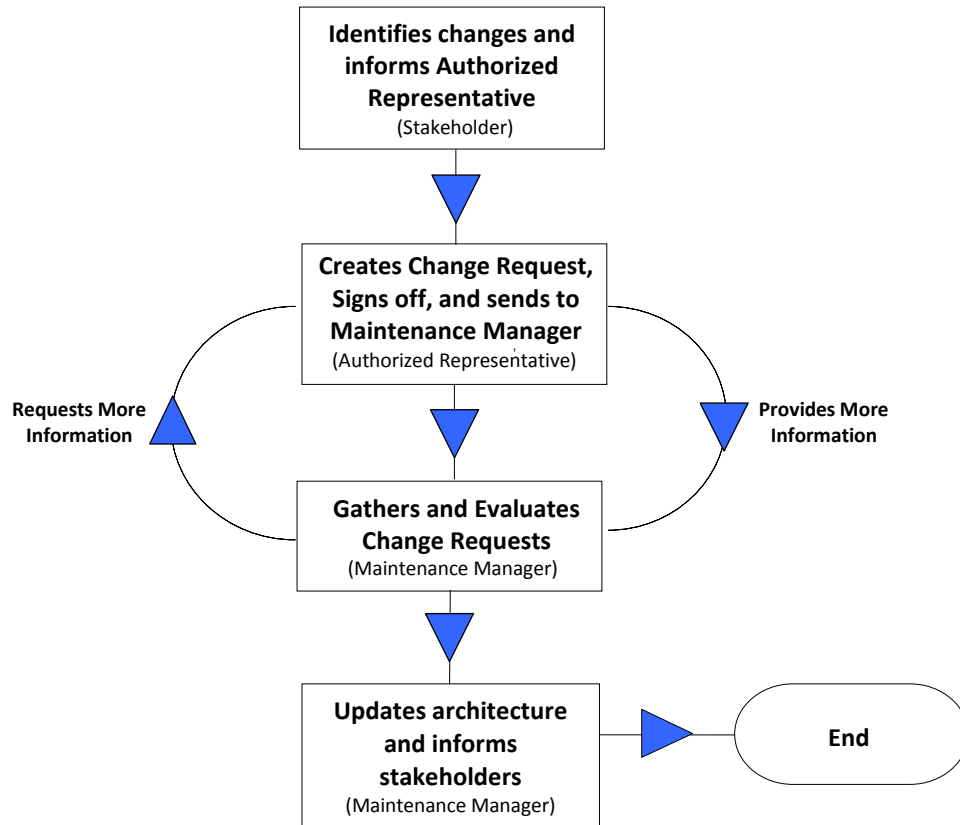
Regarding the web site, a CD-ROM version of the final web site will be maintained by the maintenance manager. The version number of the architecture will be clearly visible somewhere on the home page of the web site the version being viewed is immediately identifiable.

12.10 Change Management Process

This change management process specifies how changes are identified, how often changes will be made, and how the changes will be reviewed, implemented, and released. The basic process for change management is shown in **Exhibit 22**. The change management process involves five steps:

- **Identify Change.** Review what changes are needed, then complete and submit a Change Request Form.
- **Evaluate Change.** Evaluate the change for completeness and consensus.
- **Review Change.**
- **Update Baseline.** Apply the approved changes to the Regional ITS Architecture documents.
- **Notify Stakeholders.** Inform the stakeholders of the updated changes to the Regional ITS Architecture documents, and distribute the documents as necessary.

Exhibit 22. Change Management Process



12.11 Identify Change

This involves two issues:

- Who can identify a change to the architecture?
- How will the change request be documented?

The question of who can make change requests is an important one. The region will run the risk of being overrun by requests. This will tax scarce resources to review and deliberate the change requests. On the other end of the spectrum, if too much formality or paperwork is added to the process, then many valid or needed changes may go unexpressed.

Any Stakeholder identified in the Regional ITS Architecture is allowed to submit Change Requests. This effectively indicates that all changes have the approval of an existing, defined Stakeholder in the ITS Architecture. If the Change Request is to add a new Stakeholder and their ITS Elements and Interfaces, the Responsible Agency for the architecture must submit the Change Request.

A Change Request Form will be used to submit changes for review. The Change Request Form for the Eastgate Regional ITS Architecture can be found in **Appendix C**. The Change Request Form includes the following information:

- Name of change
- Description of change
- Part of baseline affected (could be check boxes for document, database, web site, and not known)
- Rationale for change

- Originator name or agency
- Date of origination

This information entered on the Change Request Form will be added to a change database, maintained by the Responsible Agency. The change database will include following additional fields of information:

- Change number (some unique identifier)
- Change disposition (accepted, rejected, deferred)
- Change type (minor or significant)
- Disposition comment
- Disposition date

12.12 Evaluate Change

Upon receiving a Change Request by the Maintenance Manager, an initial evaluation of the Change Request will be made for the impact to the overall architecture or the affected document. The purpose of the evaluation is two-fold:

- Verify that the Change Request form and supporting materials is complete and correct
- Compare with other Change Request forms and determine if there are any conflicts

If the proposal for architecture modification has an impact on other stakeholders, the evaluator(s) will contact the Stakeholders to confirm their agreement with the modification. All Stakeholders directly affected by the proposed change(s) must approve and sign-off on the Change Request before the Maintenance Manager considers the Change Request.

There are several options as to who performs the initial assessment, including:

- The Maintenance Manager
- The person submitting the change
- A consultant, hired to support the maintenance activities of the architecture

Each of the above options has positive and negative implications, but the evaluator must have working knowledge of the architecture to evaluate the proposed changes. The Maintenance Manager will assign the evaluation option to use for each change request evaluation received.

12.13 Reviewing the Change Request

Upon completing the initial assessment, the Change Request form will be thoroughly reviewed by the Maintenance Manager. The Maintenance Manager will review the proposed changes and provide comments. If no comments are offered, the Change Request will be considered approved and the Maintenance Manager will sign off on it.

If additional comments are made that require action, those comments will be noted on the Change Request form. Required changes can be made by the submitter of the Change Request form, or by resources designated by the Maintenance Manager. After the Change Request is resubmitted, it will again be reviewed by the Maintenance Manager; if the changes are sufficient the change is then considered approved. Approved Change Request Forms and all supporting material will then be distributed to all Stakeholders.

If a Change Request is to be withdrawn from consideration, the Maintenance Manager will be required to sign-off on the Change Request Form to close out the Change Request.

In addition to the Change Requests received on a rolling basis throughout year, the Maintenance Manager will also send an annual reminder to all Stakeholders to update their ITS Elements and Interfaces in the architecture, if necessary. Once all updates have been received and reviewed, the Maintenance Manager will decide if all the approved changes to the architecture for the previous year necessitate an immediate update to the baseline, or

whether the update should await either additional changes or the next major revision. The decision should be based on the number of Change Requests approved and the nature of the approved changes.

After the annual review, the Maintenance Manager will compile a summary of all approved Change Requests which will then be distributed to all Stakeholders and posted on the website. This provides a recording process for the change management process and provides traceability.

12.14 Update Baseline

Upon approvals of the Change Request Forms, the decision by the Maintenance Manager is implemented. If the decision is to accept the change and update the baseline then the appropriate portions of the architecture baseline are updated and an updated architecture baseline is defined. In addition to updating the baseline documents, databases, or other outputs, the configuration status will be updated. In the discipline of Configuration Management this is known as Configuration Status Accounting. This accounting is performed by having a document that defines the following information for each separate output of the architecture baseline:

- Output name
- Output revision number
- Date of latest revision
- File Name
- Location/Point of Contact

Periodically, the information in the various outputs of the architecture baseline will be audited to assure the different representations of the architecture information (e.g. the database and document) are in sync. The configuration auditing will be performed by someone independent of the staff or resources used to actually enter the changes.

12.15 Notify Stakeholders

Point of Contacts for each stakeholder will be notified by e-mail from the Maintenance Manager when baseline documents have been updated. All baseline documents will also be available to stakeholders from a website or other electronic location, such as an FTP site. It is the responsibility of the Maintenance Manager to ensure the most recent document is available from the website. The Configuration Status Document will be one of the available outputs.

Request for copies or access to the baseline documents will be made to the Maintenance Manager.

After major revisions to the architecture or the baseline documents, the Maintenance Manager may elect to also provide all baseline documents to members on CD-ROMs.

13.0 Strategic Plan Framework

In addition to developing the Regional ITS architecture, a framework for an ITS Strategic Plan was established. Although many of these projects have identified funding sources, the list is not fiscally constrained. The list of projects in **Exhibit 22** represents a compilation of the types of projects the Eastgate region feels will help meet their ITS needs and goals. **Appendix D** contains additional project information and a table cross-referencing the high-priority needs identified with the proposed projects. Areas where there are high-priority needs without identified projects should be a focus for future ITS planning efforts.

13.1 Project Development Methodology

The following process was used to compile a list of ITS projects for the region. At the first stakeholder meeting, stakeholders were asked to fill out a survey of what ITS needs were a priority for their organization. Also, the 2004 *Eastgate Regional ITS Architecture* was reviewed at the first stakeholder meeting. Stakeholders identified which projects are already operational, which are no longer planned, and which are still planned. For projects that are still planned, cost and schedule data was revised. The regional ITS needs were compared to the list of projects to ensure the needs were addressed. New projects were also added to fulfill identified ITS needs. Updated projects and cost data were then reviewed by the stakeholders in the second stakeholder meeting. Cost data still needed after the second meeting was researched to determine a ball-park number for estimating purposes.

13.2 Data Sources

Collecting all the data to form a cohesive implementation plan required a great deal of research due to the varying nature of costs associated with ITS projects. In this case, costs associated with projects were taken from stakeholder suggestions during the preliminary meetings. In occurrences where a cost estimate could not be reached, Eastgate's previous Regional ITS Plan and the Department of Transportation's Research and Innovative Technology Administration's Intelligent Transportation Systems Costs Database were used to assume costs (<http://www.itscosts.its.dot.gov>). Operations and Maintenance Costs were also taken largely from the adjusted data within this database. Other cost data was gathered based on project experiences throughout the HNTB firm.

13.3 Cost Data

The ITS cost projections listed in **Exhibit 23** are not fiscally constrained. The initial costs for the proposed traffic management centers, hardware, software, field equipment, and communications for the primary system elements, including design, construction, engineering, and inspection, are estimated and shown in **Exhibit 23**. In practice, a majority of the operations costs will be incorporated as part of an organization's regular maintenance activities. In many cases, ITS allows agencies to not only extend the life of a system by delaying major reconstruction, but also improve customer service (i.e. www.buckeyetraffic.com).

More detailed cost figures are shown in **Exhibit 23**. A full summary of the ITS Projects for the area is included in **Appendix D**.

Exhibit 23. Cost Estimate

Agency	Project	Cost	Operation & Maintenance Cost (per year)	0-5 years	6+ years	Cost Source
ODOT	Service Patrols	\$257,500	\$87,500	\$257,500		ODOT
ODOT	Maintenance Vehicle Upgrade	\$1,250-\$5,800/vehicle; Central system hardware and software may range in cost from \$1.8 million to more than \$8 million depending on the size of the fleet and the functionality required.	Communications - \$40 to \$60 per month; System administration, \$1,300/month for entire system. License fees would also apply.		\$1,250-\$5,800/vehicle; Central system hardware and software may range in cost from \$1.8 million to more than \$8 million depending on the size of the fleet and the functionality required.	NCHRP, September, 2006
ODOT	Install snow and ice detection management and advanced snow plow systems.	\$500,000	\$30,000		\$500,000	http://www.itscosts.its.dot.gov
ODOT	Work Zone Safety Improvements	\$100,000/Zone	\$5000/Zone	\$100,000/Zone		http://www.itscosts.its.dot.gov
ODOT	Highway-Rail Intersection Advanced Safety Systems	\$500,000	\$50,000	\$1,000,000		HNTB Project Experience
ODOT	Traveler Information Delivery Methods	\$750,000	\$250,000		\$1,500,000	HNTB Project Experience
Eastgate/County	Signal System Upgrades and Evacuation Plan Updates	Varies				HNTB Project Experience
County	Commercial Vehicle Ops	\$300,000	\$3,000	\$300,000		
County	Commercial Vehicle Ops	\$150,000	\$25,000		\$150,000	http://www.itscosts.its.dot.gov
Municipalities	Signal pre-emption	\$6,000/ intersection \$2,000/vehicle	\$500		\$6,000/intersection \$2,000/vehicle	FHWA ITS Joint Program Office, January 2006
Municipalities	Computer Aided Dispatch to Emergency Vehicles	\$150,000	\$2,500		\$150,000	HNTB Project Experience
Trumbull County	Maintenance Vehicle Upgrade	\$1,250-\$5,800/vehicle; Central system hardware and software may range in cost from \$1.8 million to more than \$8 million depending on the size of the fleet and the functionality required.	Communications - \$40 to \$60 per month; System administration, \$1,300/month for entire system. License fees would also apply.		\$1,250-\$5,800/vehicle; Central system hardware and software may range in cost from \$1.8 million to more than \$8 million depending on the size of the fleet and the functionality required.	NCHRP, September, 2006
Trumbull County	The North River Road/Elm Road Safety Enhancement Project	\$300,000	\$1,000	\$300,000		Trumbull County
Trumbull County	Warren Sharon Road/Howland Wilson Road Intersection Project	\$925,000	\$2,000	\$925,000		Trumbull County
City of Newton Falls	Signal Pre-emption	\$6,000/intersection \$3,000/vehicle \$1,000 for software	\$500		\$6,000/intersection \$3,000/vehicle	FHWA ITS Joint Program Office, January 2006
City of Newton Falls	Traffic Signal Upgrade	\$650,000	\$20,000	\$650,000		City of Newton Falls
WRTA	WRTA Passenger Management System	\$635,700	\$60,000	\$635,700		http://www.itscosts.its.dot.gov
WRTA	WRTA Surveillance Control	\$30,000 per location	\$3,600 per location		\$30,000 per location	HNTB Project Experience
WRTA	Kiosks at Transfer Points	\$80,000	\$8,000		\$80,000	http://www.itscosts.its.dot.gov
WRTA	Bus Traffic Signal Priority	\$500,000	\$1,000/Signal		\$500,000	HNTB Project Experience
WRTA/NITTS	Transit Vehicle Updates	\$2,500/Vehicle	\$250/Vehicle	\$2,500/Vehicle		http://www.itscosts.its.dot.gov
NITTS	AVL System	\$1,000/Bus	2% of Capital Costs		\$1,000/Bus	http://www.itscosts.its.dot.gov

Agency	Project	Cost	Operation & Maintenance Cost (per year)	0-5 years	6+ years	Cost Source
NiTTs	Google Transit	No Cost	No Cost	No Cost		
NiTTs	Advanced Para-Transit Scheduling and Dispatch System	\$750,000	\$35,000	\$750,000		HNTB Project Experiences
YSU	Research Program	\$250,000		\$250,000		ODOT
YSU	Research Program: Real-Time Stress Monitoring of Highway Bridges with a Secured Wireless Sensor Network	\$100,000				YSU
Private providers	Connection of Private Providers	\$500,000	\$50,000		\$500,000	http://www.itscosts.its.dot.gov
	Connected Vehicle	Varies	Varies			

* The costs shown in this estimate represent an estimate of probable costs prepared in good faith and with reasonable care. HNTB has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from this estimate.

**Cost s to complete the projects indicated have not yet to been determined.

13.4 Project Highlights

A full list of summarized ITS projects is included in **Appendix D**. The two projects highlighted below were created to satisfy high priority needs that came out of a needs assessment exercise completed by the stakeholders at the first workshop.

Traveler Information Delivery Methods

One need that was expressed by many stakeholders was to distribute real-time roadway and traffic conditions. One project, planned for the future implement traveler information dissemination methods which may include personalized traveler information on a subscription basis delivered to cell phones, pagers, personal computing devices. With increased technology and internet access, social network (e.i., facebook, Twitter) may also be used. Information gathered through various detection methods could also be displayed on www.buckeyetraffic.com. The key public sector cost element will be in infrastructure to enable providing enhanced content to the private sector.

Evacuation Route Identification

Another priority expressed within the region was the need for an evacuation route plan. Wide-scale, mass evacuations are rare, but important to have in place ahead of time so that if necessary, the structure would reduce chaos and evacuation could occur more effectively. For this reason, a project has been added to the projects list to study and develop a plan to evacuate Trumbull and Mahoning Counties in case of an emergency affecting the region. Eastgate, in collaboration with ODOT, Trumbull County, Mahoning County, and partner agencies, will develop a network of routes to be used in the event of an evacuation. The plan is recommended as a short term project. As more of a long term project, signal upgrades and coordination should be implemented along the designated as evacuation routes.

Appendix A
Workshop Materials

HNTB Corporation
The HNTB Companies
Engineers Architects Planners

1100 Superior Avenue
Suite 1330
Cleveland, OH 44114

Telephone (216) 522-1140
Facsimile (216) 522-0554
www.hntb.com

Project Name:
Eastgate Regional ITS Architecture
Update and Strategic Plan

Date of Meeting:
December 9, 2010

Location:
Eastgate Office, Conference Room

Purpose of Meeting:
Project Review by Stakeholders

Time:
10:00 AM



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AGENDA

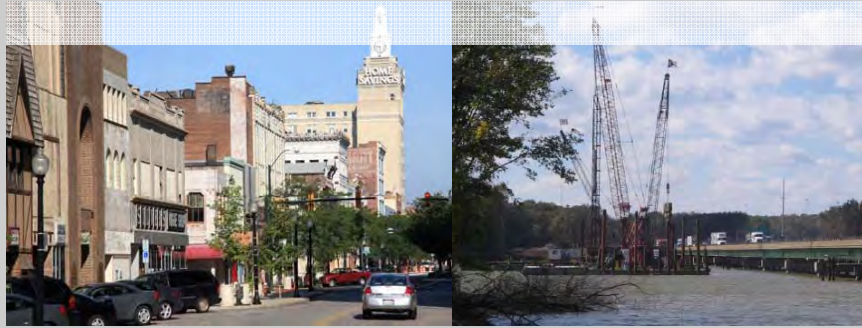
- 10:00 AM Welcome, Introductions & Project Overview
- 10:15 AM Regional ITS Architecture Overview
- 10:45 AM Review and Update Eastgate Regional ITS Elements
- 11:30 AM Eastgate Regional Council of Governments Transportation Needs
- 11:45 AM Lunch (will be provided)
- 12:15 PM Market Package Overview/Prioritization
- 1:00 PM Review and Update Customized Market Packages
 - o Travel and Traffic Management
 - o Transit Management
 - o Maintenance and Construction Operations
 - o Traveler Information
 - o Archived Data Management
 - o Emergency Management
 - o Commercial Vehicle Operations (Regional Issues)
- 2:00 PM Review of Projects for Strategic Plan Framework

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ConSysTec
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POB 517, 17 Miller Avenue
Shenrock, NY 10587
W: 914-248-8466
rsj@consystec.com



ITS Architecture Update Stakeholder Meeting

Eastgate Meeting Room

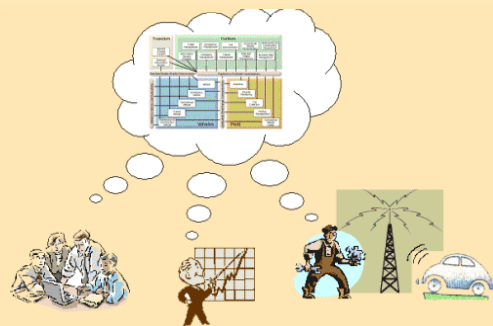
December, 2010



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ITS Architecture Overview



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What is ITS?



- **Intelligent Transportation System**

Could be:

- Integrated Transportation System
- One Definition:
 - “The application of *data processing* and *data communications* to surface transportation, to increase *safety* and *efficiency*.”

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What is an ITS Architecture?

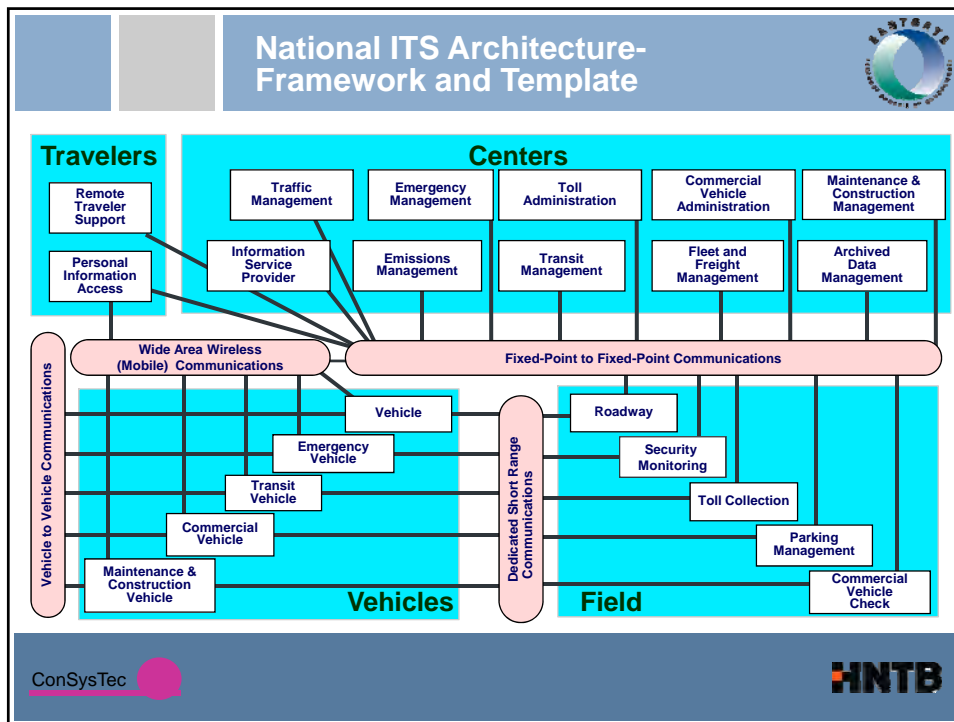


- **Is:**
 - Identifies the ITS stakeholders in a region and their elements
 - Identifies the information or control to be exchanged between stakeholder elements
 - Making policy decisions by including or not including specific information flows between stakeholder elements
 - Selects standards for information exchange
- **Isn't:**
 - Doesn't select specific technologies or design
 - How projects are selected or funded

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What is Regional ITS Architecture?

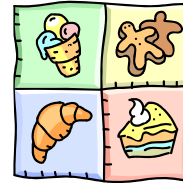
- A plan for deployment of ITS in the Region
- Focus on integration of ITS in the Region

Logos for ConSysTec and HNTB are visible at the bottom of the slide.

How National ITS Architecture relates to Regional ITS Architecture



- National ITS Architecture (*the cookie cutter*)
 - a Framework or Template
 - a menu of possibilities
- Regional ITS Architecture (*the cookies*)
 - Specific instances, associated with local stakeholders and projects
 - Current inventory + future projects
 - Only the pieces you need
 - Put together based on local needs
 - Extensions, where necessary



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Look Beyond Current Set of Projects



- How will your systems evolve?
 - What new or enhanced services will you provide?
 - What systems will you connect to and what information will you share?
 - What agreements need to be in place to make it happen?
- The Eastgate Regional ITS Architecture will provide the framework and plan for the evolution of your systems over the next 20 years.

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Benefits of a Regional ITS Architecture



- Transportation planning tool
 - Get a handle on where we are going with our Intelligent Transportation System
- Regional information sharing opportunities
 - Get early insight into what ITS information others have that can help you do your job better (or you can provide to others)
- Opportunities to leverage funding across multiple jurisdictions and agencies

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Benefits of Regional ITS Arch (Cont.)



- AND -- Addresses FHWA Rule/FTA Policy on ITS Architecture and Standards
 - Requires Development of a Regional ITS Architecture if using Highway Trust Fund money to fund deployment of projects containing ITS elements.
 - Intended to foster integration of ITS Systems
 - Defines requirements for ITS projects
 - Defines requirements for ITS agreements
- This workshop continues the process of updating the Eastgate Regional ITS Architecture

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FHWA Rule/FTA Policy

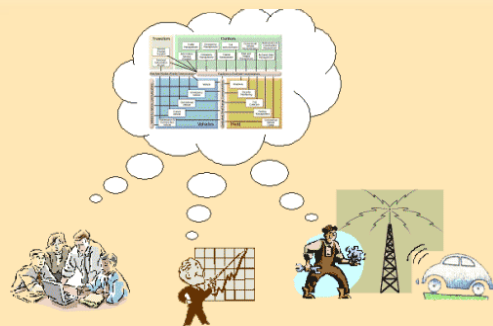


1. Description of the region (Scope)
2. Identification of participating agencies and their systems (Inventory)
3. Operational concept
4. Agreements required for implementation
5. System functional requirements
6. Interface requirements
7. Identification of ITS standards
8. Sequence of projects required for implementation
9. Process for maintaining your ITS Architecture

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Architecture Scope



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Eastgate Regional ITS Architecture Scope

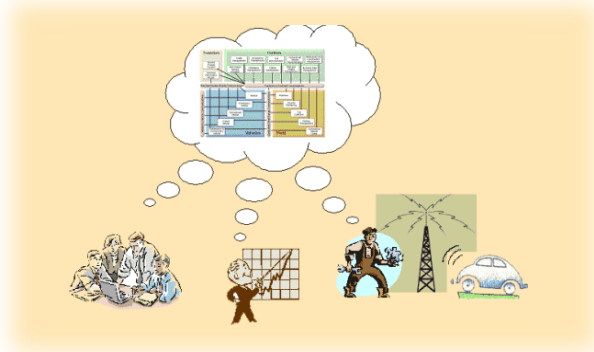


- Geographic
 - Covers systems and roads throughout the Eastgate MPO region
- Time Frame
 - Existing Today → 20 years in the future?
- Scope of Services
 - Traffic, Maintenance, Transit, Emergency, Electronic Toll (statewide only?), Commercial Vehicles Operations (statewide only?), Planning

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Discussion of Eastgate Regional ITS Elements



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What is an ITS Inventory?



- A list of ITS elements and the elements that interface with them
- And an ITS element is:
“The name used by stakeholders to describe high level parts of an ITS system.”

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Regional ITS Inventory



- Review current and planned elements
- Types of elements:
 - Centers - Traffic, Emergency, Transit
 - Field Devices - Traffic, Maintenance
 - Traveler Interfaces - Web sites
 - Data Systems - Planning, Archives
 - Vehicles - Transit, Emergency, Maintenance

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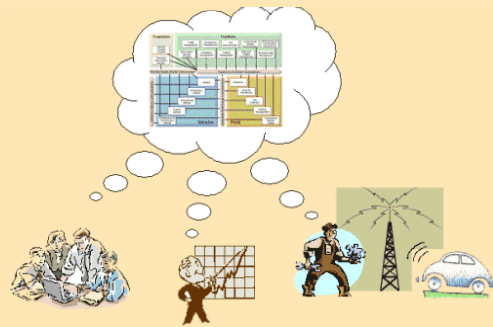
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Lets go to the inventory...



Transportation Needs



Transportation Needs



- What are Needs?
 - Regional necessities that address particular transportation issues
 - Some are ITS related, meaning the need can be satisfied with the incorporation of ITS in the transportation system
 - Some are not ITS related
 - Needs are both qualitative and quantitative
 - Qualitative Needs – Identifies a general requirement
 - E.g. Improve incident response and remediation
 - Quantitative Needs – Identifies a specific requirement by which one can measure numerically if it has been met.
 - E.g. Install 12 CCTV Cameras on state highways



Transportation Needs



Why identify Needs for Eastgate?

- Identification of ITS related needs will help make a connection between transportation planning and the ITS projects that are developed.
- Aids member agencies in developing financial strategies to deal with unmet needs
 - Identify possible future funding sources
 - Multi-year financing plan to leverage funding now



Transportation Needs



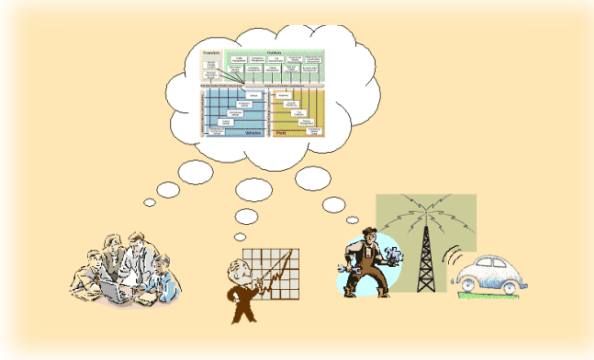
- Identify and extract ITS Needs identified by:
 - Past experience in architecture development
- Created first cut for discussion with Stakeholders
- Lets go to the Needs ...

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Discussion of ITS Services Market Packages Overview/ Prioritization

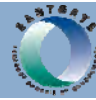


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ITS Services Cover

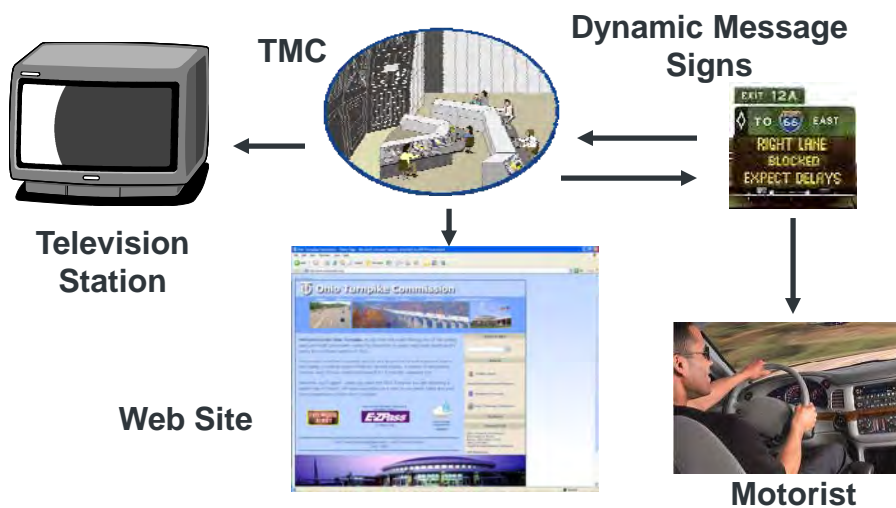


- Traffic Management
- Traveler Information
- Transit Management
- Emergency Management
- Commercial Vehicle Operations
- Maintenance and Construction
- Archived Data Management
- Advanced Vehicle Safety

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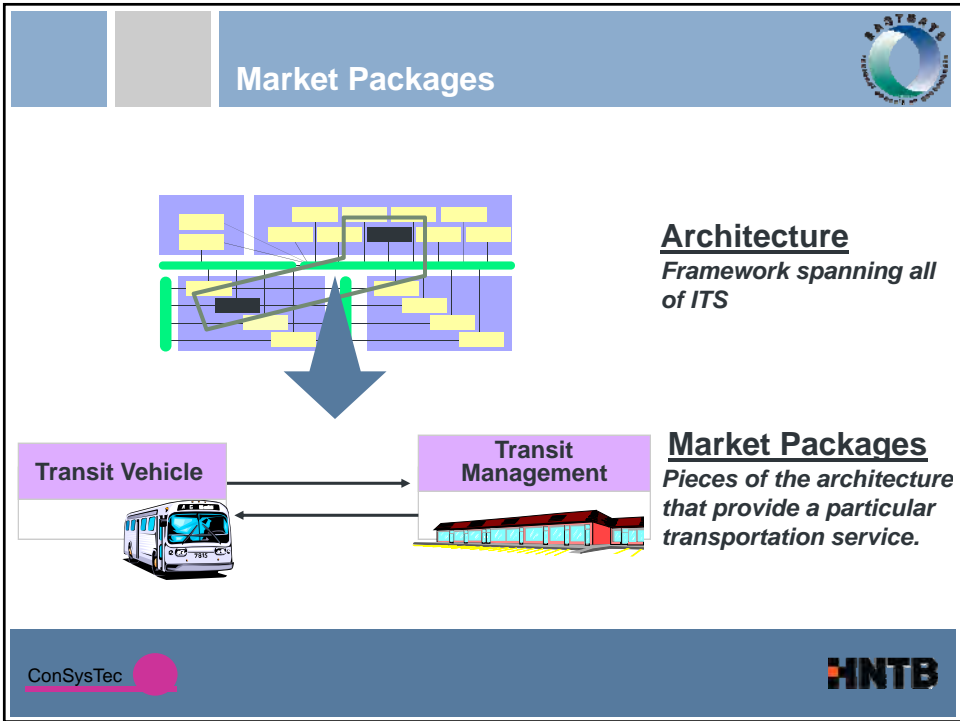
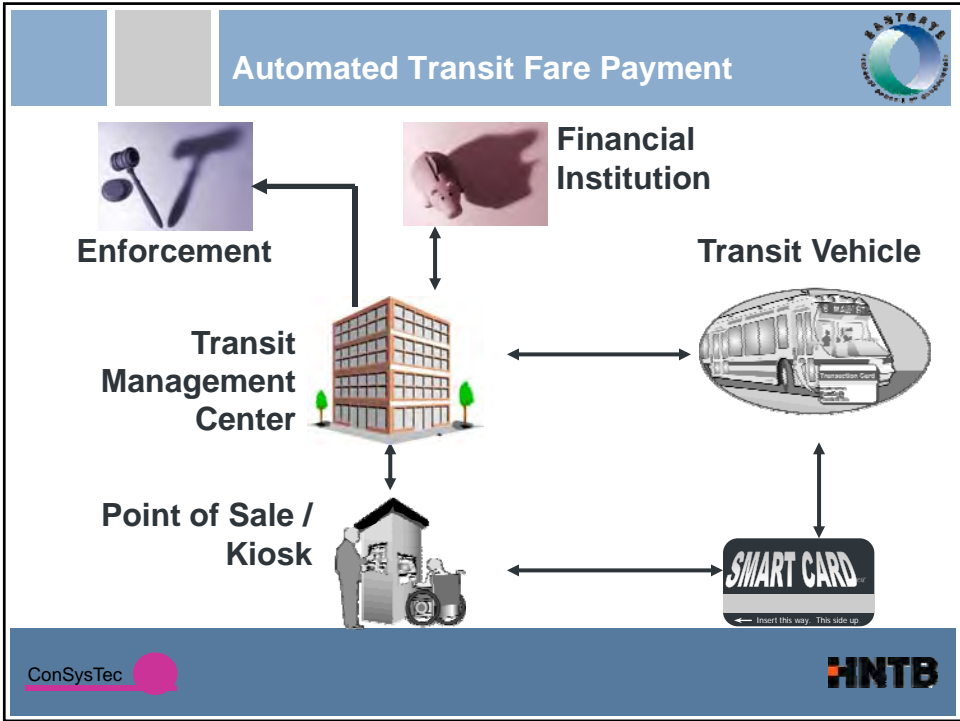
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Traffic Information Dissemination

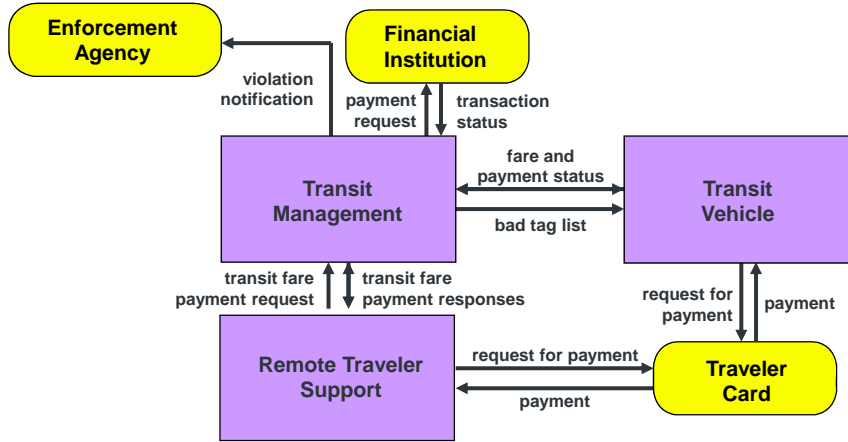


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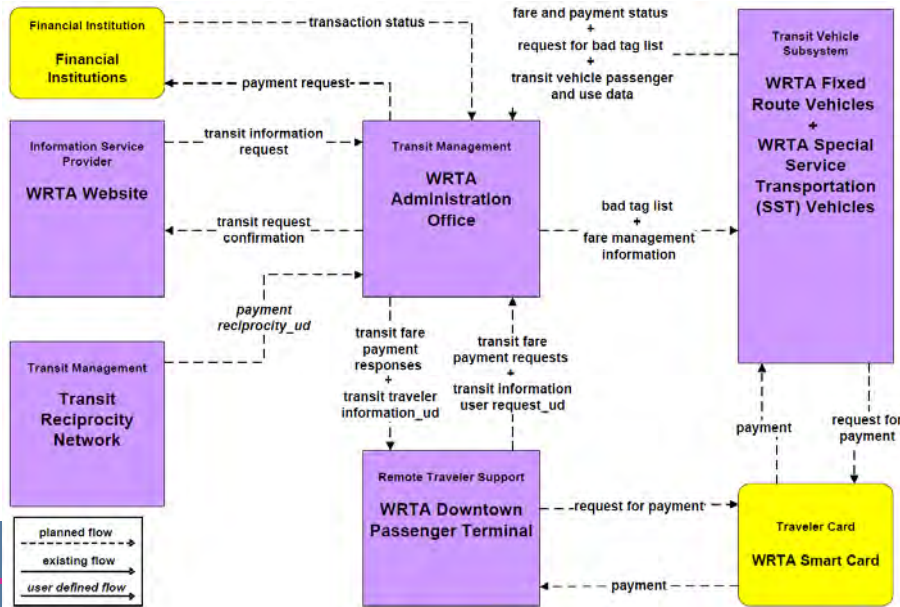
APTS4 - Automated Fare Payment Market Package



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APTS4 – Transit Passenger and Fare Payment (WRTA)



Review Prioritization of Market Packages



- Draft set of Market Packages
 - Based on stakeholder interviews
- Identify Priority of the Market Package
 - High (Short to mid term implementations)
 - Medium (Mid term implementations)
 - Low (Long term implementations)
- Priority may vary by stakeholder group

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Determine Future Needs / Select and Prioritize Market Packages



- There is a Relationship between market packages and needs
 - The Market Package Prioritizations should be directly related to the Needs identified for the region
 - High Priority Needs should translate to High Priority Market Packages
- Lets go to the Services/Market Package Prioritizations...

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Market Package Customization



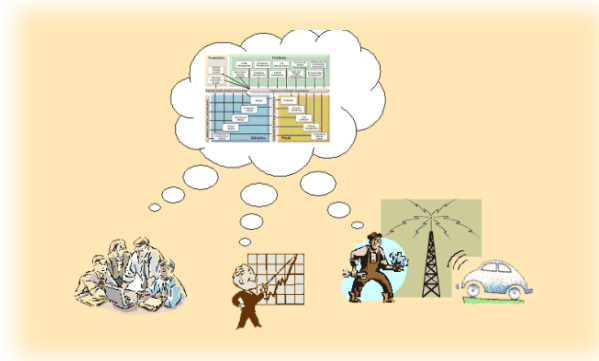
- Market Packages are described by
 - Elements
 - Interconnections
- Now that we have identified priorities, lets look at the details of the market packages and customize the elements and interconnections...

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Review of Projects for Strategic Plan Framework



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Projects



- Information needed
 - Project Title and description
 - Agency
 - Service Area
 - Market Package
 - Description
 - Priority/implementation term
 - Cost
 - Possible Agreements

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Projects



- ODOT – Emergency Management
 - Snow and ice detection management and advance snow plow system
- Trumbull County - Data Management
 - Electronic inventory
 - GPS handheld unit for maintenance
- Municipalities – Traffic Management
 - Traffic Signal Systems

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Next Steps- Architecture Website



- Draft updated Eastgate Regional ITS Architecture will be available on the project website:
 - Link to project website at www.consystemec.com
- Email to all stakeholders when ready for review
- Please take the time to review your portion of the architecture and provide comments

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Next Steps



- Your input from this workshop will be turned into an initial updated draft Eastgate Regional ITS Architecture
- Your input on the Eastgate Regional ITS Architecture website will be captured and reviewed at the remaining stakeholder meeting
- Thank you for your input today

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Eastgate ITS Architecture Advisory Committee
Workshop #1 Attendance
December 9, 2010

Mtg 1	Name	Agency	Phone	E-mail
	Mr. Jason Loree	Boardman Township	330-726-4177	jloree@twp.boardman.oh.us
	Mr. Mike Dockry	Austintown Township	330-792-8584	mdockry@austintowntwp.com
X	Mr. David McCann	Howland Township	330-856-2340	David.McCann@howlandtownship.org
	Ms. Darlene St. George	Howland Township	330-856-2340	Darlene.StGeorge@howlandtownship.org
X	Mr. Joe Warino	City of Canfield	330-533-1101	jwarino@ci.canfield.oh.us
X	Mr. Gary Diorio	MS Consultants - City of Canfield	330-744-1790	gdiorio@msconsultants.com
	Mr. Don Wittman	City of Cortland	330-637-3916	dwittman@cityofcortland.org
	Mr. Jerry Lambert	City of Girard	330-545-3879	
	Mr. Bob Toth	City of Hubbard	330-534-1271	r.toth@cityofhubbard.com
	Mr. Terry Stocker	City of Struthers	300-755-2181	mayor@cityofstruthers.com
	Mr. William George	City of Newton Falls		
	Mr. Jack Haney	City of Newton Falls	330-872-0806	citymgr@ci.newtonfalls.oh.us
	Mr. Mark Hess	City of Niles	330-544-9000	mhess@thecityofniles.com
	Mr. Paul Makosky	City of Warren	330-841-2562	pmakosky@warren.org
X	Mr. Kolton Codner	City of Youngstown	330-742-8800	krcodner@cityofyoungstownoh.com
	Mr. Bill D'Avignon	City of Youngstown, Planning	330-742-8842	wadavignon@cityofyoungstownoh.com
X	Mr. Chuck Shasho	City of Youngstown	330-742-8800	cshasho@cityofyoungstownoh.com
X	Mr. Tom Binaut	Community Bus Services	330-743-7726	tbinaut@verizon.net
X	Mr. Joe Spalla	Community Bus Services	330-743-7726	jspalla@com-bus.com
	Mr. Terry Thomas	Community Bus Services	330-743-7726	tthomas@com-bus.com
X	Mr. Ed Davis	Eastgate	330-779-3800	edavis@eastgatecog.org
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X	Ms. Kathleen Rodi	Eastgate	330-779-3800	krodi@eastgatecog.org
	Mr. Ken Sympson	Eastgate	330-779-3800	ksympson@eastgatecog.org
	Mr. Jim Buckson	FHWA Ohio Division	614-280-6846	james.buckson@dot.gov
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	Mr. Richard A. Marsico	Mahoning County Engineer	330-799-1581	
	Mr. Clark Jones	Mahoning County EMA	330-740-2200	cjones@mahoningcountyoh.gov
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	Lt. George Williams	State Highway Patrol	330-898-2311	gjwilliams@dps.state.oh.us
	Mr. Doug Hedrick	Ohio Turnpike Commission	440.234.2081	
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	Mr. Gary Shaffer	Trumbull County Engineer	330-675-2640	hwhshaffe@co.trumbull.oh.us
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Eastgate Regional ITS Needs

Need Area	Specific ITS Need	High	Medium	Low	Not a Need
Incident Management	Need improved incident detection, management and coordination				
	Need to reduce delays due to accidents or construction				
	Need to identify alternate routes for the traveling public				
	Improve HAZARDOUS cargo tracking and routing				
Traffic Management	Need to improve traffic congestion mitigation.				
	Need to improve traffic mitigation on the east-west corridors				
	Need to provide early warning of poor visibility conditions (sunblindness, thunderstorms, etc.)				
	Need to improve traffic signal interconnect and coordination to improve mobility				
	Need traffic signal preemption for emergency vehicles (needs to be expanded)				
	Need advanced warning of flash flood areas				
	Need to enhance communications and information sharing between regional agencies				
	Need to interconnect with neighboring regions				
	Need to know travel times on major routes				
	Need to know delays on major routes				
	Need for traffic signal priority for transit vehicles				
	Need to implement parking management systems (downtown and special events)				
	Need to alert drivers of speeding (automated alert systems)				
	Need for remote monitoring for infrastructure and at intersections				
Emergency Management	Need to improve emergency notification/dispatch and response times				
	Need to improve traffic safety				
	Need to expand remote traveler support services (information plus roadside assistance)				
	Need to improved tracking of emergency vehicles				
	Need to identify alternate routes for emergency vehicles				
	Need to improve evacuation planning				
Public Transportation	Need to improve the transportation infrastructure for security purposes				
	Need to improve/enhance rural traveler service				
	Need to improve urban traveler service				
	Need to improve transit coordination among city/county/tribal governments				
	Need to better communicate with transit customers				
	Need to encourage major employers to implement transit use incentives.				
	Need automated maintenance system for transit fleets				
	Need to improve efficiency of demand-responsive transit (enhanced information)				
	Need to improve schedule operations for fixed-route transit vehicles				
	Need for interactive ITS services (transit-related)				
Maintenance Operations	Need to deploy AVL on regional transit vehicles				
	Need to improve vehicle routing and detours/information				
	Need advanced and up-to-date road closure and construction zone information				
	Need to reduce delays due to accidents or construction				
	Need to know location of maintenance vehicles				
	Need to improve work zone safety (alert drivers of wrong-way movements)				
	Need for improved wind/dust monitoring				
	Need to collect roadway conditions data, such as icing, from vehicle sensors				
	Need to monitor the transportation infrastructure for maintenance purposes				
Traveler Information	Need improved flood monitoring				
	Need real-time roadway and traffic conditions information				
	Need real-time information about weather conditions/location				
	Need easier access to traveler services information (locations, types of services, etc.)				
	Need special event traffic information				
Information Management	Need to have traveler information accessible at employment sites				
	Need to collect transportation information for use by planners				
	Need to share archived data between agencies				
Information Management	Need park-and-ride information				

HNTB Corporation
The HNTB Companies
Engineers Architects Planners

1100 Superior Avenue
Suite 1330
Cleveland, OH 44114

Telephone (216) 522-1140
Facsimile (216) 522-0554
www.hntb.com

Project Name:
Eastgate Regional ITS Architecture
Update and Strategic Plan

Date of Meeting:
February 10, 2011

Location:
Eastgate Office, Conference Room

Purpose of Meeting:
Project Review by Stakeholders

Time:
8:15 AM – 11:15 AM



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AGENDA

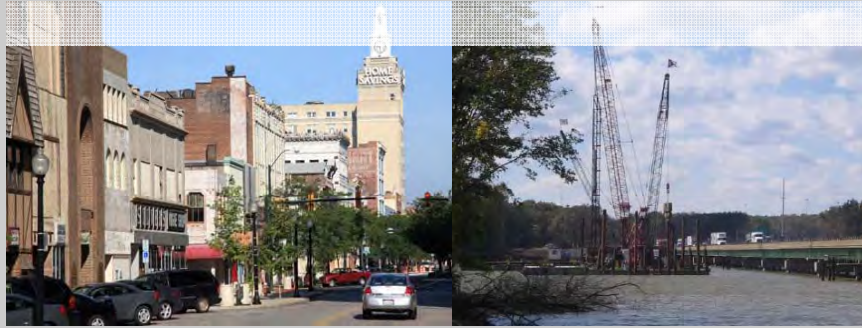
- 8:15 AM Welcome (donuts and bagels will be provided)
- 8:30 AM Introductions & Overview
- 8:35 AM Operational Concept
- 8:40 AM Website Overview
- 8:45 AM Using the Architecture
- 9:00 AM Regional ITS Projects Discussion
 - o Lead Agency
 - o Implementation Year
 - o Project Cost
 - o Gaps between Priority Needs and Planned Projects
 - o Possible Agreements
- 9:15 AM Review and Update Customized Market Packages
- 11:00 AM Maintaining the Architecture
- 11:15 AM Meeting Adjourns

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ITS Architecture Update Project Review

Eastgate Conference Room

February 10, 2011



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Agenda



- Introductions & Overview
- Operational Concept
- Website Overview
- Using the Architecture
- Regional ITS Projects Discussion
- Review & Update Customized Market Packages
- Maintaining the Architecture
- Next Steps

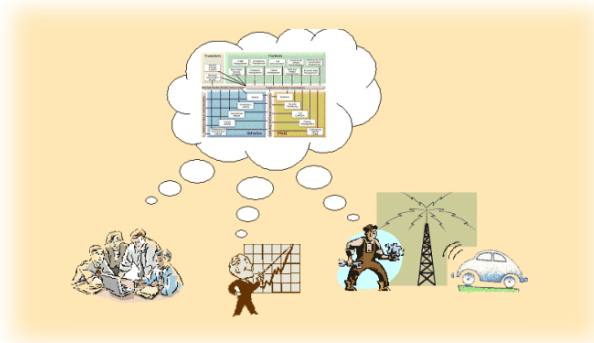
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Introductions & Overview



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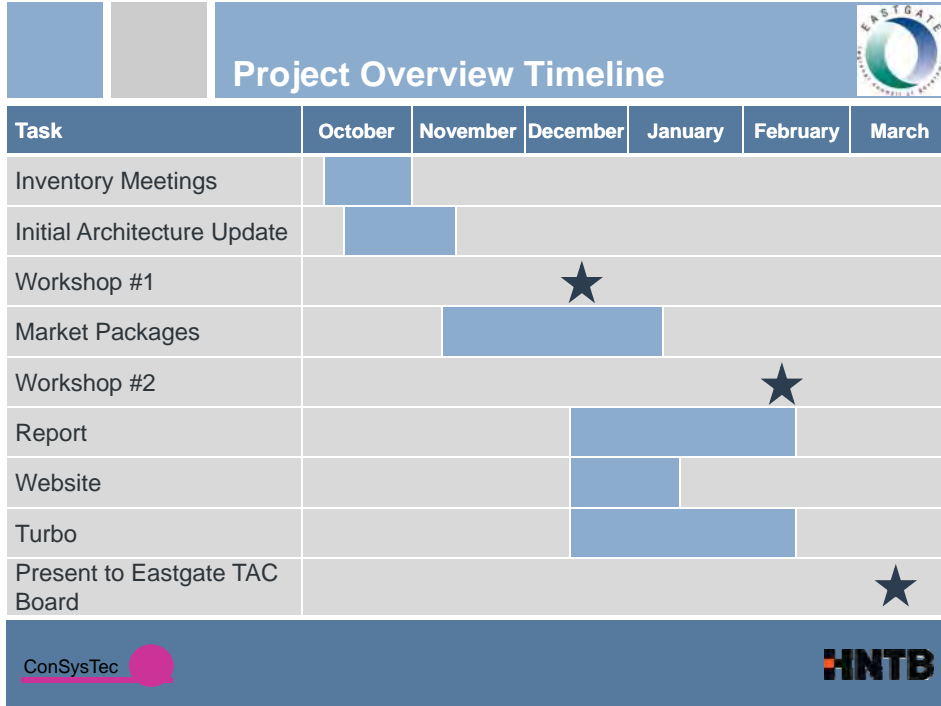


Draft Architecture - Summary Statistics

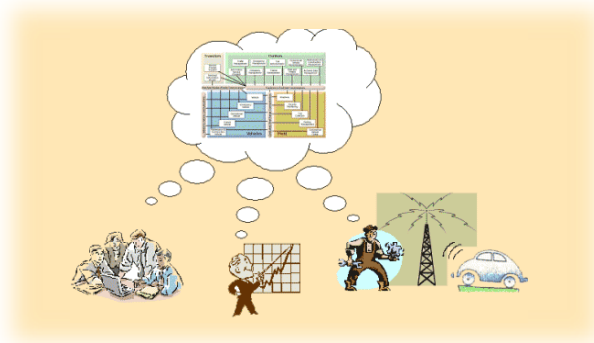
- 57 Stakeholders
 - Eastgate, ODOT, WRTA, City of Youngstown, etc.
- 136 Elements
 - WRTA EasyGo Dispatch, Buckeye Traffic, WRTA Smart Card, etc.
- Services (Market Packages)/ Information Flows
 - 44 Market Packages
 - ATMS06: Traffic Information Dissemination
 - APTS04: Transit Fare Collection Management
 - 2061 Information flows connecting the elements to provide the services

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Review of Operational Concepts





Operational Concept

- Defines roles and responsibilities of stakeholders
- Organized by ITS Area
 - Traffic Signal Control
 - Highway Management
 - Incident Management
 - Emergency Management
 - Transit Management
 - Maintenance Management
 - Traveler Information
 - Archived Data

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Operational Concept

Area	Role	Responsibility
Archived Data Systems for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
Control and Data for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
Emergency Management for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
Highway Management for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
Incident Management for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
Transit Management for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
Traveler Information for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
Traffic Signal Control for Transportation	City of Youngstown	Provide maintenance of archived data for control and pavement maintenance

System	Role and Responsibility
City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
City of Youngstown	Provide maintenance of archived data for control and pavement maintenance
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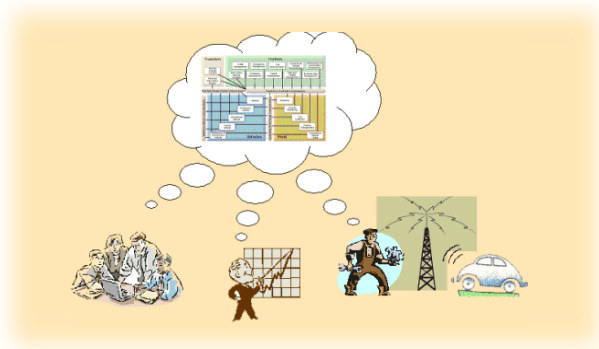
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Website Overview

Review of Draft Architecture



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Eastgate Regional ITS Architecture

- Draft architecture details can be viewed at <http://www.consystec.com/ohio/eastgate/>

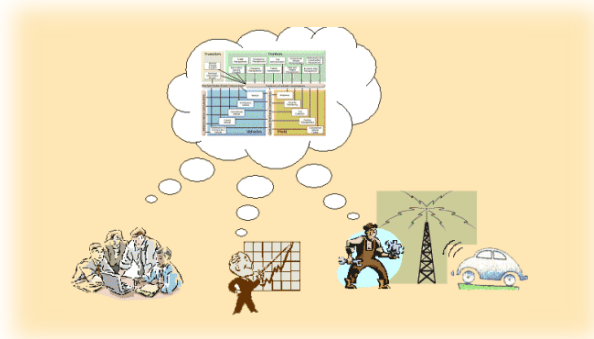


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Use & Maintenance Summary



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Use the ITS Architecture for:

- Transportation Planning
- Programming/Budgeting
- ITS Project Implementation

Architecture Use in Programming and Project Implementation

Maintaining the Architecture

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Architecture Use in Common Programming Process



1- MPO issues Request for Projects

2 - Project Sponsors submit projects

3 - Project are prioritized by the MPO

4 - Projects are voted on/accepted by the MPO governing body.



Example of Use on Project Submittals

Anchorage Metropolitan Area Transportation Solutions (AMATS) Checklist

Step One: Planning / TIP Development:

Project Agency Sponsors Agree to Comply with Federal ITS Regulations

When a project is nominated or added to the AMATS Transportation Improvement Program (TIP), project agency sponsors will provide answers to the following questions in the Project Information Packet during the project nomination process:

- a. Does my project include any ITS elements? *
- b. Does my project use funds from the federal highway trust fund (including the mass transit account) now and/or in the future?
If you are not sure, consult with the AMATS Coordinator.
- c. Does the project sponsor agree to comply with the federal ITS requirements?

If the answer is YES to the first two questions, then your project must comply with federal requirements or AMATS could be subject to loss of funding. Project agency sponsors must agree to comply with the federal requirements. The agreement will be documented as specified by AMATS. Proceed to Step Two. If the answer is yes to the first question, but no to the second, project agency sponsors are *encouraged* to use the steps recommended in this Checklist to foster a more efficient system.

*ITS means electronics, communications, or information processing used singly or in combination to improve the efficiency of a surface transportation system.





Example of Use on Project Submittals

Maricopa Association of Governments (MAG)

26-Aug-05

FY 2007 - 2011 TIP - Programming only 2011
MAG ITS Project Data Form

Please enter project data in highlighted cells, save the file with the lead agency name in it --ie, Mesa-ITSProj1.xls, and email the Excel f
The numbers shown in highlighted cells are for illustrative purposes only. Please use one worksheet per project.

Please enter required information in highlighted cells

Lead Agency:	
Other Participating Agencies:	
ITS Project Title:	
ITS Market Package:	

A. ITS Strategic Plan (40 Points Max):

	ID#	Need Score
First user need that best matches the project	2	65
Second user need that matches the project	9	47
Third user need that matches the project	27	21
Total User Needs Score		136

Total Estimated Points for ITS Plan 0.0

Determine whether the proposed ITS project is an arterial project OR an intersection project. Enter data under B1 or B2 -- NOT BOTH
B 1. Segment Congestion (30 Points Max):

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Example of Use during Project Prioritization

Rhode Island State Planning Commission

Addition of new criteria

g. Enhances Intelligent Transportation System network

5 points: provides hardware and / or monitoring equipment to implement Rhode WAYS Strategic Deployment Plan or RIPTA ITS Plan (bus fareboxes, vehicle locators, etc.)

1-4 points: installation of fiber-optic cable on off-system highway; enhances dissemination of information; provides for shared use of equipment already in place

0 points: no ITS elements are part of the project

negative points: project is on a RhodeWAYS route that calls for ITS equipment, but equipment not provided

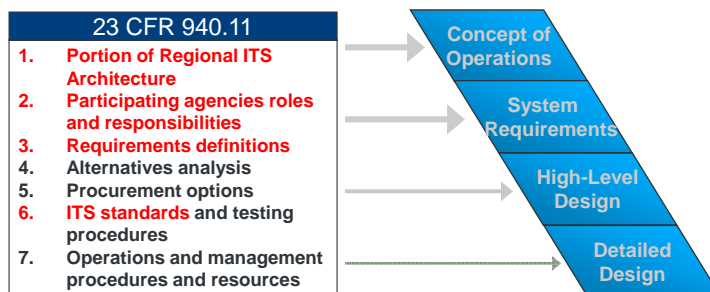
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Systems Engineering Analysis Requirements

- Rule/Policy requires all HTF-funded projects to be based on a systems engineering analysis
 - Scale commensurate with project scope
 - Identifies seven requirements “at a minimum”



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Method

- If a project architecture has been created look at the Projects web page.
- If a project architecture has not been created, look at the regional architecture and find the appropriate web pages.

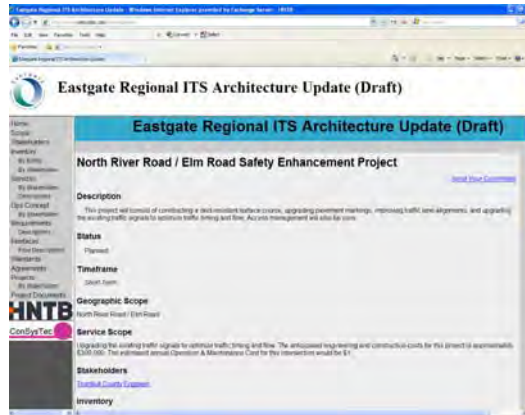
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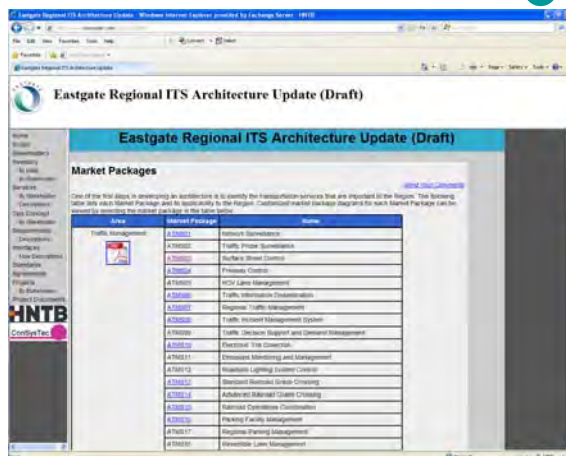
Portion of the Regional ITS Architecture

- Go to Projects page, then click on the Project.
- Project Details:
 - Project Description
 - Status
 - Timeframe
 - Scope
 - Stakeholders
 - Inventory
 - Services
 - Functional Areas
 - Interfaces
 - Standards
 - Operational Concepts



Portion of the Regional ITS Architecture

- Go to the Services page, and find the customized market package diagram(s) that represents the project.

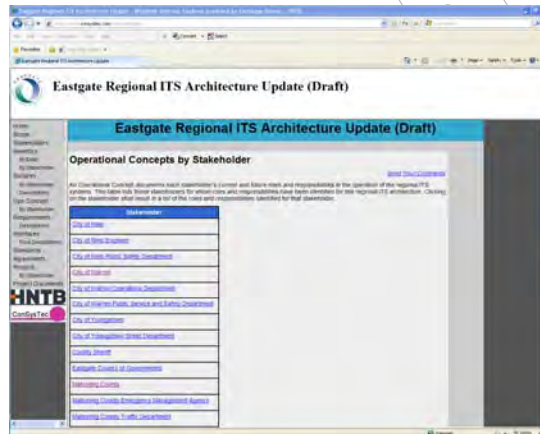




Concept of Operations

Concept of Operations **2**

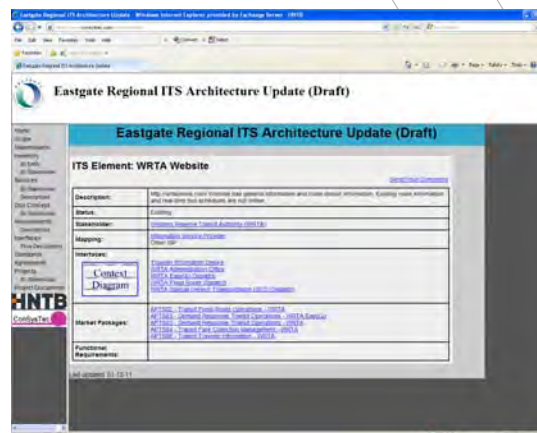
- Go to Operational Concepts Page and click on the appropriate Area(s), or
- Go to Operational Concepts by Stakeholder, and select the appropriate stakeholder



System Requirements

System Requirements **3**

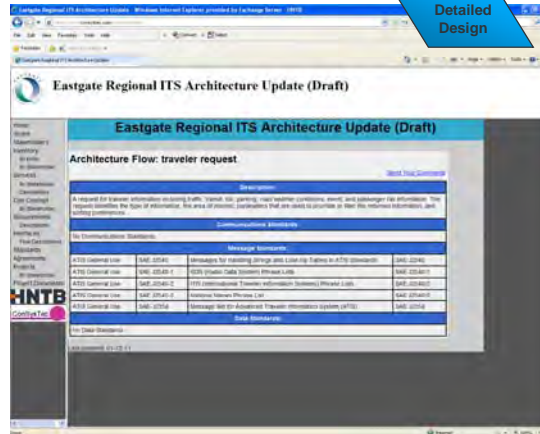
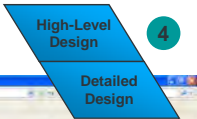
- Go to the Inventory page and click on an element.
- Click on an interface to view the flows.
- Click on an Equipment Package to view requirements.



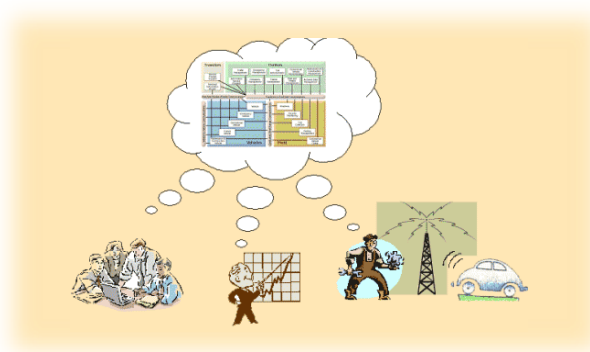


ITS Standards

- Go to the Inventory page and click on an element.
- Click on an interface to view the flows.
- Click on a flow to view applicable ITS standards.

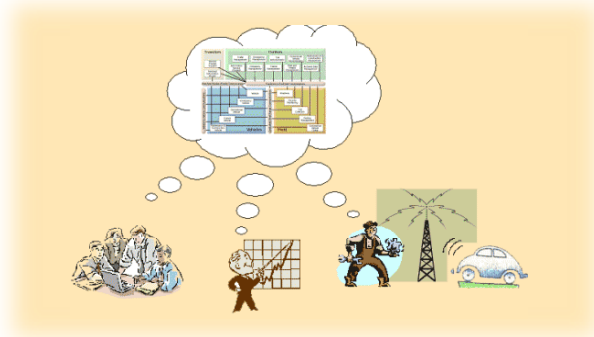


Regional ITS Projects Discussion





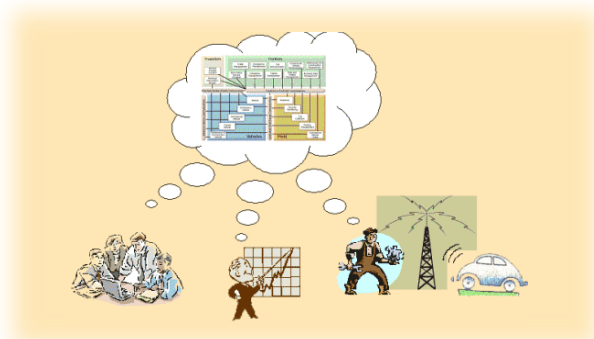
Review and Update Customized Market Packages



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Maintaining the Architecture



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Eastgate Regional ITS Architecture Maintenance

- Why Changes Occur
- Maintenance Models
- Roles and Responsibilities
- Baseline
- Change Management Process

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Why Changes Occur

- **Projects**
 - Additions/Deletions – new projects or dropped projects
 - Status – change in status (planned/existing)
 - Definition – change in details, scope, e.g., information flows, standards
 - Priorities – change in goals, budgets
 - Agreements – institutional change

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Why Changes Occur

- **Regional**
 - Goals – changes in regional needs
 - Stakeholders – New stakeholders
 - Other architectures – changes to interfaces with adjoining regions
 - National ITS Architecture – changes to the National ITS Architecture



Maintenance Models

- **Two models**
 - Periodic Basis
 - Fixed time periods
 - Event Driven
 - As changes occur

← Eastgate





Roles & Responsibilities

- Responsible Agency
- Maintenance Manager
- Stakeholders
- Maintenance Working Group

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Baseline

- Architecture document
- Turbo Architecture database
- Architecture web pages
- Change request database

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Change Management Process

- Submit a Change Request
- Define the Proposed Change
- Assess the impact
- Approving the Change
- Implementing the Change

The image shows a 'Change Request Form' for the 'Eastgate Regional ITS Architecture'. The form is titled 'Change Request Form' and includes sections for 'Change Request Information', 'Requested by Information', 'Change Description', and 'Change Approval'. It contains various fields for entering details such as request number, priority, impact, and approval status.

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Current Maintenance Plan

- Comprehensive update will be made every 3 years several months prior to the formal TIP update
- Interim updates: every 6 months if necessary
- Actively solicit changes annually
- Maintenance Working Group

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Implementation

- Make agreed changes to baseline
- Update Change Request Database
- Inform Stakeholders
- Distribute changes
- Update website

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Next Steps

- Please provide any additional comments by 2/24
- Your input will be used to create:
 - Update Turbo Database
 - Update Website
 - Distribute Draft Report
 - Receive Comments
 - Draft Final Eastgate Regional ITS Architecture Document
- Formal adoption of the ITS Architecture by the Eastgate TAC Board

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Thank you for your input today!

Katie Ott Zehnder, P.E., kzehnder@hntb.com

Sarah Brown, sebrown@hntb.com

Bruce Eisenhart, bruce.eisenhart@consystec.com

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Eastgate ITS Architecture Advisory Committee

Workshop #2 Attendance

February 10, 2011

Mtg 2	Name	Agency	Phone	E-mail
	Mr. Jason Loree	Boardman Township	330-726-4177	jlore@twp.boardman.oh.us
	Mr. Mike Dockry	Austintown Township	330-792-8584	mdockry@austintowntwp.com
	Mr. David McCann	Howland Township	330-856-2340	David.McCann@howlandtownship.org
	Ms. Darlene St. George	Howland Township	330-856-2340	Darlene.StGeorge@howlandtownship.org
	Mr. Joe Warino	City of Canfield	330-533-1101	jwarino@ci.canfield.oh.us
	Mr. Gary Diorio	MS Consultants - City of Canfield		gdiorio@msconsultants.com
	Mr. Don Wittman	City of Cortland	330-637-3916	dewittman@cityofcortland.org
	Mr. Jerry Lambert	City of Girard	330-545-3879	
X	Mr. Bob Toth	City of Hubbard	330-534-1271	r.toth@cityofhubbard.com
	Mr. Terry Stocker	City of Struthers	300-755-2181	mayor@cityofstruthers.com
X	Mr. Wiliam George	City of Newton Falls		
X	Mr. Jack Haney	City of Newton Falls	330-872-0806	citymgr@ci.newtonfalls.oh.us
	Mr. Mark Hess	City of Niles	330-544-9000	mhess@thecityofniles.com
X	Mr. Paul Makosky	City of Warren	330-841-2562	pmakosky@warren.org
	Mr. Kolton Codner	City of Youngstown	330-742-8800	krcodner@cityofyoungstownoh.com
	Mr. Bill D'Avignon	City of Youngstown, Planning	330-742-8842	wadavignon@cityofyoungstownoh.com
	Mr. Chuck Shasho	City of Youngstown	330-742-8800	cshasho@cityofyoungstownoh.com
	Mr. Tom Binaut	Community Bus Services	330-743-7726	tbinaut@verizon.net
	Mr. Joe Spalla	Community Bus Services	330-743-7726	jspalla@com-bus.com
	Mr. Terry Thomas	Community Bus Services	330-743-7726	tthomas@com-bus.com
X	Mr. Ed Davis	Eastgate	330-779-3800	edavis@eastgatecog.org
X	Mr. Jeff Gollner	Eastgate	330-779-3800	jgollner@eastgatecog.org
X	Ms. Mirta Reyes-Chapman	Eastgate	330-779-3800	mreyes-chapman@eastgatecog.org
X	Ms. Kathleen Rodi	Eastgate	330-779-3800	krodi@eastgatecog.org
	Mr. Ken Sympson	Eastgate	330-779-3800	ksympson@eastgatecog.org
	Mr. Jim Buckson	FHWA Ohio Division	614-280-6846	james.buckson@dot.gov
X	Mr. Ron Barnhart	Village of Lordstown	330-824-2510	planningzoning@lordstownvillage.com
X	Mr. Rob Donham	Mahoning County Engineer	330-799-1581	rdonham@mahoningcountyoh.gov
	Mr. Richard A. Marsico	Mahoning County Engineer	330-799-1581	
	Mr. Clark Jones	Mahoning County EMA	330-740-2200	cljones@mahoningcountyoh.gov
	Mr. George Saylor	ODOT Central Office	614.752.8099	george.saylor@dot.state.oh.us
X	Mr. Joe Defuria	ODOT - District 4	800-603-1054	Joseph.Defuria@dot.state.oh.us
	Ms. Lorie Feudner	ODOT - District 4	800-603-1054	Lorie.Feudner@dot.state.oh.us
X	Mr. Ken Greene	ODOT - District 4	800-603-1054	Ken.Greene@dot.state.oh.us
	Lt. George Williams	State Highway Patrol	330-898-2311	gjwilliams@dps.state.oh.us
	Mr. Doug Hedrick	Ohio Turnpike Commission	440.234.2081	
	Mr. Wayne Hickman	Trumbull County Engineer	330-675-2640	hwhickma@co.trumbull.oh.us
	Mr. Martin Patrick	Trumbull County Engineer	330-675-2640	hwpatric@co.trumbull.oh.us
X	Mr. Gary Shaffer	Trumbull County Engineer	330-675-2640	hwshaffe@co.trumbull.oh.us
	Ms. Linda Beil	Trumbull County EMA	330-675-2666	embeil@co.trumbull.oh.us
	Mr. Dan Dickten	Wester Reserve Port Authority	330-856-1537	ddickten@yngairport.com
	Ms. Marianne Vaughn	WRTA	330-744-8431	mvaughn@wrtasonline.com
	Mr. Jim Ferraro	WRTA	330-744-8431	jferraro@wrtasonline.com
	Mr. Rich McFadden	WRTA	330-744-8431	rmcfadden@wrtasonline.com
X	Mr. Tom Nugent	WRTA	330-744-8431	tnugen@wrtasonline.com
X	Mr. Charlie Nelson	WRTA		cnelson@neo.rr.com
	Mr. Hunter Morrison	Youngstown State University	330-941-2745	hmorrison@ysu.edu
X	Ms. Joann Esenwein	Youngstown State University	330-941-2421	jfesenwein@ysu.edu
X	Sarah Brown	HNTB Ohio, Inc.	216.522.1140	sebrown@hntb.com
X	Katie Zehnder	HNTB Ohio, Inc.		kzehnder@hntb.com
X	Bruce Eisenhart	CST Corp.		bruce.eisenhart@consystec.com

Appendix B
Example Agreements

MEMORANDUM OF AGREEMENT

BETWEEN

MIAMI-DADE COUNTY EXPRESSWAY AUTHORITY

AND

DISTRICT SIX OF THE FLORIDA DEPARTMENT OF TRANSPORTATION

THIS AGREEMENT is made and entered into this _____ day for _____, 2007, by and between Miami-Dade County Expressway Authority, a body politic and corporate, a public instrumentality, and an agency of the State of Florida, existing under the Florida Expressway Authority Act (Part I of Chapter 348, Florida Statutes, as amended) (hereinafter, "MDX"), and District 6 of the Florida Department of Transportation (hereinafter, "District 6").

WITNESSETH:

WHEREAS, MDX and District 6 recognize the value of system-wide and regional real time traveler information systems and traffic/incident management systems; and

WHEREAS, MDX and District 6 have determined that a fiber optic communication network will provide the needed infrastructure for implementing system-wide and regional real time traveler and traffic/incident management systems; and

WHEREAS, MDX and District 6 have installed or may install conduit and fiber optic cable for their respective use; and if such conduit or cable is not fully utilized, the unused conduit and fiber optic cable (hereinafter, "Excess") may be made available for utilization by the other party; and

WHEREAS, MDX and District 6 have and will continue to construct noncontiguous roadway segments; and both recognize the benefit of utilizing each other's rights-of-way to connect noncontiguous sections of its fiber network; and

WHEREAS, MDX and District 6 acknowledge each to the other that the utilization of Excess in the right-of-way of the other is a great value which cannot be calculated in dollars; and

WHEREAS, MDX and District 6 have determined that sharing of video (view only) from their respective CCTV cameras will provide additional information and resources in order for each party to better provide regional real time traveler and traffic/incident management information to the traveling public; and

WHEREAS, MDX and District 6 have determined that sharing of data (read only) from vehicle detection stations and travel time systems will provide additional information and resources in order for each party to better provide regional real time traveler and traffic/incident management information to the traveling public; and

WHEREAS, MDX has determined that it will allow District 6 free use of certain portions of MDX's Excess in exchange for District 6 allowing MDX free use of certain portions of District 6 Excess; and

WHEREAS, MDX and District 6 acknowledge that there will be permit requests, labor, materials and construction (hereinafter, "Work") required to interconnect the Excess from one party to the other

NOW, THEREFORE, in consideration of the promises contained herein and for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, MDX and District 6 agree as follows:

A. PROCESS. MDX and District 6 agree to abide by the following process for obtaining the use of the other party's Excess.

1. Request for Use.

a. MDX. The MDX Executive Director or his designee may make a request in writing to the District 6 Director of Operations for the use of District 6 Excess. This request shall contain specific details about the number of fibers needed and the specific location where fibers are needed. If, at the discretion of District 6, it is determined that Excess is available, the District 6 Director of Operations will approve the request in writing and provide information detailing the fibers or conduit to be designated for MDX use.

b. District 6. The District 6 Director of Operations may make a request in writing to the MDX Executive Director for the use of MDX Excess. This request shall contain specific details about the number of fibers needed and the specific location where fibers are needed. If, at the discretion of MDX, it determines the Excess is available, the MDX Executive Director will approve the request in writing and provide information detailing the fibers or conduit to be designated for District 6 use.

2. Revocation. If the use of Excess is granted by either party and that Excess is needed by the granting party in the future for any reason, the requesting party will be notified in writing and requested to vacate the Excess within one (1) year. A preliminary notification shall be submitted in writing six (6) months prior to the request to vacate thereby providing eighteen (18) months' notice. This time to vacate is anticipated to be sufficient to enable the vacating agency to budget, design, and build an alternate route.

B. Compensation. MDX agrees that it will not charge District 6 for the use of Excess. District 6 agrees that it will not charge MDX for the use of Excess.

C. Permits. The party making the request to connect to the other party's Excess shall be provided with permits free of charge upon submittal of the required permit application and all supporting documentation.

D. Fiber Interconnectivity Costs. ~~MDX and District 6 agree that the cost for the Work will be shared. The shared cost assessed to each party will be based on the quantity of Work to be~~

~~performed within the respective party's right-of-way.~~ The party making the request to connect to the other party's Excess shall perform and pay for the Work.

E. Maintenance and Limitation of Damages. MDX and District 6 will be responsible for maintaining their own facilities within their right-of-way. MDX and District 6 shall be responsible for performing and pay the costs associated with utility locates for their own facilities within their right-of-way on behalf of either party needing such locates, to protect the systems from accidental cuts and dig-ups. MDX and District 6 understand and agree that accidental cuts and dig-ups may occur causing damage to MDX and/or District 6 facilities. Neither party shall be liable for incidental or consequential damages arising from accidental cuts or dig-ups. Each party shall be responsible for creating and maintaining their communications back-up plan.

F. Relocation. MDX and District 6 shall be responsible for all costs of relocation and for performing such relocation activities of their own fiber optic systems, CCTV cameras, vehicle detection stations and travel time systems. MDX and District 6 agree to use their best efforts to avoid the need for relocation if and where possible.

G. Sovereign Immunity. Each party hereto agrees that it shall be solely responsible for the wrongful acts of its employees, contractors and agents. However, nothing contained herein shall constitute a waiver by either party of its sovereign immunity under Section 768.28, Florida Statutes.

H. Term. The term of this Memorandum of Agreement shall continue for as long as MDX and District 6 continue to use the other agency's Excess.

I. Amendments. Any revision to this Memorandum of Agreement shall require the written approval of both parties.

J. Assignment. This Memorandum of Agreement is intended for the exclusive privilege and benefit of the undersigned; any assignment to another agency, department, entity, or person, is strictly prohibited and shall vest in the non-assigning party the immediate right to termination, unless approved, in advance, by written instrument executed by both parties. It is specifically agreed between District 6 and MDX that the sharing of video and data are for use in each other's Traffic Management Centers (TMC) only and not for public or third party use unless approved by both parties. In the event of such an approval, the logos of each party shall be maintained on the video.

K. No Third-Party Beneficiary. It is specifically agreed between District 6 and MDX that this Agreement is not intended by any of the provisions of any part of this Agreement to establish in favor of any other party, the public or any member thereof, the rights of a third-party beneficiary hereunder, or to create or authorize any private right of action by any person or entity not a signatory party to this Agreement to enforce this Agreement or otherwise arising out of the terms of this Agreement. The duties, obligations and responsibility of District 6 and MDX with

respect to third parties shall remain as imposed by law.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

**MIAMI-DADE COUNTY EXPRESSWAY
AUTHORITY**

**DISTRICT SIX OF THE FLORIDA
DEPARTMENT OF
TRANSPORTATION**

By: _____
Executive Director

By: _____
District Secretary

Approved as to Legal Sufficiency:

General Counsel

Approved as to Legal Sufficiency:

General Counsel

DRAFT

MEMORANDUM OF UNDERSTANDING

between

**City of Syracuse, New York State Department of Transportation, Onondaga County
Department of Transportation and Onondaga County 911 Emergency
Communications**

The City of Syracuse and New York State Department of Transportation, Region 3, each operate and maintain video surveillance equipment for monitoring traffic flow and to detect traffic incidents within the Syracuse metropolitan area. It has been recognized through the ITS Regional Architecture and other efforts that traffic and incident management in the area could be enhanced through the sharing of traffic monitoring video images among the agencies responsible for traffic and incident management as well as providing this information to the public. The intent of this Memorandum of Understanding is to outline the terms of understanding regarding the sharing, control, operations and maintenance of the video surveillance equipment. This memorandum also addresses the maintenance responsibilities for the traffic signal equipment that is part of both the existing City of Syracuse Interconnected Signal System and the planned expansion of that system.

Proper mediation of video control is critical. For the Syracuse region, Table 1 provides the basis for control hierarchy relating to video images by stakeholder. The intent of this table is provide operational guidelines for **direct video feeds and control**, and is not intended to limit other means of video distribution to the general public or other agencies via Internet web sites, local media, or other public traveler information systems.

Table 1: Video Access and Control Mediation by Owning Agency & Stakeholder

CCTV Camera Owning Agency	Stakeholder	Primary Control	Secondary Control	View Only	No Direct Connection
City of Syracuse	City of Syracuse Dept. of Public Works (Traffic Engineering & Maintenance)	X			
	New York State Department of Transportation		X		
	Local Media			X	
	Onondaga County Department of Transportation			X	
	Onondaga County 911 Emergency Communications (ECD)		X		
New York State Department of Transportation	City of Syracuse Dept. of Public Works (Traffic Engineering & Maintenance)			X	
	New York State Department of Transportation	X			
	Local Media			X	
	Onondaga County Department of Transportation			X	
	Onondaga County 911 Emergency Communications (ECD)			X	

Based on NYSDOT’s plans for enhancing its video server and providing video to the Onondaga County 911 Emergency Communications and possibly to the media and general public, it is recommended that this video server act as the single point for video distribution throughout the region. Therefore video images from the City of Syracuse would be shared with NYSDOT and then be available to any other stakeholders that end up with a connection to the NYSDOT video server.

Physical System Maintenance

The Syracuse regional traffic signal and communication system will consist of an integrated system of hardware, technologies, and processes for performing an array of functions, including data acquisition, command and control, computing, and communications. Disruptions or failures in the performance of these functions can impact traffic safety, reduce system capacity, and ultimately lead the traveling public to lose faith in the transportation network. The problem is further complicated by the fact that today's systems, subsystems, and components often are highly interdependent, meaning that a single malfunction can critically impact the ability of the overall systems to perform their intended functions.

Physical maintenance of the system will follow the guidelines as highlighted in Table 2.

Table 2: Physical System Maintenance Responsibilities

Item	Maintenance Responsibility
City of Syracuse Traffic Signal Infrastructure	City of Syracuse
NYSDOT Traffic Signal Infrastructure	NYSDOT
City of Syracuse Communication System Infrastructure	City of Syracuse
NYSDOT Communication System Infrastructure	City of Syracuse
CCTV Cameras - City of Syracuse ROW	City of Syracuse
CCTV Cameras – NYSDOT ROW	NYSDOT
System Data Archiving / Data Repository	City of Syracuse
Facility Computer & Network Equipment – City of Syracuse	City of Syracuse
Facility Computer & Network Equipment – NYSDOT	NYSDOT
Other Agency ROW / Facility Infrastructure (IF APPLICABLE)	Other Agency

Regarding the NYSDOT Communication System Infrastructure referenced in Table 2 above, this only refers to communication infrastructure directly connecting NYSDOT traffic signals to the City of Syracuse traffic signal system. All other communication infrastructure of NYSDOT is separate from the Syracuse Interconnect Expansion Project and shall remain the responsibility of NYSDOT. The practice that has been in place since the signal system was implemented is the City of Syracuse owns and maintains the communication infrastructure serving the NYSDOT traffic signals connected to the

system. The demarcation line for maintenance responsibility is the fiber optic transceiver within the NYSDOT control cabinets. The City of Syracuse maintains all communication infrastructure up to and including the transceiver, while NYSDOT maintains everything else within and including the traffic signal cabinet. It is agreed that this maintenance practice and the areas of responsibility presented above will continue until further modified by the parties included in this memorandum of understanding.

NYSDOT is in the process of implementing solutions that will allow for the sharing of video images among various stakeholders throughout the region. As part of the Syracuse Interconnect Expansion Project, existing video and new cameras that will be added to the signal system by the City of Syracuse will be linked to the NYSDOT Region 3 TMC through the information exchange network. The majority of the communications infrastructure to facilitate this sharing of video will be implemented by the City of Syracuse through use of the signal system fiber optic interconnect and other fiber and communications equipment resources that have been installed by the City of Syracuse. Regarding the maintenance of this equipment, all equipment that has been purchased and installed by the City of Syracuse will be maintained by the City of Syracuse. Any communication equipment installed in NYSDOT facilities to allow for this exchange will be the property of and will be maintained by NYSDOT. Through the Technical Advisory Committee meetings, the issue of supporting the video distribution throughout the region has been discussed and NYSDOT has agreed that it will provide and maintain the equipment at its facilities necessary to support the video sharing. Communication infrastructure connections or equipment necessary for other agencies to gain access to the video distribution network will be the responsibility of each agency as will the maintenance of any required equipment or connections.

MEMORANDUM OF UNDERSTANDING

For

CENTRAL FLORIDA'S

REGIONAL TRANSPORTATION OPERATIONS CONSORTIUM

PURPOSE

This **MEMORANDUM OF UNDERSTANDING (MOU)** provides the framework and guidelines to promote coordinated decision-making and information sharing in planning, design, development and evaluation of Intelligent Transportation Systems (ITS) via a **REGIONAL TRANSPORTATION OPERATIONS CONSORTIUM (CONSORTIUM)**. This MOU is made by and among the Central Florida ITS Working Group members, collectively referred to as the **Parties**, and includes the following operating agencies:

FLORIDA DEPARTMENT OF TRANSPORTATION - DISTRICT 5
ORLANDO-ORANGE COUNTY EXPRESSWAY AUTHORITY
FLORIDA DEPARTMENT OF TRANSPORTATION - TURNPIKE
ORANGE COUNTY
SEMINOLE COUNTY
VOLUSIA COUNTY
CITY OF ORLANDO
CITY OF DAYTONA BEACH
CENTRAL FLORIDA REGIONAL TRANSPORTATION AUTHORITY d/b/a LYNX
UNIVERSITY OF CENTRAL FLORIDA - CENTER FOR ADVANCED
TRANSPORTATION SYSTEMS SIMULATION
FLORIDA HIGHWAY PATROL, TROOP D
OSCEOLA COUNTY
BREVARD COUNTY

CONCEPT

The **Parties** to this **MOU** recognize the importance of rapid dissemination of reliable, credible, real-time Regional Traveler Information, improved vehicular mobility, increased energy conservation and improved air quality and each will work in coordination and cooperation to establish a regional approach to Intelligent Transportation Systems (ITS), which includes a coordinated implementation of various transportation management technologies to facilitate regional mobility across jurisdictional lines.

The regional cooperative approach to ITS will be accomplished through a Regional Transportation Operations Consortium whose primary goal is to establish ITS performance standards that will provide interoperability among the regional partners.

OBJECTIVE

The objective of this **MOU** is to establish the organizational structure to promote coordinated decision-making and information sharing in planning, developing, and funding a Regional Transportation Operations Consortium of operating agencies within the Central Florida region for the deployment, operation and maintenance of ITS initiatives.

The primary Goals of all **Parties** are described below:

- Goal 1:** Safe and efficient transportation for residents, visitors and commerce
- Goal 2:** Protection of the public's investment in transportation
- Goal 3:** A region-wide interconnected transportation system that enhances Central Florida's economic competitiveness
- Goal 4:** Travel choices to ensure mobility, sustain the quality of the environment, preserve community values and reduce energy consumption
- Goal 5:** Safe and efficient evacuation efforts
- Goal 6:** Create a positive environment that allows for the development and deployment of ITS initiatives and leverage individual agency initiatives for regional benefit

It is desirable that all **Parties** enter into this **MOU**, which describes the working relationship and responsibilities in the operating and communication of all parties' respective Intelligent Transportation Systems and will maximize the involvement of all Parties in creating a Regional Transportation Operations Consortium in Central Florida.

All **Parties** executing this **MOU** agree to be responsible for their own acts and shall not be held responsible for the acts of any other agency executing this **MOU**.

ORGANIZATIONAL STRUCTURE

This **MOU** establishes an organizational structure for Central Florida's Regional Transportation Operations Consortium. This organizational structure will consist of three (3) tiers of "Coordination Teams" as described below:

1. **Agency Managers – Handle Day to Day Operations**
The Agency Managers shall be comprised of managers that are involved in the design, construction, operation and maintenance of Central Florida's various transportation management programs.
2. **Leadership Teams – Various ITS Public Partners that are involved in ITS.**
The Leadership Team shall be comprised of managers from public entities that administer or are involved in transportation management.

3. Executive Committee – Provides Overall Program direction. The Executive Committee shall consist of two committees:

- Florida Intrastate Highway System (FIHS) Executive Committee for operators of FIHS facilities
- Arterial Executive Committee for operators of arterials and other facilities

The FIHS and Arterial Executive Committees shall be comprised of a senior level executive or equivalent thereof.

Each Agency agrees to:

- Share all available data and information gathered from its traffic management or traveler information systems with other **Parties**
- Promptly share all available tourist, incident congestion or emergency information gathered from its traffic management or traveler information systems with other **Parties**
- Coordinate the implementation of ITS initiatives
- Pursue joint funding opportunities for collective implementation of ITS initiatives where participation of a **Party** in collective initiatives is subject to the agreement of that **Party**
- Coordinate to reduce vehicular delay from incidents and minimize response time
- Coordinate to improve emergency management communications for evacuations and major route closings, re-routings or restrictions

Notwithstanding the above, the parties should not be required to share information that is not subject to the Florida Public Records Act or is otherwise exempt therefrom.

All **Parties** executing this **MOU** commit to developing a Business Model for the **MOU** that will be reviewed and approved on an annual basis by the Executive Committee. The Business Model will include, but is not limited to, the following key areas:

- Roles of the three (3) Coordination Teams
- Decision Making Model for the MOU
- Definition of the Region
- Future Expansion of the Region
- Exchange of Information
- Identify Funding Opportunities
- Branding and Promotion

SOVEREIGN IMMUNITY

Each Party hereto agrees that it shall be solely responsible for the wrongful acts of its employees, officers and authorized agents to the extent provided under Section 768.28 Statutes. Nothing contained herein shall constitute a waiver by any party of its sovereign immunity under Section 768.28, Florida Statutes.

GENERAL PROVISIONS

All Parties executing this **MOU** recognize the following general provisions:

1. This MOU is not a binding contract, and each of the participants recognizes and acknowledges the individual constraints which may be imposed upon individual Consortium members because of such things as local regulations, specific state statutes, bonds, or other contractual covenants, agency policies and etc.
2. Each participating member of the Consortium has a specific constituency to which it has a primary duty and obligation, as well as, statutory or constitutional obligations generally described in the member's enabling legislation or charter.
3. Notwithstanding the provisions herein contained regarding the sharing of information, such sharing may be limited by individual agency policies or statutes or may be the subject of contractual non-disclosure, licenses or confidentiality agreements.
4. Consortium participants will exercise efforts in good faith, but no other Consortium member is entitled to contractually or otherwise rely upon such efforts, nor shall any member be subject to claims from another member because of failures or omissions.
5. Coordination in the implementation of Consortium initiatives does not impose an obligation upon any member to adopt or follow policies, equipment specifications, protocols or criteria in furtherance of a desire for uniformity.
6. Except as may be required by applicable law no Consortium member shall be required to comply with emergency management directives or plans where such compliance is inconsistent with or adverse to the practices and procedures of such member. No Consortium member shall be required to lift tolls unless so directed by the Governor in compliance with Florida Statutes

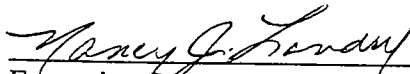
AGREEMENT EXECUTION: USE OF COUNTERPART SIGNATURE PAGES

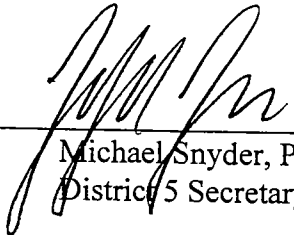
This **MOU**, and any amendments hereto may be simultaneously executed in multiple counterparts, each of which so executed shall be deemed to be an original, and such counterparts together shall constitute one and the same instrument. Notwithstanding any other provision herein to the contrary, this MOU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

Any party to this **MOU** may terminate its involvement with the Regional Transportation Operations Consortium provided that the party gives written notice of intent to terminate to all parties adhered to.

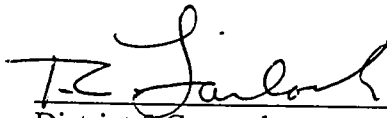
In WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION


Executive Secretary (Seal)

By: 
Michael Snyder, P.E.
District 5 Secretary

Approved as to Form, Legality and Execution:

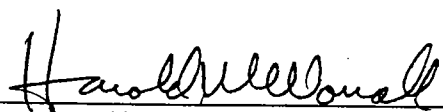

District 5 Counsel

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

Attest:

ORLANDO-ORANGE COUNTY
EXPRESSWAY AUTHORITY


Executive Secretary (Seal)

By: 
Harold Worrall, P.E.
Executive Director

Approved for the use and reliance of the
Orlando-Orange County Expressway Authority
only as to form and legality.

Date: 2/15/02


General Counsel

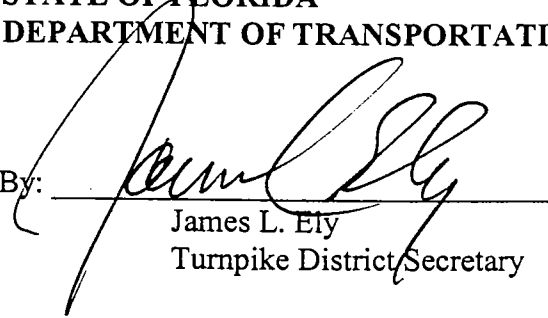
By: Alberto S. Bastonant, III
Sherman Denton & Eiden, P.A.

In WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

Attest:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

Elizabeth M. Becker
Executive Secretary (Seal)

By: 
James L. Ely
Turnpike District Secretary

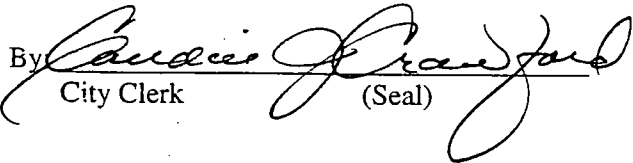
Approved as to Form, Legality and Execution:

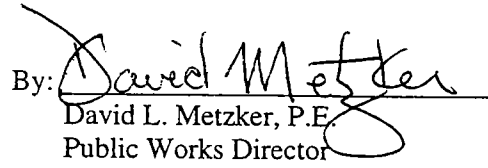
Jack R. Leonard
Turnpike District Counsel

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

Attest:


CITY OF ORLANDO

By: 
City Clerk (Seal)

By: 
David L. Metzker, P.E.
Public Works Director

In WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

**Center for Advanced Transportation Systems Simulation
University of Central Florida**

 Date 3/28/02
Essam Radwan, Ph.D, P.E.
Director
Center for Advanced Transportation
Systems Simulation

Approved as to Form,
Legality and Execution:

 Date 3/28/02
General Counsel
University of Central Florida

In WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

Attest:

SEMINOLE COUNTY, FLORIDA
DEPARTMENT OF PUBLIC WORKS

Sheralyn J. Brinson
(POLK)

By: Gary Johnson
Gary Johnson, P.E.
Director

05-June-2002



Sheralyn J. Polk
MY COMMISSION # CC780229 EXPIRES
October 4, 2002
BONDED THRU TROY FAIN INSURANCE, INC.

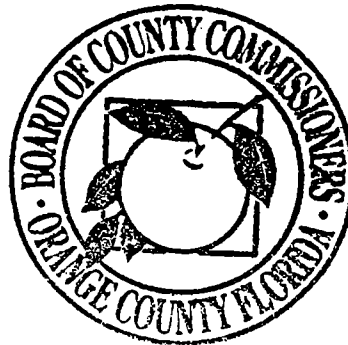
IN WITNESS WHEREOF, the parties have caused this MOU to be duly executed by their duly authorized representatives on the dates set forth below.

ORANGE COUNTY, FLORIDA
By: Board of County Commissioners

By: *Richard T. Crotty*
Richard T. Crotty
County Chairman

ATTEST: Martha O. Haynie, County Comptroller
As Clerk of the Board of County Commissioners

By: *Martha O. Haynie*
Martha O. Haynie
Deputy Clerk



Attest:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

Executive Secretary (Seal)

By: _____
Michael Snyder, P.E.
District 5 Secretary

Approved as to Form, Legality and Execution:

District 5 Counsel

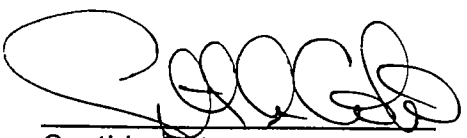
IN WITNESS WHEREOF, the COUNTY has caused this Memorandum of Understanding for Central Florida's Regional Transportation Operations Consortium to be executed in its behalf this 1st day of August, 2002, by the Chair of the Volusia County Council, authorized to enter into and execute same by Resolution Number 2002- 133 of the Council on the 1st day of August, 2002.

VOLUSIA COUNTY, FLORIDA

COUNTY COUNCIL
COUNTY OF VOLUSIA, FLORIDA

BY: 
Ann McFall
CHAIR

ATTEST:


Cynthia Coto
COUNTY MANAGER

In WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and your written.

STATE OF FLORIDA

Brevard County Public Works
Traffic Engineering Office

By: *Richard W. Thompson*
Richard W. Thompson, P.E.
Traffic Engineering Director

Approved as to Form, Legality and Execution:

Eileen Bentley
Assistant County Attorney

DEPARTMENT OF TRANSPORTATION

Executive Secretary (Seal)

By: _____
Michael Snyder, P.E.
District 5 Secretary

Approved as to Form, Legality and Execution:

District 5 Counsel

**FLORIDA HIGHWAY PATROL
TROOP D**

By: *C.R. Brown*
Major Cyrus Brown, Troop Commander

Date: 8-19-02


Attest:

Captain Paul W. McCarty
FLORIDA Highway Patrol

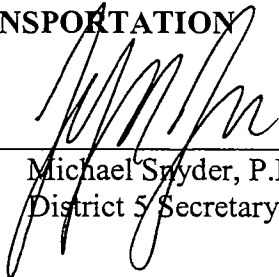
Date: 8/19/02

IN WITNESS WHEREOF, the parties have caused this instrument to be duly executed the day and year written.

**CENTRAL FLORIDA REGIONAL
TRANSPORTATION AUTHORITY**

By: 
Byron W. Brooks
Executive Director

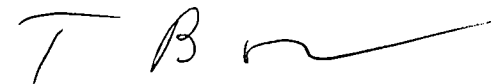
**STATE OF FLORIDA DEPARTMENT OF
TRANSPORTATION**

By: 
Michael Snyder, P.E.
District 5 Secretary

Attest:


Executive Secretary (seal)

Approved as to Form, Legality and Execution:


Tommy Boroughs, General Counsel
Holland & Knight, LLP

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

AND

THE ORLANDO ORANGE COUNTY EXPRESSWAY AUTHORITY

2002 ^{7/18/03 HAA} THIS AGREEMENT is made and entered into this 14 day of November, 2002, by and between the State of Florida Department of Transportation (hereinafter, "FDOT"), and The Orlando Orange County Expressway Authority (hereinafter, "OOCEA").

WITNESSETH:

WHEREAS, FDOT and OOCEA recognize the value of systemwide and regional real time traveler information systems and traffic/incident management systems; and

WHEREAS, FDOT and OOCEA have determined that a fiber optic communication network will provide the needed infrastructure for implementing systemwide and regional real time traveler and traffic/incident management systems; and

WHEREAS, FDOT and OOCEA have installed or may install conduit and fiber for their respective long-range use. Currently, not all conduit and fiber is being utilized by FDOT or OOCEA and the unused conduit and fiber is available for utilization (hereinafter, "Excess"); and

WHEREAS, the FDOT and OOCEA acknowledge each to the other that the utilization of Excess in the right-of-way of the other is a great value which cannot be calculated in dollars; and

WHEREAS, the FDOT has determined that it will allow OOCEA the free use of certain FDOT Excess in exchange for OOCEA allowing the FDOT free use of certain OOCEA Excess. If Excess is not available, FDOT and OOCEA will allow the use of their right-of-way to the other agency for the construction of a fiber optic system as more particularly described below.

NOW, THEREFORE, in consideration of the promises contained herein and for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the FDOT and OOCEA agree as follows:

1. **PROCESS.** FDOT and OOCEA agree to abide by the following process for obtaining the use of the other agency's Excess or to access the other agency's right-of-way for the installation of a fiber optic system.

A. Request for Use.

i. FDOT. The FDOT District Traffic Operations Engineer shall make a request in writing to the OOCEA Director of Construction and Maintenance for the use of OOCEA Excess. This request shall contain details about the number of fibers needed and the area of need. If, at the discretion of the OOCEA, it is determined that Excess is available, the OOCEA Director of Construction and Maintenance will approve the request in writing and provide information detailing the fibers or conduit to be designated for FDOT use.

ii. OOCEA. The OOCEA Director of Construction and Maintenance shall make a request in writing to the FDOT District Traffic Operations Engineer for the use of FDOT Excess. This request shall contain details about the number of fibers needed and the area of need. If, at the discretion of FDOT, it determines the Excess is available, the FDOT District Traffic Operations Engineer will approve the request in writing and provide information detailing the fibers or conduit to be designated for OOCEA use.

iii. Installation.

(a) FDOT. Prior to construction of the FDOT Projects, FDOT will submit a request for access to OOCEA right-of-way for the construction of the projects. After issuance of these approvals, FDOT may access OOCEA right-of-way and begin installation of the FDOT Projects.

(b) OOCEA. Prior to construction of the OOCEA Projects, OOCEA will submit a request for access to FDOT right-of-way for the construction of the projects. After issuance of these approvals, OOCEA may access FDOT right-of-way and begin construction of the OOCEA Projects.

iv. Unavailable Excess. If Excess is not available in a requested area, the requesting agency will have the option to perform fiber optic system installation as detailed below:

(a) Design.

(i) OOCEA will design the OOCEA Projects, as hereinafter defined, for installation within FDOT right-of-way in accordance with all applicable FDOT and OOCEA standards. In the event of a conflict between FDOT and OOCEA standards, the more stringent standards shall govern. A design plan prepared by OOCEA and signed and sealed by a professional engineer licensed in the State of Florida, will be required and will be subject to the review and approval of FDOT.

(ii) FDOT will design the FDOT Projects, as hereinafter defined, for installation within OOCEA right-of-way in accordance with all applicable FDOT and OOCEA standards. In the event of a conflict between FDOT and OOCEA standards, the more stringent standards shall govern. A design plan prepared by FDOT and signed and sealed by a professional engineer licensed in the State of Florida, will be required and will be subject to the review and approval of OOCEA.

v. Revocation. If the use of Excess is granted by either agency and that Excess is needed by the granting agency in the future for any reason, the requesting agency will be notified in writing and requested to vacate the Excess within 200 days. This time to vacate is anticipated to be sufficient to enable the vacating agency to design and build an alternate route.

2. Definitions. The terms "OOCEA Project" and "FDOT Project" are defined below.

a. "OOCEA Project" shall mean the installation of a fiber optic network system on FDOT right-of-way for OOCEA use. These projects may occur in locations approved by FDOT anywhere on the FDOT right-of-way where FDOT does not have excess fiber optic cable capacity. FDOT has the option of requesting OOCEA to install facilities in addition to the facilities being constructed as part of the OOCEA Projects for the exclusive use and property of FDOT. The cost for this additional work shall be reimbursed to OOCEA by FDOT.

b. "FDOT Project" shall mean the installation of a fiber optic network system on OOCEA right-of-way for FDOT use. These projects may occur in locations approved by OOCEA anywhere on the OOCEA right-of-way where OOCEA does not have excess fiber optic cable capacity. OOCEA has the option of requesting FDOT to install facilities in addition to the facilities being constructed as part of the FDOT Projects for the exclusive use and property of OOCEA. The cost for this additional work shall be reimbursed to FDOT by OOCEA.

3. FDOT Compensation. FDOT agrees OOCEA may construct the OOCEA Projects within the FDOT right-of-way; and further, FDOT agrees that it will not charge OOCEA for the use of such right-of-way. OOCEA agrees FDOT may construct the FDOT Projects within the OOCEA right-of-way; and further, OOCEA agrees that it will not charge FDOT for the use of such right-of-way.

4. Maintenance. FDOT and OOCEA will be responsible for maintaining their own facilities within the other agency's right-of-way. FDOT and OOCEA will be responsible for performing utility locates for their own facilities within the other agency's right-of-way on behalf of either party needing such locates, to protect the systems from accidental cuts and dig-ups. FDOT and OOCEA understand and agree that accidental cuts and dig-ups may occur causing damage to FDOT or OOCEA conduit and/or fiber and that each agency will expedite the repair of such damage on the facilities that they own and maintain. Each party's exposure risk, and consequently each party's sole remedy associated with accidental cut or dug-up facilities, is limited to the costs of repair of any cut or dug-up facilities. Neither party shall be liable for incidental or consequential damages arising from accidental cuts or dig-ups.

5. Access for Maintenance and Repair. OOCEA will notify and obtain approval from FDOT prior to accessing the OOCEA fiber optic network installed within FDOT right-of-way. FDOT will notify and obtain approval from OOCEA prior to any FDOT access of the FDOT fiber optic network installed within OOCEA right-of-way. Approval as required herein shall not be unreasonably withheld.

6. **Use.** OOCEA and FDOT may share the other agency's Excess or portions of the OOCEA or FDOT projects with third parties for transportation related purposes including traffic, regional traveler, and multi-modal information and data. OOCEA and FDOT shall require third parties to indemnify OOCEA and FDOT for losses attributable to interruption, or for providing alternate communication facilities during the interruption of any OOCEA or FDOT fiber.

7. **Tolls.** The FDOT and OOCEA and their employees and contractors shall at all times during construction and maintenance of the Projects, pay the applicable tolls.

8. **Disputes.** If construction/installation of the OOCEA Projects interfere with FDOT duties or responsibilities, the FDOT District Traffic Operations Engineer shall resolve all disputes involving traffic safety, construction, maintenance of traffic, and maintenance within the FDOT right-of-way that may occur by reason of construction/installation of the OOCEA Projects. If construction/installation of the FDOT Projects interfere with OOCEA duties or responsibilities, the OOCEA Director of Construction and Maintenance shall resolve all disputes involving traffic safety, construction, maintenance of traffic, and maintenance within the OOCEA right-of-way that may occur by reason of construction/installation of the FDOT Projects.

9. **No Property Interest.** FDOT and OOCEA agree that neither construction nor maintenance of fiber optic systems in the other agency's right-of-way shall operate to create or vest any real property interest in the right-of-way of the other.

10. **Relocation.** FDOT and OOCEA shall be responsible for all costs of relocation and for performing such relocation activities of their own fiber optic systems. FDOT and OOCEA agree to use their best efforts to avoid the need for relocation if and where possible.

11. **Sovereign Immunity.** Each party hereto agrees that it shall be solely responsible for the wrongful acts of its employee, contractors and agents. However, nothing contained herein shall constitute a waiver by either party of its sovereign immunity under Section 768.28, Florida Statutes.

12. **Term.** The term of this Memorandum of Understanding shall continue for as long as FDOT and OOCEA continue to use the other agency's Excess and/or operate and maintain their respective fiber optic systems in each other's right-of-way.

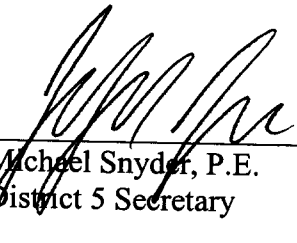
13. **Amendments.** Any revision to this Memorandum of Understanding shall require the written approval of both parties.

14. **Assignment.** This Memorandum of Understanding is intended for the exclusive privilege and benefit of the undersigned; any assignment to another agency, department, entity, or person, is strictly prohibited and shall vest in the non-assigning party the immediate right to termination, unless approved, in advance, by written instrument executed by both parties.

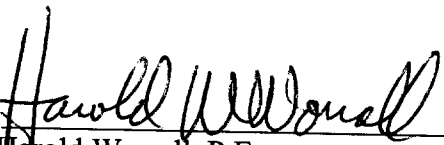
IN WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

**STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION**

**ORLANDO-ORANGE COUNTY
EXPRESSWAY AUTHORITY**

By: 

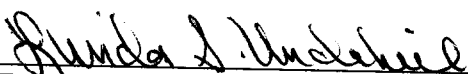
Michael Snyder, P.E.
District 5 Secretary

By: 

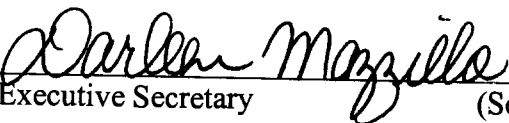
Harold Worrall, P.E.
Executive Director

Attest:

Attest:



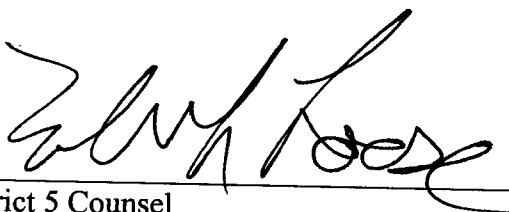
Executive Secretary (Seal)



Executive Secretary (Seal)


Reviewed Prior to Execution:

Approved for the use and the reliance of the
Orlando-Orange County Expressway
Authority only as to form and legality:



District 5 Counsel

Shutts & Bowen LLP

General Counsel
By: 

NONEXCLUSIVE REVOCABLE LICENSE AGREEMENT
by and between
FLORIDA DEPARTMENT OF TRANSPORTATION
and

W E S H - T V

This agreement is made and entered into by The Florida Department of Transportation - District 5, hereinafter "**FDOT**" whose office address is 719 South Woodland Blvd., DeLand, Florida 32720-6834 and WESH-TV, hereinafter "**Licensee**", whose office address is 1021 N. Wymore Road, Winter Park, Florida
32789.

WHEREAS, in the interest of public safety and convenience and for operational efficiency, the FDOT operates real time computerized motorist information systems which monitor traffic conditions on certain portions of interstate routes located within the District 5 regional area, and

WHEREAS, certain media networks provide traffic reports and other useful and beneficial information to the general public, and

WHEREAS, access to the real time motorist information system would assist the media networks in providing information regarding traffic flow in certain areas to the public.

NOW, THEREFORE, in consideration of the foregoing, the parties agree as follows:

1. The **FDOT** shall provide to Licensee the video images generated by FDOT's closed-circuit television cameras used for monitoring traffic conditions within the district pursuant to the terms and conditions contained herein. The video images provided shall be those selected by the FDOT control room operators from the images on the traffic surveillance monitors within the control room and that are consistent with the objectives of traffic management. This agreement grants to Licensee a non-exclusive revocable license to broadcast the video images provided to it by the FDOT. No other rights are granted by this agreement. This agreement is nonexclusive and nothing herein shall be deemed to limit the ability of the FDOT to provide the video images referenced herein to other parties.

2. The **Licensee** shall provide, operate, and maintain, at its own risk and expense, all equipment (including but not limited to the interface equipment to tie into the FDOT video matrix switcher). Licensee agrees to immediately move or relocate, at its sole expense, any or all of the equipment, hardware, or software at the request of FDOT. Licensee shall provide a

fully trained contact person who is fully responsible for the operation and maintenance of Licensee's equipment and all activities associated with this agreement. The FDOT shall have no responsibility to provide any training or supervision of Licensee's contact person associated with this agreement other than to allow the contact person to attend all briefings and/or training sessions provided by the FDOT which relate to the equipment, hardware, or software. The contact person shall have access to Licensee's equipment, hardware, and software between 8:00 a.m. and 5:00 p.m., Monday through Friday for purposes of maintenance, repair, replacement, or upgrading of said property of Licensee.

3. **Licensee** agrees to comply with all federal, state, and local laws and ordinances or regulations which relate to the license granted herein and to the use of the video images.

4. **Licensee** agrees that appropriate on-screen credit shall be given to the FDOT for use of the video images. The on-screen credit shall be given by way of a visual image of the FDOT logo or name during the entire duration of all broadcasts. The visual image shall be approved in writing by the FDOT prior to any use of the images by Licensee.

5. The closed-circuit video images provided by the **FDOT** pursuant to the terms of this agreement shall be determined by the FDOT in its sole discretion. The broadcast of the video images by Licensee shall be in accordance with the terms of an operation plan prepared by Licensee and reviewed and approved in writing by the FDOT. The FDOT does not guarantee the continuity of the video images, nor does it in any way warrant the accuracy or quality of the images provided.

6. The risk of use of the images is the sole responsibility of **Licensee** and it agrees to be fully and solely responsible for and to indemnify, defend, and hold harmless the State of Florida, and the FDOT, its agents, officers, and employees from any and all claims, damages, suit, actions or other proceedings for damages arising out of or in any way associated with the use of the video images by Licensee or in any way arising out of or associated with the license granted herein or arising out of Licensee's placement or removal or failure to remove its equipment, as provided herein.

7. The license granted herein is for the benefit of **Licensee** only. It is nonassignable and any attempt to assign, convey, transfer, or sublet this license without the prior written approval of the FDOT will terminate the license privileges granted to Licensee herein.

8. This license shall be terminable at will upon written notification by either party. In the event of termination by either party, Licensee shall remove all of its equipment, hardware,

and software within thirty days of the date of written notification of termination. If Licensee fails to remove its equipment, hardware or software within thirty days of written notice, the equipment, hardware and software which has not been removed shall be deemed to be abandoned and the FDOT may remove and dispose of, as it deems appropriate, any equipment, hardware, or software not removed by the Licensee.

9. FDOT agrees to provide the video images to Licensee at no charge. However, in the event Licensee causes damage to FDOT equipment or facilities as a result of use or activities associated with this agreement, Licensee shall immediately pay for or reimburse the FDOT for all damages it caused. In consideration of the FDOT providing the video real-time images to Licensee, Licensee ~~shall~~ ^{MAY NOT 11/23/98} provide to the FDOT access and use to all of Licensees' transportation and traffic data, including video feeds, transmitted from field devices, aircraft, weather, and emergency traffic information.

10. The terms of this agreement may be modified only in writing, signed by both parties hereto.

IN WITNESS WHEREOF, the parties to this agreement have signed this agreement as of the date written below:

WESH Television, Inc
LICENSEE

By: William P. Bauman
William P. Bauman
Vice Pres. General Mgr.

Date: 11-19-98

Attest:

J. Russell Kilgore Jr. 11/19/98
By: J. Russell Kilgore Jr.

STATE of FLORIDA
DEPARTMENT of TRANSPORTATION

By: Nancy M. Houston
Nancy M. Houston
District Five Secretary
Spinda S. Indalakis
Executive Secretary

Date: 12/28/98

Approved as to form, legality & execution:

George S. Lovell
District Counsel

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LICENSE AGREEMENT
BETWEEN
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AND
THE VIRGINIA DEPARTMENT OF TRANSPORTATION

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SCHEDULE 1

EXHIBIT A: STANDARD OPERATING PROCEDURE #19 (SOP #19)
STANDARD OPERATING PROCEDURE #33 (SOP #33)

EXHIBIT B: REQUEST FOR CABLE PLACEMENT (RCP)

EXHIBIT C: CERTIFICATE OF COMPLETION

EXHIBIT D: WMATA SYSTEM MAP

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 ¶
 SAMPLE 288 FIBER RATE¶
 ¶
 SAMPLE 432 FIBER RATE¶
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 SAMPLE 864 FIBER RATE¶
 ¶
 ... - PLUS SEPARATE 12-FIBER
 WMATA INSTALLED CABLE . ¶

LICENSE AGREEMENT

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THIS AGREEMENT (the "License Agreement") is made as of _____, 2006 by and between the **WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY** (hereinafter "WMATA"), a regional body corporate and politic, organized pursuant to Public Law 89-774, 80 Stat 1324; Maryland Acts of General Assembly, Chapter 869-1965; Virginia Acts of Assembly, Chapter 2-1966; and Resolution of DC Board of Commissioners adopted November 15, 1966; having its principal office and place of business at 600 Fifth Street, N.W., Washington, DC 20001 (hereinafter "WMATA"), and **The Virginia Department of Transportation**, having its principal place of business at 1401 East Broad Street, Richmond, Virginia 23219 hereinafter ("VDOT or "Licensee").

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a Delaware corporation

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RECITALS

WHEREAS, WMATA operates a public mass transit rail system in the Washington, D.C. metropolitan area as hereinafter defined (the "WMATA System"); and

WHEREAS, WMATA as part of its public mass transit rail system has constructed and maintains underground tunnels and surface transportation corridors (the "WMATA ROW"); and

WHEREAS, WMATA is willing to permit, on a non-exclusive license basis, to the extent it may lawfully do so, the installation and placement of _____ telecommunications facilities within the WMATA System; and

WHEREAS, WMATA has an existing system of conduits, fiber optic cables and associated equipment throughout the WMATA ROW; and

WHEREAS, VDOT wishes to construct and operate telecommunications facilities for public purposes;

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NOW, THEREFORE, for and in consideration of the mutual covenants and agreements set forth in this License Agreement, which Agreement is part of a Memorandum of Understanding (MOU) by and between these parties, the parties agree as follows:

ARTICLE 1. DEFINITIONS

The following terms, whether in the singular or in the plural, when used in this License Agreement and initially capitalized, shall have the meaning specified:

Conduit: A structure, usually underground or in a subway tunnel,

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containing one or more ducts.

WMATA Conduit Any combination of ducts, conduits, manholes, handholes and vaults, joined to form an integrated whole, and owned solely by WMATA excepting those ducts, etc. which, in WMATA's reasonable judgment, should be kept free of fiber optic cable and associated equipment for reasons of safety or because of anticipated interference with actual or anticipated construction or development.

Duct: A single enclosed raceway for wire conductors or fiber optic cables.

Metrorail Station: Any passenger station on the WMATA transit rail system.

Non-Revenue Hours: WMATA Non-Revenue Hours are:

Mondays through Fridays	0045 to 0400
Saturdays	0200 to 0600
Sundays	0200 to 0600
Holidays	0045 to 0600

The above schedule for Non-Revenue Hours is subject to change by WMATA, at its sole discretion, to reflect future operating requirements of the Metrorail System.

Notice to Proceed: WMATA's written communication authorizing VDOT to proceed with installation of the VDOT System in accordance with the WMATA approved shop drawings and installation schedule.

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Terminus Station: Any Metrorail Station where the VDOT System enters or exits the WMATA ROW (as hereinafter defined).

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Track Bed: The heavy rail track area comprising the WMATA System and any high-voltage and passenger areas in the immediate proximity of the track.

VDOT System: The optical fiber cable, inner ducts, conduits and associated appurtenances thereto, to be constructed and installed by VDOT under the terms of this License Agreement, as further

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described in Exhibits hereto and the associated rights to access such VDOT System components at demarcation points within the WMATA system as specified in Exhibits hereto. All facilities, including, but not limited to fiber optic cables, equipment and associated appurtenances thereto, owned and/or utilized by VDOT under the terms of this License Agreement which occupy the WMATA ROW (as hereinafter defined).

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WMATA ROW: WMATA's surface transportation corridors and underground tunnels.

WMATA System: WMATA Conduits, Metrorail Stations and the WMATA ROW.

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Deleted: 2.1 This License Agreement shall commence on the date of the execution hereof and shall remain in full force and effect for a period of ten (10) years (the "Initial Term"), unless terminated earlier as provided by this License Agreement.¶

ARTICLE 2. LICENSE AGREEMENT TERM

2.1 This License Agreement shall have the same Term as the Memorandum of Understanding (MOU) by and between these parties.

Deleted: 2.2 This License Agreement shall renew automatically for an additional ten (10) year term ("Renewal Term"), under the conditions set forth in Section 2.4, Article 4 and Article 10, unless WMATA is given written notice by one hundred eighty (180) days prior to the end of the initial Term that ___ does not intend to renew.¶

2.2 Upon expiration of this License Agreement , or upon termination of this License Agreement for any reason, and unless otherwise agreed by the parties, the VDOT System shall, at the sole and unfettered discretion of WMATA, either (a) become the property of WMATA or (b) at the written election of WMATA, be removed within six (6) months. In the event that the VDOT System becomes the property of WMATA pursuant to provisions of this Section, then VDOT shall execute appropriate documents, drafted by WMATA, evidencing WMATA's ownership.

2.3 Any renewal of this License Agreement is subject to Article 4. During the Renewal Term of this License Agreement, ___ shall have the right to expand the ___ System in WMATA's ROW in accordance with the provisions of this License Agreement at a cost to be determined as set forth in Section 10.4.¶

2.3 In the event that the VDOT System is to be removed pursuant to provisions of this Section, then such removal shall be at the sole cost and expense of VDOT but subject to such conditions concerning access, hours of operation and safety as may be reasonably imposed by WMATA.

2.4 Upon expiration of the Renewal Term of this License Agreement or the Initial Term if ___ elects not to renew this License Agreement, or upon termination of this License Agreement in consequence of ___'s default under Article 20 hereof, and unless otherwise agreed by the parties, the ___ System shall, at the sole and unfettered discretion of WMATA, either (a) become the property of WMATA or (b) at the written election of WMATA, be removed within six (6) months. In the event that the ___ System becomes the property of WMATA pursuant to provisions of this Section, then ___ shall execute appropriate documents, drafted by WMATA, evidencing WMATA's ownership.¶

2.4 For purposes of the maintenance and emergency repairs provisions of Article 9 of this Agreement, VDOT shall be privileged to effect like/kind replacement of fiber optic cable only to the extent necessary to properly maintain or repair the VDOT System. VDOT shall not replace originally installed fiber optic cable (except pursuant to Article 9) without the written permission of WMATA. In the event that VDOT desires to effect replacement of originally installed fiber optic cable with dissimilar equipment at any time during the term of this Agreement, then it shall notify WMATA of its intentions in writing, describing with particularity the replacement equipment. The parties shall then proceed to negotiate, in good faith, modifications to this License Agreement as may be appropriate in view of the capacities, uses and requirements of the replacement equipment.

ARTICLE 3. LICENSE

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3.1. WMATA grants to VDOT a non-exclusive license ("License") to construct, install, operate, maintain, upgrade and replace telecommunications facilities (the "VDOT System"), in, over, under, upon, across and through the WMATA System, the Track Bed and the Terminus Stations pursuant to the specific terms and conditions of this License Agreement.

3.2. WMATA grants to VDOT a non-exclusive license ("License") to lease from WMATA, to the extent, if any, that WMATA has no present use of fiber capacity and for a period of time to be determined solely at WMATA's discretion, existing fiber strands (the "WMATA Fibers") that WMATA has right, title and/or interest in or to in, over, under, upon, across and through the WMATA System pursuant to the specific terms and conditions of this License Agreement.

Deleted: 5. In the event that the _____ System is to be removed pursuant to provisions of this Section, then such removal shall be at the sole cost and expense of _____ but subject to such conditions concerning access, hours of operation and safety as may be reasonably imposed by WMATA.

3.3. No use or rights granted in this License Agreement shall create or vest in VDOT any easement or any other ownership or property rights of any nature whatsoever in the WMATA System or the WMATA Fibers or in any other property owned by WMATA.

3.4. WMATA's rights to maintain the WMATA System, and the WMATA Fibers and to operate such facilities in a manner as will best enable it to fulfill its own service requirements are in no way limited by this License Agreement.

3.6. Nothing contained in this License Agreement shall be construed as a limitation, restriction or prohibition against WMATA with respect to any joint use agreement, agreement, license or other arrangement which WMATA has entered into, or may in the future enter into (so long as any such future WMATA agreements do not act to limit or materially affect VDOT's rights, privileges and responsibilities under this License Agreement regarding the WMATA System).

ARTICLE 4. TITLE

4.1. All right, title and interest in all the WMATA System, the WMATA ROW, the WMATA Conduit System, the WMATA Fibers, the Track Bed and the Terminus Station provided by WMATA hereunder shall at all times remain exclusively with WMATA.

4.2. Subject to the provisions of Article 2, all right, title and interest in the VDOT System, constructed and installed at VDOT's expense, shall at all times during the Initial Term or Renewal Term of this License Agreement remain exclusively with VDOT.

ARTICLE 5. INSTALLATION SPECIFICATIONS

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5.1. VDOT shall at its own expense provide all labor, tools and equipment to effect installation of the VDOT System. WMATA shall assist VDOT (or VDOT's contractor(s)) with the provision of safety supervision, rail transportation and common temporary electrical power as required.

5.2. Installation of the VDOT System shall not physically conflict with or electrically interfere with WMATA's existing facilities or those of other WMATA licensees. **No PVC insulated cable is to be installed anywhere in the WMATA system. The VDOT System must be of low smoke, zero halogen, and low toxicity fiber.**

5.3. The VDOT System shall be installed in accordance with the requirements and Specifications of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the rules and regulations of the Occupational Safety and Health Act (OSHA), WMATA's safety rules and regulations and any governing authority having jurisdiction over the subject matter. If a difference in specifications exists, the more stringent shall apply.

5.4. The VDOT System will be installed during WMATA's Non-Revenue Hours, as defined in Article 1.

5.5. At each Metrorail Station between any two terminus Metrorail Stations, VDOT will leave a slack coil of at least fifty (50) feet of fiber optic cable for future service or emergency maintenance and splicing. The location of this slack coil will be in a non-track bed area as approved in writing by WMATA (either under the shop drawing procedure set forth in Section 7.5 or otherwise).

5.6. VDOT will make arrangements for use of Rights-of-Way beyond the WMATA System. Any construction on the WMATA System property to make the transition to other Rights-of-Way must be approved by WMATA in writing (either under the shop drawing procedure set forth in Section 7.5 or otherwise).

5.7. If any part of the VDOT System is not installed in accordance with this Article, VDOT shall correct the violation within sixty (60) days after receipt of written notice from WMATA.

5.8. Notwithstanding Section 5.7, when, in the reasonable opinion of WMATA such violation poses an immediate threat to the safety of WMATA's employees or the public, interferes with the performance of WMATA's then existing and current service requirements, or poses an immediate threat to the physical integrity of WMATA's facilities, WMATA may perform such work and/or take such action as it deems necessary to correct the violation without first giving written notice to VDOT and without subjecting itself to any liability. As soon as practicable thereafter, WMATA will advise VDOT in writing of the work performed or the action taken and will endeavor to arrange for re-accommodation of the VDOT System so

Deleted: 6 For purposes of the maintenance and emergency repairs provisions of Article 9 of this Agreement, _____ shall be privileged to effect like/kind replacement of fiber optic cable only to the extent necessary to properly maintain or repair the _____ System. _____ shall not replace originally installed fiber optic cable (except pursuant to Article 9) without the written permission of WMATA. In the event that _____ desires to effect replacement of originally installed fiber optic cable with dissimilar equipment at any time during the term of this Agreement, then it shall notify WMATA of its intentions in writing, describing with particularity the replacement equipment. The parties shall then proceed to negotiate, in good faith, modifications to this License Agreement as may be appropriate in view of the capacities, uses and requirements of the replacement equipment.

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3.2. WMATA grants to _____ a non-exclusive license ("License") to lease from WMATA, to the(... [2]

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affected. The parties agree that WMATA's actual costs incurred in actions undertaken pursuant to this Article 5.8 are to be reimbursed to WMATA upon reasonable request.

ARTICLE 6. PRE-INSTALLATION PROCEDURES

6.1. Within 10 days of the execution of this License Agreement, VDOT will designate and identify to WMATA:

(a) A VDOT administrative contact (authorized representative of VDOT);

(b) A VDOT contractor contact (authorized representative of VDOT's contractor/s);

6.2. Within 10 days of the execution of this License Agreement, WMATA will designate and identify to _____:

(a) A WMATA administrative contact (authorized representative of WMATA);

(b) A WMATA engineering contact;

(c) WMATA emergency contacts (including a 24 hour call roster).

6.3. The designated contacts or representatives shall be authorized to act in the respective party's behalf on those matters delegated to such individual. Each party may designate an alternate representative with authority to act in the absence of the designated contact or representative. Each party shall have the right to change its' designated contact or representative or alternate by written notice to the other.

6.4. The designated contacts or representatives shall act as liaison between the parties in order to provide effective cooperation, exchange of information and consultation in a prompt and orderly manner concerning the various matters which may arise in connection with this License Agreement.

6.5. Prior to the installation of any cables, all VDOT and VDOT contractor personnel involved in such installation must attend a WMATA provided track safety course. The date and time of such course shall be mutually agreed to by the parties.

ARTICLE 7. PRE-INSTALLATION REQUIREMENTS

Deleted: 5.5. At each Metrorail Station between any two terminus Metrorail Stations, _____ will leave a slack coil of at least fifty (50) feet of fiber optic cable for future service or emergency maintenance and splicing. The location of this slack coil will be in a non-track bed area as approved in writing by WMATA (either under the shop drawing procedure set forth in Section 7.5 or otherwise).¶

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5.6 At each Metrorail Station, _____ (_____) dark fibers within a separate fiber optic cable for WMATA's use shall be cut back, cleaned and placed on a fiber optic splice tray within the WMATA communications room or as directed by WMATA. If there is no space on the existing splice tray, _____ shall provide and maintain, at its own expense one splice tray on which the fibers will be terminated.¶

5.7. _____ will make arrangements for use of Rights-of-Way beyond the WMATA System. Any construction on the WMATA System property to make the transition to other Rights-of-Way must be approved by WMATA in writing (either under the shop drawing procedure set forth in Section 7.5 or otherwise).¶

Deleted: 5.8. If any part of the _____ System is not installed in accordance with this Article, and _____ has not corrected the violation within sixty (60) days after receipt of written notice from WMATA, WMATA may, at its option, correct said violation, and _____ shall be responsible for paying WMATA for any actual, reasona... [5]

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(b) An _____ contractor contact (authorized represe... [6]

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Deleted: c) A WMATA financial contact;¶

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7.1. Prior to the installation of any fiber optic cable, VDOT shall submit to WMATA a Request for Cable Placement (RCP) on the form shown as Exhibit B, attached hereto and made a part hereof. The RCP shall identify at a minimum: (a) two Terminus Stations; (b) desired start and end dates of installation; and (c) approximate fiber optic cable footage and the number of fibers to be installed.

7.2. WMATA shall respond in writing within fifteen (15) business days with preliminary approval to commence engineering. At that time, WMATA may also request in writing that work be coordinated with other similar activity being performed by WMATA. VDOT will make reasonable efforts to cooperate with WMATA's requests.

7.3. Upon WMATA's preliminary approval, VDOT will conduct an escorted walk-through or visual inspection of the proposed route. VDOT will make all efforts to use paper records and shop drawings to assist in accomplishing this task, such records to be made available by WMATA with the understanding by both parties that such records may not be current, accurate or complete.

7.4. VDOT shall provide WMATA with seven (7) sets of shop drawings on reproducible paper, indicating proposed attachments, conduit runs, trough installation, and direct burial or other placement methods. Such drawings will indicate where existing conveyance is in place as well as where new cable ladder, trough, or other hardware ("Hardware") is to be installed. VDOT shall supply and install any necessary hardware. Hardware shall remain the property of VDOT throughout the duration of cable ownership, except that WMATA may request use of the hardware for its internal communications needs at no charge, and VDOT will not unreasonably withhold approval of such request.

7.5. Within twenty (20) business days of receipt of the shop drawings WMATA shall approve the shop drawings and the requested schedule or advise VDOT of discrepancies or corrections required. VDOT shall not commence work until it has received WMATA's written "Notice-To-Proceed". Upon completion of the VDOT System, VDOT shall provide WMATA with accurate "as built" drawings of the entire system. As built drawings must be submitted on 3½ inch microdisk in AUTOCAD 2000 with one (1) hard copy for review.

7.6. In each instance where VDOT System facilities are proposed to be placed in the WMATA Conduit System, WMATA shall designate the particular Duct(s) to be occupied, the location and manner in which facilities will enter and exit the WMATA Conduit System and the specific location, manner of installation and type of Hardware which is permitted by WMATA to occupy the WMATA Conduit System. If, in its reasonable opinion, WMATA determines that certain types

of telecommunications facilities could materially interfere with the efficient and safe conduct of WMATA's operations, WMATA may prohibit VDOT from installing such types of facilities in the WMATA Conduit System, provided, however, that WMATA shall give VDOT a written explanation for such prohibition.

7.7. WMATA accepts no liability and waives no rights solely by reason of its approval of any of VDOT's drawings, plans, etc. or by conducting any inspections. WMATA's review and approval of drawings, plan, etc. shall not be construed as a warranty thereof.

ARTICLE 8. INSTALLATION PROCEDURES

8.1. After VDOT has received WMATA's written Notice-To-Proceed, VDOT shall provide all labor, tools, hardware and test equipment necessary for the proper installation of the VDOT System. WMATA shall provide track equipment to VDOT for the transport of equipment, if necessary, during the installation effort. VDOT's contractor's employees and sub-contractors will assemble at various staging areas to be designated by WMATA.

8.2. VDOT's contractor will be allowed access to the staging areas between the hours of midnight and 6:00 AM in order to brief and debrief subcontractors, and set up equipment. Post work cleanup must be accomplished during Non-Revenue Hours, as defined in Article 1. Physical work on track bed and station areas will be conducted during WMATA'S Non-Revenue Hours.

8.3. Routing path of fiber optic cable will first be prepared including cleaning, and installation of pull cords.

8.4. VDOT may request written permission from WMATA to perform installation work in non-track bed areas during Revenue Hours. Provided that such work does not interfere with Metrorail operations, and proper escort has been coordinated through General Orders/Track Rights (GOTRS), Standard Operating Procedure #19 (SOP #19) shown as Exhibit A, attached hereto and made a part hereof., WMATA shall approve VDOT's request.

8.5. During installation and once fiber optic cable is placed, WMATA may inspect the installation for safety and craftsmanship. Any discrepancies will be communicated to VDOT in writing, and VDOT shall have 15 calendar days to make the required corrections.

ARTICLE 9. MAINTENANCE/EMERGENCY REPAIRS

9.1. During the Initial Term or Renewal Term of this License Agreement, VDOT shall, at its own expense, maintain the VDOT System, including fiber optic cable installed in WMATA Conduit covered by this License Agreement in a safe

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condition and in a manner acceptable to WMATA, so as not to physically conflict or electrically interfere with the facilities attached thereon or placed therein by WMATA or any of WMATA's licensees.

9.2. Before VDOT may access the VDOT System in the WMATA Metrorail System, both non-track bed and track bed, VDOT must obtain WMATA's prior permission. WMATA's permission shall not be unreasonably withheld, delayed or denied, and will be entirely in accord with SOP #19 dealing with GOTRS escort/support request access procedures.

9.3. VDOT may request permission from WMATA to perform work in non-track bed areas during Revenue Hours. Provided that such work does not interfere with Metrorail operations, and proper escort has been coordinated through GOTRS, WMATA shall approve VDOT's request.

9.4. Notwithstanding the other provisions of this License Agreement, the parties acknowledge that the requirement placed on VDOT to receive prior permission from WMATA before entering the Metrorail System may cause undue hardship for VDOT in the event of an emergency affecting the VDOT System. In the event of an emergency, VDOT shall be permitted access to the VDOT System during Non-Revenue hours upon prior notice to WMATA, in keeping with standard WMATA emergency procedures as outlined in SOP's. Whenever possible, _____ shall give WMATA four (4) hours advance notice before requesting such access to the VDOT System.

9.5. In consideration of the fact that WMATA is in the primary business of providing public transportation, VDOT access to the track bed (high voltage, passenger areas, etc.) is limited to WMATA's Non-Revenue Hours as defined in Article 1. Only in an emergency situation which could have adverse impacts on the Metrorail System as determined by WMATA, shall WMATA consider giving _____ access to the track bed during Revenue Hours.

9.6. VDOT maintenance and repairs shall be performed by VDOT or its approved contractors who shall be qualified and bonded to perform this type of maintenance and/or repair.

9.7. The VDOT System shall be maintained in accordance with the requirements and specifications of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the rules and regulations of the Occupational Safety and Health Act (OSHA), WMATA's safety rules and regulations and any governing authority having jurisdiction over the subject matter. If a difference in specifications exists, the more consistent with physical reality shall apply.

9.8. If any part of the VDOT System is not maintained in accordance with this Article, and VDOT has not corrected the violation within sixty (60) days after

Deleted: 2. Before _____ may access the _____ System in the WMATA Metrorail System, both non-track bed and track bed, _____ must obtain WMATA's prior permission. WMATA's permission shall not be unreasonably withheld, delayed or denied, and will be entirely in accord with SOP #19 dealing with GOTRS escort/support request access procedures.

Deleted: 3. _____ may request permission from WMATA to perform work in non-track bed areas during Revenue Hours. Provided that such work does not interfere with Metrorail operations, and proper escort has been coordinated through GOTRS, WMATA shall approve _____'s request.

receipt of written notice from WMATA, WMATA may, at its option, correct said violation. The parties agree that WMATA should be reimbursed for its actual costs incurred pursuant to this Article 9.8, or Article 9.9, upon reasonable request.

9.9. Notwithstanding Section 9.8, where, in the reasonable opinion of WMATA, a maintenance violation poses an immediate threat to the safety of WMATA's employees or the public, interferes with the performance of WMATA's then existing and current service requirements, or poses an immediate threat to the physical integrity of WMATA's facilities, WMATA may perform such work and/or take such action as it deems necessary to correct the violation without first giving written notice to VDOT and without subjecting itself to any liability. As soon as practicable thereafter, WMATA will advise VDOT in writing of the work performed or the action taken and will endeavor to arrange for re-accommodation of the VDOT System so affected.

9.10. WMATA's manholes shall be opened only as permitted by WMATA's authorized employees or agents. VDOT shall be responsible for obtaining any necessary authorization to open manholes and to conduct work operations including the removal of any water. VDOT employees, agents or contractors will be permitted to enter or work in WMATA's manholes and or handholes only when an authorized employee or agent of WMATA is present. In an emergency, VDOT may request access to WMATA's manholes and/or handholes twenty-four (24) hours per day, seven (7) days per week by calling WMATA's Rail Operations Control Center at (202) 962-1652. WMATA's authorized employee or agent shall have the authority to suspend work operations in and around WMATA's manholes and/or handholes if, in the sole discretion of said employee or agent, any hazardous conditions arise, any unsafe practices are being followed, or the work may adversely affect WMATA's facilities. The presence of WMATA's authorized employee or agent is solely for the protection of WMATA's facilities and shall not relieve VDOT of its responsibility to conduct all of its work operations in a safe and workmanlike manner.

9.11. At all times when VDOT has access to WMATA's track bed or non-track bed area, VDOT employees, agents, and contractors shall be escorted by a WMATA employee in accordance with SOP#19.

ARTICLE 10. COMPENSATION

This License Agreement is entered into for and in consideration of execution of a Memorandum of Understanding between these parties. The parties, and each of them, stipulate that consideration for these agreements is appropriate and commercially reasonable.

ARTICLE 11. EXPENSES

Deleted: 4. Notwithstanding the other provisions of this License Agreement, the parties acknowledge that the requirement placed on _____ to receive prior permission from WMATA before entering the Metrorail System may cause undue hardship for _____ in the event of an emergency affecting the _____ System. In the event of an emergency, _____ shall be permitted access to the _____ System during Non-Revenue hours upon prior notice to WMATA, in keeping with standard WMATA emergency procedures as outlined in SOP's. Whenever possible, _____ shall give WMATA four (4) hours advance notice before requesting such access to the _____ System.

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Deleted: 6. _____ maintenance and repairs shall be performed by _____ or its approved contractors who shall be qualified and bonded to perform this type of maintenance and/or repair.

Deleted: 7. The _____ System shall be maintained in accordance with the requirements and specifications of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), the rules and regulations of the Occupational Safety and Health Act (OSHA), WMATA's safety rules and regulations and of ... [13]

Deleted: 9.9. Notwithstanding Section 9.8, where, in the reasonable opinion of WMATA, a maintenance violation poses an immediate threat to the safety of WMATA's employees or the public, interferes with the performance of WMATA's then existing and current service requirements, or poses an immediate threat to the ph(... [14]

11.1. VDOT shall be solely responsible for all costs associated with building the VDOT System.

ARTICLE 12. TAXES/MECHANIC'S LIENS/ENCUMBRANCES

12.1. VDOT shall be obligated to pay all taxes, assessments and other impositions upon its use of WMATA's ROW for the VDOT System. VDOT acknowledges that WMATA is tax-exempt pursuant to Title III of the Washington Metropolitan Area Transit Authority Compact, Public Law 89-774, 80 Stat. 1324, as some may be amended from time to time, and that such tax exemption does not inure to the benefit of VDOT.

12.2. VDOT shall pay, when due, all taxes, special assessments and governmental fees of any kind whatsoever, if any, which may be levied or assessed upon the VDOT

12.3. VDOT shall keep the WMATA ROW free from all liens, including mechanic's liens, and encumbrances resulting from its use or occupancy. Failure to do so shall constitute an event of default under Article 20 hereof.

ARTICLE 13. NON-EXCLUSIVITY

13.1. Nothing in this License Agreement shall be construed to require WMATA to be VDOT's exclusive provider of or contractor with respect to Rights-of-Way or to limit in any way VDOT's right in its own name to apply for and obtain municipal franchises, authorizations and permits, to construct, maintain and own fiber optic facilities, and to apply for and obtain pole attachment agreements, conduit licenses or other Rights-of-Way agreements from other Rights-of-Way providers.

ARTICLE 14. REPRESENTATIONS REGARDING AUTHORIZATIONS

14.1. WMATA hereby represents that it has the power and authority to own and operate the WMATA System, and to lease conduit rights in the WMATA ROW to VDOT for the operation and maintenance of the VDOT System and to perform the obligations required of WMATA under this License Agreement.

14.2. Subject to the provisions of Section 22.2, WMATA represents that installation of VDOT fiber optic cable, is not, in any section of the present WMATA System, precluded due to the existence or placement of other parties' cable or equipment in the system. VDOT and WMATA understand that those portions of the WMATA system which are, or will be, subject to construction, major repair or substantial rehabilitation will not be suitable for installation of VDOT's equipment until such projects are complete and that the provisions of this Section 14.2 do not

apply in the instances of such construction, major repair or rehabilitation.

14.3. VDOT hereby represents that it has the full right and authority under its authorizations to enter into this License Agreement and the execution and performance of its obligations under this License Agreement shall not conflict with, or constitute a default under, or constitute an event of termination under any of its authorizations.

ARTICLE 15. COMPLIANCE WITH LAW

15.1. VDOT shall perform its rights and obligations hereunder in accordance with the authorizations obtained by it and all applicable laws, rules and regulations imposed by any governmental authority.

15.2. VDOT, at its sole cost and expense, shall secure and maintain in effect all federal, state and local permits, licenses and other approvals required for the construction, operation and/or removal of the VDOT System, including zoning, building, health, environmental or communication service, and shall indemnify WMATA against payment therefore and against any fines or penalties that may be levied for failure to obtain any such applicable permits, licenses and other approvals. Upon WMATA's request, VDOT shall provide copies of all such permits, licenses and approvals.

ARTICLE 16. CONDEMNATION/RELOCATION OF SYSTEM

16.1. If at any time during the term of this License Agreement, all or a significant portion of the VDOT System or the WMATA System that includes the VDOT System shall be taken for any public or quasi-public purpose by any lawful power or authority by the exercise of the right of condemnation or eminent domain, either party may elect to terminate this License Agreement upon giving the other party sixty (60) calendar days prior written notice. Both parties shall be entitled to participate in any condemnation proceedings to seek to obtain compensation via separate awards for the economic value of their respective interests. In the event VDOT's interest in such proceeding cannot be severed from WMATA's interest, VDOT shall be entitled to receive its pro-rata share of the award for its interest in the VDOT System.

16.2. Upon receipt of a formal notice of condemnation or eminent domain, each party shall notify the other immediately of any condemnation proceeding filed against the portions of the WMATA System including the VDOT System, or the VDOT System alone. Each party shall also notify the other of any similar threatened condemnation proceeding and agrees not to sell the VDOT System or the WMATA System to such acquiring agency or other party in lieu of condemnation without prior written notice to the other.

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Deleted: work in WMATA's manholes and or handholes only when an authorized employee or agent of WMATA is present. In an emergency, _____

Deleted: request access to WMATA's manholes and/or handholes twenty-four (24) hours per day, seven (7) days per week by calling WMATA's Rail Operations Control Center at (202) 962-1652. WMATA's authorized employee or agent shall have the authority to suspend _____ work operations in and around WMATA's manholes and/or handholes if, in the sole discretion of said employee or agent, any hazardous conditions arise, any unsafe practices are being followed, or the work may adversely affect WMATA's facilities. _____ agrees to pay WMATA, as set out in Article 11, the charges for having WMATA's employee(... [15]

Deleted: 9.11. At all times when _____ has access to WMATA's track bed or non-track bed area, _____ employees, agent(... [16]

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¶ 10

Deleted: Upon completion of construction, installation and testing of any portion, line or segment of the _____ Sys(... [17]

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Deleted: The parties agree that no segment or portion of _____ fiber optic cable installed in a WMATA ROW shall be used(... [18]

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10.3. On each anniversary of the date of execution of this Agreement (the "Compens(... [19]

16.3. VDOT recognizes that, from time to time, WMATA may elect and/or be required to relocate the WMATA System and/or the VDOT System, or a portion thereof. All costs incurred in relocating the VDOT System which are not paid by a third party shall be paid by WMATA. WMATA shall use its best efforts to have the relocation conducted in a manner that will not cause any interruption in VDOT's use of the VDOT System. WMATA agrees to give VDOT at least six (6) months prior written notice of any relocation or of any governmental proceedings which might result in a relocation, or such lesser amount of notice as WMATA receives from such governmental authority, and VDOT shall have the right to participate in any such proceedings. If WMATA cannot relocate the VDOT System or the affected portion thereof, VDOT or WMATA may terminate this License Agreement upon giving at least thirty (30) calendar days written notice to the other party. Upon the effective date of termination undertaken in accordance with the provisions of the preceding sentence, this License Agreement shall become null and void and neither party shall have any further obligation to the other with respect thereto, except that the ownership provisions as set forth in Article 4 shall apply.

ARTICLE 17. PROPRIETARY INFORMATION

17.1. Each party acknowledges that, in the course of the performance of this License Agreement, it may have access to privileged and proprietary information claimed to be unique, secret and confidential, and which constitutes the exclusive property or trade secrets of the other, and the parties acknowledge that they are in a confidential relationship with each other. This information may be presented in documents marked with a restrictive notice or otherwise tangibly designated as proprietary or during oral discussions, at which time representatives of the disclosing party will specify that the information is proprietary. Each party agrees to maintain the confidentiality of the proprietary information and to use the same degree of care as it uses with regard to its own proprietary information to prevent the disclosure, publication or unauthorized use of the proprietary information. Neither party may duplicate or copy proprietary information of the other party other than to the extent necessary for legitimate business uses in connection with this License Agreement. A party shall be excused from these non-disclosure provisions in the event that (a) the proprietary information is required to be disclosed to a third party by virtue of an order of court or a government administrative commission, body or tribunal of competent jurisdiction, provided however, that the party from whom disclosure is sought shall use its best efforts to notify the other party of such order prior to effecting disclosure; (b) the proprietary information has been, or is subsequently, made public by the other party or is independently developed by such party, or (c) the other party gives its express, prior written consent to the disclosure of the proprietary information or if the disclosure is required by law or regulation. Notwithstanding anything to the contrary in this License Agreement, this provision shall survive the termination or expiration of this License Agreement.

Deleted: (a) The longitudinal footage shall be determined, for purposes of compensation calculations, to be the sum of (1) longitudinal footage described in all Certificates of Completion bearing dates prior to the current Compensation Date, and (2) the sum of longitudinal footage for all segments of _____ fiber optic cable which are not described in Certificates of Completion but which were, in WMATA's reasonable opinion, completed and capable of performing revenue service at least ninety days prior to the Compensation Date.¶

¶ (b) Compensation due for (1) segments of cable whose Certificates of Completion bear dates less than one year prior to the current Compensation Date and (2) for those segments described in 10.3(a)(2), above, shall be equitably prorated according to the portion of the year subsequent to the date on the Certificate of Completion. Compensation for segments of Cable with Certificates of Completion with dates less than one year prior to the current Completion Date shall be paid within ten (10) days of the Completion Date on the Certificate. Compensation with respect to segments described in 10.3(a)(2), shall be paid within ten (10) days of the first Compensation Date subsequent to ninety days after the date when the segment was capable of performing revenue service.¶

¶ c) Compensation for each segment is due when the segment is completed and at the rate as determined by the CPI-U at the time of completion pro-rated for the period remaining until the Agreement anniversary date (Compensation Date). On the Agreement anniversary date, Compensation is due for all completed segments or those within 90 days of completion as adjusted by the increase in the CPI-U, as below.¶

¶ 10.4. CPI Adjustment - The product of the compensation calculations performed according to Schedule 1 shall, for each annual payment subsequent to the first annual payment, be adjusted according to the provisions of this Sectf ... [20]

ARTICLE 18. INDEMNIFICATION

18.1. VDOT's contractor(s) and subcontractor(s), and their successors or assigns, shall indemnify and hold harmless WMATA, its directors, officers, employees, agents, licensees, and invitees from and against any and all claims, demands, costs, damages, losses, liabilities, joint and/or several, expenses of any nature (including reasonable attorney, accountant, and expert fees and disbursements), judgments, fines, settlements and other amounts (collectively "Damages") arising from any and all expenses, claims, demands, actions, suits or proceedings, civil, criminal, administrative or investigative (collectively "claims") relating to or arising out of:

(a) Any acts, errors or omissions of VDOT's contractors/subcontractors or employees thereof or any negligence or intentional misconduct by VDOT's contractor(s) and/or subcontractor(s) in the installation, maintenance or operation of the VDOT System or the conduct or management with regard to the VDOT System or the connections thereto;

(b) Any breach by VDOT's contractor(s) and/or subcontractor(s) of any obligation or covenant under this License Agreement;

(c) Any personal injury to, or death of, any person or persons, including without limitation agents or employees of WMATA, and any loss, damage, defacement or destruction of property, including without limitation any rolling stock or equipment owned, leased, or in the possession of WMATA or any property owned, leased, or in the possession of any entity authorized to use WMATA's Rights-of-Way, arising out of or incident to the activities, operations, or actions of VDOT's contractor(s) and/or subcontractor(s), their agents, officers or employees.

18.2. No claims for indemnification shall be made by any party against the other unless the aggregate amount of such claim, together with any other indemnifiable claims of such party, exceeds the amount of \$5,000. Any reasonable expenses incurred by any indemnified person pursuant to this Article in defending any civil or criminal action, suit or proceeding (or the threat thereof), other than a claim, action, suit or proceeding brought by the indemnifying party, shall be borne and paid by the indemnifying party in advance of the final disposition of such action, suit or proceeding (or the threat thereof) upon receipt of an undertaking by or on behalf of the indemnified person to repay to the indemnifying party the amount of such expenses if it shall ultimately be determined that such person is not entitled to the indemnification provided for under this Article. Any person asserting a right to indemnification under this Article shall so notify the indemnifying party in writing. If the facts giving rise to such indemnification involve any actual or threatened claim or demand by or against a third party, the indemnifying party shall be entitled to control the defense or prosecution of such claim or demand in the name of the indemnified person, if the indemnifying party notifies the

Deleted: (a) WMATA shall notify _____ no later than 30 days prior to the Compensation Date of (1) the Consumer Price Index for the Standard Metropolitan Statistical Area of Washington, D.C. (CPI-U) for the most recent whole year period (Current Year) as well as (2) the CPI-U from the date of execution (Base Year) of this Agreement. An increase in the Current Year CPI-U when compared to the Base Year CPI-U shall be computed by subtracting the Base Year CPI-U from the Current Year CPI-U and dividing the result by the Base Year CPI-U. Computation for the factor representing the increase in the CPI-U for each year shall be the CPI-U for that Year minus the CPI-U for the Base Year and that result divided by the Base Year CPI-U. In no event, shall Compensation be adjusted by a decrease in the CPI-U. ¶

¶ (1). Any payment made on the date of execution of the Agreement (also known as the "First Compensation Date") shall not be subject to a CPI-U adjustment. ¶

¶ (b) _____ shall pay WMATA an amount equal to the Total Compensation determined according to Schedule 1 of this Agreement as adjusted pursuant to Section 10.4(a). ¶

¶ (c). In the event that the CPI-U is converted to a different standard reference base or is otherwise revised, the determination of the amount of any adjustment shall be made by the use of such other factor, formula, or table for converting the CPI-U as may be published by the Bureau of Labor Statistics or, if said Bureau shall not publish same, then with the use of such conversion factor, formula or table as may be published by any reputable, nationally recognized publisher of statistical information. If the CPI-U ceases to be published, and there is no successor thereto, such other index as the parties may agree upon in writing will be substituted therefor. If WMATA and _____ are unable to agree as to such substituted index, then the matter will be resolved according to Article 27 of this Agreement. ¶

... [21]

indemnified person in writing of its intention to do so within twenty (20) days of the receipt of such notice by the indemnified person. The indemnified person shall have the right, however, to participate in such proceeding through counsel of its own choosing, which participation shall be at its sole expense. Whether or not the indemnifying party chooses to defend or prosecute such claim, each indemnified person and WMATA or VDOT's contractor(s) and/or subcontractor(s), whichever is not the indemnifying party, shall, to the extent requested by the indemnifying party and at the indemnifying party's expense, cooperate in the prosecution or defense of such claim and shall furnish such records, information and testimony and attend such conferences, discovery proceedings, hearings, trials and appeals as may reasonably be requested in connection therewith.

18.4. The provisions of this Article shall survive the termination of this License Agreement. VDOT shall assure that (1) its contracts with contractor(s) to build and maintain the VDOT System reflect the indemnification obligations stated in this Section 18; (2) VDOT contracts with contractor(s) and subcontractor(s) to build and maintain the VDOT System shall all recite that WMATA is a third party beneficiary of such contracts and (3) WMATA shall be provided with copies of all such VDOT contracts prior to the start of any construction on the VDOT System.

ARTICLE 19. INSURANCE

19.1. VDOT's contractor(s) and/or subcontractor(s) shall maintain or cause to be maintained, during all times when said contractor(s) and/or subcontractor(s) are, or may be, present on WMATA property, insurance of the following types, including coverage for maintenance and repair, with the limits set forth below:

(a) Commercial General Liability: A comprehensive Commercial General Liability policy including coverage for independent contractors, Completed Operations Liability and Contractual Liability, with a combined single limit of liability of not less than \$2,000,000 per occurrence for bodily injury and property damage.

(b) Worker's Compensation: A policy complying with the requirements of the applicable Worker's Compensation law or similar laws of the state or other political division having jurisdiction over the employee, and Employer's Liability with a limit of liability of \$500,000 for each occurrence. Such policy shall also comply, if applicable with the U.S. Longshoremens and Harbor Workers' Act, Jones Act or Admiralty Laws and the Federal Employers' Liability Act. Such policy shall further include coverage for occupational diseases with a limit of liability of \$500,000 for each employee.

(c) Automobile Liability Insurance: An insurance policy covering use of all owned, non-owned and hired vehicles with a combined single limit of not less than \$1,000,000 per occurrence for bodily injury and property damage.

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¶ 11.3. WMATA may demand further advances from _____ if WMATA determines that costs associated with this project will exceed the initial deposit. _____ shall provide additional advance funds upon written notice from WMATA accompanied by a breakdown of the advance funds requested. If _____ does not provide the requested funds in a timely fashion, WMATA will cease all work on its part, and no further access to the WMATA system will be provided under this License Agreement, until such funds are provided.¶

¶ 11.4. _____ shall also reimburse WMATA for any escort services required to perform maintenance of _____ System during the term of this License Agreement. ¶

¶ 11.5. The only situation in which _____ shall not reimburse WMATA is in the case of damage to the _____ System caused solely by WMATA.¶

¶ 11.6 To the extent WMATA or _____ (the Invoicing Party) is entitled to charge the other party based on the Invoicing Party's costs, time or materials, the Invoicing Party shall keep such books and records (which books and records shall be maintained on a consistent basis and substantially in accordance with generally accepted accounting principles) as shall readily disclose the basis for any charges or credits, ordinary or extraordinary, billed or due to the other party under this Agreement and shall make them available for examination, audit and reproduction for a period of [22]

(d) Railroad Protective Liability: An insurance policy issued to WMATA covering the liability of the contractor and/or subcontractor for the work to be performed on or adjacent to WMATA's operating railroad property for any bodily injuries or deaths or any damage to the property, equipment and facilities of WMATA caused by the activities of the contractor and/or subcontractor resulting from this work. Such insurance shall be written on the ISO form and with limits of \$5,000,000 Combined Single Limit for Bodily Injury and Property Damage with a \$10,000,000 annual aggregate.

19.2. Insurance companies providing the insurance coverages required by this Article must be rated by A.M. Best or a comparable rating company and carry at least an "A" rating. All insurance shall be procured from insurance companies licensed and authorized to do business in Virginia.

19.3. WMATA shall be named as an Additional Insured on all liability insurance policies required by this License Agreement, except Worker's Compensation.

19.4. Upon request, VDOT's contractor(s) and/or subcontractor(s) shall provide WMATA with Certificates of Insurance evidencing that the above-required insurance policies are in force. Such certificates shall be provided prior to the commencement of work. The requisite insurance policies shall not be canceled, modified (except to increase the amount of coverage) or terminated without thirty (30) calendar days written notice to WMATA's Office of Risk Management.

19.5. VDOT hereby waives subrogation against and releases WMATA from all liability covered by VDOT's contractor's or subcontractor's insurance for losses or claims arising out of VDOT's contractor's or subcontractor's activities pertinent to this License Agreement.

ARTICLE 20. EVENTS OF DEFAULT

20.1. Each of the following events shall constitute an event of default (whether any such event shall be voluntary or involuntary or occur by operation of law or pursuant to any judgment, decree, order, rule or regulation of any court or administrative or governmental body) if such event of default is not cured within thirty (30) calendar days of receipt of notice of such event of default to the defaulting party (except in the case of default in payment):

(A) the failure of VDOT's contractor(s) and/or subcontractor(s) to carry and maintain insurance in compliance with Article 19;

(B) the failure of either party to perform or observe any material covenant to be performed or observed by it pursuant to the License Agreement hereunder;

Deleted: ARTICLE 13. NON-EXCLUSIVITY

¶ 13.1. Nothing in this License Agreement shall be construed to require WMATA to be _____'s exclusive provider of or contractor with respect to Rights-of-Way or to limit in any way _____'s right in its own name to apply for and obtain municipal franchises, authorizations and permits, to construct, maintain and own fiber optic facilities, and to apply for and obtain pole attachment agreements, conduit licenses or other Rights-of-Way agreements from other Rights-of-Way providers.¶

ARTICLE 14. REPRESENTATIONS REGARDING AUTHORIZATIONS

¶ 14.1. WMATA hereby represents that it has the power and authority to own and operate the WMATA System, and to lease conduit rights in the WMATA ROW to _____ for the operation and maintenance of the _____ System and to perform the obligations required of WMATA under this License Agreement.¶

... [23]

Deleted: 16.2. Upon receipt of a formal notice of condemnation or eminent domain, each party shall notify the other immediately of any condemnation proceeding filed against the portions of the WMATA System including the _____ System, or the _____ System alone. Each party shall also notify the other of any similar threatened condemnation proceeding and agrees not to sell the _____ System or the WMATA System to such acquiring agency or other party in lieu of condemnation without prior written notice to the other.¶

¶ 16.3. _____ recognizes that, from time to time, WMATA may elect and/or be required to relocate the WMATA System and/or the _____ System, or a portion thereof. All costs incurred in relocating the _____ System which are not paid by a third party shall be paid by WMATA. WMATA shall use its best efforts to have the relocation conducted in a manner that will not cause any interruption in _____'s use of the _____ System. WMATA agrees to give _____ at least six (6) months' [24]

ARTICLE 21. REMEDIES

21.1. Upon the occurrence and during the continuance of any event of default, the parties' remedies shall be governed by Section 10.1 Of the MOU.

21.2. Notwithstanding any other provision of this License Agreement, in no event shall WMATA be liable for special, consequential, exemplary or punitive damages as a result of the performance or nonperformance of its obligations under this License Agreement.

ARTICLE 22. FORCE MAJEURE

22.1. Neither party shall be liable to the other for any failure of performance under this License Agreement due to causes beyond its control, including but not limited to: acts of God, fire, flood or other catastrophes; any law, order, regulation, direction, action or request of the United States Government, or of any other government, including state and local governments having or claiming jurisdiction over such party, or of any department, agency, commission, bureau, corporation or other instrumentality of any one or more of these federal, state or local governments, or of any civil or military authority; national emergencies; unavailability of materials or Rights-of-Way; insurrections; riots; wars; or strikes, lock-outs, work stoppages or other labor difficulties (collectively, "force majeure events").

ARTICLE 23. ORDERLY TERMINATION

23.1. Upon expiration or earlier termination of this License Agreement, WMATA and VDOT agree to cooperate with each other in good faith to achieve an orderly termination.

ARTICLE 24. OBLIGATIONS OF VDOT

24.1. In addition to the obligations of set forth elsewhere in this License Agreement, VDOT shall:

(a) have full and complete control, responsibility and liability for the signals distributed over the fiber optic components of the VDOT equipment located in the WMATA ROW by VDOT or for its benefit;

(b) have full and complete control, responsibility and liability for the purchase, installation, construction and maintenance of the terminals and peripheral equipment connected to the fiber optic components of the VDOT equipment located in the WMATA ROW pursuant to the License granted by

WMATA:

(c) employ its own employees, agents and/or independent contractors in the handling, storage, retrieval, processing, transmitting, and/or receiving of any electronic signals distributed over the fiber optic components of the VDOT equipment located in the WMATA ROW; and

(d) have full and complete control, responsibility and liability for operating and maintaining any operating authority from any federal, state or local governmental body or agency that relates to the activities of VDOT under this License Agreement.

ARTICLE 25. ASSIGNMENTS

26.1. Neither party shall assign, transfer, delegate or in any other manner dispose of, any of its rights, privileges or obligations under this License Agreement without the other party's prior written consent which shall not be unreasonably withheld or delayed.

ARTICLE 26. MISCELLANEOUS

28.1. Counterparts. This License Agreement may be executed in counterparts each of which shall be deemed an original and all of which together shall constitute one and the same instrument, and in pleading or proving any provision of this License Agreement, it shall not be necessary to produce more than one complete set of such counterparts.

28.2. Captions/Gender. Article and section headings contained in this License Agreement are for reference purposes only and shall not in any way affect the meaning or interpretation of this License Agreement. Whenever used herein the singular number shall include the plural, the plural shall include the singular, and the use of any gender shall include all genders.

IN WITNESS WHEREOF, the parties hereto have caused this License Agreement to be executed by their duly authorized representatives as of the date first above written.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

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Deleted: Each party acknowledges that, in the course of the performance of this License Agreement, it may have access to privileged and proprietary information claimed to be unique, secret and confidential, and which constitutes the exclusive property or trade secrets of the other, and the parties acknowledge that they are in a confidential relationship with each other. This information may be presented in documents marked with a restrictive notice or otherwise tangibly designated as proprietary or during oral discussions, at which time representatives of the disclosing party will specify that the information is proprietary. Each party agrees to maintain the confidentiality of the proprietary information and to use the same degree of care as it uses with regard to its own proprietary information to prevent the disclosure, publication or unauthorized use of the proprietary information. Neither party may duplicate or copy proprietary information of the other party other than to the extent necessary for legitimate business uses in connection with this License Agreement. A party shall be excused from these non-disclosure provisions in the event that ... [25]

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Deleted: ARTICLE 18. INDEMNIFICATION

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Deleted: 18.1. _____, its successors or assigns, shall indemnify and hold harmless WMATA, its directors, officers, employees, agents, licensees, and invitees from and against at ... [26]

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(a) Any acts, errors or omissions of _____, its agents, contractors or employees or any negligence or intentional misconduct by _____ in the installation, maintenanc ... [27]

Signature

Print or Type Name of Signer

Title of Signer

Date

ATTEST:

Signature :

VIRGINIA DEPARTMENT OF TRANSPORTATION

Signature

Print or Type Name of Signer

Title of Signer

Date

ATTEST:

Signature

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Deleted: (c) Any failure of any representation or warranty made by _____ herein to be true in any material respect as of the date made or deemed made;¶

¶
(d) Any claim by any customer of _____ relating to the provision by _____ of telecommunications services to such customer over the _____ System; and¶

¶
(e) Any personal injury to, or death of, any person or persons, including without limitation agents or employees of WMATA, and any loss, damage, defacement or destruction of property, including without limitation any rolling stock or equipment owned, leased, or in the possession of WMATA or any property owned, leased, or in the possession of any entity authorized to use WMATA's Rights-of-Way, arising out of or incident to the activities, operations, or actions of _____, its agents, contractors or employees.¶

¶
18.2. To the extent permitted by law WMATA shall indemnify and hold harmless _____, its employees, agents, licensees, and customers from and against any and all claims, demands, costs, damages, losses, liabilities, joint and/or several, expenses of any nature relating to or arising out of the gross negligence or willful and/or wanton misconduct of WMATA or its employees. Provided, however, that WMATA's total liability under this Article 18.2 shall, in no event, include consequential, special or punitive damages nor shall WMATA's liability exceed in cases of physical damage to _____ equipment, the reasonable cost(s) of repair or replacement of that equipment. ¶

... [28]

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SCHEDULE 1

I. Definitions

Certificate of Completion - shall mean that document referred to in Section 10.1 of this Agreement.

Greatest Number of Fibers - shall mean the greatest number of _____ optical fibers in any cross section of a single fiber optic cable in any portion of a WMATA ROW described in any Certificate of Completion.

Segment Compensation - shall mean the compensation as determined under Section II, below, for the longitudinal footage of fiber optic cable, excluding the fifty (50) feet of slack fiber optic cable under each platform, described in each Certificate of Completion. Segment Compensation for sections or segments of fiber optic cable described in Certificates of Completion bearing dates less than one year prior to the current Compensation Date shall be equitably prorated to reflect that portion of the year subsequent to the date of the Certificate of Completion.

Total Compensation - shall be the arithmetic sum of all Segment Compensation calculations for all Certificates of Completion dated on or before the Compensation Date.

II. General Compensation Methodology

(A) Segment Compensation shall be determined by multiplying the longitudinal footage of fiber optic cable described in the Certificate of Completion by the Cost per Cable Foot described below. The Greatest Number of Fibers contained in a single fiber optic cable shall determine the appropriate multiplier. In cases where two or more fiber optic cables are located in any portion of a WMATA ROW, a segment compensation calculation shall be performed for each such cable. WMATA fibers shall not be considered in any of the calculations made pursuant to Article 10 of this Agreement.

(1) For any fiber optic cable with up to 132 fibers, the compensation per longitudinal foot per year shall be \$4.50.

(2) For any fiber optic cable with more than 132 but less than 217 fibers, the compensation per longitudinal foot per year shall be the amount

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equal to \$4.50 for the first 132 fibers plus an amount equal to \$.02250 times the number of fibers in excess of 132 fibers.

(3) For any fiber optic cable with 217 or more fibers, the compensation per longitudinal foot per year shall be the amount equal to \$4.50 for the first 132 fibers plus an amount equal to \$.02250 times the next 84 fibers plus an amount equal to \$.01125 times the number of fibers in excess of 216 fibers.

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B) Notwithstanding the provisions of Section II(A) of this Schedule A, _____ shall pay WMATA no less than the sum of \$_____/longitudinal foot per year for all fiber optic cable, excluding exit or entrance cable, mentioned or described in Certificates of Completion which bear dates prior to the date when the aggregate longitudinal footage of the _____ System, as described in Certificates of Completion, equals twenty miles.

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III. Incentive Compensation Methodology

(A) The provisions of this Section III, Schedule 1 shall only apply if the longitudinal footage of fiber optic cable described in Certificates of Completion for which _____ paid compensation on a Compensation Date equaled or exceeded twenty miles in length (the "Milestone Year"). Under no circumstances shall the Incentive Compensation Methodology for any segment, as described in Sections III (B) 1, 2, and 3, Schedule 1, as follows, result in a Compensation per longitudinal foot per year of less than \$4.50.

(B) On the Compensation Date following the first Compensation Date in which the condition of Section III(A) is satisfied, and provided that the condition continues to be satisfied, WMATA shall effect the following adjustments to the Total Compensation:

(1) Compensation for the first twenty miles of the _____ system shall be determined in accordance with Section II of this Schedule.

(2) Compensation for system lengths in excess of twenty miles but less than forty miles shall be determined by adding the compensation due under Section III(B)(1) to an amount equal to 90% of the Total Compensation otherwise due for the increment in excess of twenty miles.

(3) Compensation for system lengths in excess of forty miles shall be determined by adding the compensation due under Section III(B)(2) to an amount equal to 85% of the Total Compensation otherwise due for the increment in excess of forty miles.

EXHIBIT B

REQUEST FOR CABLE PLACEMENT (RCP)

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TO: WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

FROM:

In accordance with the terms of the License Agreement dated _____, 2001 between WMATA and _____ (_____), a request is hereby made for the installation and/or placement of Communication Facilities within the following portion of the WMATA ROW.

LOCATION: _____ (Include two Terminus Stations)

DESIRED START AND END DATES OF INSTALLATION:

APPROXIMATE CABLE FOOTAGE TO BE INSTALLED:

NUMBER OF FIBERS: _____ **Fibers**
(for / for WMATA)

ADDITIONAL COMMENTS:

Preliminary approval granted _____, 19

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

Signature

Print or Type Name of Signer

Title of Signer

EXHIBIT C

CERTIFICATE OF COMPLETION

TO: **WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY**

FROM: _____

In accordance with the terms of the License Agreement dated between WMATA and _____ (_____), an installation and/or placement of Communication Facilities within the following portion of the WMATA ROW was completed.

LOCATION:

END DATE OF INSTALLATION AND TESTING: _____
(Include two Terminus Stations)

CABLE FOOTAGE INSTALLED: _____

NUMBER OF FIBERS: _____ **Fibers**
(_____ for / _____ for WMATA)

ADDITIONAL COMMENTS: _____

Signature

Print or Type Name of Signer

Title of Signer

Date

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

Signature

Print or Type Name of Signer

Title of Signer

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COUNTYWIDE ATMS / ITS TRAFFIC SIGNAL
INTERLOCAL AGREEMENT

Agreement Between Pinellas County and
The City of Clearwater

Date March 2, 2006

COUNTYWIDE ATMS / ITS TRAFFIC SIGNAL
INTERLOCAL AGREEMENT

THIS AGREEMENT, made and entered into on the ____ day of _____, 2006, by and between Pinellas County, a political subdivision of the State of Florida, hereinafter referred to as the COUNTY, and the City of Clearwater, a municipal corporation, hereinafter referred to as the CITY,

WITNESSTH, That:

WHEREAS, this Agreement is made and entered between parties pursuant to Section 163.01, Florida Statutes, the “Florida Interlocal Cooperation Act of 1969”, and

WHEREAS, the COUNTY and CITY desire to foster an atmosphere of cooperation, which will afford advantages to the citizens and businesses within the municipal boundaries and in the unincorporated area, and

WHEREAS, it is beneficial to all citizens throughout the County that the governments cooperate to address community needs in matters affecting health, safety, welfare, economic conditions and countywide mobility, and

WHEREAS, the COUNTY and CITY have determined that it is of mutual benefit to centralize traffic signal operations on specified arterial roads and other major thoroughfares, across municipal boundaries, establishing an Advanced Traffic Management System (ATMS), for the most efficient operations of those facilities on a countywide basis, and

WHEREAS, the COUNTY and CITY have determined that it is of mutual benefit to centralize Intelligent Transportation Systems (ITS) on specified arterial roads and other major thoroughfares across municipal boundaries, for the safest and most efficient operation of those facilities on a countywide basis, and

WHEREAS, the CITY presently has traffic control authority to carry out the matters authorized by Section 316.006(2), Florida Statutes on ATMS / ITS corridors within the city limits; and

WHEREAS, Section 125.01(p), Florida Statutes, authorizes counties to enter into agreements with other governmental agencies within or outside the boundaries of the county for joint performance, or performance by one unit in behalf of the other, of any of either agencies authorized functions.

WHEREAS, the Pinellas County Charter, Section 2.04(q), provides that County government has all powers necessary to transfer the functions and powers of any other

governmental agency upon approval by the governing body of that agency and the Board of County Commissioners, and

WHEREAS, Section 335.0415, Florida Statutes, authorizes that public roads may be transferred between jurisdictions only by mutual agreement of the affected governmental agencies.

WHEREAS, the COUNTY and CITY have determined that it is beneficial to transfer the responsibility for operation and maintenance all traffic control devices on any roadway to the COUNTY once ATMS / ITS equipment is installed, as per the implementation plan, and

WHEREAS, the COUNTY has agreed to assume the current funding obligation for the operations transferred hereunder, pursuant to the terms of this Agreement, and

WHEREAS, the COUNTY and CITY have determined that it is of mutual benefit to contract or transfer traffic signal maintenance between the CITY and the COUNTY for certain ATMS and non-ATMS traffic signals, and

WHEREAS, the COUNTY will establish, administer, manage, operate and maintain the Pinellas Countywide Primary Control Center, also known as the Pinellas County Regional Transportation Management Center, hereinafter referred to as the PCC, to provide for the ATMS and ITS.

NOW THEREFORE, the parties, in consideration of mutual promises herein contained, and for other goods and valuable consideration, receipt of which is hereby acknowledged by all parties, hereby agree as follows:

SECTION 1 GENERAL

It is mutually agreed that in exchange for relinquishing and transferring traffic control jurisdiction and related devices described herein on the ATMS / ITS corridors, to the COUNTY, the CITY shall be relieved of the expense associated with such traffic control, and in turn the COUNTY shall, after receiving such traffic control responsibilities, assume the costs and expenses of same. From this basic agreement the following sections are developed.

SECTION 2
ATMS / ITS NETWORK

- 2.1. For purposes of this Agreement the ATMS / ITS system network and implementation phasing is identified as Exhibit "A2". Exhibit "A2" is incorporated in the Metropolitan Planning Organization (MPO) Long Range Transportation Plan (LRTP). Any modifications to the map adopted by the MPO will automatically supersede the attached plan without need to amend this Agreement.
- 2.2. The CITY agrees to transfer to the COUNTY traffic control responsibilities on ATMS / ITS corridors at the beginning of the construction phase for ATMS corridor implementation projects within the CITY limits. This transfer will be effective upon "notice to proceed" for the construction contract. The COUNTY will perform all project coordination, construction inspection; system related activities and traffic control determinations. The COUNTY and CITY will develop a mutually agreed upon partnering plan for construction related activities.
- 2.3. For purposes of this agreement transfer of traffic control responsibilities on ATMS / ITS corridors shall be limited to those enumerated below. State roads remain the jurisdiction of the FDOT, however coordination of traffic control determinations with the FDOT will be by the COUNTY, with input from the CITY.
 - 2.3.1. Conduct required traffic engineering studies to determine appropriate traffic control devices.
 - 2.3.2. Install and maintain traffic signals where warranted.
 - 2.3.3. Establish traffic signal timing for all traffic signals.
 - 2.3.4. Establish timing plan settings for all traffic signals.
 - 2.3.5. Modification to signal timing and phasing.
 - 2.3.6. Establish speed limits.
 - 2.3.7. Prohibit or restrict left, right and U-turns.
 - 2.3.8. Designate crosswalks; establish school zones and safety zones for safe pedestrian movement.
 - 2.3.9. Establish and mark traffic lanes, bike lanes and other striping required to regulate, guide or warn traffic.
- 2.4. It is specifically understood and agreed that all rights and powers as may be vested in the CITY pursuant to Chapter 316 of the Florida Statutes or any other law or ordinance or charter provision of CITY and not specifically transferred to COUNTY herein shall be retained by CITY. It is further understood and agreed that CITY is not transferring any of its traffic enforcement functions, right or duties by the execution of this Agreement, and CITY shall fully retain such traffic enforcement functions, rights and duties together with all rights of enforcement of CITY traffic ordinances or state traffic statutes.

SECTION 3 FUNDING

- 3.1. The COUNTY will fund, administer, staff, operate and maintain the PCC to accomplish the directives set forth in this Agreement.
- 3.2. The COUNTY will be responsible for all funding, as becomes available, for implementation, operation and maintenance of the ATMS / ITS features on the ATMS / ITS corridors.
- 3.3. Following transfer of ATMS / ITS corridors, the COUNTY will assume all capital cost for signal upgrades or new signal construction. If the signal is included as part of a separate road improvement, land development or other transportation project, funding will be from the project source of funds.
- 3.4. Following transfer of ATMS / ITS corridors to the COUNTY, the COUNTY will assume all operation and maintenance costs related to all traffic control devices and ATMS / ITS devices.
- 3.5. Following transfer of ATMS / ITS corridors the COUNTY agrees to be responsible for and pay utility bills for traffic control devices and ITS devices only. Utility bills for streetlights or other features are excluded from COUNTY responsibility.
- 3.6. Following transfer of ATMS / ITS corridors the COUNTY shall contract with the CITY for city forces to maintain all the traffic signals on the ATMS / ITS corridors, within the city limits of Clearwater. Some ATMS / ITS and non-ATMS / ITS signals may also be contracted to the CITY or transferred to the COUNTY, as mutually agreed upon, for purposes of economy, location or staffing availability. The contract rate will be directly tied to the standard flat rate maintenance charges utilized by the COUNTY for their signal maintenance contracts. All maintenance contracts shall utilize standardized Level of Service criteria. See Exhibit "A1"
- 3.7. The CITY shall continue to maintain all traffic signals, vehicle detection systems and communications network on all roadways that have not been transferred to the COUNTY. All costs associated with these responsibilities will be the CITY'S expense.
- 3.8. The CITY will continue to fund, administer, operate and maintain the CITY'S Traffic Operations Center (TOC) and existing MTCS-PC signal system. All costs associated with these maintenance responsibilities will be the CITY'S expense.
- 3.9. Upon execution of this Agreement the COUNTY will fund future modifications required to utilize the TOC as the secondary control center and backup location to the PCC. Any design, building modifications, equipment, software or communications infrastructure funds budgeted prior to execution of this Agreement will continue to be funded through existing sources.
- 3.10. The COUNTY will continue to fund, administer operate and maintain the existing MTCS-PC signal system in all areas of the County except the City's of Clearwater and St.

Petersburg. All costs associated with these responsibilities will be the COUNTY'S expense.

- 3.11. There shall be no reimbursement or replacement for funds expended or budgeted for the ATMS / ITS implementation prior to execution of this agreement.

SECTION 4 PINELLAS COUNTY RESPONSIBILITIES

- 4.1. The COUNTY will exercise the necessary power, privilege and authority to accomplish countywide regional transportation management by operation of traffic signals and related intelligent transportation systems on the ATMS / ITS system.
- 4.2. The COUNTY will manage, operate and maintain the PCC through the County Public Works Department under the County Administrator. The functional management structure is defined in Exhibit "A1".
- 4.3. The COUNTY will provide all engineering and operational studies, signal system timing and make all traffic control determinations for ATMS / ITS corridors once they are transferred to the COUNTY.
- 4.4. The COUNTY will be the sole local government to negotiate public / private partnership agreements as related to the ATMS / ITS system. This includes companies that may provide infrastructure systems, components, or emerging technology in return for proprietary data that can be utilized for pay or premium services. This does not include agreements made by the CITY relative to equipment and services owned by the CITY.
- 4.5. The COUNTY Public Works Director will participate as an active member of the PCC Advisory Committee as outlined in Exhibit "A1". The COUNTY Public Works Director will chair the PCC Advisory Committee.
- 4.6. The COUNTY shall adhere to all standards set forth in the "Standard Operating Guidelines and Functional Management Structure for ATMS / ITS System", Exhibit "A1". The COUNTY agrees that the PCC Advisory Committee shall review, comment and approve all modifications to this document.
- 4.7. The COUNTY shall provide a CITY REPRESENTATIVE to be a liaison to the CITY for coordination of local issues. Should an existing CITY employee initially fill the position, the COUNTY would provide funding to the CITY for reimbursement of employee salary burdens through a separate inter-local agreement. Job duties are described in Exhibit "A1".
- 4.8. The COUNTY shall be the Primary Project Manager for design of all ATMS / ITS corridor projects and in prioritizing implementation of these systems. All projects will be built to specifications established by the COUNTY or FDOT.

- 4.9. Following transfer of an ATMS / ITS corridor any new traffic signals installed on transferred roadway within the city limits of Clearwater shall be paid for by the COUNTY, excluding state roads. Mast arm type signals will be utilized, including the CITY'S choice of color, unless circumstance or design limitations would preclude this type of installation. Other esthetic or decorative items will be handled through a separate Joint Project Agreement (JPA). Upon completion the maintenance will be contracted to the CITY as per section 3.6 and 5.3.
- 4.10. The COUNTY will provide and own the fiber-optic communication lines that constitute the countywide ATMS / ITS communication network trunk line. This excludes any CITY owned fiber-optic lines.
- 4.11. The COUNTY will involve the CITY in design, project meetings and plan reviews for all ATMS construction projects within the CITY limits.
- 4.12. The COUNTY will maintain close coordination with CITY fire and police agencies relative to operation and maintenance of traffic signals and preemption devices within the city limits. The CITY REPRESENTATIVE will be the primary contact for these agencies.

SECTION 5 CITY OF CLEARWATER RESPONSIBILITIES

- 5.1. The CITY Public Works Administrator will participate as an active member of the PCC Advisory Committee as outlined in Exhibit "A1".
- 5.2. The CITY shall adhere to all standards set forth in the "Standard Operating Guidelines and Functional Management Structure for ATMS / ITS System", Exhibit "A1". The CITY agrees that the PCC Advisory Committee shall review, comment and approve all modifications to this document.
- 5.3. The CITY may, at their own expense, house CITY staff members at the PCC. Operation and Maintenance Costs will be established through a separate agreement. In lieu of annual payment, the local contributions already made to the overall ATMS / ITS implementation will be deemed satisfactory compensation to offset annual payment until such costs exceed the CITY'S initial \$3.8 million contribution.
- 5.4. The CITY agrees to provide maintenance for mutually agreed upon ATMS and non-ATMS traffic signals, as outlined in Section 3.6 of this agreement.
- 5.5. The CITY agrees to utilize the CITY'S TOC, located in the Municipal Services Building, as a secondary control center and the backup location for the ATMS / ITS computer network, unless or until other mutually agreed upon provisions for back up are established.
- 5.6. The CITY may participate in ATMS / ITS corridor projects within or near the city limits including plans review, project meetings and construction coordination.

- 5.7. The CITY shall continue to operate and maintain the existing MTCS-PC signal system. This includes hardware and software maintenance, staffing at appropriate locations and signal timing plan development.
- 5.8. Following transfer of a ATMS / ITS corridor the CITY grants to the COUNTY permission and permit to use any CITY public rights-of-way or easement needed for maintenance of traffic signals, ATMS, ITS or communications facilities on those corridors.
- 5.9. Nothing in this agreement affects existing CITY duties or responsibilities for funding, traffic control or other CITY jurisdiction on any and all non-ATMS / ITS corridors.

SECTION 6 SPECIAL PROVISIONS

- 6.1. Upon execution of this Agreement, the existing Pinellas County Traffic Control Center, located on US 19, will operate as the PCC and be so designated.
- 6.2. The PCC staff and the CITY will coordinate efforts for all CITY special events. Each event will be studied to determine whether the impact of the event is better handled by the local TOC, PCC, or a combination of both. To the extent possible, events where there will be PCC involvement the CITY REPRESENTATIVE will coordinate and operate event related activities at the PCC.
- 6.3. The PCC will provide control access to the CITY for local ITS activities including parking information, special event management and other situations where utilizing ATMS / ITS devices provide benefit to the citizens of the CITY and the COUNTY. The PCC may, if circumstances dictate a higher level of need, supercede CITY control to utilize ATMS / ITS equipment for appropriate response. Such instances would include detection of an incident, emergency response, or other emergency level situation.

SECTION 7 MISCELLANEOUS PROVISIONS

- 7.1. Any amendment to or modifications of this Agreement or any alteration, extension, supplement or change of the time or scope of the work shall be in writing and signed by both parties.
- 7.2. This Agreement shall be governed and construed in accordance with the laws of the State of Florida.

- 7.3. Nothing herein shall be construed to create any third party beneficiary rights in any person not a party to this Agreement, nor to increase the liability of the COUNTY to third parties under any theory.
- 7.4. If any word, clause, sentence or paragraph of the Agreement is held invalid, the invalidity shall not affect other provisions of the Agreement which can be given effect without the invalid provision, and therefore the separate provisions of this Agreement are severable.
- 7.5. This document embodies the whole Agreement of the parties. There are no promises, terms, conditions or allegations other than those contained herein and this document shall supersede all previous communications, representations and/or agreements, whether written or verbal, between the parties hereto.
- 7.6. This Agreement shall be binding upon the parties, their successors, assigns and legal representatives.
- 7.7. The parties will offer each other full cooperation in the transition phase as well as throughout the term of this Agreement.

SECTION 8 FISCAL FUNDING CLAUSE

In the event that sufficient budgeted funds are not available for a new fiscal period, the COUNTY shall notify the CITY by January 1st of the fiscal year prior to such an occurrence and the Agreement shall terminate on the last day of the then fiscal year period without penalty or expense to the COUNTY.

**SECTION 9
EFFECTIVE DATE AND TERMINATION**

This Agreement shall take effect upon the County identifying funds for purposes of this agreement followed by execution by the parties and filing with the Clerk of the Circuit Court for Pinellas County, Florida. This Agreement shall be effective for a period of ten (10) years from the date of execution. This agreement may be renewed subject to execution of a written renewal agreement between the COUNTY and CITY. Each renewal period may not exceed (10) years. There is no limit to the number of renewals unless so specified in a subsequent renewal agreement. This Agreement shall be terminated upon mutual consent of the parties or by either party, upon formal written notice received prior to January 1st of any calendar year with termination becoming effective October 1st of the same calendar year.

|

IN WITNESS WHEREOF, the parties hereto have caused these present to be executed by their duly authorized officers, and their official seals hereto affixed, the day and year first above written.

ATTEST:
Ken Burke:

PINELLAS COUNTY, FLORIDA,
by and through its
Board of County Commissioners

By: _____
Deputy Clerk

By: _____
Chairman

Countersigned:

CITY OF CLEARWATER, FLORIDA,

By: _____
Mayor-Commissioner

By: _____
City Manager

ATTEST:

By: _____
City Clerk

APPROVED AS TO FORM

APPROVED AS TO FORM

OFFICE OF THE COUNTY ATTORNEY

OFFICE OF CITY ATTORNEY

**Pinellas County Regional Transportation
Management Center**

**Standard Operating Procedure Manual and
Functional Management Structure
for ATMS / ITS System**

Exhibit “A1”

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I. Introduction:

The Pinellas Countywide Primary Control Center (PCC), also known as the Pinellas County Regional Transportation Management Center was created to manage and operate the Countywide Advanced Traffic Management System (ATMS) and the related Intelligent Transportation Systems (ITS). The system is comprised of major arterials and thoroughfares within Pinellas County that cross jurisdiction boundaries impacting countywide regional travel.

The goals and objectives of the PCC are to utilize the ATMS / ITS systems to provide the most efficient use of the countywide roadway network through corridor management and related ITS services. The PCC is responsible for implementing traffic control strategies along major corridors so they operate seamlessly across jurisdictional boundaries. This includes utilizing ITS devices to provide comprehensive data necessary for incident detection and traveler information.

II. Functional Management Structure:

Pinellas County will manage, operate and maintain the PCC through the County Public Works Department under the County Administrator. The following describes the functional management structure of the system (See Figure 2). Although not specifically discussed the Metropolitan Planning Organization's ITS Committee will play an interactive role with the PCC in development of the Pinellas County Regional ITS Plan.

The management structure for the PCC staff is shown for initial completion of ATMS Phase 1. Additional positions will be required as the system size and tasks increase. Under the full build scenario approximately 8 total positions will be required. Pinellas County will employ all personnel.

The following defines the different positions involved in operation and management of the PCC.

A. PCC Advisory Committee:

The initial representation on the committee will be the Director of Public Works for Pinellas County, the Public Works Administrator for the City of Clearwater and a representative of the FDOT. The COUNTY Director of Public Works will be the chairman of the committee. Additional representatives may be added as determined by the committee members. The Advisory Committee will be a review / policy Committee to the PCC. The functions of the Advisory Committee are as follows:

1. Appoints the PCC Manager.
2. Reviews and recommends approval of operating guidelines, protocols and overall countywide traffic management strategies.
3. Responsible for review, comment and adoption of changes to the PCC – Standard Operating Procedures Manual.

4. Reviews work program submittals and project funding requests. Verifies consistency with overall priorities of the ATMS / ITS implementation.
5. Shall be responsible for resolving any disputes or disagreements concerning standard operating guidelines and administrative issues.
6. The committee will determine the make up, level and representation of the PCC Advisory Committee.
7. Recommends which traffic signals the COUNTY will contract or transfer for maintenance responsibilities.

The Advisory Committee will meet on a regular basis, as determined by the Advisory Committee, to conduct its business.

The following positions are required for staffing the PCC for the initial completion of ATMS Phase 1.

PCC Manager: (1)
PCC Traffic Management Operators (2)
City Representative (1)
Clerical Assistant (1)

A brief job description for these staff positions is as follows:

- B. PCC Manager: (1)
1. Responsible for attaining the goals and objectives of the PCC including corridor management and ITS services.
 2. Responsible for overseeing the day-to-day operations of the PCC.
 3. Supervision of all PCC staff.
 4. Shall perform hiring and evaluations of PCC staff members.
 5. Responsible for developing Standard Operating Guidelines for the PCC.
 6. Develops and oversees PCC yearly budget.
 7. Develops and manages ATMS / ITS implementation work program.
 8. Responsible for proper management of contracts for expansion and enhancement of the system.
 9. Provides coordination between government agencies, emergency services, media, information service providers and other transportation management centers on ATMS and ITS services.
 10. Coordinate with the ITS Committee to ensure consistency of the ATMS and ITS services with the Pinellas County ITS Plan.
- C. ATMS / ITS Transportation Specialist (2) – City Representative will occupy an equivalent position.
1. Operate the ATMS / ITS system on a daily basis.
 2. Receive and handle complaints.
 3. Coordinate with municipalities on signal operations concerns.
 4. Coordinate with municipalities on special events.
 5. Make adjustment to system for optimum efficiency and performance.

6. Determine appropriate actions when incidents are detected.
7. Coordinate and participate in incident management with emergency services dispatch.
8. Contact and dispatch maintenance personnel to equipment failures.

D. City Representative:

1. The primary duty of a City representative is to be a City's liaison to the PCC. This would include, but not limited to, primary contact point for City questions, comments and concerns related to traffic signals and ITS devices within the municipal boundaries, local representation to a City for coordination meetings on special events, traffic signal operations, ITS operations, and interaction between the City Traffic Operations Center and the PCC.
2. The City representative will be a staff member of the PCC and work under the supervision of the PCC Manager to obtain the overall goals of the ATMS / ITS System. This includes working on any part of the ATMS / ITS system as needed to accomplish countywide operation of traffic signals and intelligent transportation system devices, disregarding municipal boundaries.
3. Other duties as described under the ATMS / ITS Transportation Specialist.

E. Clerical Assistant (1)

1. Perform clerical duties for PCC staff.
2. Perform purchasing and time keeping for PCC.

III. Operation and Management Guidelines:

The PCC is defined as the location where management and operation of the Countywide Regional ATMS / ITS system will occur. The objective of the PCC is to provide countywide corridor management and related ITS services for consistency and accountability. This location will provide for these objectives based on the following guidelines. From time to time this document will be updated to reflect new guidelines, operational strategies and ITS services. The PCC will be responsible for:

1. Network monitoring for processing and disseminating real-time traffic data, such as traffic volumes, speeds, and video images.
2. Implementing traffic control strategies along major corridors operating seamlessly across jurisdictional boundaries and providing the most efficient operation.
3. Implementing incident management strategies to facilitate quicker incident response and minimize impact on transportation network due to road and lane closures.
4. Provide coordination with other agencies that may also be implementing ITS strategies and devices that may impact the operation of the regional transportation

**FUNCTIONAL MANAGEMENT STRUCTURE
For
PINELLAS COUNTY REGIONAL TRANSPORTATION
MANAGEMENT CENTER (PCC)**

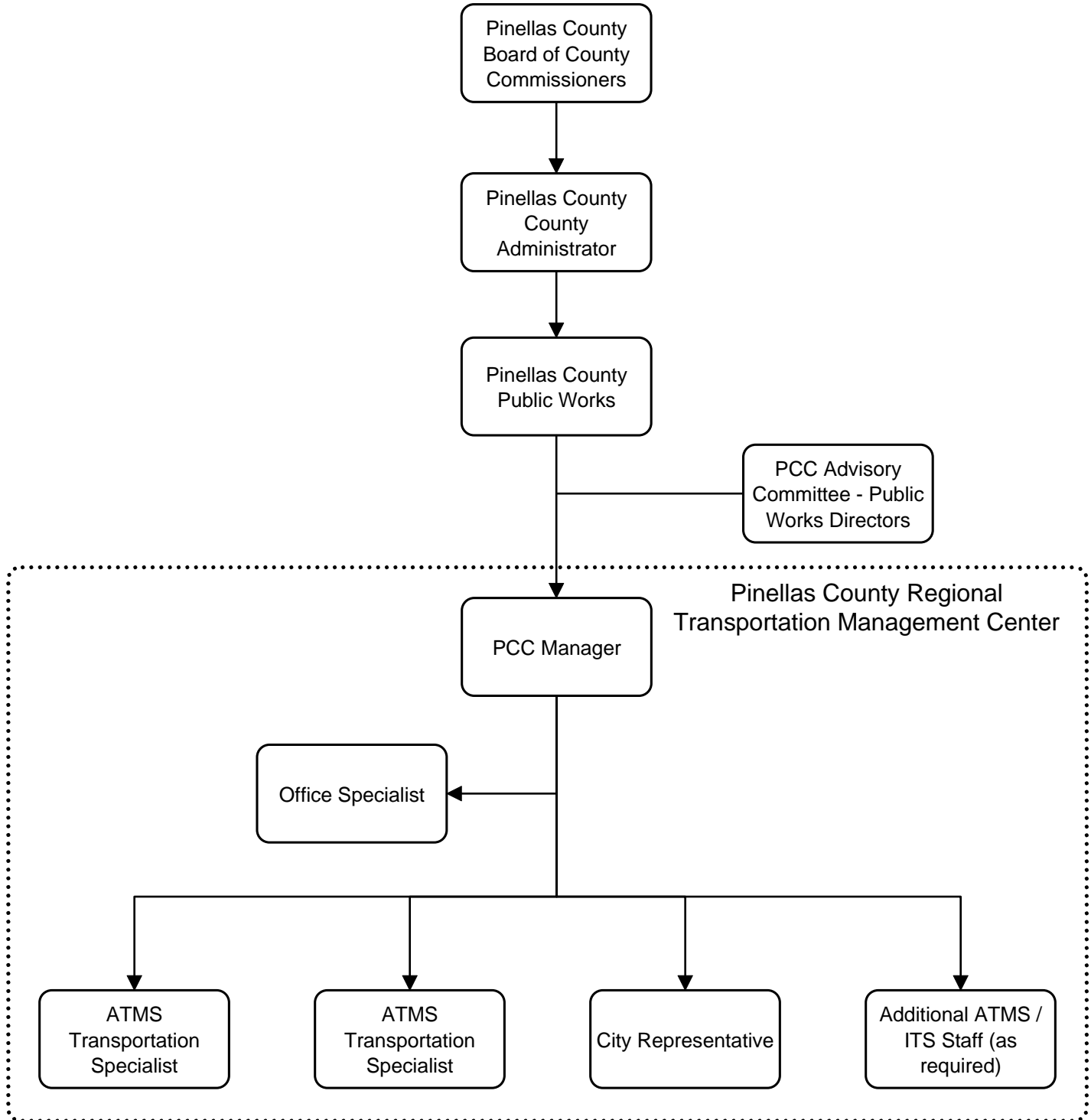


Figure 1

- network. These agencies may include transit, emergency service dispatch and the FDOT.
5. The PCC will monitor response activities and provide coordination for planned events that impact countywide regional travel.
 6. Collecting and disseminating traveler information through Dynamic Message Signs, web sites, etc. In addition, the PCC will serve as a central point of contact for the media, information service providers, and other regional traffic management centers.
 7. Archiving and storing traffic information.
 8. The PCC will work with other local jurisdictions on questions, comments and concerns related to traffic signals and ITS devices within their jurisdiction. The PCC staff will provide representation to the local jurisdictions for coordination meetings on special events, traffic signal operation and design, Intelligent Transportation System operations, and interaction between locally controlled intersections and the ATMS.
 9. The PCC will be responsible for ATMS / ITS services as may be developed and added to the system.
 10. The PCC will be the lead agency to prioritize and manage a work program to expand and enhance the ATMS and related ITS system. Staff will coordinate local municipalities, the Florida Department of Transportation and the Pinellas County Metropolitan Planning Organization to evaluate other work programs where ATMS or ITS related components may be incorporated to aid in expansion of the ATMS.
 11. The PCC Staff will be the primary project manager for all current and future design, construction or implementation projects for the ATMS / ITS system, disregarding where funding is obtained.
 12. The PCC will be the lead agency in developing public / private partnerships for the beneficial expansion, utilization or enhancement of services provided to the public. This may include, but not limited to, companies that may provide infrastructure systems, components, or emerging technology in return for proprietary data that can be utilized for pay or premium services.

IV. Maintenance Standards and Guidelines:

The PCC will be responsible for maintaining all aspects of the ATMS / ITS network. The maintenance function will be divided into several areas to best accommodate the overall network. The following is a basic outline of those functions and what entity will perform the maintenance functions. Where specific standards are available they are listed herein.

A. ITS Devices:

Pinellas County will be responsible for maintaining all ITS devices once they have been installed. ITS devices include all devices attached to the ATMS / ITS system, excluding traffic signals. They may include CCTV cameras, Dynamic Message Signs (DMS), trail blazer signs and system communications cable.

B. Traffic Signal Maintenance:

Following transfer of ATMS / ITS corridors Pinellas County will be responsible for maintaining all traffic signals on those roads. The County will execute this function in several possible ways. They include:

1. The County may contract traffic signal maintenance to any city that has an existing traffic signal shop and desires to provide these services. They shall be maintained by the same service and maintenance standards as defined in this exhibit. The contract rate will be established and authorized through a separate contract. The PCC Advisory Committee will determine which signals should be contracted to the City for maintenance.
2. The County will maintain traffic signals on transferred ATMS / ITS corridors in municipalities that have no established traffic signal shop and will eliminate the flat rate maintenance cost currently being paid by those cities.
3. Contracts may be let by the County for certain aspects of traffic signal maintenance that may be beneficial to the operation of the ATMS / ITS network. (i.e. a loop maintenance contract). The maintaining entity may opt out of these contracts if they can perform the function at the same level as defined within the contract scope and requirements.

C. Traffic Signal Maintenance – Levels of Service Standards:

The following is a list of existing levels of service standards for maintenance of traffic signals that are part of the ATMS / ITS network.

1. All signals must be maintained as per FDOT maintenance guidelines.
2. All signals will have preventative ground maintenance performed at a minimum of twice a year. This includes checks of all signal equipment including loops, controller settings, cabinet wiring and grounding.
3. All signals will have preventative aerial maintenance performed, at a minimum, of once a year. This includes checks on all overhead wiring, signal head and pole and mast arm connection inspections.
4. All signal malfunctions received during regular work hours will be dispatched immediately after receiving call.
5. All signal malfunctions will have a one- hour response time after hours by the standby personnel.
6. All inductance loop repairs will be done within 48 hours of notification.
7. In the event of a reported power outage a technician will be dispatched immediately during normal working hours and one-hour response time after hours by standby personal to confirm the outage.

8. All conflict monitors will be checked on the bench and certified semi-annually with a documented maintenance form.

ATMS / ITS System Network

Exhibit “A2”

I-4 SMIS Operations and Shared Communications Network Agreement

This Agreement is made and entered into this 11th day of August 1997, by and between the **STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION**, hereinafter called "**FDOT**" and **SEMINOLE COUNTY**, hereinafter called "**SEMINOLE**."

WITNESSETH:

WHEREAS, Interstate Highway 4 (I-4) is a State controlled and maintained transportation facility under the jurisdiction of **FDOT** which lies partly within the jurisdiction boundaries of Seminole County, and

WHEREAS, **FDOT** and **SEMINOLE** recognize the importance of rapid dissemination for reliable, credible, real-time Regional Traveler and Multimodal Information, and each will work in coordination and cooperation of foster Advance Traveler Information System initiatives. Both parties agree that it would be mutually beneficial to share both existing and proposed **FDOT** and **Seminole** owned fiber optic cable plants in order to facilitate the implementation of a common transportation communications network. This network sharing will provide the **FDOT** and **Seminole** with alternate cable paths and redundant rings for the **FDOT's** I-4 Surveillance and Motorist Information System (SMIS) and **Seminole's** Computerized Signal Systems, and

WHEREAS, it is a primary goal of **FDOT** and **Seminole** to provide for the safe and efficient movement of people and goods on Florida highways, it is desirous of both agencies to enter into this agreement which describes their working relationship and responsibilities in the operating and maintaining the I-4 Surveillance and Motorist Information System, hereinafter called "I-4 SMIS", along I-4, and

WHEREAS, I-4 SMIS is a means to (1) reduce the time between the occurrence of an accident and the arrival of emergency response vehicles (Law enforcement, wrecker, ambulance and fire/rescue); (2) provide real time data to Seminole County Traffic Action Center, hereinafter called "SEMTAC"; and (3) reduce delay and hazard to many other persons effected by the closing or partial closing of the highway due to an accident, disabled vehicle, spilled load, or often a combination of the three, and

WHEREAS, I-4 SMIS is a means to allow SEMTAC staff the ability to adjust traffic signal timings along arterial routes during congestion to minimize motorist stops, delays and to reduce fuel consumption, and

WHEREAS, I-4 SMIS permits the summoning of the law enforcement agency by detecting the change in speed of the vehicles by sensors in the roadway which can be verified visually by on-site cameras along I-4.

NOW THEREFORE, in consideration of the objectives of I-4 SMIS and the promises and representations herein, the parties agree as follows:

1. The **FDOT** and **Seminole** realize that a reliable communication network will be needed to facilitate the routing and termination of the fiber optic cable for the transfer of traffic related data. Thus, **FDOT** will allow **Seminole** to utilize six (6) fibers along I-4 SMIS to provide connectivity for communication purposes.
2. **Seminole** will allow at least two (2) single mode fiber strands within Countys' fiber network on designated loops for the **FDOT** regional transportation communication purpose and establishment of a redundant network. Additional dedications will be based on user needs and mutual agreement of the parties. **Seminole** will be responsible for maintaining their fiber optic cable plant and utility locates.
3. **Seminole** agrees to operate the system in the following contingencies: In an emergency situation whereby the **FDOT** is unable to communicate and control the I-4 SMIS equipment or **FDOT** requests **Seminole's** assistance during a major incident along I-4. In order to ensure its availability for the forgoing contingencies, **Seminole** Traffic Engineering will operate from 6 AM to 10:30 PM weekdays and during major incidents 24 hours per day. **Seminole** will follow their normal procedures when dispatching the appropriate law enforcement officers to an incident scene. **Seminole** will have visual contact with the scene via cameras which will aid in dispatching the appropriate agencies to the scene. **Seminole** will at a minimum follow the **FDOT** I-4 SMIS Operator guidelines.
4. The area-wide **FDOT** transportation fiber optic cable system will handle only traffic, regional traveler, and multimodal information and data. **FDOT** will assign band width in the **FDOT** area-wide transportation communication system based upon agency need and participation (ie., future users).
5. **Seminole** will purchase, install and make operational the T-1 hub tied into the I-4 SMIS. The **FDOT** agrees to maintain the I-4 SMIS and make the necessary jumper connections at Hub 5 and SEMTAC for **Seminole** to operate the I-4 SMIS in case of an emergency and will reconfigure the T-1 at no cost to **Seminole**. The **FDOT** will provide and train the SEMTAC staff on the manufacturer's operating software(s) (ie., changeable message sign, 170 detector stations, and camera) which will be utilized in emergency situations.
6. **Seminole** will promptly share all available incident, congestion, or emergency information gathered from its traffic management or traveler information system with **FDOT**.
7. The parties agree that they will not cause or allow the violation of the laws relating to ethics in government in the course of implementing the terms of this agreement.
8. Any revisions to the contents of this agreement shall require approval of both parties.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be duly executed the day and year written.

Attest:

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

Funda S. Brantley
Executive Secretary (seal)

By: *Nancy M. Houston*
Nancy M. Houston
District Secretary

Approved as to Form, Legality and Execution:

George S. Lovell
District Counsel

ATTEST:
COMMISSIONERS

BOARD OF COUNTY
SEMINOLE COUNTY, FLORIDA

Maryanne Morse
MARYANNE MORSE
Clerk of the Board of
County Commissioners of
Seminole County, Florida

BY: *R. C. Morris*
RANDALL C. MORRIS, Chairman

Date: *7/24/97*

For the use and reliance of Seminole only. Approved as to form and legal sufficiency.

As authorized for execution by the Board of County Commissioners at their *22 July* 19*97* regular meeting.

William J. Hunt
County Attorney

Appendix C
Change Request Form



Eastgate Regional ITS Architecture

Change Request (CR) Form

To Be Completed By Stakeholder(s) Requesting Changes		
Originator Name:		Date Submitted
Originator Telephone:	Originator Fax:	Originator E-Mail:
Originator Agency:		Functional Area:
Agency Authorized Signature:		Signature Date:
Description of Proposed Change:		
Rationale for Proposed Change:		
Affected Agency:	Authorized Signature:	Signature Date:
Affected Agency:	Authorized Signature:	Signature Date:
List Attachments:		
Baseline Documents Affected:		
<input type="checkbox"/> Website <input type="checkbox"/> Turbo Architecture <input type="checkbox"/> Market Package Diagram <input type="checkbox"/> Architecture Document <input type="checkbox"/> Other (describe)		

To Be Completed By Maintenance Manager		
Change Request Number:	Date CR Received:	Date CR Logged:
Date Initially Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Disposition Comments
Date Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Disposition Comments
Date Discussed:	Disposition: <input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> More Info	Disposition Comments
Date of Maintenance Working Group Approval (If Applicable):		
Baseline Documents Affected/Version implemented		
<input type="checkbox"/> Turbo Architecture	Date: _____ Version: _____	<input type="checkbox"/> Website Date: _____ Version: _____
<input type="checkbox"/> Market Package	Date: _____ Version: _____	<input type="checkbox"/> _____ Date: _____ Version: _____
<input type="checkbox"/> Architecture Doc	Date: _____ Version: _____	

Appendix D

Summary of ITS Projects

Eastgate Regional ITS Architecture - Project List

Agency	Project	Service Area	Market Package	Description	S/M/L	Cost	Operation & Maintenance Cost (per year)
ODOT	Service Patrols	Emergency Management	EM04-1: Roadway Service Patrols	Purchase and operate one freeway service patrol vehicle.	M	\$257,500	\$87,500
ODOT	Maintenance Vehicle Upgrade	Maintenance and Construction	EM02: Emergency Routing MC01-3: Maintenance and Construction Vehicle and Equipment Tracking	Automatic Vehicle Location for maintenance vehicles.	L	\$1,250-\$5,800/vehicle; Central system hardware and software may range in cost from \$1.8 million to more than \$8 million depending on the size of the fleet and the functionality required.	Communications - \$40 to \$60 per month; System administration, \$1,300/month for entire system. License fees would also apply.
ODOT	Install snow and ice detection management and advanced snow plow systems.	Maintenance and Construction	MC06-4: Winter Maintenance	Road weather information systems integrated with advanced technology snow plows. These systems provide early warning of icing and snow, and meter the amount of chemical and/or sand applied based on surface conditions, including amount of chemical already applied.	L	\$500,000	\$30,000
ODOT	Work Zone Safety Improvements	Maintenance and Construction	MC09-3: Work Zone Safety Monitoring	Improvements to work zones to reduce collisions. Ability to alert drivers of a construction zone, roadway hazard, or speed change.	M	\$100,000/Zone	\$5000/Zone
ODOT	Highway-Rail Intersection Advanced Safety Systems	Traffic Management	ATMS14-2: Standard Railroad Grade Crossing	Install advanced Highway-Rail Safety Systems at key crossings. A study must be conducted to identify the crossings and the preferred system.	L	\$500,000	\$50,000
ODOT	Traveler Information Delivery Methods	Travel Information	ATIS02-1: Broadcast Traveler Information	Implement traveler information dissemination methods which may include personalized traveler information on a subscription basis delivered to cell phones, pagers, personal computing devices. Information gathered through various detection methods could also be displayed on BuckeyeTraffic.org. The key public sector cost element will be in infrastructure to enable providing enhanced content to the private sector.	M	\$750,000	\$250,000
Eastgate/ County	Signal System Upgrades and Evacuation Plan Updates	Traffic Management/ Emergency Management	ATMS03: Surface Street Control	Signal upgrade and coordination along the major evacuation routes	L	Varies	
			ATMS07: Regional Traffic Control EM09-1: Evacuation and Reentry Management	Study and development of plan to evacuate Trumbull and Mahoning Counties in case of an emergency affecting mass area.	S	\$300,000	\$3,000
Mahoning/Trumbull Counties	Commercial Vehicle Ops	Commercial Vehicle Operations	CVO03-1: Electronic Clearance	System collecting data carried in trucks traveling on specific routes.	L	\$150,000	\$25,000
Municipalities	Signal pre-emption	Emergency Management/ Traffic Management	EM02: Emergency Routing	Pre-emption signal system for emergency vehicles	L	\$6,000/intersection \$2,000/vehicle	\$500
Municipalities	Computer Aided Dispatch to Emergency Vehicles	Emergency Management	EM01-7: Emergency Call-Taking and Dispatch	Integrating the computer aided dispatch to the emergency management center that will allow the operators to dispatch emergency response vehicles to the scene more rapidly.	L	\$150,000	\$2,500
Trumbull County	Maintenance Vehicle Upgrade	Maintenance and Construction	EM02: Emergency Routing MC01-3: Maintenance and Construction Vehicle and Equipment Tracking	Automatic Vehicle Location for maintenance vehicles.	M	\$1,250-\$5,800/vehicle; Central system hardware and software may range in cost from \$1.8 million to more than \$8 million depending on the size of the fleet and the functionality required.	Communications - \$40 to \$60 per month; System administration, \$1,300/month for entire system. License fees would also apply.
Trumbull County	The North River Road / Elm Road Safety Enhancement Project	Traffic Management	ATMS03: Surface Street Control	This project will consist of constructing a skid resistant surface course, upgrading pavement markings, improving traffic lane alignments, and upgrading the existing traffic signals to optimize traffic timing and flow. Access management will also be considered within the projects limits of 150 feet in all directions.	S	\$300,000	\$1,000
Trumbull County	Warren Sharon Road/Howland Wislon Road Intersection Project	Traffic Management	ATMS03: Surface Street Control	This intersection improvement project will consist of a signal improvement and the addition of left turn lanes at the intersection of Warren Sharon Road and Howland Wilson Road in Howland Township.	S	\$925,000	\$2,000
City of Newton Falls	Signal pre-emption	Emergency Management/ Traffic Management	EM02: Emergency Routing	Pre-emption will be provided on all approaches for four signalized intersections including W. Broad at Ridge/Windham, W. Broad at Canal, Broad at Center, and E. Broad at Milton. Seventeen emergency vehicles, including fire, EMS, and police, will be retrofitted with the proper equipment.	S	\$6,000/intersection \$3,000/vehicle \$1,000 for software	\$500
City of Newton Falls	Traffic Signal Upgrade	Traffic Management	ATMS03: Surface Street Control	This project will consist of the replacement and upgrade of traffic signals along SR 534 with interconnect communication.	S	\$650,000	\$20,000
WRTA	WRTA Passenger Management System	Public Transportation	APTS4: Transit Passenger and Fare Management	System that provides fare reconciliation between peer agencies using a common travel card.	S	\$635,700	\$60,000
WRTA	WRTA Surveillance Control	Traffic Management	ATMS01: Network Surveillance	To include CCTV at certain locations to provide surveillance at stations and surrounding areas for security purposes	M	\$30,000 per location	\$3,600 per location
WRTA	Kiosks at Transfer Points	Public Transportation	APTS08-1: Transit Traveler Information	WTRA to establish kiosk at key locations to provide bus route information and trip planning	M	\$80,000	\$8,000
WRTA	Bus Traffic Signal Priority	Public Transportation	APTS09-2: Transit Signal Priority	Study key transit corridors for applicability of bus traffic signal priority to improve transit travel time. Implement transit signal priority on traffic signals on identified corridors.	M	\$500,000	\$1,000/Signal
WRTA/NiTTTS	Transit Vehicle Updates	Public Transportation	APTS08-1: Transit Traveler Information	Installation of Wireless Internet Feed on buses, automated signs, and annunciators.	S	\$2,500/Vehicle	\$250/Vehicle

Eastgate Regional ITS Architecture - Project List

Agency	Project	Service Area	Market Package	Description	S/M/L	Cost	Operation & Maintenance Cost (per year)
NiTTTS	AVL System	Public Transportation	APTS01-1: Transit Vehicle Tracking	Installation of AVL on all NiTTTS vehicles.	M	\$1,000/Bus	2% of Capital Costs
NiTTTS	Google Transit	Public Transportation	APTS08-1: Transit Traveler Information	NiTTTS will pair with Google to feed information on Google transit.	S	No Cost	No Cost
NiTTTS	Advanced Para-Transit Scheduling and Dispatch System	Public Transportation	APTS07-1, APTS07-2: Multi-modal Coordination	Implement an advanced para-transit scheduling and dispatch system at NiTTTS coordinated with WRTA.	S	\$750,000	\$35,000
Youngstown State University	Research Program	Traffic Management	ATMS19-1: Speed Monitoring	Establish a research program, in conjunction with ODOT, to test new implementation concepts such as crash mitigation or work zone operations systems.	M	\$250,000	
Youngstown State University	Research Program: Real-Time Stress Monitoring of Highway Bridges with a Secured Wireless Sensor Network	Maintenance and Construction	MC12-1: Infrastructure Monitoring	This collaborative research aims to develop a real-time stress monitoring system for highway bridges with a secured wireless sensor network. The program monitors the stress of highway bridges in Mahoning County with a light-weight and reliable wireless sensor network by applying state of the art technologies in wireless networks, sensor technologies, peer-peer communications, embedded systems, and power managements. The near term goal is to collect wireless sensor data under different traffic patterns from local highway bridges. The long term goal is to build a non-destructive structural health monitoring system and derive a structural health index to predict the remaining life span of a highway bridge in order to save human lives, avoid costly failure, provide timely restoration, prevent unnecessary reconstructions, and minimize disruptions of traffic.	S	\$100,000	
Private providers	Connection of Private Providers	Travel Information	ATIS-1-2: Broadcast Traveler Information	Private providers to work with ODOT to establish links with private providers to deliver traffic information to more people in different facets.	L	\$500,000	\$50,000
	Connected Vehicle	Travel Information	ATIS10-1: VII Traveler Information	Deployment of <i>Connected Vehicle</i> infrastructure, including roadside equipment and controller modifications, to implement vehicle-to-infrastructure (V2I) communications in the 2014-2020 timeframe (as vehicles are equipped). <i>Connected Vehicle</i> is a suite of technologies and applications that use wireless communications to provide connectivity that can deliver transformational safety, mobility, and environmental improvements in surface transportation. Applications provide connectivity with and among vehicles, between vehicles and the roadway infrastructure, and among vehicles, infrastructure, and wireless devices (consumer electronics, such as cell phones and PDAs) that are carried by drivers, pedestrians, and bicyclists.	L	Varies	Varies

The costs shown in this estimate represent an estimate of probable costs prepared in good faith and with reasonable care. HNTB has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from this estimate.