STRAFFORD-ROCKINGHAM REGION
ITS ARCHITECTURE

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1. INTRODUCTION

Intelligent Transportation Systems (ITS) are applications of advanced technology in the field of transportation, with the goals of increasing operational efficiency and capacity, improving safety, reducing environmental costs, and enhancing personal mobility. ITS projects can provide a variety of benefits, including: increased system capacity through more efficient use of existing infrastructure; improved system management, including incident management; better-informed travelers through the provision of real-time traveler and weather information; increased safety; and reduced environmental impacts. Intelligent Transportation Systems are a series of tools that can be applied, as needed, to address specific, identified regional transportation needs.

To achieve their full potential, ITS systems cannot exist independently. Rather, they must be integrated with one another, and with conventional transportation investments, in order to maximize the return on investment of the individual systems. Successful ITS deployments require an approach to planning, implementation, and operations that emphasizes collaboration between relevant entities and compatibility of individual systems. At the core of this process is a systems architecture that guides the coordination and integration of individual ITS deployment projects. This ITS architecture serves as a framework for regional ITS coordination; defining the component systems, their interconnections, and providing a tool for facilitating institutional relationships within a region.

The Strafford Regional Planning Commission (SRPC) and the Rockingham Planning Commission (RPC) completed development of the initial regional ITS architecture in March 2008. The maintenance plan for the regional ITS architecture recommends it be updated every 4 years. This document summarizes the 2012 update to the Strafford-Rockingham Region ITS Architecture.

1.1 Background

The development of a regional ITS architecture is part of the Federal requirements meant to encourage regional integration of transportation systems. The Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998, promoted integration through a focus on interagency and multimodal coordination, and it included a requirement for ITS projects funded through the Highway Trust Fund (including the mass transit fund) to conform to the National ITS Architecture and applicable standards.

In January 2001, an FHWA Rule and FTA Policy were published that implement the ITS architecture requirement of TEA-21. The Rule/Policy defines conformance with the National ITS Architecture as adherence of ITS projects to a regional ITS architecture that is developed based on the National ITS Architecture. For reference, the FHWA rule and FTA policy are attached in Appendices A and B, respectively.

The Strafford-Rockingham Region ITS Architecture was developed by SRPC and RPC to ensure that ITS projects in the region adhere to the FHWA rule and the FTA policy. Furthermore, it is hoped that the existence and regular update of the Strafford-Rockingham Region ITS Architecture will promote increased interagency coordination of transportation technology in the region. It should be noted that this regional ITS architecture was updated in accordance with the guidelines, concepts, and terminology of the National ITS Architecture, Version 7.0 (www.iteris.com/itsarch), as well as the requirements set forth in the 2001 Federal Highway Administration (FHWA) Rule and Federal Transit Administration (FTA) Policy that implement section 5206(e) of the U.S. Department of Transportation (USDOT) Transportation Equity Act for the 21st Century (TEA-21). The Strafford-Rockingham Region ITS Architecture's consistency with federal requirements for ITS architectures is specifically addressed in Section 1.4. The Strafford-Rockingham Region ITS Architecture was designed to be consistent with the *New Hampshire Statewide ITS Architecture*, developed by

NHDOT in February 2006. This regional ITS architecture is also intended to be consistent with adjacent regional ITS architectures, including the *ITS Architecture for the Nashua Region*, the *Regional Intelligent Transportation Systems (ITS) Architecture for the Southern New Hampshire Planning Commission (SNHPC) Region*, the *Maine Statewide ITS Architecture*, and the *Metropolitan Boston Regional ITS Architecture*. Whenever possible, the same terminology and naming conventions used for ITS elements identified in the adjacent architectures were incorporated into the Strafford-Rockingham Region ITS Architecture. The Strafford-Rockingham Region ITS Architecture has numerous links to the *New Hampshire Statewide ITS Architecture,* due to many of the overlapping, statewide activities in the region. It is recognized, however, that the region currently has only limited links to other adjacent regional ITS architectures.

It is important to understand that the architecture is a "living document." This effort involved re-evaluating and updating the architecture so that it remains current with ITS deployment activities, evolving transportation needs in the region, and ITS developments at the agency, statewide, and national levels. The architecture must continue to be periodically re-evaluated and (if necessary) updated to ensure that it remains relevant. A recommended process of using and maintaining the ITS architecture is detailed in Chapter 9 of this report.

1.2 Architecture Mission Statement and Goals

Working with regional stakeholders in the original development of the regional ITS architecture, the following statement was developed to define the mission of the architecture:

> "In order to enhance the region's transportation safety, security, mobility, and performance; stakeholders in the Strafford-Rockingham region will apply advanced technologies and systems to improve interagency coordination and create opportunities for seamless integration of transportation services, both within the region and with adjacent regions."

Consistent with the region's transportation goals, the goals for this architecture are to:

- Improve safety.
- Improve security.
- Increase efficiency.
- Improve coordination.
- Improve mobility/ accessibility.
- Improve traveler information.
- Improve economic prosperity/livability.
- Reduce environmental impacts.
- Maximize investment value.

1.3 Architecture Objectives

The following are the strategic objectives for the Strafford-Rockingham Region ITS Architecture:

- **Providing a Framework for Regional ITS Implementation:** The ultimate goal in developing a regional ITS architecture is to establish a framework for integrated, systematic deployment of ITS systems across the region. This framework should not only provide a roadmap for implementing exclusive ITS projects, but also for considering the benefits of including ITS initiatives in all transportation investments.

- **Promoting a Regional ITS Dialogue and Improving Interagency Coordination:** A key objective is to improve interagency coordination, which is essential for integration of ITS and the transportation system as a whole. The architecture development and update processes seek to facilitate communication among the region's agencies that will carry over to permanent working relationships. Thus, the architecture process defines interfaces between agencies, describes the roles and responsibilities of these interfacing agencies, and provides recommendations for agreements among them.

- **Consistency with, and Leveraging of, the National ITS Architecture and Standards:** Standards facilitate ITS coordination by assuring that ITS projects implemented over time, space, and jurisdictional boundaries are interoperable. Since there is an existing national architecture and standards being developed by USDOT, it makes sense to use them; adopting and enforcing these standards ensures that ITS projects built anytime, anywhere will be compatible with each other. The result is that each new project will both add value to the ever-expanding regional ITS program and benefit from it. These standards also help ensure that the regional ITS infrastructure will be compatible with state and national components, as the boundaries of each expand and overlap.

- **Fulfilling Federal ITS Requirements:** As previously mentioned, for ITS projects to receive federal funding, they must be consistent with a regional ITS architecture which is itself compliant with the FHWA Rule and FTA policy regarding the development of regional ITS architectures. This architecture's consistency with federal requirements is described in the following section.

1.4 Consistency with Federal Requirements

The Strafford-Rockingham Region ITS Architecture has been updated to be in accordance with the concepts and methods outlined in the National ITS Architecture, Version 7.0. The architecture was originally developed in accordance with the National ITS Architecture, Version 6.0. Updates to the National ITS Architecture between these versions include the renaming of market packages to service packages, changes to services packages, addition of new service packages, a new version of the *TurboArchitecture*™ database, and other changes,[1]

The National ITS Architecture contains a vast body of ITS user services, terminology, standards, and procedures which, when applied in accordance with the principals of the systems engineering process, promotes the objective of ITS interoperability both regionally and nationally. The FHWA Rule/FTA Policy (i.e., the Final Rule) describe the minimum requirements for a compliant regional ITS architecture.

[1] A more detailed summary of changes can be found at http://www.iteris.com/itsarch/html/whatsnew/whatsnew.htm.

Exhibit 1-1, below, lists the Final Rule requirements and maps the corresponding sections of this document that the address those requirements.

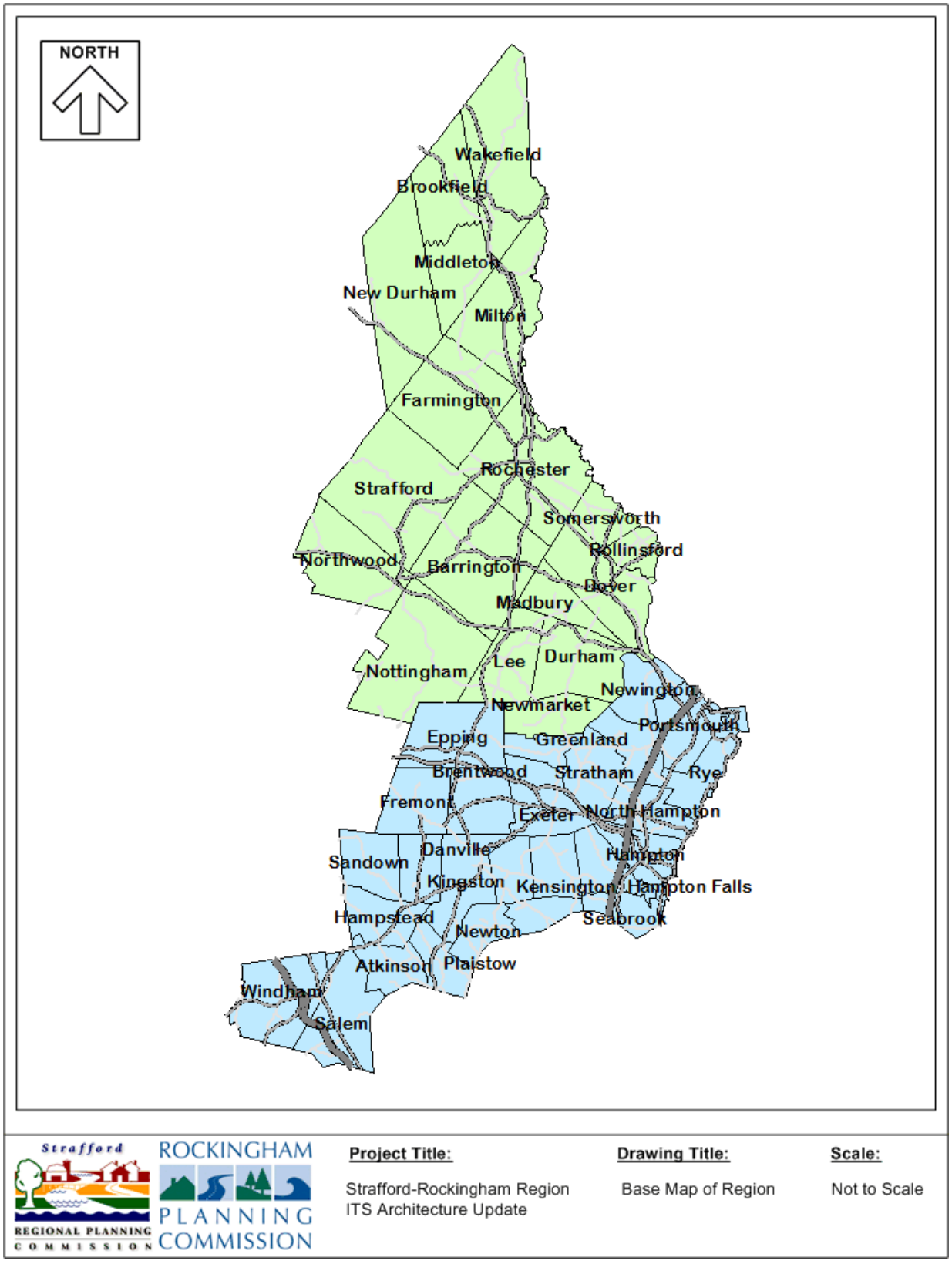
Exhibit 1-1: Federal Requirements Satisfied by the Strafford-Rockingham Region ITS Architecture

From FHWA 23CFR940.9 (b) and FTA Policy: "The regional ITS architecture shall include, at a minimum, the following:	Corresponding Document Chapter or Section
(1) A description of the region;	1.5
(2) Identification of participating agencies and other stakeholders;	2
(3) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;	6, Appendix H
(4) Any agreements (existing or new) required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture;	6, Appendix I
(5) System functional requirements;	7, Appendix J
(6) Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);	4.2, Appendix F
(7) Identification of ITS standards supporting regional and national interoperability; and	5, Appendix G
(8) The sequence of projects required for implementation."	8

1.5 Description of the Region

The region covered by this architecture consists of the geographic regions included in the Strafford Regional Planning Commission and the Rockingham Planning Commission boundaries. The region is shown in Exhibit 1-2.

Exhibit 1-2: Definition of the Strafford-Rockingham Region



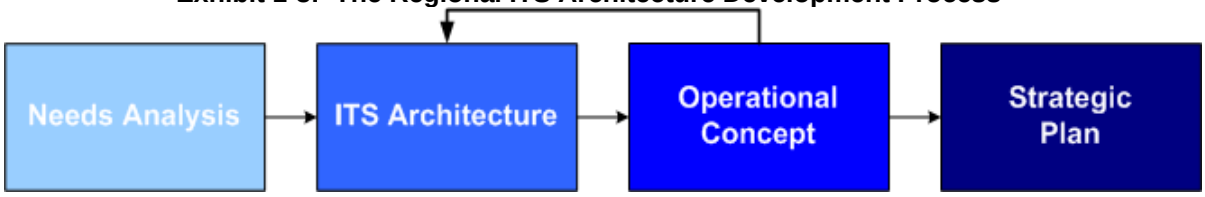
1.6 Timeframe

The project team, in cooperation with numerous local, regional, and state transportation and emergency management stakeholders, updated this architecture to provide an updated framework for coordinated ITS deployment in the region over the next ten (10) years, consisting of 2012 to 2022.

1.7 The Regional ITS Architecture Update Process

The process undertaken for original development of the Strafford-Rockingham Region ITS Architecture is illustrated in Exhibit 1-3. Each step of the process was founded on the comprehensive input and involvement of local ITS stakeholders, with the goal of creating a final regional ITS architecture rooted in local needs. The study approach was also fully mindful of Federal recommendations and requirements for the development and outcomes of the regional ITS architecture development process. For further description of the development process, refer to the 2008 architecture.

Exhibit 1-3: The Regional ITS Architecture Development Process



To continue to remain relevant and to ensure ongoing consistency with federal requirements, the 2008 Strafford-Rockingham Region ITS Architecture recommended that the regional architecture be formally reviewed and updated approximately every four years following the development of new long range transportation plans. Updates resulting from the review are intended to reflect changes in regional transportation needs and priorities, the progress of ITS deployments, new ITS initiatives identified in regional and state transportation planning documents, evolutions in ITS technology and standards, and any updates to the U.S. DOT National ITS Architecture.

The objectives of the ITS Architecture & Plan Update project were three-fold:

- Update and expand the existing, federally-compliant ITS Architecture for the Strafford-Rockingham Region based upon the latest version (7.0) of the National ITS Architecture, and the evolving needs and priorities in the region.

- Work with stakeholders to update the ITS Strategic Plan - a prioritized, project-based deployment strategy for phased implementation based on the architecture update.

- Produce a Final Report document summarizing the findings, recommendations, and action items resulting from the ITS Architecture and Strategic Plan update process.

This project was intended to not only enable regional transportation stakeholders to continue to demonstrate consistency with the eligibility requirements for federal ITS funding, but also support a truly effective process to improve regional coordination of ITS implementation, better respond to regional needs, and support regional transportation stakeholders in achieving clear actionable outcomes related to ITS.

First, the Kick-off Meeting/Working session, held on February 10, 2012, engaged key stakeholders in defining the scope of the updated architecture, identify new stakeholders to involve in the update

process, and facilitate a discussion regarding the current state of ITS projects in the region. Then, a wider stakeholder group was invited to a Stakeholder Input Meeting on March 15, 2012. At this meeting, the project team solicited information on local and regional transportation needs, issues, and goals; identified local and regional ITS initiatives and opportunities; and discussed ongoing coordination efforts. After receiving this input, the draft updates to the Strafford-Rockingham Region ITS Architecture were begun, while another workshop was held to gather input for the strategic plan on April 13, 2012. At this meeting, stakeholders discussed ITS deployment opportunities and subsequent prioritization. The draft updates to both the architecture and strategic plan were completed for stakeholder review before the Stakeholder Review Meeting, held on May 17, 2012. The project team compiled feedback from the review meeting to finalize the architecture and strategic plan documents for the region, followed by the creation of a Final Report document, summarizing the update process, the resulting findings, changes to the original architecture, and action items. In the meantime, a website was created for the strategic plan.

Refer to Appendix D for a list of stakeholders that attended each meeting.

1.8 Organization of the Report

The report is structured as follows:

- **Chapter 1 (Introduction):** This chapter provides introductory material; it describes the background of ITS architectures, outlines the objectives of this project, defines the region, and explains the Architecture process;

- **Chapter 2 (Stakeholder Involvement):** This chapter describes the stakeholder involvement process, including a list of participating agencies;

- **Chapter 3 (Needs and Existing Inventory Analysis):** This chapter defines the regional transportation needs which form the basis for the Physical Architecture;

- **Chapter 4 (Updating the ITS Architecture):** This chapter explains the update of the ITS Architecture, including the Service Packages, and Information Flows that resulted from regional needs;

- **Chapter 5 (Standards Plan):** This chapter discusses ITS standards and their relevance to the Strafford-Rockingham Region ITS Architecture;

- **Chapter 6 (Operational Concept):** This chapter includes the Operational Concept, which describes the institutional relationships and agreements necessary to implement the Architecture;

- **Chapter 7 (Functional Requirements):** This chapter identifies the region's high-level functional requirements for ITS systems;

- **Chapter 8 (ITS Strategic Plan):** This chapter summarizes the projects included in the *Strafford-Rockingham Region ITS Strategic Plan* – a separate document, developed concurrently, that describes specific projects and priorities for ITS in the region; and

- **Chapter 9 (Using and Maintaining the Regional ITS Architecture):** This chapter concludes the report with recommendations for using and maintaining the Architecture.

2. STAKEHOLDER INVOLVEMENT

A principal objective of the ITS Architecture update process is to bring together a variety of transportation and emergency management stakeholders to foster a regional dialogue about the future of Intelligent Transportation Systems in the Strafford-Rockingham Region.

ITS architectures and systems are designed to address specific transportation needs. Thus the architecture update process requires that a wide range of agencies and organizations participate, ensuring that the regional ITS architecture accurately addresses the critical issues of the region. Any stakeholder involved in planning, funding, or operating transportation systems in the region has an inherent interest in the ITS architecture and future systems deployment.

The stakeholders who participated in the Strafford-Rockingham Region ITS Architecture update process represented a wide range of local, regional, and statewide entities, multiple modes of transportation, and both public and private interests. The stakeholders participated in workshops and meetings, reviewed project deliverables (draft documents), and provided input at each stage of the process, from needs analysis to the strategic plan.

2.1 Identified Stakeholders

The following comprehensive list of stakeholders was developed for the region. These stakeholders were invited to participate in the update activities, including stakeholder meetings and review of documents, discussed further in Section 2.2.

Municipal Stakeholders (Public Works, Police, and Fire Departments)

All Cities, Towns, and communities within the geographic boundaries of the region, including:

Strafford Regional Planning Commission Communities

- Barrington
- Brookfield
- Dover
- Durham
- Farmington
- Lee
- Madbury
- Middleton
- Milton
- New Durham
- Newmarket
- Northwood
- Nottingham
- Rochester
- Rollinsford
- Somersworth
- Strafford
- Wakefield

Rockingham Planning Commission Communities

- Atkinson
- Brentwood
- Danville
- East Kingston
- Epping
- Exeter
- Fremont
- Greenland
- Hampstead
- Hampton
- Hampton Falls
- Kensington
- Kingston
- New Castle
- Newfields
- Newington
- Newton
- North Hampton
- Plaistow
- Portsmouth
- Rye
- Salem
- Sandown
- Seabrook
- South Hampton
- Stratham
- Windham

Regional Stakeholders (within the region and adjacent to the region)

- Strafford Regional Planning Commission
- Strafford County Sherriff's Office
- Rockingham Planning Commission
- Rockingham County Sherriff's Office
- Cooperative Alliance for Regional Transportation (CART)
- Cooperative Alliance for Seacoast Transportation (COAST)
- Northern New England Passenger Rail Authority (NNEPRA) - Downeaster Passenger Rail
- Alliance for Community Transportation (ACT)
- Nashua Regional Planning Commission (NRPC)
- Nashua Transit
- Southern New Hampshire Planning Commission (SNHPC)
- Lakes Region Planning Commission (Lakes RPC)
- Central New Hampshire Regional Planning Commission (CNHRPC)
- Southern Maine Regional Planning Commission (SMRPC)
- Merrimack Valley Planning Commission (MVPC)
- York County Emergency Management Agency

State Stakeholders (New Hampshire and adjoining states)

- New Hampshire Department of Transportation (NHDOT)
- New Hampshire Department of Safety (NHDOS)
- New Hampshire Homeland Security and Emergency Management
- New Hampshire Motor Transport Authority
- Maine Department of Transportation (MaineDOT)
- Maine State Police
- Maine Turnpike Authority (MTA)
- Massachusetts Department of Transportation – Office of Transportation Planning (MassDOT – OTP)
- MassDOT – Highway Division

Federal Stakeholders

- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
- Federal Motor Carrier Safety Administration (FMCSA)

Other Private/Institutional Stakeholders

- University of New Hampshire (UNH)
- Pease International Tradeport
- Portsmouth Naval Shipyard
- Seabrook Station
- Pan-Am Railways
- C&J
- Greyhound Buslines
- Flight Line
- Total Traffic Network

2.2 Stakeholder Meetings and Input

Project stakeholders were invited to meet and provide input during each phase of the process; a broad cross-section of the agencies listed above was represented at each meeting. Stakeholders were also able to provide their input through one-on-one discussions with the project team as well as by commenting on circulated documents. Stakeholder attendance at the project workshops is included in Appendix D.

The following stakeholder meetings were held during the course of the study:

- **Kick-off Meeting/Working Session (February 10, 2012):** This meeting, which included the project team and key stakeholders, marked the beginning of the architecture update process. The consultant team was introduced and they provided a brief introduction to ITS and the architecture update process. The team asked stakeholders to refine the scope of the updated architecture, identify new stakeholders to involve in the update process, and discuss the current state of ITS projects in the region. Stakeholders were also invited to

provide information about updates to transportation needs in the region. Stakeholders were asked to provide any additional documentation and project information.

- **Stakeholder Input Meeting (March 15, 2012):** At this meeting, a wider stakeholder group was similarly provided an introduction to ITS and the architecture update process, the scope of the project, and the needs from the original architecture. The purpose of this meeting was to solicit information on local and regional transportation needs, issues, and goals; identify local and regional ITS initiatives and opportunities; and discuss ongoing coordination efforts from the wider stakeholder group. This meeting provided much of the needed information on which the architecture is founded.

- **Strategic Plan Workshop (April 13, 2012):** This workshop allowed stakeholders to meet together to discuss ITS opportunities and principles for prioritization that would be used to develop the final project list included in the region's ITS Strategic Plan. Chapter 7 of this document reflects the key findings of the ITS Strategic Plan. Based on the findings of the ITS Strategic Plan, updates to the regional ITS architecture were performed as necessary.

- **Stakeholder Review Meeting (May 17, 2012):** This workshop included a presentation of the draft changes to both the Strafford-Rockingham Region ITS Architecture and Strategic Plan. This included updated stakeholders, ITS inventory, and service packages based on information gathered through a review of relevant regional planning documents, through previous meetings, and through one-on-one follow-up interviews. Feedback from this meeting was compiled to finalize the architecture and strategic plan documents for the region.

Following the conclusion of the workshops, regional transportation stakeholders were provided with a final opportunity to review and comment on the Strafford-Rockingham Region ITS Architecture and the ITS Strategic Plan, prior to finalization of these documents and their presentation to the Metropolitan Planning Organizations (MPOs) for adoption.

3. NEEDS AND EXISTING INVENTORY ANALYSIS

The purpose of the needs analysis is to review the existing conditions and status of ITS deployments initiated by agencies in the region. The subsequent discussion of updates to regional needs in this chapter is related to general transportation needs in the region, only some of which may be addressed by ITS. The existing inventory analysis is based on a review of planning documents or studies and reports that identify regional ITS needs, as well as ITS efforts that have already been undertaken within the region. The needs update is also based on discussions with the agencies participating in the architecture development process. This effort resulted in documentation of updated regional needs.

3.1 Existing Documentation

This project builds on a number of previous planning efforts undertaken in the region and in neighboring regions. These documents provided an initial insight into local needs, existing inventory, and planned projects. The following documents were reviewed as part of the update process.

MPO Planning Documents

- *Transportation Improvement Program Fiscal Years 2011-2014,* Strafford Regional Planning Commission & Strafford Metropolitan Planning Organization, no adoption date.
- *Transportation Improvement Program Fiscal Years 2009-2012,* Strafford Regional Planning Commission & Strafford Metropolitan Planning Organization, adopted September 25, 2008.
- *Transportation Improvement Program Fiscal Years 20011-2014,* Rockingham Planning Commission, adopted October 13, 2010.
- *Transportation Improvement Program Fiscal Years 2009-2012*, Rockingham Planning Commission, adopted October 7, 2008.
- *2009-2035 Long Range Transportation Plan,* Rockingham Planning Commission, adopted October 7, 2008.
- *2011-2035 Metropolitan Transportation Plan,* Strafford Metropolitan Planning Organization, no adoption date.
- *FY 2009 Annual List of Obligated Projects,* Rockingham Planning Commission, December 30, 2009.
- *FY 2010 Annual List of Obligated Projects,* Strafford Regional Planning Commission, December 30, 2010.
- *Fiscal-Year 2012-2013 Unified Plan Working Program,* Strafford Metropolitan Planning Organization, March 2011.
- *2012-2013 Unified Planning Work Program,* Rockingham Planning Commission, approved April 13, 2011.
- *Unified Planning Working Program Fiscal Year 2010&2011,* Rockingham Planning Commission, approved April 8, 2009.

- *Congestion Management Process,* Rockingham Planning Commission, October 2010.

Statewide Planning Documents

- *Draft Ten Year Transportation Improvement Plan 2013-2022 - Projects Only,* NHDOT, November 30, 2011.
- *State Transportation Improvement Program: 2011-2014,* NH DOT, approved January 18, 2011.
- *State Transportation Improvement Program: 2009-2012,* NH DOT, approved January 23, 2009.

Other Documents

- *Traffic Signal Audit – Kittery and Lebanon*, Kittery Area Comprehensive Transportation System, October 2011.
- *Regional Traffic Signal Audit*, Kittery Area Comprehensive Transportation System, March 2009.
- *Draft MOU between COAST/NHDOT/RPC/SRPC*, January 2009
- *Draft MOU between CART/NHDOT/RPC/SNHPC*, January 2009

The findings were then developed in greater detail through conversations held with stakeholders and discussion at the Project Kick-Off Meeting/Working Session and the Stakeholder Input Meeting.

3.2 Regional Needs

Based on the review of existing documentation and the subsequent outreach, the inter-related issues that were identified in the development of the regional ITS architecture were updated and expanded on:

3.2.1 TRAFFIC MANAGEMENT

With the region experiencing significant growth in congestion, traffic management activities continue to take on increasing regional importance. There are several factors that regularly affect the roadway system in Strafford-Rockingham region:

- Recurring Traffic Congestion: The region continues to experience population growth accompanied by increasing passenger and commercial vehicle traffic volumes. Standard commuting patterns cause congestion throughout the region, especially at major corridors and intersections. In particular, there is significant commuter congestion along the I-93 and I-95 corridors during peak hours, though this has been somewhat mitigated by the implementation of open road tolling (ORT) on I-95. However, other regional arterials and routes continue to experience what stakeholders relate as growing congestion problems.

- Seasonal and Retail Traffic Peaks: The region experiences congestion peaks in response to seasonal tourism traffic and retail activities. These congestion peaks further exacerbate the region's transportation infrastructure's capacity limitations.

- Roadway Construction: Construction activities in the region result in roadway queuing and undirected traffic spillover. Major construction activities that were recently completed in the region include the widening of I-93 and the Spaulding Turnpike (Route 16).

- Toll Collection: The region does experience some congestion at toll plazas in the region, as well as traffic spillover from drivers seeking to avoid tolls. This is particularly true along the Route 1 and Route 1 bypass corridor.

- Weather Conditions: Adverse weather causes hazardous road conditions and increased traffic congestion. Severe weather resulting in flooding can result in significant road closures and traffic detouring.

- Incidents: Vehicle accidents, HAZMAT situations, and other incidents unexpectedly affect traffic patterns. Incidents along important corridors or water crossings can further exacerbate existing levels of traffic congestion and vehicle delay.

- Planned Events: Large-scale planned events also temporarily disrupt traffic flow throughout the region.

These factors influence traffic in varying degrees: Commuting patterns have long-term, recurring, and largely predicable affects on traffic patterns, whereas the other factors have short-term, occasional impacts. Construction activities and planned events are predictable in advance, while weather conditions and incidents cause unplanned traffic congestion and delays.

The impacts of these factors are both direct and indirect. Congestion impedes the movement of emergency vehicles, delays transit service, and increases commute times. Commuters already bypass problem areas via local roads through residential areas, which adversely impacts local neighborhoods. Traffic signals, traffic monitoring equipment, and other technologies are already in use in the region to help manage traffic. Needs in each of these categories are described below.

Traffic Signals

Traffic signals are the most prevalent traffic control devices in the region, and can form the basis for an ITS system to the extent that these signals are coordinated, demand responsive, and/or equipped to provide emergency vehicle pre-emption or transit/maintenance vehicle priority.

As part of its Route 28 Corridor ITS Project, the Town of Salem has implemented centralized, remote control of several coordinated traffic signals along the Route 28 corridor. The Town of Salem has plans to continue to expand the number of signals incorporated into its traffic management system, and to improve the detection along the corridor to further support the implementation of pre-planned traffic signal coordination patterns in response to observed real-time traffic conditions.

The City of Portsmouth also has an interconnected traffic signal corridor and is developing the capability to control and operate this corridor remotely. Other municipalities in the region with interconnected traffic signals include Dover, Somersworth, Kingston, Plaistow, and Rochester.

Multiple municipalities and communities in the region have also installed emergency vehicle pre-emption equipment at their traffic signals. In addition, transit agencies are exploring the option of implementing transit signal priority (TSP) at municipalities. It should be noted that currently there exist legislative obstacles to TSP that will need to be resolved prior to implementation.

Additional traffic signal investment faces several challenges in the region. First, traffic patterns at many problem intersections vary with both short-term and long-term changes in traffic conditions, which proves challenging to the municipal DPWs responsible for maintaining these signals. Most municipalities lack the in-house technical expertise to evaluate and program traffic signal systems to achieve optimal conditions. Second, traffic signal control equipment in the region often needs to be upgraded and/or replaced in order to provide enhance traffic management functionality. This infrastructure investment is complicated by the need for compatibility between new and legacy traffic signal control equipment. Third, traffic signals in several major travel corridors must be coordinated across municipal, regional, and state boundaries; further complicating the operation and maintenance of the signal system. Fourth, once coordination is established, it requires resources to maintain that coordination in an effective manner as equipment ages and as traffic conditions change. Once implemented, in order to maximize the potential benefits of such an investment, the traffic signals may require additional system maintenance and an accompanying staff training program. Finally, as public safety vehicle signal pre-emption technology (and/or transit vehicle signal priority) is installed across the region, it will be important that technology for encoding and discriminating among various levels of priority are compatible across the region.

Traffic Monitoring Systems

Traffic monitoring is another form of traffic management already in use in the region. Several municipalities in the region have traffic data collection capabilities in their signal control equipment. However, this existing traffic detection equipment in the region is often underutilized. Although traffic count data may be recorded, the institutional capacity to store and analyze this information for planning or operations purposes may not exist at the municipal level. A system for streamlining information collection, storing and processing would allow the existing technology to be utilized more fully.

NHDOT has installed additional traffic monitoring equipment along the I-93 and the I-95 corridors. This includes additional traffic cameras and sensors to gather real-time travel time information. The Town of Salem has also installed traffic cameras to assist in monitoring key intersections along the Route 28 corridor. Additional cameras could help monitor more of the system so that traffic issues could be spotted and managed more quickly. Stakeholders have expressed an interest in gaining access to the video feeds from these and other cameras along major roadways for use in emergency management and public safety services. NHDOT has plans to make some of these feeds available in the future. However, camera surveillance is still a controversial issue in the region, and legislative limits placed on the use of such monitoring devices will need to be watched closely.

3.2.2 INCIDENT AND EMERGENCY MANAGEMENT

As mentioned previously, everyday congestion further complicates the region's incident and emergency response and management activities. In addition to congestion mitigation, regional stakeholders also identified several other incident and emergency management needs.

Flooding and severe storms pose risks to the region and suggest the need for continued emergency management coordination. The risks potentially posed by the Seabrook Station, hurricanes, and terrorism also suggest the need for coordinated emergency evacuation planning. Hurricane Irene was an example of a severe storm requiring emergency management coordination, and the flooding caused by the storm damaged many NH roadways. The Seabrook Evacuation Plan was in the process of being updated during the stakeholder involvement process of this project. Stakeholders raised concern that greater coordination between agencies and more effective public information would be useful in an evacuation plan.

Several public safety stakeholders identified the need for additional cameras and traffic monitoring systems to assist in incident detection and response. Stakeholders were also interested in pursuing video analytics and other security systems to safeguard strategic transportation infrastructure. Technology to facilitate continued coordination is important. The region's first responders have been well-trained in Unified Incident Command and the progression of digital radio in the state allows for communication with local public safety personnel and Maine/Massachusetts State Police. However, additional communication and coordination technologies were identified as being desirable for the region. Stakeholders have also identified the need for interoperable radio communications between emergency service agencies, such as police and fire departments.

NHDOT's Statewide Transportation Operations Center (TOC) is co-located with the Statewide Emergency Operations Center (EOC) allowing for timely and efficient coordination between transportation and emergency management stakeholders at the state level. NHDOT shares information gathered from its traffic monitoring devices with incident and emergency responders. NHDOT also has security cameras located at key transportation infrastructure.

The New Hampshire Division of Ports and Harbors is currently overseeing a pilot project to install an underwater security system at the Port. This web-based security system would facilitate various levels of access and coordination among the Port and local police, the U.S. Coast Guard, the Statewide EOC, and other emergency management stakeholders.

Also, the Southern Maine Regional Planning Commission (SMRPC) has worked with several regional stakeholders along the New Hampshire-Maine border to establish a Traffic Incident Management Team. This Traffic Incident Management Team developed a working action for incidents impacting traffic flow on I-95, US-1, and other arterials in York, Rockingham, and Strafford Counties. Current participants include: Maine State Police, New Hampshire State Police, Maine Turnpike Authority, MaineDOT, NHDOT, Maine Emergency Management Agency, York County Emergency Management Agency, York County Sheriff, U.S. Coast Guard, City of Portsmouth, and the Towns of Kittery, York, Ogunquit, Wells, Eliot, South Berwick.

3.2.3 TRANSIT MANAGEMENT AND COORDINATION

With the region's population growth and the aging of the general population, there is an increasing need for additional public transportation alternatives in the region. Providing alternatives to single-occupancy automobile travel would assist the region in addressing its congestion mitigation, mobility, environmental, and quality of life goals.

Public sector transit services in the region are currently provided by CART, COAST, and UNH. The Amtrak Downeaster service provides intercity passenger rail service in the region. Flight Line is a ground transportation company that provides east-west service between the Portsmouth Transportation Center and the Manchester Transportation Center via the Epping Park and Ride and the Manchester-Boston Regional Airport. Also, private sector transit service providers, notably C&J, also offer intercity bus service in the region.

In order to improve the efficiency of transit operations, and provide additional information to the riding public, several transit agencies in the region (such as CART, COAST, and UNH) have either implemented or are piloting advanced dispatch and automatic vehicle location (AVL) technology on their transit vehicles. For example, COAST has implemented a radio upgrade with AVL capabilities, but currently the AVL is only used by dispatchers. Other vehicle improvements include procuring newer vehicle stock, and providing enhanced security on board vehicles and at transit facilities. Again as an example, COAST has completed installing onboard video surveillance systems and implemented GPS-based on-board stop announcement systems. It should be noted again that congestion mitigation practices such as improvements to corridors' signal timing offers transit operations benefits as well.

In addition to improving the general availability and efficiency of the region's public transportation services, the region is also interested in increasing public awareness of existing services and better coordination among public transportation service providers.

Providing traveler information to the public, especially communicating with non-technologically savvy people, is of interest. It is anticipated that this information would be disseminated through a variety of means, including additional marketing efforts, partnerships with other regional transportation and economic partners, additional inclusion in the State's 511 efforts, and signs and displays on board vehicles and at transit facilities. Agencies such as COAST are also providing data to Google Transit for trip planning.

Regional stakeholders are also interested in coordinating regional public transportation resources to allow people easier transfers and improved mobility. This would include coordination of public transportation services through a regional brokerage as described in the *Coordinated Public Transit Human Services Transportation Plan for the Seacoast Region of New Hampshire* (2007). The Alliance for Community Transportation (ACT) is working to establish coordination of human services transportation services through a regional call center. Besides intraregional transit coordination, there is also a need for coordination with neighboring regions and adjoining states. Merrimack Valley Planning Commission (MVPC) and the Merrimack Valley Regional Transit Authority (MVRTA) have also expressed interest in working with the region's transit systems to improve transfers and mobility. Regional Transit Authorities in Massachusetts are in the process of adopting the CharlieCard as an interoperable regional fare card.

Regional transit stakeholders also expressed an interest in increased coordination and communication with public safety organizations. This increased coordination would allow transit agencies to better route their vehicles, and assist public safety organizations in responding to emergency situations. This coordination is also needed for transit agencies to provide assistance in emergency evacuations.

3.2.4 TRAVELER INFORMATION SERVICES

The regional stakeholders identified a need for improved traveler information services in the region. Improved traveler information could be used to assist in congestion mitigation by helping travelers to better plan their travel routes. It could be used to help travelers avoid incidents, thereby assisting in incident management activities. It could also be used to support public transit by informing travelers concerning public transportation services.

NHDOT has developed "Smart Work Zones" to also inform drivers concerning construction zone activity. These "Smart Work Zones" use sensors and cameras to monitor work zone activity and report this information to the general public. For example, along I-93, NHDOT has a "Smart Work Zone" that has traffic cameras and sensors to monitor work zone traffic flow. Traffic information is then distributed to the general public via a special website and through Dynamic Message Signs (DMS) located in advance of the work zone location.

The state is also planning some system improvements to its 511 services. The state's 511 website, www.511nh.com, is intended to eventually carry more information on traffic incidents and parking information, and be expanded to include more information on local arterials.

3.2.5 ECONOMIC DEVELOPMENT

Stakeholders identified the role in transportation in attracting residents and businesses to the region for economic development as a priority need. An efficient transportation network, for both freight (by air, boat, rail, and truck) and private vehicle travel, is essential to making the region attractive for economic investment. This need is closely related to several other regional needs, as improved

traffic management, improved transit management, improved traveler information services, etc., can all contribute to improving the overall efficiency and effectiveness of the transportation network, and thus increase the region's economic competitiveness.

3.2.6 DATA AND INFORMATION SHARING

There is recognition among regional stakeholders for improved data and information sharing in the future. As more data becomes available, it will be important to exchange this data with regional partners across disciplines and jurisdictions. This includes sharing real-time data for operational purposes and archived data for planning and analysis data.

3.2.7 INFRASTRUCTURE MAINTENANCE AND PRESERVATION

Along with providing security for strategic infrastructure assets, regional stakeholders identified the ongoing need for the maintenance and preservation of the region's infrastructure. In particular, it was identified that many of the region's bridges were in need of maintenance and rehabilitation. With these bridges providing key access the communities in the region, preservation and maintenance of these bridges is a key issue.

3.2.8 TRANSPORTATION FUNDING

Several stakeholders identified transportation funding as an overarching transportation issue in the region. Like most regions in the United States, transportation funding in the Strafford-Rockingham region is extremely limited. For the most part, state transportation funding has already been committed to developing the infrastructure improvement projects identified in NHDOT's 10-year plan. Therefore, additional transportation investments will need to rely primarily on local funding sources, such as transportation impact fees. Finding and securing alternative funding sources will be a primary challenge for all regional stakeholders. Stakeholders will also need to prioritize projects accordingly, with resources dedicated towards projects that more effectively meet the needs as defined below.

3.3 ITS Inventory

Based on the information gathered from documentation and from stakeholder meetings, the inventory of ITS elements was updated. This inventory includes existing elements, which are those that are already in place or that have been designed, as well as planned elements that address the needs identified in the needs analysis. A good working understanding of the region's existing and planned ITS elements allows for an informed collaboration of project stakeholders and ensures that project recommendations do not conflict with existing or planned ITS initiatives.

3.3.1 INVENTORY BY STAKEHOLDER

In the context of the architecture, the following stakeholders presented in Exhibit 3-1 are any entities that hold or are responsible for an element in the architecture. This stakeholders listed here should not be confused with the regional stakeholders identified in Chapter 2. The regional transportation stakeholders identified in Chapter 2 includes all stakeholders involved in the development of the Strafford-Rockingham Region ITS Architecture and ITS Strategic Plan, regardless of whether or not the stakeholder actually holds or is responsible for an ITS element.

The stakeholders presented in Exhibit 3-1 include only stakeholders that operate, plan, or maintain transportation systems or services with ITS elements.

The inventory presented in Exhibit 3-1 identifies the region's ITS elements grouped by stakeholder. This Exhibit shows the elements that belong to each stakeholder (or group of stakeholders) in the region. It should be noted that this inventory includes both specific ITS systems, where such systems presently exist in the region, as well as generic ITS elements intended to allow for future ITS deployments in the region.

Exhibit 3-1: ITS Inventory by Stakeholder

Stakeholder	Element Name
Alliance for Community Transportation (ACT)	ACT Website
	Regional Call/Coordination Center
AMTRAK	Amtrak Operations
Archived Data Users	Archived Data Users
City of Dover Department of Public Works	Dover Traffic Management System
	Dover Traffic Signals
City of Portsmouth Department of Public Works	Portsmouth Data Repository
	Portsmouth DPW
	Portsmouth Traffic Management System
	Portsmouth Traffic Signals
City of Portsmouth Public Safety Agencies	Portsmouth Dispatch Center
	Portsmouth Public Safety Vehicles
City of Somersworth Department of Public Works	Somersworth Data Repository
	Somersworth DPW
	Somersworth Traffic Management System
	Somersworth Traffic Signals
City of Somersworth Public Safety Agencies	Somersworth Dispatch Center
	Somersworth Public Safety Vehicles
Cooperative Alliance for Regional Transportation (CART)	CART Data Repository
	CART Demand Response Dispatch
	CART Demand Response Transit Vehicles
	CART System Operator
	CART Telephone
	CART Transit Vehicle Operator
	CART Website
Cooperative Alliance for Seacoast Transportation (COAST)	COAST Bus Stops and Transfer Points
	COAST Data Repository
	COAST Demand Response Dispatch
	COAST Demand Response Transit Vehicles
	COAST Fixed Route Dispatch
	COAST Fixed Route Transit Vehicles
	COAST System Operator
	COAST Transit Vehicle Operator
	COAST Website
Easter Seals NH	CART Broker/Manager
Event Promoters	Regional Event Promoters
Federal Highway Administration	Government Reporting System
Federal Public Safety Agencies	Alerting and Advisory Systems
FEMA	FEMA
Financial Institution	Financial Institution
Flight Line	Flight Line Dispatch
	Flight Line Fixed Route Vehicles
	Flight Line Website
Homeland Security	Homeland Security
Hospitals	Hospitals
Local Media	Local Media
Local Municipalities	Local Data Repositories

Stakeholder	Element Name
	Local Field Devices
	Local Infrastructure Monitoring Systems
	Local Municipal Websites
	Local Road Weather Stations
	Local Traffic Management Systems
Local Public Safety Agencies	Local EOC
	Local Public Safety Centers
	Local Public Safety Vehicles
Local Public Works Agencies	Local DPW
	Local Maintenance and Construction Vehicles
	Local Parking Facility Security - Surveillance Systems
	Local Parking Management Systems
Maine Department of Transportation (MaineDOT)	MaineDOT Radio Room
Maine Turnpike Authority	Maine Turnpike 24HR Communications Center
MassDOT - Highway Division	MassDOT - Highway Division Highway Operations Center
Motor Carriers	Commercial Vehicles
	Motor Carriers
New Hampshire Commercial Vehicle Administration	New Hampshire Commercial Vehicle Administration
	Roadside Safety Inspection Station
New Hampshire Department of Health and Human Services	Health And Human Services
New Hampshire Department of Safety	E-911
	Emergency Vehicle
	New Hampshire Division of Emergency Services, Communications, and Management
	Portable Thermal Imaging Devices
	Portable Weigh-In-Motion
	State Police Dispatch
	Statewide Emergency Operations Center
New Hampshire Department of Transportation	511
	511nh.com
	Archived Data Management System
	Bridge Operations Center Field Devices
	Bridge Operations Centers
	Critical Transportation Infrastructure Security - Surveillance System
	NHDOT Field Devices
	Road Weather Information System
	Roadway Service Patrol Vehicle
	State Maintenance and Construction Vehicle
	Statewide Transportation Management Center
	Surface Transportation Weather Service
New Hampshire Division of Ports and Harbors	Port Security System
NH Department of Safety - Division of Motor Vehicles	DMV Crash Records Archive
NHDOT - Bureau of Turnpikes	Toll Administration Center

Stakeholder	Element Name
	Toll Plaza
NHDOT Maintenance District Three	NHDOT Maintenance District 3 Headquarters
NHDOT Maintenance District Five	NHDOT Maintenance District 5 Headquarters
NHDOT Maintenance District Six	NHDOT Maintenance District 6 Headquarters
Other Prepaid Stored Value Smart Card Distributors	Other Prepaid Stored Value Smart Cards
Other State Police	Other State Police
Other Transit Providers	Other Transit Provider Dispatch
	Other Transit Provider Vehicles
Parking Facility Operators (Non-Municipal)	Parking Facilities (Non-Municipal)
Pedestrians	Pedestrians
Private Ground Transportation Providers	Private Ground Transportation Services
Private Tow and Wrecker Company	Private Tow and Wrecker Dispatch
	Private Tow and Wrecker Vehicles
Public and Private Utility Companies	Public and Private Utilities Dispatch
Rail/Airport/Port Operators	Rail/Airport/Port Non-Public Facilities Safety - Security Monitoring Devices
	Rail/Airport/Port Operations
	Rail/Airport/Port Public Facilities Safety - Security Monitoring Devices
	Wayside Equipment
Regional Fare Card Agencies	Regional Fare Card
Rockingham Planning Commission (RPC)	RPC Data Warehouse
Seabrook Station	Seabrook Station Alerting Systems
Service Agencies	Service Agency Cards
Strafford Regional Planning Commission (SRPC)	SRPC Data Warehouse
Town of Kingston	Kingston Dispatch Center
	Kingston DPW
	Kingston Traffic Management System
	Kingston Traffic Signals
Town of Plaistow	Plaistow Dispatch Center
	Plaistow DPW
	Plaistow Traffic Management System
	Plaistow Traffic Signals
Town of Salem	Salem Data Repository
	Salem Traffic Management System
Town of Salem Department of Public Works	Salem DPW
	Salem Traffic Monitoring Devices
	Salem Traffic Signals
Town of Salem Public Safety Departments	Salem Dispatch Center
	Salem Public Safety Vehicles
Traveler Card Update Device Owners	Traveler Card Update Devices
Travelers	Personal Devices
	Traveler
	Vehicles
TRIO	TRIO ISP
University of New Hampshire	UNH Bus Stops and Transfer Points
	UNH Data Repository
	UNH Fixed Route Dispatch

Stakeholder	Element Name
	UNH Fixed Route Transit Vehicles
	UNH System Operator
	UNH Transit Vehicle Operator
	UNH Website
US Coast Guard	U.S. Coast Guard

3.3.2 INVENTORY BY SERVICE

The inventory can also be considered according to the ITS service that each element provides.

Exhibit 3-2 and Exhibit 3-3 present the inventory grouped by subsystem or terminator from the National ITS Architecture. *Subsystems* are the general component systems of the overall ITS architecture, representing the general functional areas that are addressed by ITS. *Terminators* are the human (Driver, for example) and non-human (i.e. Media, Traveler Card) participants that are external to ITS but interface with it; they define the boundary of an architecture. These tables tie each element to a specific subsystem, indicating the functional area that the element addresses.

Exhibit 3-2: ITS Inventory by National ITS Architecture Subsystem

Subsystem	Element
Archived Data Management	Archived Data Management System
	CART Data Repository
	COAST Data Repository
	DMV Crash Records Archive
	Local Data Repositories
	Portsmouth Data Repository
	RPC Data Warehouse
	Salem Data Repository
	Somersworth Data Repository
	SRPC Data Warehouse
	UNH Data Repository
Commercial Vehicle	Commercial Vehicles
Commercial Vehicle Administration	New Hampshire Commercial Vehicle Administration
	Statewide Emergency Operations Center
	Statewide Transportation Management Center
Commercial Vehicle Check	Portable Thermal Imaging Devices
	Portable Weigh-In-Motion
	Roadside Safety Inspection Station
Emergency Management	Kingston Dispatch Center
	Local EOC
	Local Public Safety Centers
	New Hampshire Division of Emergency Services, Communications, and Management
	Plaistow Dispatch Center
	Portsmouth Dispatch Center
	Private Tow and Wrecker Dispatch
	Salem Dispatch Center
	Somersworth Dispatch Center
	State Police Dispatch
	Statewide Emergency Operations Center
	U.S. Coast Guard
Emergency Vehicle	Emergency Vehicle
	Local Public Safety Vehicles
	Portsmouth Public Safety Vehicles
	Private Tow and Wrecker Vehicles
	Roadway Service Patrol Vehicle

Subsystem	Element
	Salem Public Safety Vehicles
	Somersworth Public Safety Vehicles
Fleet and Freight Management	Motor Carriers
Information Service Provider	511
	511nh.com
	ACT Website
	CART Telephone
	CART Website
	COAST Website
	Flight Line Website
	Local Municipal Websites
	Regional Call/Coordination Center
	TRIO ISP
	UNH Website
Maintenance and Construction Management	Kingston DPW
	Local DPW
	NHDOT Maintenance District 3 Headquarters
	NHDOT Maintenance District 5 Headquarters
	NHDOT Maintenance District 6 Headquarters
	Plaistow DPW
	Portsmouth DPW
	Public and Private Utilities Dispatch
	Salem DPW
	Somersworth DPW
	Statewide Transportation Management Center
Maintenance and Construction Vehicle	Local Maintenance and Construction Vehicles
	State Maintenance and Construction Vehicle
Parking Management	Local Parking Facility Security - Surveillance Systems
	Local Parking Management Systems
	Parking Facilities (Non-Municipal)
Payment Administration	Toll Administration Center
Personal Information Access	511
	Personal Devices
Remote Traveler Support	511nh.com
	COAST Bus Stops and Transfer Points
	Rail/Airport/Port Public Facilities Safety - Security Monitoring Devices
	Traveler Card Update Devices
	UNH Bus Stops and Transfer Points
Roadway	Bridge Operations Center Field Devices
	Dover Traffic Signals
	Kingston Traffic Signals
	Local Field Devices
	Local Infrastructure Monitoring Systems
	Local Road Weather Stations
	NHDOT Field Devices
	Plaistow Traffic Signals
	Portsmouth Traffic Signals

Subsystem	Element
	Road Weather Information System
	Salem Traffic Monitoring Devices
	Salem Traffic Signals
	Somersworth Traffic Signals
Roadway Payment	Toll Plaza
Security Monitoring	Critical Transportation Infrastructure Security - Surveillance System
	Local Infrastructure Monitoring Systems
	Local Parking Facility Security - Surveillance Systems
	Port Security System
	Rail/Airport/Port Non-Public Facilities Safety - Security Monitoring Devices
Traffic Management	Bridge Operations Centers
	Dover Traffic Management System
	Kingston Traffic Management System
	Local Traffic Management Systems
	Plaistow Traffic Management System
	Portsmouth Traffic Management System
	Salem Traffic Management System
	Somersworth Traffic Management System
	Statewide Transportation Management Center
Transit Management	CART Broker/Manager
	CART Demand Response Dispatch
	COAST Demand Response Dispatch
	COAST Fixed Route Dispatch
	Flight Line Dispatch
	Other Transit Provider Dispatch
	UNH Fixed Route Dispatch
Transit Vehicle	CART Demand Response Transit Vehicles
	COAST Demand Response Transit Vehicles
	COAST Fixed Route Transit Vehicles
	Flight Line Fixed Route Transit Vehicles
	Other Transit Provider Vehicles
	UNH Fixed Route Transit Vehicles
Vehicle	Commercial Vehicles
	Emergency Vehicle
	Vehicles

Exhibit 3-3: ITS Inventory by National ITS Architecture Terminator

Terminator	Element
Alerting and Advisory Systems	Alerting and Advisory Systems
	Seabrook Station Alerting Systems
Archived Data User Systems	Archived Data Users
Basic Commercial Vehicle	Commercial Vehicles
Care Facility	Hospitals
Driver	Traveler
Emergency Telecommunications System	E-911
Enforcement Agency	Local Public Safety Centers
	State Police Dispatch
	Statewide Transportation Management Center
	U.S. Coast Guard
Event Promoters	Regional Event Promoters
	TRIO ISP
Financial Institution	Financial Institution
	Health And Human Services
Government Reporting Systems	Government Reporting System
Intermodal Freight Depot	Rail/Airport/Port Operations
Map Update Provider	TRIO ISP
Media	Local Media
	TRIO ISP
Multimodal Transportation Service Provider	Amtrak Operations
	CART Demand Response Dispatch
	COAST Demand Response Dispatch
	COAST Fixed Route Dispatch
	Private Ground Transportation Services
Other Archives	Archived Data Management System
	CART Data Repository
	COAST Data Repository
	Local Data Repositories
	Portsmouth Data Repository
	Salem Data Repository
	Somersworth Data Repository
	UNH Data Repository
Other Emergency Management	FEMA
	Homeland Security
	Other State Police
	State Police Dispatch
	TRIO ISP
Other MCM	NHDOT Maintenance District 3 Headquarters
	NHDOT Maintenance District 5 Headquarters
	NHDOT Maintenance District 6 Headquarters
Other Roadway	Road Weather Information System
Other Traffic Management	Bridge Operations Centers
	Maine Turnpike 24HR Communications Center
	MaineDOT Radio Room
	MassDOT - Highway Division Highway Operations Center

Terminator	Element
	TRIO ISP
Pedestrians	Pedestrians
Rail Operations	Rail/Airport/Port Operations
	TRIO ISP
Surface Transportation Weather Service	Surface Transportation Weather Service
Telecommunications System for Traveler Information	511
Transit Operations Personnel	CART System Operator
	COAST System Operator
	UNH System Operator
Transit Vehicle Operator	CART Transit Vehicle Operator
	COAST Transit Vehicle Operator
	UNH Transit Vehicle Operator
Travel Services Provider	511
	TRIO ISP
Traveler	Traveler
Traveler Card	Other Prepaid Stored Value Smart Cards
	Regional Fare Card
	Service Agency Cards
Wayside Equipment	Wayside Equipment

4. UPDATING THE ITS ARCHITECTURE

The updated regional needs were then translated into updates to the Physical Architecture, which describes ITS services and the interconnections among infrastructure in the region. This effort relied extensively on the concepts and terminology outlined in the National ITS Architecture.

4.1 Architecture Update

The regional transportation needs identified by stakeholders along with the identified existing and planned ITS elements provide the basis for updating the Physical Architecture, which describes specific ITS services in greater detail. The architecture is a framework that defines the desired ITS functions of a system, the physical entities in which the functions reside, and the information flows that connect the entities. It focuses on elements that are likely to be implemented over the next ten years to assure that the architecture is realistically applicable rather than an ITS "wish list."

The main underlying framework for the Strafford-Rockingham Region ITS Architecture came from the National ITS Architecture, as required by Federal guidelines, and the New Hampshire Statewide ITS Architecture. The local functional requirements were used to identify applicable portions of these frameworks, then insert local ITS inventory and additional future components as necessary to complete the systems. The result is a localized ITS architecture, unique to the region, but consistent with Federal and State examples.

The updated architecture was developed using *TurboArchitecture™ Version 7.0*, a software program created by FHWA to facilitate development of regional ITS architectures. This tool was used to record and represent the architecture in an interactive, accessible form. *TurboArchitecture™* allows users to view the content of the architecture in varying levels of detail, and provides a streamlined way to update it as necessary.

This draft updated architecture was presented to regional stakeholders for review and comment. The architecture was then revised and improved to incorporate stakeholder comments. The final draft of the updated architecture, which incorporates stakeholder feedback and the findings of the separately developed ITS Strategic Plan, was then presented to SRPC and RPC for review and approval. The *TurboArchitecture™* database, which contains the formal Physical Architecture, will continue to be owned and maintained jointly by SRPC and RPC.

The ITS architecture is described in the following Sections. Section 4.2 provides a summary of various elements of the Strafford-Rockingham Region ITS Architecture.

It is important to reiterate that the architecture is not a static document. As with this update, it must continue to be re-evaluated periodically and updated to ensure that it remains current and relevant to the region. The ongoing maintenance process is discussed later in this document.

4.2 Summary of the Regional Architecture

This section provides a summary of the updated Strafford-Rockingham Region ITS Architecture. For the sake of brevity, explanations of the federal framework are included only as necessary, but more information can be found at the National ITS Architecture website:

http://www.iteris.com/itsarch/index.htm

Also, a list of acronyms, abbreviations, and a glossary related to architecture terminology is included in Appendix C, for reference.

The building blocks of the architecture are Stakeholders, Equipment Packages, Elements, Entities, Interconnects, Information Flows, and Service Packages:

- *Stakeholders* own ITS *Elements,* which provide ITS functions through *Equipment Packages*;
- Elements can be combined and categorized as one of two types of *Entities,* either subsystems or terminators;
- Complete ITS services are provided when entities are *Interconnected* and exchange information through directional *Information Flows*; and
- All of these components combine to form *Service Packages*, which are realistic, deployment-oriented representations of the physical elements required to provide ITS services. Service Packages are the fulfillment of the Functional Requirements identified in Chapter 7 and Appendix J.

Elements are classified as "existing" if their design is complete at the time of the creation of the architecture, regardless of whether the actual element is deployed. Elements are classified as "planned" if their interfaces have not yet been designed at the time that this architecture was created.

4.2.1 ARCHITECTURE STAKEHOLDERS

For purposes of the Physical Architecture, the *architecture stakeholders* are the owners and operators of ITS elements. This should not be confused with the list of regional stakeholders that participated in the development of the architecture in a planning sense, which is defined more generally and incorporates a wider variety of organizations (some of whom do not own or operate ITS systems directly). Therefore, the *architecture stakeholders* listed in this section are a subset of the regional stakeholders listed in Section 2.1.

Most of the stakeholders included in the regional architecture are defined as specific agencies or companies, but there are also several non-specific stakeholders to ensure that the architecture can accommodate other entities that are not called out specifically by name in the architecture (for instance, one of the smaller municipalities in the study region). Exhibit 4-1 lists all of the stakeholders with elements in the Strafford-Rockingham Region ITS Architecture.

Exhibit 4-1: List of Stakeholders Defined in the Physical Architecture

Alliance for Community Transportation (ACT)	New Hampshire Department of Transportation
AMTRAK	New Hampshire Division of Ports and Harbors
Archived Data Users	NH Department of Safety - Division of Motor Vehicles
Bridge Authorities*	NHDOT - Bureau of Turnpikes
City of Dover Department of Public Works	NHDOT Maintenance District Three
City of Portsmouth Department of Public Works	NHDOT Maintenance District Five
City of Portsmouth Public Safety Agencies	NHDOT Maintenance District Six
City of Somersworth Department of Public Works	Other Prepaid Stored Value Smart Card Distributors*
City of Somersworth Public Safety Agencies	Other State Police*
Cooperative Alliance for Regional Transportation (CART)	Other Transit Providers*
Cooperative Alliance for Seacoast Transportation (COAST)	Parking Facility Operators (Non-Municipal)*
Easter Seals NH	Pedestrians
Event Promoters*	Private Ground Transportation Providers*
Federal Highway Administration	Private Tow and Wrecker Company*
Federal Public Safety Agencies	Private Traveler Information Systems
FEMA	Public and Private Utility Companies
Financial Institution*	Rail/Airport/Port Operators
Flight Line	Regional Fare Card Agencies
Homeland Security	Rockingham Planning Commission (RPC)
Hospitals*	Seabrook Station
Local Media*	Service Agencies*
Local Municipalities*	State Public Safety Agencies
Local Public Safety Agencies*	Strafford Regional Planning Commission (SRPC)
Local Public Works Agencies*	Town of Kingston
Maine Department of Transportation (MaineDOT)	Town of Plaistow
Maine Turnpike Authority	Town of Salem
MassDOT - Highway Division	Town of Salem Department of Public Works
Motor Carriers*	Town of Salem Public Safety Departments
New Hampshire Commercial Vehicle Administration	Traveler Card Update Device Owners
New Hampshire Department of Health and Human Services	Travelers
New Hampshire Department of Safety	TRIO
	University of New Hampshire
	US Coast Guard

* Non-specific entity representing other potential stakeholders not explicitly named

4.2.2 EQUIPMENT PACKAGES, ELEMENTS, AND ENTITIES

The stakeholders own elements, which reflect equipment packages as defined in the National ITS Architecture and are combined to create entities. There are two types of entities: *subsystems* and *terminators*. *Subsystems* are combinations of elements that cooperatively perform specific functions. *Terminators* are the human (Driver, for example) and non-human (i.e. Media, Traveler Card) participants that are external to ITS but interface with it; they define the boundary of an architecture. The subsystems and terminators included in the Strafford-Rockingham Region ITS Architecture are listed in Exhibit 4-2.

Exhibit 4-2: List of Entities

Subsystems	Terminators
• Archived Data Management • Commercial Vehicle • Commercial Vehicle Administration • Commercial Vehicle Check • Emergency Management • Emergency Vehicle • Fleet and Freight Management • Information Service Provider • Maintenance and Construction Management • Maintenance and Construction Vehicle • Parking Management • Payment Administration • Personal Information Access • Remote Traveler Support • Roadway • Roadway Payment • Security Monitoring • Traffic Management • Transit Management • Transit Vehicle • Vehicle	• Alerting and Advisory Systems • Archived Data User Systems • Basic Commercial Vehicle • Care Facility • Driver • Emergency Telecommunications System • Enforcement Agency • Event Promoters • Financial Institution • Government Reporting Systems • Intermodal Freight Depot • Map Update Provider • Media • Multimodal Transportation Service Provider • Other Archives • Other CVAS • Other Emergency Management • Other ISP • Other MCM • Other MCV • Other Parking • Other Payment Administration • Other Roadway • Other Traffic Management • Other Transit Management • Other Vehicle • Pedestrians • Rail Operations • Surface Transportation Weather Service • Telecommunications System for Traveler Information • Transit Operations Personnel • Transit Vehicle Operator • Travel Services Provider • Traveler • Traveler Card • Wayside Equipment

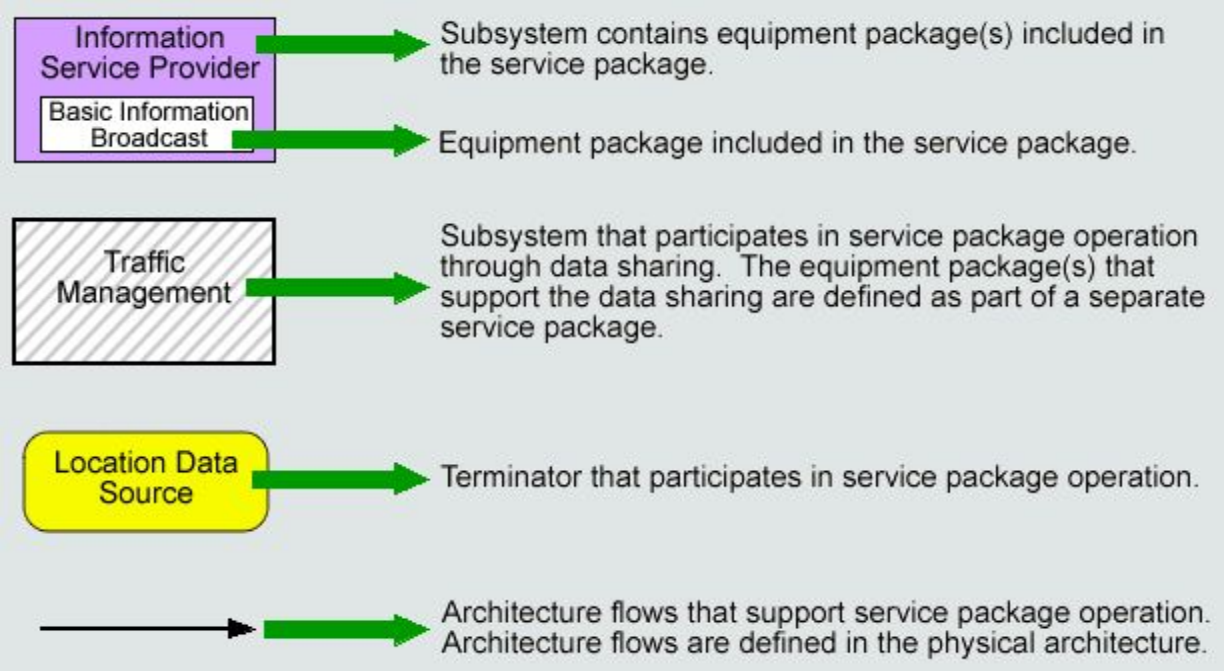
4.2.3 INFORMATION FLOWS

An interface between two entities is called an *Interconnect*. Directional movements of information between entities are called *Information Flows.* It is through these physical connections that data is exchanged to make ITS services possible. There are many different types of information flows throughout the architecture, specific to particular types of services being offered, so a comprehensive list is not included in this document. Instead, the information flows utilized in this architecture can be found in the Service Package Diagrams as described below.

4.2.4 SERVICE PACKAGES

Entities (subsystems and terminators) and information flows are combined to form *Service Packages*. Service Packages are realistic, deployment-oriented representations of the physical elements required to implement ITS services. They combine existing and future elements to provide guidance for ITS coordination over a 10-year horizon. Service Package Diagrams are visual representations of the Service Packages and can be read using the key provided in Exhibit 4-3.

Exhibit 4-3: Key to Reading Service Package Diagrams[2]



In the most recent version of the National ITS Architecture (Version 7.0), there are ninety-seven (97) illustrative service packages defined in eight categories:

- Archived Data Management (AD)
- Advanced Public Transportation Systems (APTS)
- Advanced Traveler Information Systems (ATIS)
- Advanced Transportation Management Systems (ATMS)

[2] From http://www.iteris.com/itsarch/html/static/key_b.htm#Market Packages.

- Advanced Vehicle Safety Systems (AVSS)
- Commercial Vehicle Operations (CVO)
- Emergency Management (EM)
- Maintenance and Construction Management (MC)

Each Service Package is given a name and number that corresponds with the category of which it is a part. For example: "ATMS01 – Network Surveillance" is the first service package described in the Advanced Transportation Management Systems (ATMS) category. Also, there may be more than one version of the same Service Package, with different participants and elements. These multiple versions of a single Service Package are called *instances*.

The Strafford-Rockingham Region ITS Architecture was built using these illustrative packages, which were then localized based on unique regional ITS infrastructure and functional requirements.

For example, Exhibit 4-4 shows the National ITS framework for the Service Package "ATMS01 – Network Surveillance." Then Exhibit 4-5 is a version of the same Service Package created for the Strafford-Rockingham Region ITS Architecture, in this case the specific instance of the network surveillance to be included as part of Salem's traffic management system. There are also other instances of the same Service Package included in the architecture.

Exhibit 4-4: ATMS01 – Network Surveillance (from the National ITS Architecture)

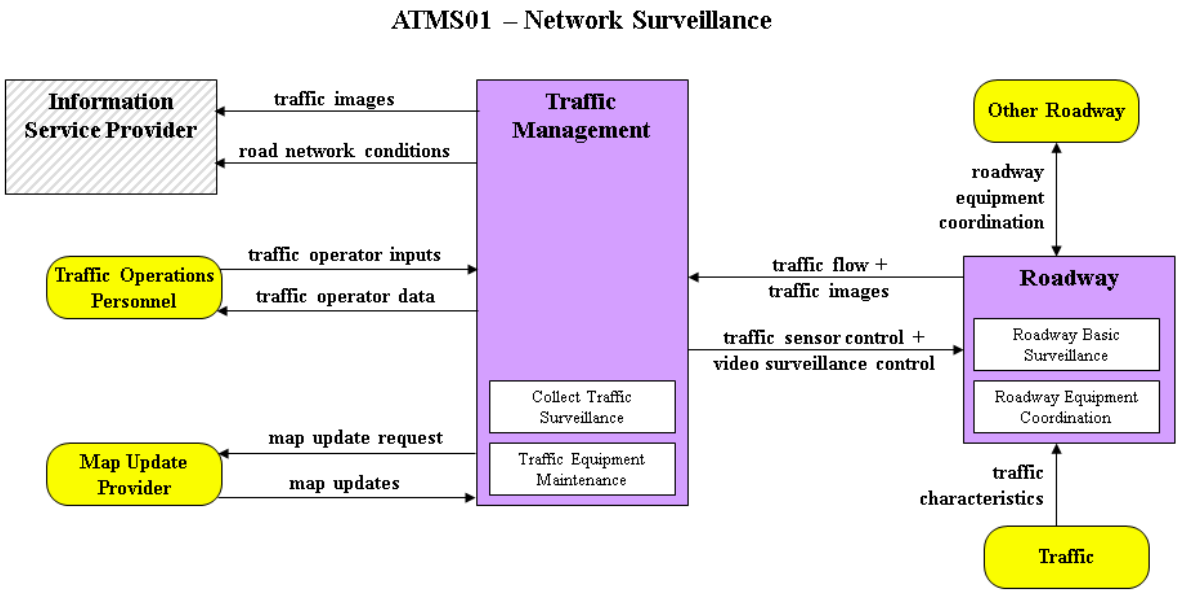


Exhibit 4-5: ATMS01 Diagram – Applied to Strafford-Rockingham Region

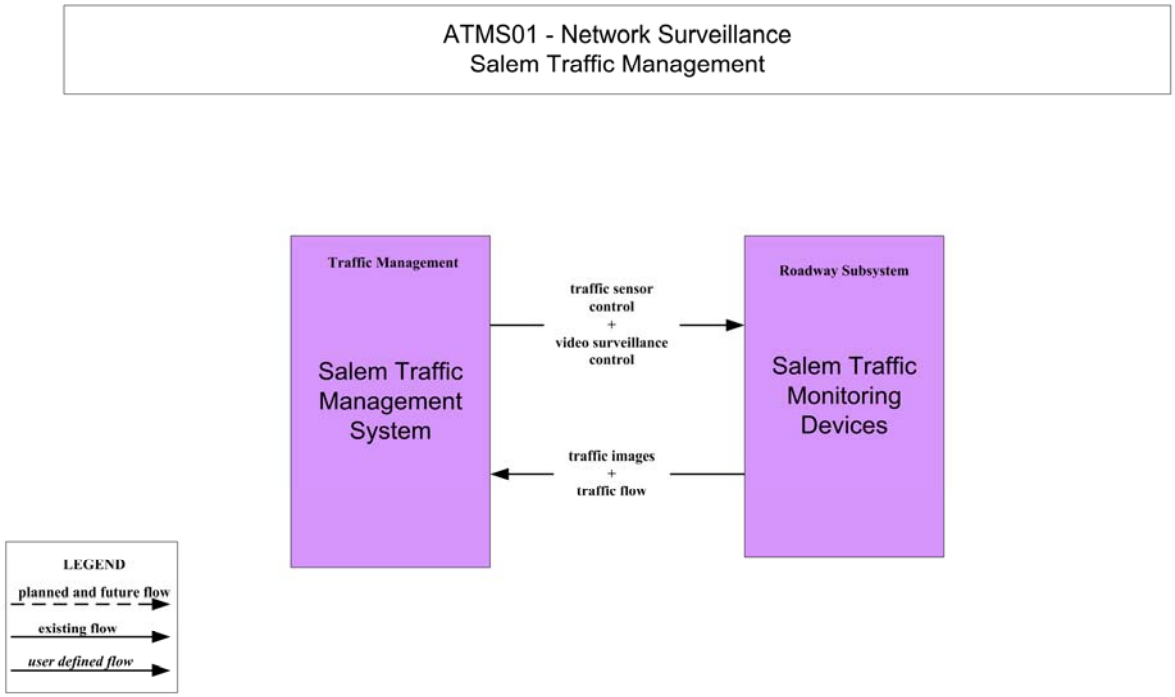


Exhibit 4-6 provides a list of the National ITS Architecture Service Packages included in the Strafford-Rockingham Region ITS Architecture, while Exhibit 4-7 describes the ones that are not included. A more detailed list of Service Packages, including localized descriptions for those included in this architecture, is provided in Appendix E. Diagrams for all Service Package instances included in the Strafford-Rockingham Region ITS Architecture are also included in Appendix F.

It should be noted that several service packages included in the Strafford-Rockingham Region ITS Architecture reference statewide ITS activities. In these instances, the relevant service packages are incorporated into the regional ITS architecture solely by reference to the New Hampshire Statewide ITS Architecture. For example, ATMS10 – Electronic Toll Collection is occurring within the region. However, since the electronic tolling is part of a statewide tolling effort and is already included in the New Hampshire Statewide ITS Architecture, the service package is incorporated solely by reference in this document.

Exhibit 4-6: Service Packages Included in the Strafford-Rockingham Region ITS Architecture

Service Package	Title	Description
AD1	**ITS Data Mart**	Provides an archive that houses data collected and owned by a single agency.
AD2	**ITS Data Warehouse***	Supports data storage similar to AD3 but with centralized data storage.
AD3	**ITS Virtual Data Warehouse**	Provides an archive that houses data collected from multiple agencies by accessing physically distributed ITS archives that are locally managed.
APTS01	**Transit Vehicle Tracking**	Monitors current transit vehicle location using an Automated Vehicle Location (AVL) system.
APTS02	**Transit Fixed-Route Operations**	Performs vehicle routing, optimized scheduling, and system monitoring for fixed-route transit services.
APTS03	**Demand Response Transit Operations**	Performs vehicle routing, optimized scheduling, system monitoring, and reservation services for demand responsive transit services.
APTS04	**Transit Fare Collection Management**	Manages passenger loading and fare payments on-board transit vehicles using electronic means. It allows transit users to pay with electronic fare cards.
APTS05	**Transit Security**	Provides for the physical security of transit passengers and transit vehicle operators. On-board equipment is deployed to perform surveillance and sensor monitoring in order to warn of potentially hazardous situations.
APTS07	**Multi-modal Coordination**	Establishes communications between multiple transportation agencies to improve service coordination.
APTS08	**Transit Traveler Information**	Provides transit users with transit information over the Internet, at stops, and on vehicles.
APTS09	**Transit Signal Priority**	This service package supports transit vehicle traffic signal priority.
APTS10	**Transit Passenger Counting**	Supports automatic counting of passengers entering and exiting a transit vehicle.
ATIS01	**Broadcast Traveler Information***	Collects traffic/travel information and broadly disseminates it using a wide area digital broadcast (FM subcarrier, cellular data broadcast).
ATIS02	**Interactive Traveler Information**	Interactively provides tailored traveler information based on a traveler requests and submitted profiles.
ATIS07	**Yellow Pages and Reservation***	Provides yellow pages and reservation services to the user.
ATMS01	**Network Surveillance**	Enables traffic management to monitor traffic and road conditions, identify and verify incidents, detect faults in indicators, and collect transportation data.
ATMS03	**Surface Street Control**	Provides the central control equipment, communication links, and signal control equipment that support local signal control and/or arterial traffic management.
ATMS04	**Freeway Control***	Includes equipment to support ramp, lane, and interchange control for freeways.
ATMS06	**Traffic Information Dissemination**	Provides driver information using roadway equipment such as dynamic message signs or highway advisory radio.
ATMS07	**Regional Traffic Control**	This service package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy.
ATMS08	**Traffic Incident Management System**	This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized.
ATMS10	**Electronic Toll Collection***	Provides technology to collect tolls electronically and detect violations.
ATMS13	**Standard Railroad Grade Crossing***	Manages traffic at highway-rail intersections (HRIs) where speeds are less than 80 miles per hour.

Service Package	Title	Description
ATMS17	**Regional Parking Management**	Provides regional coordination between parking facilities and between parking facilities and traffic and transit management systems, supporting multimodal travel planning.
ATMS18	**Reversible Lane Management***	Provides for the management of reversible lane facilities and equipment.
ATMS20	**Drawbridge Management***	Systems that manage drawbridges at rivers and canals.
ATMS22	**Variable Speed Limits**	Systems that monitor traffic and environmental conditions along the roadway and set variable speed limits along a roadway to improve safety, congestion, and emissions.
CVO03	**Electronic Clearance***	Provides for automated clearance at roadside check facilities.
CVO04	**CV Administrative Processes***	Provides for electronic handling of CVO credentials and tax filing.
CVO06	**Weigh-In-Motion***	Provides for high speed weigh-in-motion.
CVO07	**Roadside CVO Safety***	Provides for automated roadside safety monitoring, reporting, and safety inspections.
EM01	**Emergency Call-Taking and Dispatch**	Provides basic public safety call-taking services and facilitates the deployment of appropriate resources to an emergency.
EM02	**Emergency Routing**	Enhances emergency vehicle routing using automated vehicle location (AVL) technology and information about traffic, road conditions, and suggested routes. This service package also supports emergency vehicle traffic signal preemption.
EM03	**Mayday Support***	Allows users to request emergency assistance and enables responders to locate the user.
EM04	**Roadway Service Patrols***	Supports roadway service patrols that monitor roads and aid motorists.
EM05	**Transportation Infrastructure Protection**	Monitors transportation infrastructure, prevents incidents using barriers, and controls access during incidents.
EM06	**Wide-Area Alert***	Uses ITS driver and traveler information systems to alert the public in emergency situations that pose a threat to life and property.
EM07	**Early Warning System***	Monitors and detects potential, looming, and actual disasters.
EM08	**Disaster Response and Recovery***	Enhances the ability of the surface transportation system to respond to and recover from severe disasters.
EM09	**Evacuation and Reentry Management***	Supports evacuation of the general public from a disaster area and manages subsequent reentry.
EM10	**Disaster Traveler Information***	Provides disaster-related traveler information to the general public.
MC01	**Maintenance and Construction Vehicle and Equipment Tracking**	Tracks the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities.
MC03	**Road Weather Data Collection***	Collects current road and weather condition data from sensors on the roadway or railway.
MC04	**Weather Information Processing and Distribution***	Processes and distributes the environmental information collected from the Road Weather Data Collection service package.
MC05	**Roadway Automated Treatment***	Automatically treats a roadway section based on environmental conditions.
MC06	**Winter Maintenance**	Supports winter road maintenance including snow plow operations and roadway treatments (such as de-icing).
MC07	**Roadway Maintenance and Construction**	Supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way.
MC08	**Work Zone Management***	Directs activity in work zones, controlling traffic through portable dynamic message signs (DMS) and coordinating activities with other impacted groups.
MC10	**Maintenance and Construction Activity Coordination***	Supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations or to the Information Service Providers who can provide the information to travelers.

Service Package	Title	Description
MC12	**Infrastructure Monitoring**	Uses fixed and vehicle-based sensors to monitor vibration, stress, temperature, continuity, etc. of transportation infrastructure.
* Indicates service packages included solely by reference to the New Hampshire Statewide ITS Architecture.		

Exhibit 4-7: Service Packages NOT Included in Strafford-Rockingham Region ITS Architecture

Service Package	Service Package Name	Service Package Description	Reason
APTS06	**Transit Fleet Management**	Supports remote, automatic transit maintenance scheduling and monitoring.	No local need for such a system was perceived within the timeframe of this architecture.
APTS11	**Multimodal Connection Protection**	Supports the coordination of multimodal services to optimize the travel time of travelers as they move from mode to mode (or to different routes within a single mode).	No local need for such a system was perceived within the timeframe of this architecture.
ATIS03	**Autonomous Route Guidance**	Provides route planning and guidance based on static, stored information.	Infrastructure and data sources not available to support this package at the present time.
ATIS04	**Dynamic Route Guidance**	Provides route planning and guidance that is responsive to current conditions.	
ATIS05	**ISP Based Trip Planning and Route Guidance**	Provides pre-trip route planning and turn-by-turn route guidance services.	
ATIS06	**Transportation Operations Data Sharing**	Makes real-time transportation operations data available to transportation system operators.	
ATIS08	**Dynamic Ridesharing**	Supports dynamic ridesharing/ride matching services to travelers.	While UNH, the State of Maine, and other stakeholders have expressed interest in ridesharing programs, no current plans for dynamic ridesharing exist in the region.
ATIS09	**In Vehicle Signing**	Distributes traffic and travel advisory information to drivers through in-vehicle devices.	Infrastructure and data sources not yet available.
ATIS10	**Short Range Communications Traveler Information**	Provides location-specific information or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications infrastructure	
ATMS02	**Traffic Probe Surveillance**	Monitors the roadway network using communications between the vehicle and Information Service Provider or the roadside.	No local need for such a system was perceived.
ATMS05	**HOV Lane Management**	Manages HOV lanes by coordinating freeway ramp meters and signals with HOV lane usage signals.	No HOV Lanes exist in the region at this time.
ATMS09	**Transportation Decision Support and Demand Management**	Recommends courses of action to traffic operations personnel based on an assessment of current and forecast road network performance.	No local need for such a system was perceived.
ATMS11	**Emissions Monitoring and Management**	Monitors individual vehicle emissions and general air quality using sensors.	NHDOT's RWIS deployments have emissions monitoring capabilities; however NHDOT is not currently processing this data. It is anticipated that this service package will be included in a future revision of the New Hampshire Statewide ITS Architecture.
ATMS12	**Roadside Lighting System Control**	Systems that manage electrical lighting systems by monitoring operational conditions.	No local need for such a system was perceived.
ATMS14	**Advanced Railroad Grade Crossing**	Manages traffic at highway-rail intersections (HRIs) where speeds are greater than 80 miles per hour.	There are no high-speed rail corridors (>80mph) in the study area.
ATMS15	**Railroad Operations Coordination**	Provides strategic coordination between freight rail operations and traffic management centers. Rail operations provides train and maintenance schedules, which can be used to manage traffic or enhance traveler information.	There is currently little strategic coordination between freight rail operations and traffic management centers in the region.
AMTS16	**Parking Facility Management**	Provides enhanced monitoring and management of parking facilities. Assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees.	No local need for such a system was perceived.

Service Package	Service Package Name	Service Package Description	Reason
ATMS19	**Speed Warning and Enforcement**	Monitors the speeds of vehicles traveling through a roadway system and supports warning drivers when their speed is excessive.	No local need for such a system was perceived.
ATMS21	**Roadway Closure Management**	Closes roadways to vehicular traffic when conditions are unsafe or access to the roadway must be prohibited.	No local need for such a system was perceived. Applicable to areas prone to severe weather (e.g. mountain passes).
ATMS23	**Dynamic Lane Management and Shoulder Use**	Provides for active management of travel lanes along a roadway using field equipment, physical overhead lane signs and associated control electronics.	No local need for such a system was perceived.
ATMS24	**Dynamic Roadway Warning**	Systems that dynamically warn drivers approaching hazards on a roadway, such as roadway weather conditions, road surface conditions, and traffic conditions.	
ATMS25	**VMT Road User Payment**	Facilitates charging fees to roadway vehicle owners for using specific roadways with potentially differential payment rates based on time-of-day, which specific roadway is used, and class of vehicle.	
ATMS26	**Mixed Use Warning Systems**	Supports the sensing and warning systems used to interact with pedestrians, bicyclists, and other vehicles that operate on the main vehicle roadways, or on pathways which intersect the main vehicle roadways.	
AVSS01	**Vehicle Safety Monitoring**	Diagnoses critical components of the vehicle and warns the driver of dangers.	AVSS service packages are very forward looking and are likely to be spearheaded by national efforts and through private industry (such as vehicle manufacturers).
AVSS02	**Driver Safety Monitoring**	Determines the driver's condition, and warns the driver of potential dangers.	
AVSS03	**Longitudinal Safety Warning**	Monitors the areas in front of and behind the vehicle and present longitudinal warnings to the driver.	
AVSS04	**Lateral Safety Warning**	Monitors the areas to the sides of the vehicle and present lateral warnings to the driver.	
AVSS05	**Intersection Safety Warning**	Determines the probability of a collision in an equipped intersection and provides timely warnings to drivers.	
AVSS06	**Pre-Crash Restraint Deployment**	Monitors the vehicle's local environment, determines collision probability and deploys a pre-crash safety system.	
AVSS07	**Driver Visibility Improvement**	Enhances driver visibility using an enhanced vision system.	
AVSS08	**Advanced Vehicle Longitudinal Control**	Automates the speed and headway control functions on board the vehicle.	
AVSS09	**Advanced Vehicle Lateral Control**	Automates the steering control on board the vehicle.	
AVSS10	**Intersection Collision Avoidance**	Determines the probability of an intersection collision and warns approaching vehicles.	
AVSS11	**Automated Vehicle Operations**	Enables 'hands-off' operation of the vehicle on automated portions of the highways.	
AVSS12	**Cooperative Vehicle Safety Systems**	Enhances the on-board longitudinal and lateral warning stand-alone systems by exchanging messages with other surrounding vehicles and roadside equipment.	
CVO01	**Carrier Operations and Fleet Management**	Provides the capabilities to manage and route a fleet of commercial vehicles.	Most CVO ITS applications are administered at the statewide level and are not applicable to the region at this time.
CVO02	**Freight Administration**	Tracks the movement of cargo and monitors the cargo condition.	
CVO05	**International Border Electronic Clearance**	Provides for automated clearance at international border crossings.	This service package does not directly affect this region.

Service Package	Service Package Name	Service Package Description	Reason
CVO08	**On-board CVO Safety**	Provides for on-board commercial vehicle safety monitoring and reporting.	Most CVO ITS applications are administered at the statewide level and are not applicable to the region at this time.
CVO09	**CVO Fleet Maintenance**	Supports automatic maintenance of CVO fleet vehicles with on-board monitoring/communication equipment.	
CVO10	**HAZMAT Management**	Integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents.	
CVO11	**Roadside HAZMAT Security Detection and Mitigation**	Provides the capability to detect and classify HAZMAT on commercial vehicles using roadside technology.	
CVO12	**CV Driver Security Authentication**	Allows fleet managers to detect when an unauthorized driver attempts to drive their vehicle.	
CVO13	**Freight Assignment Tracking**	Provides for the planning and tracking of commercial vehicle shipments.	
MC02	**Maintenance and Construction Vehicle Maintenance**	Performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment.	Package not perceived as applicable for implementation during the architecture timeframe by local entities.
MC09	**Work Zone Safety Monitoring**	Improves work crew safety by detecting vehicle intrusions and warning crew workers.	
MC11	**Environmental Probe Surveillance**	Uses on-board vehicle sensors to collect environmental data.	No local need for such a system was perceived.

5. STANDARDS PLAN

5.1 The Role of Standards in ITS Architecture and Deployment

ITS standards provide an additional level of *technical* coordination to achieve the Strafford-Rockingham Region ITS Architecture's goal of promoting compatibility among ITS deployments. This complements the *functional* coordination implicit in the service packages, and the *institutional* coordination facilitated by the operations concept.

ITS standards provide a common structure for sharing of information and data among operating agencies, systems, and even individual ITS devices. While the Strafford-Rockingham Region has not formally adopted any ITS standards as part of the Region's ITS Architecture, this section identifies the need for ITS standards, references applicable ITS standards for the region, discusses national and statewide guidance on ITS standards, and provides information on how to use, evaluate, and endorse regional ITS standards in the future.

5.1.1 NEED FOR ITS STANDARDS

An ITS Standards Plan is an important element of a regional ITS architecture for several reasons:

- The functionality of certain service packages requires interconnection of multiple ITS systems deployed in phases over time, and perhaps by different agencies. Achieving this functionality may be difficult, expensive, or even impossible if the systems are not built upon a common standards foundation.

- The effectiveness of a number of early ITS deployments has been limited by the inability to upgrade or interconnect those systems because the technology did not "speak the same language."

- Standards will facilitate integration of ITS systems being deployed at the statewide level, such as 511 traveler information systems, or across multiple local jurisdictions, such as traffic signal coordination.

- By using widely recognized ITS standards, operators of ITS systems will have greater latitude in developing, scaling, and upgrading ITS components. (For example, a Dynamic Message Sign (DMS) in the field can be replaced with another unit by a different manufacturer without having to re-code the interface between the sign and the central traffic management software).

These issues led to the creation of the National ITS Standards Program (discussed below) and the ITS standards requirement of the regional architecture process, to promote ITS Standards dialogue early in the ITS deployment process.

5.1.2 DECISION FACTORS AFFECTING THE SELECTION OF ITS STANDARDS

The region faces several issues in evaluating and adopting regional ITS standards:

- **Needs and Functional Requirements:** First and foremost, what is the purpose that the system is to fulfill? How do these translate into functional capabilities for the technology under evaluation?

- **Stakeholder Objectives:** Who will ultimately implement, use, and maintain the systems? What are the perspectives on system functionality, cost, interoperability, etc. from each stakeholder's perspective?

- **Technology Scan:** What are the available options for fulfilling these system functional requirements?

- **Legacy Systems:** What equipment or standards are presently used and by whom? What weight should the "sunk cost" of existing systems be given in the evaluation of alternatives?

- **Relevant Standards:** Are there national standards that provide a basis for the proposed system? Has NHDOT adopted a statewide standard? Are these standards voluntary or mandatory? Is there an informal or industry standard? Are there choices among proprietary vendor standards? How does inter-agency integration and/or integration with statewide systems affect the choice of standards?

- **Design and Cost Implications:** Based upon the choice of standards, what is the net impact on system design and cost?

Answering these questions will require a continued dialogue among the affected parties and an analysis of region-specific needs.

5.1.3 NATIONAL AND STATEWIDE GUIDANCE FOR ITS STANDARDS

The value of ITS standards multiplies as the number of affected entities, systems, and vendors grows (unfortunately, so does the complexity and cost of developing such standards). Recognizing this, there has been a significant amount of work in developing national ITS standards, as is discussed in the following section.

Furthermore, because of the strong linkage between ITS in the Strafford-Rockingham region and statewide ITS initiatives, as well as the influence of the New Hampshire Department of Transportation (NHDOT) in project design and funding, many of the ITS standards issues which the region will face are more appropriately addressed at the statewide level through the New Hampshire Statewide ITS Architecture. An overview of this effort is also provided below.

So long as these national and statewide standards address local requirements, it is recommended that they be adopted for the region to leverage the significant development efforts behind these standards, as well as the other benefits of standards coordination discussed above.

Nonetheless, after looking to national and statewide ITS standards, there will inevitably be localized issues that will require a region-specific dialogue. Thus, promoting the ongoing interaction of local and state stakeholders is a critical element of a "living" regional ITS architecture as planning migrates towards project implementation.

5.2 The National ITS Standards Program

The US Department of Transportation (USDOT) has undertaken an ambitious effort to develop National ITS Standards. Many aspects of this program are still works in progress, though the initiative has led to the development of many officially endorsed ITS standards, such as the National Transportation Communications for ITS Protocol (NTCIP, www.ntcip.org).

USDOT is currently supporting the development of more than one hundred (100) ITS standards, and also tracks ITS standards development that it is not directly supporting. Up-to-date information is available at the USDOT's ITS Standards website: http://www.standards.its.dot.gov/default.asp.

5.2.1 GOALS OF THE PROGRAM

The ITS Standards Program was created to encourage the development of non-proprietary, industry-based ITS standards that will achieve interoperable ITS systems nationwide. The goals of the Standards Program are to:

- Promote the ability of public sector agencies to choose ITS products and services from multiple vendors;
- Promote the creation of an innovative ITS market;
- Facilitate interoperability at all levels;
- Ensure the safety of the traveling public;
- Facilitate deployment of ITS technologies;
- Support testing and evaluation of standards; and
- Promote international competitiveness of American industry.

The Standards Program utilizes a consensus-building process designed to encourage private and public stakeholder participation. Therefore, the development, testing, outreach, education, technical assistance, and policy support of standards is carried out through cooperative agreements with Standards Development Organizations (SDOs). The SDOs that participate in ITS standards activities include:

- AASHTO (American Association of State Highway and Transportation Officials)
- ANSI (American National Standards Institute)
- APTA (American Public Transportation Association)
- ASTM (American Society for Testing and Materials)
- IEEE (Institute of Electrical and Electronics Engineers)
- ITE (Institute of Transportation Engineers)
- NEMA (National Electrical Manufacturers Association)
- SAE (Society of Automotive Engineers)

Working groups within SDOs write the ITS standards, which are then reviewed by other transportation professionals (within and outside of the SDOs) before adoption. A multidisciplinary team lead by the Battelle Memorial Institute is also testing the ITS standards, to provide information to potential users on the reliability of standards in actual transportation settings.

5.2.2 VOLUNTARY USE OF NATIONAL ITS STANDARDS

Use of the USDOT standards is currently not mandatory—in part, this is because several key standards are still undergoing active development. TEA-21 requires USDOT to "ensure that ITS projects carried out using funds made available from the Highway Trust Fund . . . conform to the national architecture, applicable standards, or provisional standards and protocols." However, there is currently no binding requirement similar to the rule/policy mandating the development of regional ITS architectures. USDOT reserves the right to adopt official national ITS standards in the future and link federal ITS funding to their use.

As the national standards initiative progresses, the system has had a trickle-down effect on the ITS industry. Many vendors of hardware, communications, and software advertise that their wares are compliant with the national standards as a selling point.

5.2.3 NATIONAL ITS STANDARDS IN NEW HAMPSHIRE

To the extent that mature, universal national ITS standards exist, there is little reason not to adopt these standards at the regional level to leverage all of the benefits of standardization discussed in the introduction to this section. As part of the *New Hampshire Statewide ITS Architecture*, a set of national standards have been identified to support interoperability of ITS systems throughout the state. The standards component of the *New Hampshire Statewide ITS Architecture* is described in the following section.

5.3 Standards Component of the New Hampshire Statewide ITS Architecture

The New Hampshire Department of Transportation (NHDOT) is a major player in the development, operation, and maintenance of transportation infrastructure in the region, as are other statewide entities such as the New Hampshire Department of Safety.

Similar to the Strafford-Rockingham Region ITS Architecture, the *New Hampshire Statewide ITS Architecture* also includes a standards component to fulfill Federal Architecture requirements. This component addresses ITS standards issues statewide, notably for NHDOT-led projects, statewide information and traveler information systems such as the state's 511 system.

It is in the interest of all parties to promote statewide and local coordination in the development of ITS standards, due to the influence of the statewide architecture on ITS initiatives in the region and the benefits of leveraging statewide ITS deployments to address local transportation needs. Whenever possible, deferral to state-level ITS standards is both appropriate and advantageous.

Statewide ITS standards may in the future become design standards for all NHDOT-funded projects, similar to existing standards for roadway geometry, signage, etc. Indeed, many state DOTs across the U.S. are beginning to formally incorporate ITS design guidelines and standards plans into their highway design manuals. NHDOT is also currently working to standardize the ITS devices it deploys across the state, which may help facilitate future device integration and compatibility issues.

Stakeholders should refer to the *New Hampshire Statewide ITS Architecture* for statewide ITS standards that are applicable to the interfaces of the Strafford-Rockingham Region ITS Architecture. In addition, *TurboArchitecture™ Version 7.0* identified a set of standards for inclusion in the Strafford-Rockingham Region ITS Architecture based on the defined information flows. These standards are included for informational purposes in Appendix G.

5.4 Using, Evaluating, and Endorsing ITS Standards

Given the benefits of adopting widely accepted standards, the recommendation of this report is to adopt national and statewide ITS standards to the fullest extent possible. This recommendation directly supports the strategic objective of the ITS architecture, namely promoting coordinated, interoperable, and cost-effective ITS implementation.

5.4.1 ITS STANDARDS IN ARCHITECTURE MAINTENANCE AND PROJECT DEPLOYMENT

The following are recommendations for promoting the systematic use of ITS standards in regional ITS deployment projects:

- National, statewide, and regional ITS standards should be referenced in design documents and project specifications for individual project deployments, similar to the manner in which

consistency with other aspects of the regional ITS architecture is required. Deference to statewide standards should be made in cases where regional and statewide standards conflict, provided the statewide standards meet the functional needs of the regional ITS application in question. As mentioned above, Appendix G lists current national SDO standards that are relevant to the information flows contained within the Strafford-Rockingham Region ITS Architecture.

- A Standing Regional ITS Coordination Committee, which is broadly responsible for maintenance and upkeep of the architecture, should evaluate regional standards issues on an as-needed basis. (Refer to Section 9.4 for more information about function and proposed composition of the Standing Regional ITS Coordination Committee).

- Memoranda of Understanding or other formal standards agreements adopted by the Standing Regional ITS Coordination Committee should become official addenda to the regional ITS architecture.

5.4.2 REGIONAL ITS STANDARDS EVALUATION CRITERIA

There will likely be cases where national and statewide ITS standards alone will provide insufficient guidance to address a regional standards policy need. In such instances, the following evaluation process is recommended as a means for the Standing Regional ITS Coordination Committee to determine an appropriate course of action:

- Identify affected stakeholders, including relevant municipal, regional, state, inter-state, federal, and/or private/institutional interests. Establish a working group to evaluate the relevant issue and to provide recommendations to the Standing Regional ITS Coordination Committee.

- Compile needs and functional requirements in a collaborative process with stakeholders as a basis for evaluating their affect on technology and standards choices.

- Identify relevant existing agency, regional, statewide, national, industry, proprietary, and/or informal standards that provide candidate solutions for the proposed application.

- Identify any ‘legacy’ standards that are being used by existing ITS systems in the region. Evaluate the impact of adopting a newer standard on the backward-compatibility of systems, switchover or replacement costs, and system interoperability.

- Evaluate the functional, technology, cost, benefit, and institutional impacts of the proposed standards alternatives. Like many other types of transportation decisions, this should also include a “do-nothing” or “wait-and-see” option if that is a viable choice. The relative impacts of the proposed standard on individual stakeholders (e.g., switchover costs) should also be taken into consideration.

- Identify a preferred alternative and present this alternative for endorsement by the Standing Regional ITS Coordination Committee.

- Formalize the agreement by adopting the standard as an official amendment to the regional ITS architecture (refer to Chapter 9).

- Prepare any formal interagency agreements such as MOUs among relevant entities.

- Reference the adopted standard in future project design and procurement documentation, as well as future updates to the Strafford-Rockingham Region ITS Architecture. Information

on the adopted standards should be made widely available to interested parties through the designated regional ITS architecture Custodial Agencies (refer to Chapter 9).

6. OPERATIONAL CONCEPT

While much discussion about ITS deployment focuses on technology, it is important to acknowledge that ITS coordination requires an important institutional component as well. ITS often offers an opportunity to introduce new methods of interagency communication and collaboration. These affect how organizations work on a day-to-day basis and deliver transportation services to the general public. Accordingly, the institutional and operational aspects of ITS planning deserve as much consideration as the technological aspects. This fact is recognized by USDOT guidelines for regional ITS architecture development.

The Needs Analysis (described in Section 3) and ITS Architecture update process (described in Section 4) created a refined a vision of an integrated transportation system for the region. Realizing this vision will require a diverse set of stakeholders to cooperatively plan, operate, and maintain the regional ITS inventory. It is critical to address the interagency relationships that will be needed for the architecture to become reality. The Operational Concept is intended to provide this guidance.

Whereas the Needs Analysis and ITS Architecture update processes focused on the *logical* aspects of the Strafford-Rockingham Region ITS Architecture, the Operational Concept focuses on the *institutional* aspects. It describes how services will be implemented, the roles different agencies will have during operation, and the relationships required among organizations.

USDOT regional architecture guidance stipulates that that an operational concept should have two components:

1. A technical component, identifying *operational* roles and responsibilities through general descriptions of how the service will be provided; and

2. An institutional component, identifying *implementation* roles and responsibilities through a more detailed description of stakeholder responsibilities.

Section 6.1 provides an overview of the Operational Concept for the Strafford-Rockingham Region ITS Architecture, Section 6.2 walks through a step-by-step example for reading an individual service package operational concept, and Section 6.3 concludes with a discussion of interagency agreements needed to support regional ITS deployment. A complete set of operational concept tables for the service packages included in the Strafford-Rockingham Region ITS Architecture is included in Appendix H.

6.1 Operational Concept Overview

Interagency coordination will be necessary to implement any of the service package ‘instances’ (i.e., a specific regional variation of a service package) that involve the collaboration of more than one stakeholder. These service package ‘instances’ that require inter-agency coordination, listed in Exhibit 6-1, require an operational concept to describe the nature of this coordination and any necessary agreements. (Thus, service package instances in the architecture that involve only one agency are *not* featured in the operational concept.) In order to avoid duplication of effort, some instances with operational concepts are included solely by reference to the *New Hampshire Statewide ITS Architecture*.

Exhibit 6-1: Service Packages with Operational Concepts in the Strafford-Rockingham Region ITS Architecture

Service Package ID	Service Package Name	Specific Service Package 'Instances' in Regional Architecture Involving Inter-Agency Coordination
AD1	ITS Data Mart	(None)
AD3	ITS Virtual Data Warehouse	RPC Data Warehouse
		SRPC Data Warehouse
APTS01	Transit Vehicle Tracking	(None)
APTS02	Transit Fixed-Route Operations	COAST
		University of New Hampshire
APTS03	Demand Response Transit Operations	CART
		COAST
APTS04	Transit Passenger and Fare Management	Electronic Fare Collection
APTS05	Transit Security	All Instances
APTS07	Multi-modal Coordination	Regional Coordination
APTS08	Transit Traveler Information	All Instances
APTS09	Transit Signal Priority	All Instances
APTS10	Transit Passenger Counting	(None)
ATIS01	Broadcast Traveler Information	NHDOT 511 System**
ATIS02	Interactive Traveler Information	Local Websites
		NHDOT 511 System**
ATIS07	Yellow Pages and Reservation	NHDOT 511 System**
ATMS01	Network Surveillance	Statewide Transportation Management System (NHDOT) **
ATMS04	Freeway Control	Statewide Transportation Management System (NHDOT) **
ATMS06	Traffic Information Dissemination	Local Traffic Information Dissemination
		Statewide Transportation Management System (NHDOT) **
ATMS07	Regional Traffic Control	Statewide Transportation Management System (NHDOT) **
ATMS08	Traffic Incident Management System	All Local Instances
ATMS10	Electronic Toll Collection	Electronic Toll Collection **
ATMS13	Standard Railroad Grade Crossing	General Railroad Grade Crossing **
ATMS17	Regional Parking Management	(None)
ATMS18	Reversible Lane Management	Reversible Lane Management (NHDOT) **
ATMS20	Drawbridge Management	Drawbridge Management **
ATMS22	Variable Speed Limits	(None)
CVO03	Electronic Clearance	Electronic Clearance **
CVO04	CV Administration Processes	CV Administration Processes **
CVO06	Weigh-In-Motion	Portable WIM **
CVO07	Roadside CVO Safety	Roadside Inspection Stations **
EM01	Emergency Call-Taking and Dispatch	Local Public Safety Centers
		State Police Dispatch **
EM02	Emergency Routing	All Local Instances
		State Police Dispatch **
		Statewide Emergency Operations Center **
EM03	Mayday Support	Statewide Emergency Operations Center **

Service Package ID	Service Package Name	Specific Service Package 'Instances' in Regional Architecture Involving Inter-Agency Coordination
EM04	Roadway Service Patrols	NHDOT Courtesy Patrols **
EM05	Transportation Infrastructure Protection	Port Security System
		NHDOT Infrastructure Protection **
EM06	Wide-Area Alert	Statewide Emergency Operations Center **
EM07	Early Warning System	Statewide Emergency Operations Center **
EM08	Disaster Response and Recovery	Statewide Emergency Operations Center **
EM09	Evacuation and Reentry Management	Statewide Emergency Operations Center **
EM10	Disaster Traveler Information	Statewide Emergency Operations Center **
MC01	Maintenance and Construction Vehicle and Equipment Tracking	(None)
MC03	Road Weather Data Collection	NHDOT RWIS **
MC04	Weather Information Processing and Distribution	NHDOT RWIS **
MC05	Roadway Automated Treatment	NHDOT Maintenance Districts **
MC06	Winter Maintenance	Local DPW
		NHDOT Maintenance Districts **
MC07	Roadway Maintenance and Construction	NHDOT Maintenance Districts **
MC08	Work Zone Management	NHDOT Work Zone Management **
MC10	Maintenance and Construction Activity Coordination	NHDOT 511 System **
MC12	Infrastructure Monitoring	(None)
**Identifies Operational Concepts that are included solely by reference to the New Hampshire Statewide ITS Architecture.		

The nature and extent of interaction between agencies can vary greatly, as is discussed in greater detail in Section 6.3. Four general types of agreements (Exhibit 6-2) have been developed as a means of describing the types of interactions among agencies in support of ITS services.

Exhibit 6-2: Types of Interagency Agreements

Responsibility	Code	Definition
Share Information	SI	Party A electronically shares data and device status information from its field devices with Party B.
Coordinate Activity	C	Party A works with Party B to coordinate their planning, project development and operations activities to achieve common objectives. The cooperation may be long-term, strategic, or incident-specific.
Request/Perform Action	A	Party A requests/expects action on the part of Party B or resources from Party B in order to perform an action. Party B responds by providing the service or resources requested/expected.
Share Control	SC	Party A allows Party B to share control of its field devices. Party B may also be responsible for maintenance and operations activities.

6.2 Interpreting the Operational Concept

The following explanation is a guide to reading the operational concept tables for service packages listed in Exhibit 6-1, which will be included in their entirety as Appendix H. If only one entity is involved in the deployment of a particular service package instance, that instance will not be included in Appendix H.

Note that it may be advantageous for the reader to review the operational concepts in tandem with the corresponding service package diagrams, as the operational concepts explain how the service packages will actually be implemented on an institutional level.

The operational concept for each Service Package 'instance' is described in tabular format with three main components:

- The first section provides a general description of how the ITS service will be provided (i.e., fulfilling the USDOT technical, operational component - see Exhibit 6-3, **B**).
- The second section provides a more detailed description of stakeholder responsibilities (i.e., fulfilling the USDOT institutional, implementation component - see Exhibit 6-3, **D**).
- The third section identifies interagency agreements that are needed to implement specific operational roles and responsibilities (see Exhibit 6-3, **E**).

Exhibit 6-3 illustrates a sample operations concept diagram for the AD2 – ITS Data Warehouse service package. The diagram is interpreted as follows:

- **Title:** The name of an operational concept is the heading at the top of the chart. It is based on the service package instances that it encompasses. For example, from **A** in Exhibit 6-3, one can read that this operational concept corresponds to Service Package "AD2 – ITS Data Warehouse", specifically the "RPC Data Warehouse" instance. Notice that the name will correspond with that of the service package diagram to which it belongs. In cases where an operational concept encompasses more than one service package, it will be labeled as such.
- **Operational Description**: Next, **B** in Exhibit 6-3 provides an Operational Description, i.e., a narrative about how the entire service package is envisioned as a means of achieving a functional end.
- **Lead Agency**: The lead agency is proposed to be responsible for initiating the project and overseeing operations. From Exhibit 6-3, **C**, note that RPC is the proposed Lead Agency for this example.
- **Agency Responsibilities:** The responsibilities of other participating agencies are summarized in section **D** of Exhibit 6-3. The chart is organized with "Party A" listings as the rows, and "Party B" listings as the columns. Notice that stakeholders are shown in both columns of the chart, and the chart should be read directionally because many interactions are not symmetrical between the two entities.

  Notice also that the "Party B" columns list the name of the elements owned by stakeholders in parenthesis below the stakeholder names. These element names correspond with element names on the service package diagrams (stakeholder names are not listed on service package diagrams, so this correlation is important for mapping the operational concepts to service packages).

In Exhibit 6-3, note that RPC (**1**) is the first Party A listing. It is the entity that owns the ITS element "RPC Data Warehouse" (**2**), shown in parentheses. Their responsibility is to "Collect, archive and make regional ITS data accessible to users" (**3**) for "Local Agencies" (**4**). Moving to the next Party A listing, we see that "Local Agencies", in return, have a responsibility to "Provide local ITS data" to RPC.

- **Interagency Agreements:** Part **E**, identifies the types of interagency agreements required among that agencies to realize the operation of this service package instance. The "Participants" column denotes the two agencies that will be a part of the agreement. The "Type of Agreement" column lists the type of agreements that it suggested between them, based on the construction described in Section 6.1.

  In the example, as RPC and "Local Agencies" (**5**) rely on one another to fulfill the function of the data warehouse, these entities should form a "Share Information" (type "SI") agreement (**6**), since exchanging data is the extent of the relationship that will exist between them. Section 6.3 provides greater detail in the composition of such agreements.

Exhibit 6-3: Operational Concept Example

AD3 - ITS Data Warehouse (RPC Data Warehouse) ← A

Operational Description

B: This market package creates a central data storage facility for regional ITS data, operated by RPC. ITS data will continue to be collected by local traffic management systems, NHDOT's Archived Data Management System, regional transit agencies, and RPC. The collected data will be electronically submitted to RPC's data storage equipment (which may simply consist of one PC or an entire system of machines). The information will be made available to users at RPC's office and potentially via their website.

C: *Lead Agency*: RPC

Agency Responsibilities*

		Party B: RPC (RPC Data Warehouse) [2]	Local Agencies** (Local Data Repositories) [4]	NHDOT (Archived Data Management System)	CART (CART Data Repository)	COAST (COAST Data Repository)
Party A	RPC [1]		3 Collect, archive, and make regional ITS data accessible to users			
Party A	Local Agencies**	Provide local ITS data				
Party A	NHDOT	Provide statewide ITS data				
Party A	CART	Provide transit ITS data				
Party A	COAST	Provide transit ITS data				

D:
*To be read directionally: Party A is responsible to Party B.

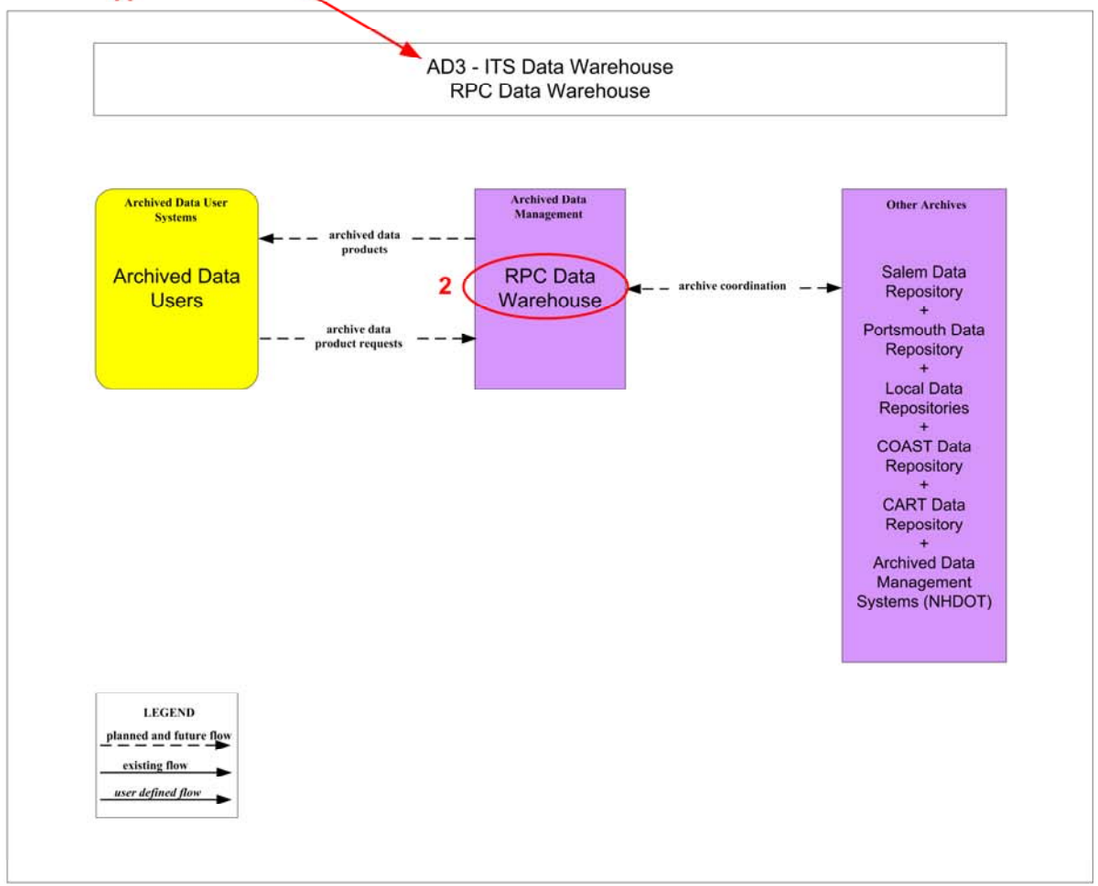
**Local Agencies in this case include the municipalities and/or DPWs of Atkinson, Brentwood, Danville, East Kingston, Epping, Exeter, Fremont, Greenland, Hampstead, Hampton, Hampton Falls, Kensington, Kingston, New Castle, Newfields, Newington, Newton, North Hampton, Plaistow, Portsmouth, Rye, Salem, Sandown, Seabrook, South Hampton, Stratham, Windham, as well as any others that may be applicable in the future. This includes the Salem Data Repository and the Portsmouth Data Repository.

Interagency Agreements

E:

Participants	*Type of Agreement****
RPC, Local Agencies** [5]	6 SI
RPC, NHDOT	SI
RPC, CART	SI
RPC, COAST	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control



6.3 Interagency Agreements

As was outlined in the previous discussion, operational concepts derived from the architecture necessarily define several types of interagency agreements necessary to realize specific ITS services.

6.3.1 AGREEMENT TYPES

In Section 6.1, four types of interagency agreements were identified and described in Exhibit 6-2: "Share Information" (SI); "Request/Perform Action" (A); "Coordinate Activity" (C); and "Share Control" (SC). These four types of agreements are constructed to demonstrate four basic levels of interaction, ranging from the most minimal (SI) to the most involved (SC):

- In a **Share Information (SI)** agreement, two agencies are merely agreeing to exchange data, so there is little transfer of responsibility and minimal risk if an agency does not perform. For example, if a municipal DPW agrees to provide transportation data to RPC for entry into a regional data storage facility, the agencies would form an SI agreement. Little risk is involved, as failed information sharing on either part will not endanger life or property.

- A **Request/Perform Action (A)** agreement is somewhat more involved, in that it conveys an expectation that the agencies will communicate in real time and undertake activities in response. There is more reliance of one agency on another to complete their respective activities. However, they will still remain generally independent and in control of their own duties. For example, as part of a traveler information project, State Police may request that incident information be displayed on a NHDOT-operated Variable Message Sign, an action that improves the incident response but does not affect the State Police's core responsibilities in responding to a traffic incident.

- In a **Coordinate Activity (C**) agreement, agencies agree to cooperate more closely with one another, increasing yet again the level of inter-agency operational reliance. For example, if a railroad operator and a municipal DPW agree to coordinate highway/rail crossing construction activities through their Railroad Operations Center and Traffic Management Center, they agree to create a plan for the activities, together. They are not merely requesting actions from each other, as they agree to take mutual responsibility for the activity to be performed. There could be serious danger of collision or accident to both the public and members of either agency if one agency fails to follow through. However, both agencies still have control in the outcome as they are directly involved in the activities taking place.

- Finally, a **Share Control (SC)** agreement involves the highest level of operational coordination, because one agency is actually agreeing to allow another agency to assume operational control of ITS systems. For example, a municipal DPW might agree to allow the NHDOT Statewide Transportation Operations Center to operate its traffic signals during nights and weekends, thereby transferring partial or complete control of this infrastructure.

A complete compilation of recommended interagency agreements, in these terms, is included in Appendix I.

6.3.2 FORMALITY OF AGREEMENTS

The level of formality and descriptiveness of these types of agreements can take many different forms, depending on the nature of the information being exchanged, the technical capabilities of the

agencies, the institutional relationships already in place, and many other factors. The examples described in Exhibit 6-4 represent a range of formality and descriptive detail.

Exhibit 6-4: Forms of Interagency Agreements[3]

Form of Agreement	Description
Handshake Agreement	• Informal agreement between one or more partners. • Not recommended for long-term operations.
Memorandum of Understanding (MOU)	• Initial agreement used to provide minimal detail and usually demonstrating a general consensus. • Used to expand a more detailed agreement like an Interagency Agreement that 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	• 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	• Agreement between governmental agencies (e.g., Agreements between universities and State DOT, MPOs and State DOT, etc.).
Operational Agreement	• 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.

[3] U.S. Department of Transportation, "Regional ITS Architecture Guidance Document," October 12, 2001.

Form of Agreement	Description
Master Agreements	• Standard contract and/or legal verbiage for a specific agency and serving as a master agreement by which all business is done. These agreements can be found in the legal department of many public agencies. • Allows states, cities, transit agencies, and other public agencies that do business with the same agencies over and over (e.g., cities and counties) to have one Master Agreement that uses smaller agreements (e.g., MOUs, Scope-of-Work and Budget Modifications, Funding Agreements, Project Agreements, etc.) to modify or expand the boundaries of the larger agreement to include more specific language.

Agreements are established to clearly define responsibilities among the involved parties. The four types of agreements discussed above represent an escalating degree of trust, reliance, risk, and potential monetary expenses. The formality of these agreements generally increases with risk and cost. Formality will also increase when the actions of one organization will impact the operations of another. For example, if an agency maintains and operates the traffic signals of another agency, clear definition of responsibilities for both parties will help ensure smooth operations.

6.3.3 TYPICAL AGREEMENT CONTENT

The following is a list of elements to consider in the development of an agreement for ITS operations and maintenance. Not all elements are relevant to each exchange of information and the level of specificity will depend on the nature of the interface.

General

- Purpose of the Agreement
- Benefits to Each Party (e.g. operational, economic)
- Duties of Responsible Organizations (a summary of duties and responsibilities)

Data Sharing

- Provision of Data
- Data Rights
- Data Reuse
- Data Identification
- Data Availability
- Data Accuracy

Control Sharing

- Provision of Control
- Control Rights
- Control Restrictions
- Control Priority
- Control Availability

- Connections (defines how the connection is made)

System Administration

- Provision of Equipment
- Physical Access Point
- Demarcation Point / Boundary
- Security
- Configuration Management
- Standards and Protocols
- System Documentation

Operations and Personnel

- Contacts
- Hours of Operations
- Responsibilities
- Maintenance
- Contacts
- Hours of Operations
- Responsibilities
- Response Time

Legal

- Liability
- Indemnity
- Damage to Equipment
- Ownership
- Equipment
- Software
- Intellectual Property
- Coordination
- Notification
- Periodic Reporting
- Pre-Change Coordination
- Dispute Resolution
- Termination of Agreement
- Compensation

6.3.4 RECOMMENDATION FOR FORMALIZING ITS WORKING ARRANGEMENTS

In general, all interagency interfaces identified in this architecture should be covered by formal agreements, at the very least through a project-level concept of operations endorsed by all parties. This includes interfaces under development, interfaces proposed in the architecture, as well as interfaces that are currently operational but without a formal agreement.

Although some existing informal agreements may provide a precedent for ITS-specific agreements, there are a number of considerations that suggest why it is prudent to consider adopting more formalized agreements:

- *Rationale for agreement:* A formal agreement that explains the reasoning behind the agreement and that lays out the benefits of the cooperation will help justify the arrangement to the participating parties, other agencies that would benefit from coordination, and to the public. This will help build and maintain support for continuing a beneficial relationship, especially when the agreement may be reconsidered in the future.

- *Documentation of procedures:* By documenting existing procedures that are operating successfully, a formal agreement can help maintain an interface in the face of personnel or administrative change. An informal agreement that relies solely on interpersonal relationships at the operating level may quickly dissolve if operating staff changes occur.

- *Institutional commitment:* Adopting a formal agreement shows commitment by the participating agencies to continue the relationship. While an informal agreement shows commitment at the operating level, a formal agreement shows commitment at the institutional level. Support for a relationship at the administrative levels of the participating agencies will be essential for continued operation of the interface.

- *Liability issues:* In a cooperative arrangement, situations may arise where one or both parties may be held liable for damage or injuries sustained as a result of human or technical error. A formal agreement that documents agency roles and responsibilities with consideration for liability concerns will speed the process of conflict resolution and reduce resulting legal costs.

For the reasons outlined above, it is therefore recommended that interagency agreements dealing with ITS deployment or operational coordination be formalized rather than extended as “handshake” agreements.

7. FUNCTIONAL REQUIREMENTS

Based on the service packages selected and the operational concepts developed, high-level Functional Requirements were developed. These high-level Functional Requirements identify the functionality that ITS systems would need in order to fulfill the regional transportation needs identified by the stakeholders. These Functional Requirements are described in greater detail through the entities, data exchanges, and service packages that make up the Physical Architecture (Chapter 4). Functional Requirements for specific ITS elements included in the Strafford-Rockingham Region ITS Architecture are summarized in Appendix J.

7.1 High-Level Functional Requirements

The regional transportation needs identified in Section 3.2 form the basis for specifying the capabilities of ITS systems and services. The stakeholder-identified needs were subsequently translated into specific service packages and operational concepts. This section identifies high-level functional requirements of future ITS services that address one or more regional transportation needs.

Based on the foregoing analysis of needs, ITS systems in the region shall fulfill the following functional requirements:

7.1.1 TRAFFIC MANAGEMENT

Traffic Management Systems in the region shall have the ability to:

- Monitor real-time traffic conditions using municipal-owned and state-owned equipment to support 'seamless' regional system management and traveler information capabilities;
- Allow for real-time control of signal equipment, drawbridge equipment, and reversible-lane equipment to adapt to traffic flow and mitigate congestion;
- Manage incidents by coordinating with State Police dispatch, local public safety dispatch centers, local emergency operations centers (EOCs), local DPWs, and NHDOT District Maintenance Headquarters;
- Coordinate with NHDOT Statewide Traffic Operations Center (TOC) and the New Hampshire Department of Safety Statewide Emergency Operations Center (EOC);
- Collect maintenance, construction, and event information from varied sources and allow for use of this information in traffic management and incident response;
- Collect and archive traffic data for planning and analysis purposes;
- Provide road network conditions to the state's 511 system, municipal websites, RPC and SRPC websites, transit service providers, emergency response agencies, and the media;
- Disseminate traveler information to drivers through roadside signage (such as CMS), broadcast traveler information devices, interactive traveler information systems, statewide ITS systems (e.g., TRIO ISP, 511) and the media;
- Facilitate coordinated system control and information sharing capabilities among transportation management entities as well as other transportation service providers (i.e., transit, airports, ferries);
- Interface with railroad control infrastructure to manage highway-rail intersections for traffic control and safety;
- The state shall continue to manage standard railroad crossings;

- The state shall continue to administer its electronic tolling program;
- Interface with ITS systems operated at the municipal, agency, and Statewide levels; and
- Collect event plans from planners and coordinate transportation system needs.

7.1.2 TRANSIT MANAGEMENT

Transit management systems in the region shall have the ability to:

- Automatically monitor the real-time location and schedule performance of transit vehicles to promote schedule adherence and system reliability;
- Provide public access to transit vehicle schedules, real-time performance, incident information, and other transit information over their organization's website, the state's 511 system, and other outlets;
- Monitor vehicles and transfer centers to identify and resolve potential security threats;
- Provide reliable voice, data, and video communications with transit vehicles;
- Have the capability to communicate directly with local public safety dispatch centers about transit emergencies;
- Allow for electronic fare collection and pass programs, including regional multi-purpose smart card initiatives;
- Coordinate activities with other multimodal transportation providers;
- Receive real-time road network conditions from regional traffic management infrastructure;
- Allow for future transit vehicle signal priority to promote schedule reliability in key corridors; and
- Allow for future automatic passenger counting for transit user boardings and alightings.

7.1.3 TRAVELER INFORMATION

- Agencies which collect and process transportation system data shall have the ability to disseminate this information in real-time through a variety of broadcast and interactive traveler information media (such as local websites); and
- Systems shall leverage traveler information infrastructure and investments being undertaken at the statewide level such as 511.

7.1.4 COMMERCIAL VEHICLE OPERATIONS

- New Hampshire Statewide EOC and State Police Headquarters shall have the ability to coordinate HAZMAT Management activities throughout the state, including the Strafford-Rockingham region.
- New Hampshire Commercial Vehicle Administration shall coordinate with State Police to administer the state's CVO activities, such as electronic clearance, portable weigh-in-motion, portable thermal imaging activities, and roadside safety inspection stations.

7.1.5 EMERGENCY MANAGEMENT

Local public safety dispatch centers shall have the ability to:

- Operate the reverse 911 system, where available;
- Report incidents to other dispatch centers;
- Coordinate incident response activities among other dispatch centers;
- Coordinate incident response statewide through the Statewide EOC; and
- Dispatch and route public safety vehicles.

Signal priority shall be introduced for traffic signals at congested intersections to facilitate expeditious movement of emergency vehicles.

The Port Security System shall have the ability to communicate threat alerts to the U.S. Coast Guard, local public safety centers, local EOCs, and the Statewide EOC.

The Seabrook Station shall have the ability to communicate alerts and coordinate emergency management activities with the New Hampshire Division of Emergency Services, Communication, and Management and the Statewide EOC.

The Statewide EOC and State Police Headquarters shall have the ability to communicate with local traffic management centers, municipal DPWs, local public safety dispatch centers, and transit agencies, regarding Wide Area Alerts, Early Warning Systems, disaster response and recovery, and emergency evacuation and reentry efforts.

7.1.6 ARCHIVED DATA MANAGEMENT

Agency/municipal data repositories shall have the ability to collect, store, and provide electronic access to roadway traffic data.

Transit agency data repositories shall have the ability to collect, store, and provide electronic access to transit data.

RPC and SRPC data warehouses shall have the ability to collect, store, and provide electronic access to their own transportation data as well as data gathered from municipal DPWs, transit agencies, and other local transportation stakeholders within their respective planning boundaries.

Statewide data collection systems, such as future NHDOT data collection initiatives, shall have the ability to provide systems that allow local entities (such as transportation agencies, transit agencies, regional planning commissions, etc.) to contribute transportation information and facility archive coordination activities.

7.1.7 MAINTENANCE AND CONSTRUCTION COORDINATION

Municipal DPWs shall have the ability to:

- Dispatch and track maintenance vehicles;
- Remotely monitor vehicle conditions;
- Monitor local infrastructure sensors, such as stream gauges;
- Communicate with traffic management centers, transit dispatch, emergency dispatch centers and other entities about maintenance and construction needs and activities; and

- Coordinate activities with local transportation operation centers, transit dispatch, utility dispatch, and NHDOT District Maintenance Headquarters.

The state's 511 system and TRIO ISP shall have the ability to distribute road weather information and maintenance/construction information to local entities.

Weather information providers (such as the National Weather Service) shall distribute weather information to state and local entities.

Roadway weather stations shall have the ability to provide real-time information on roadway surface and atmospheric conditions to support maintenance and traveler information decisions.

7.2 Element-Specific Functional Requirements

TurboArchitecture™ Version 7.0, a software program created by FHWA to facilitate development of regional ITS architectures, allows users to specify functional requirements for specific ITS elements. These element-specific functional requirements are summarized in Appendix J. These element-specific functional requirements are included for reference purposes and to fulfill federal requirements. Detailed functional requirements for these ITS elements should be developed as part of the development of project planning and project architecture development process.

8. ITS STRATEGIC PLAN

The ITS Strategic Plan is a strategy for implementing the systems defined in the Strafford-Rockingham Region ITS Architecture. This strategy was developed based on the regional transportation needs and priorities identified by regional stakeholders. It includes recommended ITS initiatives for the region and a prioritization and sequencing of those initiatives.

8.1 ITS Strategic Plan Objectives and Approach

The objective of the ITS Strategic Plan is to translate the recommendations of the completed logical architecture into specific short-, medium- and long-term projects that can be incorporated into the regional Transportation Improvement Program (TIP). The recommended projects must take into consideration the unique nature and attributes of the Strafford-Rockingham region and present an efficient, effective means of deploying ITS to achieve both early success and long-term integration with regional, state, and interstate advanced technology infrastructure.

The region's size and diverse project area and specific transportation needs require a tailored approach to ITS deployment. Project stakeholders also applied ITS "lessons learned" from other regions to the Strafford-Rockingham region. In addition, it is important that the deployment plan is realistic in terms of the scale and phasing of the deployment, ensuring free-standing operability of projects in the short-term.

Other key aspects of the approach include:

- **Consistency with the Regional ITS Architecture:** As previously mentioned, the *Strafford-Rockingham Region ITS Architecture* was created concurrently with the original ITS Strategic Plan, and the updates have also occurred concurrently. The architecture was built and updated based on a comprehensive study of local transportation needs, existing ITS systems, and planned ITS initiatives. It was developed to ensure that new ITS projects take interoperability and multidisciplinary needs into account; thereby maximizing the value for both existing and future ITS investments. Therefore all ITS projects suggested in this ITS Strategic Plan are consistent with the recommendations of the regional ITS architecture.

- **Responsiveness to Regional Needs:** ITS solutions typical in other regions are not necessarily relevant to the Strafford-Rockingham region. The types of ITS projects proposed in this ITS Strategic Plan directly relate to stakeholder-identified needs. For example, stakeholders emphasized that key concepts, such as congestion mitigation and safety, should be embedded in as many ITS projects as possible. Also, the scale and cost of the ITS projects proposed, as well as the deployment plan for those projects, are appropriate with regards to the region's size and available resources.

- **Multi-Functional ITS Technologies:** To maximize the value of ITS deployments in the region, the project concepts have been developed so that ITS equipment can serve more than one purpose whenever possible. Serving multiple purposes promotes the region's goals of improved interdisciplinary and interagency coordination. Multi-functionality also provides broader access to potential funding sources for regional ITS projects. This principle can be applied to traffic detectors, surveillance cameras, communications, and a host of other ITS infrastructure elements.

- **Communications Technologies:** Communications systems provide the backbone for the operation of and connections between ITS devices and operating entities. Adopting this as a long-term focus ensures that ITS can be deployed and coordinated more effectively.

- **Inter-Jurisdictional, Inter-Regional and Interstate Coordination:** Emphasizing inter-jurisdictional efforts within the region can lead to more effective and economical procurement and use of ITS technologies. Coordination between jurisdictions can also ensure that compatible technologies are used and can therefore realize multi-agency and multi-functional ITS. In addition, while the boundaries of this project were limited to the boundaries of the SRPC and RPC (the Strafford-Rockingham region), regional ITS projects will be impacted by statewide and inter-state initiatives. Therefore, taking these initiatives into account is an important aspect of the ITS Strategic Plan.

- **Incremental Deployment Based Upon Early Success:** In developing and updating the ITS Strategic Plan, identifying early success projects was deemed important. Early success projects, i.e., low-cost deployments which demonstrate real benefits within a short timeframe, help build momentum and confidence for the ITS program. These projects address short-term needs while providing a basis for eventual region-wide deployments.

- **Environmental Benefits:** Stakeholders in the region are aware of the important benefits that ITS can provide towards reaching environmental goals such as congestion mitigation and emissions reductions, as well as the potential funding sources for efforts that meet these goals effectively. Project concepts in the ITS Strategic Plan take into account the strategic approach to realize goals effectively within the context of funding realities.

8.2 Regional ITS Projects

This ITS Strategic Plan includes high-level preliminary descriptions and cost estimates for the regional ITS projects identified by regional stakeholders. A summary of the regional ITS projects included in the ITS Strategic Plan is included in Exhibit 8-1. More complete descriptions of each project are included in the Strafford-Rockingham Region ITS Strategic Plan document. Each description contains the following information:

- **Project Title and Description:** A general overview is given for each project, primarily focusing on the operational capabilities and functional scope of the project.

- **Project Location(s):** The approximate geographic extent of the project is described.

- **Planning Cost Estimate:** High-level, preliminary planning estimates are included for each project. Refer to Section 5.2 for further details.

- **Service Packages:** The relevant service packages from the updated *Strafford-Rockingham Region ITS Architecture* are identified. This illustrates the linkages between the project and the regional ITS architecture, which is necessary to apply federal funds toward the project.

- **Time Frame (Short-, Medium-, or Long-term):** The relative deployment priority for each project was identified as Short-term (0-3 years), Medium-term (3-5 years), or Long-term (5-10 years).

- **Lead Agency:** The public agency or agencies judged to be the most appropriate lead agency for each deployment are identified.

- **Project Participants:** Principal stakeholders and agencies whose cooperation and support is critical to the implementation and success of the project are also identified.

- **Expected Benefits:** Coordination activities or agreements between agencies that will be required to deploy and operate the ITS projects are identified.

- **Integration with Other Projects:** Other projects are identified that must be completed before or at the same time, to ensure the proper ordering and prioritization of projects to create a functional ITS system.

Through these regional ITS projects, summarized in Exhibit 8-1, the functional elements of the Strafford-Rockingham Region ITS Architecture have been translated into project-based deployments that can be prioritized, programmed into the regional TIP, funded, and implemented strategically over time.

Exhibit 8-1: Summary of Regional ITS Projects

Ref. #	Project Title	Project Description	Project Location(s)	Planning Cost Estimate*	Service Packages	Timeframe	Lead Agency	Project Participants	Expected Benefits	Integration with Other Projects
TM-1	Signal Coordination and Maintenance Study	Study to develop an inventory of coordinated signal technology in use in the region and develop recommendations for an ongoing maintenance and coordination process.	Regional	$80,000	APTS09, ATMS03, ATMS08, EM02	Short-term	SRPC, RPC	NHDOT, Local Municipalities	Coordination of signal technology. Improve traffic flow, reduce congestion and emissions.	
TM-2	US Route 4 Corridor ITS	Signal coordination and implementation of ITS (such as DMS and CCTV).	US Route 4 (Madbury to Lee/Barrington)	$630,000 to $950,000	APTS09, ATIS01, ATMS01, ATMS04, ATMS06, ATMS07, ATMS08, EM02, MC09	Medium-term	NHDOT	Local Municipalities	Improve traffic flow, reduce congestion and emissions. Improve incident detection and response. Improve traveler information.	Coordinated with Route 125 ITS implementation.
TM-3	Route 125 Corridor ITS	Signal coordination and implementation of ITS (such as DMS and CCTV).	Route 125 (from Plaistow through Rochester)	$1.45 million to $1.57 million	APTS09, ATIS01, ATMS01, ATMS04, ATMS06, ATMS07, ATMS08, EM02, MC09	Long-term	NHDOT	Local Municipalities	Improve traffic flow, reduce congestion and emissions. Improve incident detection and response. Improve traveler information.	Coordinated with US Route 4 ITS implementation.
TM-4	Route 111 Corridor ITS	Signal coordination and implementation of ITS (such as DMS and CCTV).	Route 111 (Windham, Salem, Hampstead, Kingston)	$910,000 to $970,000	APTS09, ATIS01, ATMS01, ATMS04, ATMS06, ATMS07, ATMS08, EM02, MC09	Long-term	NHDOT	Local Municipalities	Improve traffic flow, reduce congestion and emissions. Improve incident detection and response. Improve traveler information.	
TM-5	NH Route 9 Corridor ITS	Signal coordination and implementation of ITS (such as DMS and CCTV).	NH Route 9 from Exit 9 (Spaulding Turnpike) to Berwick	$740,000 to $770,000	APTS09, ATIS01, ATMS01, ATMS04, ATMS06, ATMS07, ATMS08, EM02, MC09	Long-term	NHDOT	Local Municipalities	Improve traffic flow, reduce congestion and emissions. Improve incident detection and response. Improve traveler information.	
TM-6	Route 108 Corridor ITS	Signal coordination and implementation of ITS (such as DMS and CCTV).	Route 108 from Exeter to Rochester	$980,000 to $1.04 million	APTS09, ATIS01, ATMS01, ATMS04, ATMS06, ATMS07, ATMS08, EM02, MC09	Medium-term	NHDOT	Local Municipalities	Improve traffic flow, reduce congestion and emissions. Improve incident detection and response. Improve traveler information.	
TM-7	Expansion of Open Road Tolling	Feasibility assessment of expanding open road tolling.	Dover, Hampton, and Rochester Toll Plazas	$100,000	ATMS10	Medium-term	NHDOT	Local Municipalities, RPC, SRPC	Relieve traffic congestion and reduce emissions at toll locations and reduce traffic divergence onto local arterials.	
PT-1	Regional Call/Coordination Center for Demand Response Services	Implementation of a regional call/coordination center for passenger transportation information management.	Strafford-Rockingham Region	$1.23 million	APTS03, APTS08	Short-term	COAST on behalf of ACT	COAST, UNH, Easter Seals NH, SRPC, RPC	Improve operating efficiency and reduce costs of transit operations.	Coordinated with regional ITS procurement coordination.
PT-2	Regional Transit ITS Procurement Coordination	Establish process to enable voluntary regional coordination of transit ITS procurements, e.g., Electronic Fare Collection equipment.	Strafford-Rockingham Region	$50,000	APTS01, APTS02, APTS03, APTS04, APTS05, APTS07, APTS08, APTS09, APTS10	Medium-term	CART, COAST	SRPC, RPC, UNH, Easter Seals NH, ACT, C&J, Amtrak, MVRTA	Improve interagency coordination and interoperability of ITS systems. Take advantage of economies of scale.	Coordinated with individual transit agency vehicle and equipment procurements.
PT-3	COAST Transit Signal Priority Implementation	Implement corridor level TSP.	Route 108, Local Municipalities	$190,000	APTS09	Medium-term	COAST	Local Municipalities	Improve operating efficiency. Increase travel time reliability.	Coordinated with signal technology procurements and coordination in municipalities, as well as with emergency vehicle preemption.
PT-4	Real-time Information for UNH Transit Users	Expansion of AVL capabilities to provide vehicle location information to the public.	UNH service area	$150,000	APTS08	Short-term	UNH	UNH	Improve traveler information and user experience.	Coordinated with other UNH vehicle procurements and ITS investments.
PT-5	Real-time Information for COAST Transit Users	Expansion of AVL capabilities to provide vehicle location information to the public.	COAST service area	$150,000	APTS08	Medium-term	COAST	COAST	Improve traveler information and user experience.	Coordinated with other COAST vehicle procurements and ITS investments.

Ref. #	Project Title	Project Description	Project Location(s)	Planning Cost Estimate*	Service Packages	Timeframe	Lead Agency	Project Participants	Expected Benefits	Integration with Other Projects
PT-6	Mobile Data Terminal Deployment for COAST Vehicles	Deployment of MDTs with vehicle location and dispatching functionality on all fixed route and demand response COAST vehicles.	COAST service area	$135,000	APTS02, APTS03	Medium-term	COAST	COAST	Improve dispatching capabilities and operating efficiency.	Coordinated with other COAST vehicle procurements and ITS investments.
PM-1	Park-and-Ride ITS Improvements	Deploy surveillance, parking sensors, and signage at Park-and-Ride facilities.	Park-and-Ride Lots (Dover, Portsmouth, Windham, and Salem)	$900,000	APTS05, APTS08, ATMS01, ATMS16, ATIS01	Medium-term	NDHOT	CART, COAST, Easter Seals NH, ACT, C&J, SRPC, RPC, Local Municipalities	Improve security and surveillance at parking facilities. Improve traveler awareness of parking availability.	
MM-1	Route 1 and Route 1A Integrated Corridor Management Study	Study to determine appropriate use of ITS to achieve signal coordination, Transit Signal Priority, coordination related to emergency/evacuation management, and parking information and management.	Route 1 (particularly Seabrook and Hampton) and Route 1A	$150,000	APTS09, ATIS01, ATMS01, ATMS04, ATMS06, ATMS07, ATMS08, EM02, MC08	Medium-term	RPC	NHDOT, SRPC, COAST, Local Municipalities	Improve traffic flow, reduce congestion and emissions. Improve incident detection and response. Improve traveler information.	Coordination with transit technology procurements.
MM-2	Regional 511 Interface Study/Long-Range Plan	Study to identify how municipalities, transit agencies, and regional parking data should interface with the state-wide 511 system as it expands in the future.	Strafford-Rockingham Region	$100,000	ATIS02	Medium-term	NHDOT	SRPC, RPC, COAST, UNH, CART, Local Municipalities	Improve traveler information. Improve operations. Improve interagency coordination.	Coordination with NHDOT 511 Procurement Project.
EM-1	Evacuation ITS Improvements	Study to determine role of ITS in facilitating evacuation coordination and response.	Seacoast	$100,000	ATMS01, ATMS03, ATMS06, ATMS18, EM09	Short-term	NHDOT	NHDOS, Local Municipalities, Seabrook Station, COAST, UNH, MassDOT - Highway Division	Improve ability to respond in an emergency evacuation scenario.	Coordinated with statewide EOC, Seabrook Station emergency planning efforts, and local traffic and parking management plans.
EM-2	US Route 4 Incident Reporting	Deployment of static signage and marketing to promote reporting of incidents to coincide with state 511 improvements.	US Route 4	$100,000	ATIS01, ATMS06, ATMS08	Medium-term	NHDOT	NHDOS, Local Municipalities	Improve incident detection and verification.	Coordinated with statewide 511 efforts.
EM-3	Route 101 Corridor ITS	Corridor level implementation of ITS (such as DMS and CCTV) to support and promote incident detection and response.	Route 101	$1.5 million	ATIS01, ATMS06, ATMS08	Long-term	NHDOT	Local Municipalities	Improve incident detection and verification.	Coordinated with statewide 511 efforts.
IMC-1	SRPC Data Warehouse Study	Establish data format for the region's ITS data and procure system hardware.	SRPC Office (Dover, NH)	$40,000	AD2, AD3	Long-term	SRPC	Dover, Somersworth, COAST, UNH, NHDOT, Local Municipalities	Increase ease of ITS data exchange among agencies for planning/ research activities.	Coordinated with regional ITS data collection efforts.
IMC-2	RPC Data Warehouse Study	Establish data format for the region's ITS data and procure system hardware.	RPC Office (Exeter, NH)	$40,000	AD2, AD3	Long-term	RPC	Salem, Portsmouth, CART, COAST, NHDOT, Local Municipalities	Increase ease of ITS data exchange among agencies for planning/ research activities.	Coordinated with regional ITS data collection efforts.
IMC-3	Bridge Security Surveillance and Interagency Video Exchange	Establish a video distribution system to allow authorized municipal and transit organizations to view bridge conditions in real-time.	Regional bridges	$1.6 million	ATMS01, ATMS06	Medium-term	NHDOT	Local Municipalities, Transit agencies, MassDOT - Highway Division, Maine Turnpike, MaineDOT, Interstate Bridge Authority, NH Homeland Security and Emergency Management	Improve bridge security/surveillance. Allow transit and local transportation agencies to be aware of travel conditions (construction, congestion, incidents) at bridge locations.	Coordinated with ITS deployments along roads with bridges and with the NHDOT's existing video deployments.
IMC-4	Region-to-TMC Communications Backbone	Implement a robust communications backbone between the State's TMC in Concord and the seacoast region.	Strafford-Rockingham Region	$3 million	ATMS06	Long-term	NHDOT	Local Municipalities	Improve communications throughout the region back to central location, facilitating increased interagency coordination and supporting future ITS deployments.	Coordinated with ITS deployments region-wide.

*Cost estimates are high-level and preliminary. Refer to Section 5 of the ITS Strategic Plan for additional information.

9. USING AND MAINTAINING THE REGIONAL ITS ARCHITECTURE

As has been emphasized throughout this report, the Strafford-Rockingham Region ITS Architecture is a 'living' body of work that outlines a vision for strategic, coordinated ITS deployment in the study area. To serve its intended function, and to be consistent with Federal requirements, this regional ITS architecture will be an integral part of ITS project planning and design in the Strafford-Rockingham region.

Like any planning document, it must be revisited from time to time to ensure its ongoing consistency with actual conditions. This update considered changes in transportation and emergency management needs, regional ITS deployment, ITS initiatives at the statewide level, evolutions in technology, updates to the National ITS Architecture, and other factors. This chapter describes the use of the regional ITS architecture in the planning and deployment of ITS initiatives. This chapter also contains updated recommendations related to the future maintenance and upkeep of the Strafford-Rockingham Region ITS Architecture.

9.1 The ITS Architecture in Project Planning and Deployment

9.1.1 GUIDING ITS DEPLOYMENT

More so than many such strategic planning tools, the Strafford-Rockingham Region ITS Architecture also has direct relevance to project-level planning and engineering design as ITS migrates from vision to reality. The technical guidance outlined within the architecture provides a framework for individual project requirements as well as inter-project coordination. Furthermore, the interagency coordination aspects of project deployment, including formalization of agreements and operations-phase responsibility, are also contained within this architecture.

The Strafford-Rockingham Region ITS Architecture includes a *TurboArchitecture*™ database of ITS stakeholders, entities, service packages, interconnects, and other information. As ongoing ITS deployment in the region progresses, the *TurboArchitecture*™ software tool can also be used to develop project-specific architectures, facilitating consistency of those projects with the regional ITS architecture. Project consistency with this regional ITS architecture is an explicit requirement of the 2001 FHWA Rule and FTA Policy regarding ITS architecture conformity.

While the regional ITS architecture will be used to guide project deployment, the regional ITS architecture must also be updated to reflect those deployments. To take a simple example, a project deployment may result in certain information flows migrating from "planned" status to "existing" status within the architecture. As ITS project needs, technology, and priorities evolve, the architecture will need to mirror that evolution. The regional ITS architecture should never act as a hindrance to ITS project development, but rather serve to guide project development to ensure that the value of the ITS investment is maximized.

9.1.2 MAINSTREAMING ITS PLANNING

Another objective of the Strafford-Rockingham Region ITS Architecture is to facilitate "mainstreaming" of ITS planning and deployment into the regional transportation planning process. Intelligent Transportation Systems should be viewed as another tool in the transportation improvement toolkit, complementing and in some cases replacing more conventional infrastructure investments. Furthermore, progress towards ITS implementation should be reviewed systematically through a structured mechanism in the regional transportation planning process.

As ITS is increasingly streamlined into conventional infrastructure improvements, and as system management assumes a position of greater prominence in transportation planning in general, there

will be an increasing need to demonstrate that *all* transportation improvement projects in the region have adequately considered ITS impacts and deployment opportunities.

All of this is not to suggest that the regional ITS architecture will impose burdens or obstacles to ITS deployment or regional transportation planning. On the contrary, this document is designed to assist the region in achieving its vision for integrated ITS deployment. However, as a "living document," discrepancies between regional and project architectures (or the regional and statewide architectures) should trigger a systematic process to evaluate the implications and resolution of the conflict, potentially through revision of one or more of these architectures.

9.2 The ITS Architecture in Regional Transportation Planning

9.2.1 COORDINATION WITH REGIONAL TRANSPORTATION PLANNING

Transportation planning in the Strafford-Rockingham region, as in most of the nation, is based on an MPO-oriented capital programming process that was established with the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991.

Local transportation projects are identified in the Long-Range Regional Transportation Plan (RTP), which outlines the regional goals and objectives used to guide transportation investments over 25 years. Some of the problems defined in the RTP are then explored in studies sponsored by the MPOs and other regional interests until realistic alternative solutions are generated and a preferred alternative is identified. As an issue evolves into a project, it becomes eligible for inclusion in the annual Transportation Improvement Program (TIP), a fiscally constrained list of the top-priority transportation projects underway over the next four years. TIP projects must then be approved by the state and federal agencies in order to be included in the Statewide Transportation Improvement Program (STIP) and receive federal funding.

Through this process, the United States Department of Transportation seeks to ensure that federal transportation funding is used in a manner that is consistent with federal laws and regulations. ITS projects are no exception: the FHWA Rule and FTA Policy issued in 2001 (see Appendices A and B) stipulate that projects with ITS components seeking Federal Highway Trust Fund dollars must be consistent with the regional ITS architecture.[4] The purpose of this policy is to encourage agencies to collaborate and avoid duplication or conflict of effort at the earliest stage possible. It is in the best interest of project proponents and MPOs to ensure consistency before projects reach the state and federal approval processes, as costly delays or change requirements could be encountered at those junctures.

Thus, the Strafford-Rockingham Region ITS Architecture provides an important supplement to transportation planning in the region, as all projects with ITS elements must be consistent with it if they are to receive federal funding. A project that is deemed important, but is not included in the regional ITS architecture, may prompt a modification to the architecture, as discussed in Section 9.5, or may have to be revised until it is consistent with the architecture. In all cases, consistency should be pursued as soon as possible.

[4] Federal Highway Administration, "Intelligent Transportation System Architecture and Standards; Final Rule," and Federal Transit Administration, "National ITS Architecture Policy on Transit Projects: Notice" CRF vol 66 no 5, 1/8/2001.

9.2.2 SYSTEMATIC EVALUATION OF ITS REGIONAL OPPORTUNITIES

To promote systematic evaluation of ITS opportunities and "mainstreaming" of ITS into the regional transportation planning, the following types of questions should be asked during the formulation of the regional TIP:

- What, if anything, can ITS do to address this particular transportation need?
- Should this conventional project have an ITS component?
- Could ITS replace a conventional infrastructure improvement or reduce its cost?
- Are the ITS elements of this project properly reflected in the regional ITS architecture?
- How can the region leverage other ITS investments (in the region or at the agency or statewide level) by incorporating ITS into other projects?
- Should projects be introduced to advance certain aspects of the regional ITS deployment strategy?

In order to promote systematic ITS review within the regional transportation planning process, the region should consider giving the Standing Regional ITS Coordination Committee a specific mandate to review proposed transportation projects and to provide recommendations to the MPOs. Refer to Section 9.4 for more information on the proposed Standing Regional ITS Coordination Committee.

9.3 Custodial Agencies for the Regional ITS Architecture

A "Custodial Agency" (or agencies) should be designated as the lead entity in the region to oversee ongoing implementation and maintenance of the regional ITS architecture. This entity will not necessarily lead ITS *project* implementation, but rather will facilitate ITS coordination from a planning and policy perspective, as it relates to the regional ITS architecture.

Responsibilities of this lead agency include:

- Serving as a repository for regional ITS architecture documentation, the *TurboArchitecture*™ database, architecture amendments and addenda, and other information related to the architecture and regional ITS deployment. Thus, other stakeholders in the region will know that the designated Custodial Agency (or agencies) is the source for the most complete, accurate, and up-to-date information concerning the Strafford-Rockingham Region ITS Architecture;

- Initiating periodic comprehensive reviews of the Strafford-Rockingham Region ITS Architecture (approximately every four (4) years, see Section 9.5) to review the architecture against evolving transportation needs, deployment progress, ITS standards development, National ITS Architecture updates, etc.;

- Overseeing a revision or change management process to update the regional ITS architecture through interim modifications as specific deployment events necessitate (discussed below);

- Organizing and convening a Standing Regional ITS Coordination Committee (discussed below) consisting of regional stakeholders to advise on ITS

deployment matters (e.g., project review, development of regional standards, etc.); and

- Serving as a liaison with agency, statewide, and inter-regional ITS architecture and deployment initiatives, to ensure continuing coordination among ITS deployment efforts at various levels.

- Notifying regional stakeholders of updates to the regional ITS architecture documentation via email and a public notice posted on an appropriate website(s). It is important to note that while the custodial agency (or agencies) will endeavor to notify all stakeholders and the general public of updates, it remains the responsibility of all stakeholders to contact the custodial agency (or agencies) to ensure that they are using the most recent version of the regional ITS architecture documentation. It is also the responsibility of the regional stakeholders to regularly update their email contact information, to ensure that receive the email notifications issued by the custodial agency (agencies).

Due to their existing responsibilities in regional transportation, and its leadership in previous ITS planning initiatives, it is recommended that the Strafford Regional Planning Commission (SRPC) and the Rockingham Planning Commission (RPC) continue to jointly assume the responsibilities of the Custodial Agency for the Strafford-Rockingham region.

9.4 Standing Regional ITS Coordination Committee

It is recommended that Strafford-Rockingham region establish a Standing Regional ITS Coordination Committee to meet periodically to provide guidance on ITS architecture revisions and other issues. This committee should include representation from a wide variety of stakeholders, similar to the stakeholder groups convened to develop the Strafford-Rockingham Region ITS Architecture (specific issues could potentially be addressed by smaller working groups within the Committee).

The following entities, at a minimum, should be represented within the Standing Regional ITS Coordination Committee:

Co-Chairs – Regional ITS Architecture Custodial Agency

- Strafford Regional Planning Commission (SRPC) – ITS Coordinator
- Rockingham Planning Commission (RPC) – ITS Coordinator

Committee Members:

- New Hampshire Department of Transportation (NHDOT)
- New Hampshire Department of Safety – New Hampshire State Police
- Various Municipal DPW and Emergency Services Representatives
- Cooperative Alliance for Regional Transportation (CART)
- Cooperative Alliance for Seacoast Transportation (COAST)
- University of New Hampshire
- Northern New England Passenger Rail Authority - Downeaster Passenger Rail
- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
- Various Institutional and Private Sector Representatives
- Interested local municipalities

This Committee, or a subset thereof reporting to the full Committee, should convene on an as-needed basis to perform the following functions:

- Interface with specific project proponents to address ITS Architecture consistency issues;
- During the project definition process, systematically review proposed transportation improvements to evaluate potential or proposed ITS components;
- Review and update the ITS Strategic Plan;
- Address regional ITS standards, operations, policy, and funding issues and make specific recommendations regarding the resolution of these issues;
- Oversee and approve of proposed interim architecture modifications; and
- Initiate and oversee periodic comprehensive reviews of the Strafford-Rockingham Region ITS Architecture.

9.5 Architecture Maintenance and Upkeep

Just as the RTP and TIP evolve with regional needs, so should the Strafford-Rockingham Region ITS Architecture. Though not required by federal ruling, ITS architecture updates should occur in response to federal consistency requirements, changing transportation needs, and actual ITS deployments.

Updates to the Strafford-Rockingham Region ITS Architecture should take two forms:

9.5.1 INTERIM ARCHITECTURE MODIFICATIONS

As the ITS environment evolves, there will be instances in which modifications to the architecture will be needed between updates. For example, additional interfaces may be required to the involvement of a new stakeholder in the ITS architecture process, the incorporation of a new Service Package, or the migration of interconnects from “planned” to “existing” status. Regional stakeholders should apprise the designated Custodial Agencies of the perceived need for these changes. The Custodial Agencies shall work with regional stakeholders to determine if architecture modifications are truly necessary to maintain consistency between regional and project architectures. If architecture modifications are necessary, the proposed changes should be presented to the Standing Regional ITS Coordination Committee for discussion and official endorsement as an addendum to the regional ITS architecture.

9.5.2 PERIODIC COMPREHENSIVE REVIEW

It is recommended that SRPC and RPC initiate a comprehensive ITS architecture update process approximately every four (4) years, to be coordinated with the Regional Planning Commissions’ Long-Range Transportation Planning processes. This current document is a result of such an updated process, which occurred four (4) years after the original regional ITS architecture was developed. This periodic comprehensive review process re-convenes ITS stakeholders to perform a complete assessment of the existing architecture “from the ground up.” In particular, this comprehensive review included: identification of changing regional transportation needs; modifications needed due to updates to the Statewide and/or National ITS Architectures; incorporation of interim regional architecture updates adopted; and modifications needed to reflect ongoing ITS deployment progress. The review also evaluated the architecture utilization and maintenance process, as well as the 10-year project deployment plan. The review process was coordinated with the region’s Long-Range Transportation Planning process, since this process typically involves many of the same stakeholders examining regional transportation needs and priorities. Based on this comprehensive review, the architecture review team modified the regional

architecture as necessary and released this document, an updated version to guide future deployment. This process should be repeated with each update.

9.5.3 CONFIGURATION MANAGEMENT

It is recommended that configuration control be utilized for all regional ITS architecture documentation and outputs. Dates (consisting of at a minimum a month and a year) should be included on all draft and final documents, including the Strafford-Rockingham Region ITS Architecture document (this document), the Strafford-Rockingham Region ITS Strategic Plan document, and the *Strafford-Rockingham Region ITS Architecture Final Report* document. The *TurboArchitecture*™ database should include both the date (again consisting of at a minimum a month and a year) and a version number. The initial version of the *TurboArchitecture*™ database was labeled Version 1.0. The new version of the *TurboArchitecture*™ database after the comprehensive review has been updated to a whole new number, Version 2.0. Interim modifications to the *TurboArchitecture*™ database will be labeled as Version 2.1, Version 2.2, etc. Following the next periodic comprehensive review, the *TurboArchitecture*™ database will be updated to Version 3.0. It is intended that this configuration control will eliminate confusion regarding the most recent version of regional ITS architecture documentation and outputs.

9.6 Summary of Use and Maintenance Recommendations

To derive the full benefits of regional ITS coordination, it is important that the Strafford-Rockingham Region ITS Architecture and ITS Strategic Plan remain relevant and up-to-date. The recommendations presented in this chapter are designed to facilitate the use and maintenance of the Strafford-Rockingham Region ITS Architecture and ITS Strategic Plan.

The following is a summary of recommendations to help to achieve the objectives of the ITS Architecture through the project deployment phase:

1. Revisit and revise the Strafford-Rockingham Region ITS Architecture periodically to ensure its ongoing consistency with actual conditions – regional transportation needs, regional ITS deployment progress, ITS initiatives at the statewide level, evolutions in technology, ITS standards development, updates to the National ITS Architecture, and other factors.
2. Continue the designation of the Strafford Regional Planning Commission (SRPC) and the Rockingham Planning Commission (RPC) as the joint Custodial Agencies for the Strafford-Rockingham Region ITS Architecture and ITS Strategic Plan.
3. Continue to appoint staff within both SRPC and RPC to act as a day-to-day contact and liaison regarding regional ITS coordination issues.
4. Establish a Standing Regional ITS Coordination Committee to meet periodically to provide guidance on ITS architecture revisions and other issues.
5. Promote systematic ITS review within the regional transportation planning process, potentially by giving the Standing Regional ITS Coordination Committee a specific mandate to review proposed transportation projects and to provide recommendations to MPOs.
6. Work with regional and statewide partners in the evaluation and endorsement of regional ITS standards, to ensure that the interoperability objectives of the architecture are carried through to the detailed technical design of project deployments.
7. Continue to provide both Interim Architecture Modifications (as needed) and Periodic Comprehensive Reviews (approximately every four years) to ensure that the Strafford-Rockingham Region ITS Architecture and ITS Strategic Plan remains up-do-date and relevant to stakeholder needs and ITS deployment conditions.

APPENDIX A

FHWA RULE ON ITS ARCHITECTURE AND STANDARDS

Federal Register

Monday,

January 8, 2001

Part IV

Department of Transportation

Federal Highway Administration

23 CFR Parts 655 and 940
Intelligent Transportation System Architecture and Standards; Final Rule

Federal Transit Administration

Federal Transit Administration National ITS Architecture Policy on Transit Projects; Notice

DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

23 CFR Parts 655 and 940

[FHWA Docket No. FHWA–99–5899]

RIN 2125–AE65

Intelligent Transportation System Architecture and Standards

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Final rule.

SUMMARY: The purpose of this document is to issue a final rule to implement section 5206(e) of the Transportation Equity Act for the 21st Century (TEA–21), enacted on June 9, 1998, which required Intelligent Transportation System (ITS) projects funded through the highway trust fund to conform to the National ITS Architecture and applicable standards. Because it is highly unlikely that the entire National ITS Architecture would be fully implemented by any single metropolitan area or State, this rule requires that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a ''regional ITS architecture.'' Therefore, conformance with the National ITS Architecture is defined under this rule as development of a regional ITS architecture within four years after the first ITS project advancing to final design, and the subsequent adherence of ITS projects to the regional ITS architecture. The regional ITS architecture is based on the National ITS Architecture and consist of several parts including the system functional requirements and information exchanges with planned and existing systems and subsystems and identification of applicable standards, and would be tailored to address the local situation and ITS investment needs.

EFFECTIVE DATE: February 7, 2001.

FOR FURTHER INFORMATION CONTACT: *For technical information:* Mr. Bob Rupert, (202) 366–2194, Office of Travel Management (HOTM–1) and Mr. Michael Freitas, (202) 366–9292, ITS Joint Program Office (HOIT–1). *For legal information:* Mr. Wilbert Baccus, Office of the Chief Counsel (HCC–32), (202) 366–1346, Federal Highway Administration, 400 Seventh Street, SW., Washington, DC 20590. Office hours are from 8 a.m. to 4:30 p.m., e.t., Monday through Friday, except Federal holidays.

SUPPLEMENTARY INFORMATION:

Electronic Access and Filing

You may submit or retrieve comments online through the Docket Management System (DMS) at: *http//dmses.dot.gov/submit.* Acceptable formats include: MS Word (versions 95 to 97), MS Word for Mac (versions 6 to 8), Rich Text Format (RTF), American Standard Code Information Interchange (ASCII) (TXT), Portable Document Format (PDF), and WordPerfect (version 7 to 8). The DMS is available 24 hours each day, 365 days each year. Electronic submission and retrieval help and guidelines are available under the help section of the web site.

An electronic copy of this document may be downloaded by using a computer, modem, and suitable communications software from the Government Printing Office's Electronic Bulletin Board Service at (202) 512–1661. Internet users may also reach the Office of the **Federal Register**'s home page at *http://www.nara.gov/fedreg* and the Government Printing Office's web page at: *http://www.access.gpo.gov/nara.* The document may also be viewed at the DOT's ITS web page at *http://www.its.dot.gov.*

Background

A notice of proposed rulemaking (NPRM) concerning this rule was published at 65 FR 33994 on May 25, 2000, and an extension of the comment period to September 23, 2000, was published at 65 FR 45942 on July 26, 2000.

In the NPRM on this rule, the FHWA had proposed that the regional ITS architecture follow from the ITS integration strategy proposed in another NPRM entitled ''Statewide Transportation Planning; Metropolitan Transportation Planning'' published at 65 FR 33922 on May 25, 2000. That rule is being developed according to a different schedule and will be issued separately. For this reason, all references to the proposed integration strategy have been removed from this rule. However, it is still the intent of this rule that regional ITS architectures be based on established, collaborative transportation planning processes. The other major changes to the final rule relate to options for developing a regional ITS architecture and the time allowed to develop such an architecture. Additional changes to the final rule largely deal with clarification of terms, improved language dealing with staging and grandfathering issues, and clarification of use of ITS standards.

Intelligent Transportation Systems represent the application of information processing, communications technologies, advanced control strategies, and electronics to the field of transportation. Information technology in general is most effective and cost beneficial when systems are integrated and interoperable. The greatest benefits in terms of safety, efficiency, and costs are realized when electronic systems are systematically integrated to form a whole in which information is shared with all and systems are interoperable.

In the transportation sector, successful ITS integration and interoperability require addressing two different and yet fundamental issues; that of technical and institutional integration. *Technical integration* of electronic systems is a complex issue that requires considerable up-front planning and meticulous execution for electronic information to be stored and accessed by various parts of a system. *Institutional integration* involves coordination between various agencies and jurisdictions to achieve seamless operations and/or interoperability.

In order to achieve effective institutional integration of systems, agencies and jurisdictions must agree on the benefits of ITS and the value of being part of an integrated system. They must agree on roles, responsibilities, and shared operational strategies. Finally, they must agree on standards and, in some cases, technologies and operating procedures to ensure interoperability. In some instances, there may be multiple standards that could be implemented for a single interface. In this case, agencies will need to agree on a common standard or agree to implement a technical translator that will allow dissimilar standards to interoperate. This coordination effort is a considerable task that will happen over time, not all at once. Transportation organizations, such as, transit properties, State and local transportation agencies, and metropolitan planning organizations must be fully committed to achieving institutional integration in order for integration to be successful. The transportation agencies must also coordinate with agencies for which transportation is a key, but not a primary part of their business, such as, emergency management and law enforcement agencies.

Successfully dealing with both the technical and institutional issues requires a high-level conceptual view of the future system and careful, comprehensive planning. The framework for the system is referred to as the *architecture.* The architecture defines the system components, key functions, the organizations involved, and the type of information shared

between organizations and parts of the system. The architecture is, therefore, fundamental to successful system implementation, integration, and interoperability.

Additional background information may be found in docket number FHWA–99–5899.

The National ITS Architecture

The Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102–240, 105 Stat. 1914, initiated Federal funding for the ITS program. The program at that time was largely focused on research and development and operational tests of technologies. A key part of the program was the development of the National ITS Architecture. The National ITS Architecture provides a common structure for the design of ITS systems. The architecture defines the functions that could be performed to satisfy user requirements and how the various elements of the system might connect to share information. It is not a system design, nor is it a design concept. However, it does define the framework around which multiple design approaches can be developed, each one specifically tailored to meet the needs of the user, while maintaining the benefits of a common approach.

The National ITS Architecture, Version 3.0 can be obtained from the ITS Joint Program Office of the DOT in CD–ROM format and on the ITS web site *http://www.its.dot.gov*. The effort to develop a common national system architecture to guide the evolution of ITS in the United States over the next 20 years and beyond has been managed since September 1993 by the DOT. The National ITS Architecture describes in detail what types of interfaces should exist between ITS components and how they will exchange information and work together to deliver the given ITS user service requirements.

The National ITS Architecture and standards can be used to guide multi-level government and private-sector business planners in developing and deploying nationally compatible systems. By ensuring system compatibility, the DOT hopes to accelerate ITS integration nationwide and develop a strong, diverse marketplace for related products and services.

It is highly unlikely that the entire National ITS Architecture will be fully implemented by any single metropolitan area or State. For example, the National ITS Architecture contains information flows for an Automated Highway System that is unlikely to be part of most regional implementations. However, the National ITS Architecture has considerable value as a framework for local governments in the development of regional ITS architectures by identifying the many functions and information sharing opportunities that may be desired. It can assist local governments with both of the key elements: technical interoperability and institutional coordination.

The National ITS Architecture, because it aids in the development of a high-level conceptual view of a future system, can assist local governments in identifying applications that will support their future transportation needs. From an institutional coordination perspective, the National ITS Architecture helps local transportation planners to identify other stakeholders who may need to be involved and to identify potential integration opportunities. From a technical interoperability perspective, the National ITS Architecture provides a logical and physical architecture and process specifications to guide the design of a system. The National ITS Architecture also identifies interfaces where standards may apply, further supporting interoperability.

Transportation Equity Act for the 21st Century

As noted above, section 5206(e) of the TEA–21, Public Law 105–178, 112 Stat. 457, requires ITS projects funded from the highway trust fund to conform to the National ITS Architecture, applicable or provisional standards, and protocols. One of the findings of Congress in section 5202 of the TEA–21, is that continued investment in systems integration is needed to accelerate the rate at which ITS is incorporated into the national surface transportation network. Two of the purposes of the ITS program, noted in section 5203(b) of the TEA–21, are to expedite the deployment and integration of ITS, and to improve regional cooperation and operations planning for effective ITS deployment. Use of the National ITS Architecture provides significant benefits to local transportation planners and deployers as follows:

1. The National ITS Architecture provides assistance with technical design. It saves considerable design time because physical and logical architectures are already defined.

2. Information flows and process specifications are defined in the National ITS Architecture, allowing local governments to accelerate the process of defining system functionality.

3. The architecture identifies standards that will support interoperability now and into the future, but it leaves selection of technologies to local decisionmakers.

4. The architecture provides a sound engineering framework for integrating multiple applications and services in a region.

ITS Architecture and Standards NPRM

Discussion of Comments

The FHWA received 105 comments on this docket from a wide range of stakeholders, including major industry associations, State departments of transportation, Metropolitan Planning Organizations (MPOs), and local agencies. The comments were generally favorable about the scope and content, but requested additional clarification and guidance on implementation of specific items. On many issues, some commenters wanted more specific requirements, while others wanted more flexibility. Most commenters, including major industry associations and public sector agencies, agreed with the overall scope, but some felt that the specifics might be difficult to implement and asked for clarification of key terms. A few commenters wanted the FHWA to reduce the number of requirements or convert the rulemaking into a guidance activity until more ITS deployment experience is gained.

In summary, the FHWA received a large number of generally favorable comments about the NPRM that suggested minor specific changes and expressed a need for further guidance on implementation. Since the general tenor of the comments was positive, the FHWA has kept the scope of the NPRM and made appropriate clarifications to the text of the final rule to address concerns raised in comments. In response to the many comments requesting it, starting in early 2001, the FHWA will also provide a program of guidance, training, and technical support to assist with the implementation of this rule. The following is a detailed discussion of the comments and their disposition, organized by subject matter.

Section 940.3 Definitions

ITS Project. There were 34 comments submitted to the docket concerning the definition of an ITS project. Many of the commenters felt the definition was not clear enough, was too broad, or was too subject to interpretation. Some comments questioned how much of a project's budget would have to be spent on ITS before a project would be considered an ITS project. Some suggested specific language to more narrowly define an ITS project by

focusing on the portion of the overall project that is actually ITS or by suggesting language that would narrow the definition of an ITS project to only include projects which introduce new or changed integration opportunities.

Since the intent of this rule and the supporting legislation is to facilitate the deployment of integrated ITS systems, it is the position of the FHWA that the definition of an ITS project must be fairly broad to include any ITS system being funded with highway trust fund dollars. It is only by properly considering all planned ITS investments in the development of a regional ITS architecture that the integration opportunities and needs can even be identified. This consideration should be carried out in the development of an architecture prior to the specific project being advanced. If, in the development of a regional ITS architecture, it is determined that a specific planned project offers no real integration opportunities for the region, then the impact of this rule on that specific project is minimal.

As a response to the comments concerning the clarity of the definition, the definition of an ITS project has been slightly modified to remove the examples since they were considered misleading. The FHWA recognizes that any definition will be subject to interpretation by the stakeholders and acknowledges the need for guidance in this area to ensure clear and consistent interpretation of this rule. Guidance on what constitutes an ITS project (including examples) will be developed to assist the various stakeholders, including the FHWA Division Offices, to better understand what projects should be considered ITS projects.

Region. There were 26 comments submitted related to the definition of a region. Seven comments supported the open definition provided in the NPRM, arguing that the possible integration opportunities in an area should define the region and that there were too many possible variations to allow a restrictive definition. Six commenters who expressed concern over varying conditions interpreted the definition to mean Metropolitan Planning Area (MPA). Five comments suggested an MPA was too restrictive. Eight other comments indicated that the proposed definition of a region did not clearly identify what entity would have the lead in developing a regional ITS architecture or thought the definition implied the MPO should have the lead. Nine comments suggested various limits or boundaries to fit specific situations. Ten comments expressed a need for greater clarification of the definition for a region.

The intent of the proposed definition was to allow considerable flexibility on the part of the stakeholders in defining the boundaries of a region to best meet their identified integration opportunities. While there was no intent to generally restrict the definition to MPAs or States, the FHWA determined that regional ITS architectures should be based on an integration strategy that was developed by an MPO or State as part of its transportation planning process.

Given that the final rule does not require or reference an integration strategy, the FHWA feels a need to provide more specific guidance on the definition of a region. As such, the definition of a region has been revised to indicate that the MPA should be the minimum area considered when establishing the boundaries of a region for purposes of developing a regional ITS architecture within a metropolitan area. This should not be interpreted to mean that a region must be an MPA, or no less than an MPA, but the MPA and all the agencies and jurisdictions within the MPA should be at least considered for inclusion in the process of developing a regional ITS architecture within a metropolitan area. This rule is silent on other possible limits or minimum areas for defining a region, relying on the flexible nature of this rule to accommodate those special circumstances. The FHWA also acknowledges it is possible that overlapping regions could be defined and overlapping regional ITS architectures be developed to meet the needs of the regions.

Other Definitions. There were 20 comments suggesting that other terms used in the NPRM be defined. These included ''interoperability,'' ''standards,'' ''concept of operations,'' ''conceptual design,'' and ''integration strategy.'' Several of these are no longer used in the final rule and, therefore, were not defined. Other terms, such as ''interoperability'' and ''standards,'' were determined to be common terms whose definition did not effect the implementation of the final rule. Furthermore, language regarding standards conformity has been clarified in the body of the final rule.

Section 940.5 Policy

Twenty-eight commenters addressed the issue of consistency between the two related FHWA notices of proposed rulemaking (23 CFR parts 940 and 1410) and the Federal Transit Administration's (FTA) notice (FTA Docket No. FTA–99–6417) on National ITS Architecture published at 65 FR 34002 on May 25, 2000. The comments revealed a lack of understanding about the relationship between the regional ITS architecture and the integration strategy proposed as part of the revisions to FHWA's transportation planning rules. There were five comments suggesting a single DOT rule addressing how all ITS projects would meet the National ITS Architecture conformance requirements of the TEA–21 instead of an FHWA rule for highway projects and an FTA policy for transit projects. Four other comments acknowledged the need for two policies, but recommended they articulate the same process.

A final transportation planning rule is being developed on a different schedule than this rule, and comments regarding the portions of the National ITS Architecture conformity process included in the transportation planning rule will be addressed as it proceeds toward issuance. The FHWA and FTA have chosen to go forward with policies that have been developed cooperatively to implement the National ITS Architecture conformance process. This FHWA rule and the parallel FTA policy have been developed without reference to the proposed changes to the transportation planning process, including no mention of the development of an integration strategy. However, the policy statement of this rule notes a link to established transportation planning processes, as provided under 23 CFR part 450. This rule fully supports these collaborative methods for establishing transportation goals and objectives, and does not provide a mechanism for introducing projects outside of the transportation planning processes.

This final rule on National ITS Architecture conformance and the FTA policy on the same subject have been developed cooperatively and coordinated among the agencies to ensure compatible processes. Any differences between this rule and the parallel FTA policy are intended to address differences in highway and transit project development and the way the FHWA and the FTA administer projects and funds.

Fifteen commenters questioned the need for an integration strategy, and the relationship between the strategy and the regional ITS architecture.

Given the fact that proposed revisions to the FHWA's transportation planning rules are being developed according to a different schedule, this rule has been revised to remove any references to an integration strategy. Comments regarding the integration strategy will be addressed in the final transportation

planning rule, and the discussion of the regional ITS architecture in § 940.9 has been revised to clarify its content.

Section 940.7 Applicability

A few commenters noted that the proposed rule had not addressed the TEA–21 language that allows for the Secretary to authorize certain exceptions to the conformity provision. These exceptions relate to those projects designed to achieve specific research objectives or, if three stated criteria are met, to those intended to upgrade or expand an ITS system in existence on the date of enactment of the TEA–21. The legislation also included a general exemption for funds used strictly for operations and maintenance of an ITS system in existence on the date of enactment of the TEA–21.

The FHWA acknowledges this omission and has included the appropriate language in this section of the rule.

Section 940.9 Regional ITS Architecture

Several comments were received related to the way the proposed rule referred to developing regional ITS architectures. Eight comments, from State agencies and metropolitan planning organizations, supported an incremental approach to developing regional ITS architectures, starting with project ITS architectures and building them together. Four other comments, from metropolitan planning organizations and industry associations, noted that an ad hoc regional ITS architecture developed incrementally through projects would result in an architecture less robust than if there were a single, initial effort to develop it.

Also, thirteen comments from the Association of American State Highway and Transportation Officials (AASHTO) and a number of States recommended extending the time for developing regional ITS architectures, as the proposed two year implementation would be too short. Ten of the commenters preferred four years in order to acquire the necessary resources for developing regional ITS architectures.

Most commenters were in agreement with the content of the regional ITS architecture as defined in the proposed rule. However, there were 19 comments that dealt with confusion over the definition of both ''conceptual design'' and ''concept of operations.'' In addition, there were 17 other comments on the makeup of the stakeholders, involvement of the private sector, and the need and desirability of ''agreements'' between stakeholders.

The comments indicated confusion regarding the development of regional ITS architectures, and especially so in discussing the period of time for their development. Therefore, the final rule has clarified the time period for developing regional ITS architectures by adopting the proposed extension to four years subsequent to beginning to deploy ITS projects (§ 940.9(c)), or four years from the effective date of this rule for those areas that are currently deploying ITS projects (§ 940.9(b)). In clarifying the time for development, this rule has eliminated any references to specific methods for developing regional ITS architectures. By not prescribing any methods, the rule provides flexibility to a region in deciding how it should develop its regional ITS architecture. Guidance and information related to developing regional ITS architectures is available from FHWA Division Offices and from the ITS web site, *http://www.its.dot.gov*, and will be expanded to provide assistance in meeting the intent of the rule.

Both the terms ''conceptual design'' and ''concept of operations'' have been deleted from the final rule. In their stead are descriptions of the content that is expected to form the basis for a regional ITS architecture. This content has not significantly changed from that defined in the NPRM but is now contained in § 940.9(d). The level of detail required is to the architecture flow level as defined in the National ITS Architecture. The regional ITS architecture must identify how agencies, modes, and systems will interact and operate if the architecture is to fulfill the objective of promoting ITS integration within a region.

The relevant stakeholders for a region will vary from region to region. The list articulated in § 940.9(a) is representative only and not meant to be inclusive or exclusive. On the specific issue of private sector participation, if the private sector is deploying ITS systems in a region or otherwise providing an ITS-based service, it would be appropriate to engage them in the development of a regional ITS architecture. Because of these variations from region to region, the FHWA felt it inappropriate to attempt to define an all inclusive list of stakeholders. The group of relevant stakeholders will be a function of how the region is defined and how transportation services are provided to the public. Section 940.9(d)(4) specifies that in the development of the regional ITS architecture, it shall include ''any agreements (existing or new) required for operations.'' The formalization of these types of agreements is at the discretion of the region and participating stakeholders.

There were 14 comments from a broad range of organizations questioning how existing regional ITS architectures, strategic plans or ITS Early Deployment Plans would be treated under this rule. It is the intent of the FHWA that any existing ITS planning documents should be used to the extent practical to meet the requirements of this rule. If a regional ITS architecture is in place, is up to date, and addresses all the requirements of a regional ITS architecture as described in this rule, there is no requirement to develop a ''new'' one. If the existing regional ITS architecture does not address all the requirements of the rule, it may be possible to update it so that it meets the regional ITS architecture requirements of this rule. What is necessary is that the end result is an architecture that meets the requirements of this rule and properly addresses the ITS deployments and integration opportunities of that region. This issue is specifically addressed in § 940.9(e) of this rule.

There were five comments related to the impact of this rule on legacy systems (*i.e.*, ITS systems already in place) and requesting some sort of ''grandfathering'' for them. The language in § 940.11(g) of the final rule clarifies the grandfathering or staging aspects of the process. The final rule does not require any changes or modifications to existing systems to conform to the National ITS Architecture. It is very likely that a regional ITS architecture developed by the local agencies and other stakeholders would call for changes to legacy systems over time to support desired integration. However, such changes would not be required by the FHWA; they would be agreed upon by the appropriate stakeholders as part of the development of the regional ITS architecture.

There were 15 comments dealing with the maintenance process and status of the National ITS Architecture. Two comments suggested the need for the FHWA to formally adopt the National ITS Architecture. Four other comments also supported the formalization of a process for maintaining or updating it with the full opportunity for public input.

Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture, and the subsequent adherence of all ITS projects to that regional ITS architecture. This rule requires that the National ITS Architecture be used as a resource in developing a regional ITS architecture.

As a technical resource, it is important that the National ITS Architecture be maintained and updated as necessary in response to user input or to add new user services, but formal adoption of the National ITS Architecture is not necessary. However, the FHWA recognizes the need to maintain the National ITS Architecture and to establish an open process for configuration control that includes public participation. The process currently used by the DOT to maintain the National ITS Architecture is very rigorous and involves significant public participation. That process is currently being reviewed by the DOT with the intent of establishing a configuration management process that engages the public at key stages and ensures a consensus for updating the National ITS Architecture.

Four comments suggested that this rule should not be implemented until the National ITS Architecture was complete. The National ITS Architecture will never stop evolving since there always is a potential need to regularly update it as more is learned about ITS deployment. The FHWA believes the National ITS Architecture is developed to a stage where it can be used as a resource in developing regional ITS architectures, as required by this rule.

Seventeen comments asked the FHWA to define the agency that is responsible for the development and maintenance of the regional ITS architecture; specifically MPOs and/or the State as those entities that are already responsible for the planning process.

The FHWA did not define the responsibility for either creating or maintaining the regional ITS architecture to a specific entity because of the diversity of transportation agencies and their roles across the country. It is recognized that in some regions traditional State and MPO boundaries may not meet the needs of the traveling public or the transportation community. This is also why the FHWA did not rigidly define a region. The FHWA encourages MPOs and States to include the development of their regional ITS architectures as part of their transportation planning processes. However, the decision is best left to the region to determine the approach that best reflects their needs, as indicated in § 940.9. It is clear that the value of a regional ITS architecture will only be realized if that architecture is maintained through time. However, in accepting Federal funds under title 23, U.S.C., the State is ultimately responsible for complying with Federal requirements, as provided in 23 U.S.C. 106 and 133.

Four commenters noted that the proposed rule did not adequately address planning for, or committing to, a defined level of operations and maintenance.

The final rule addresses this concern on two primary levels, in the development of the regional ITS architecture and the development of individual projects. Section 940.9(d)(4) specifies that in the development of the regional ITS architecture, it shall include ''any agreements (existing or new) required for operations.'' The formalization of these types of agreements is at the discretion of the region and participating stakeholders.

Also, relative to operations and management at a project level, § 940.11(c)(7) specifies that the systems engineering analysis (required of all ITS projects) includes ''procedures and resources necessary for the operations and management of the system.''

Section 940.11 Project Implementation

In addition to the comments on regional ITS architecture development noted above, the docket received 86 comments on systems engineering and project implementation. These comments revealed that the structure of the NPRM in discussing regional ITS architecture development, project systems engineering analysis, and project implementation was confusing and difficult to read.

To clarify these portions of the rule, the systems engineering and project implementation sections of the NPRM have been combined into § 940.11, Project Implementation. Also, paragraphs that were in the regional ITS architecture section of the NPRM that discussed major ITS projects and the requirements for developing project level ITS architectures have been rewritten to clarify their applicability. Since these paragraphs deal with project development issues, they have been moved to § 940.11(e). A definition for ''project level ITS architecture'' was added in § 940.3 and a description of its contents provided in § 940.11(e).

The docket received 33 comments regarding systems engineering and the systems engineering analysis section of the proposed rule. Most of the comments related to the definition, the process not being necessary except for very large projects, and confusion as to how these requirements relate to existing FHWA policy.

In response to the docket comments, the definition of systems engineering in § 940.3 has been clarified and is more consistent with accepted practice. In order to provide consistency in the regional ITS architecture process, the systems engineering analysis detailed in §§ 940.11(a) through 940.11(c) must apply to all ITS projects regardless of size or budget. However, the analysis should be on a scale commensurate with project scope. To allow for the greatest flexibility at the State and local level, in § 940.11(c), a minimum number of elements have been clearly identified for inclusion in the systems engineering analysis. Many of those elements are currently required as provided in 23 CFR 655.409, which this rule replaces. Recognizing the change in some current practices this type of analysis will require, the FHWA intends to issue guidance, training, and technical support in early 2001 to help stakeholders meet the requirements of the final rule.

Fifty-three comments were submitted regarding ITS standards and interoperability tests. The commenters expressed concern about requiring the use of ITS standards and interoperability tests prematurely, the impact on legacy systems of requiring ITS standards, and confusion regarding the term ''adopted by the DOT.''

In response to the comments, the FHWA has significantly modified the final rule to eliminate reference to the use of standards and interoperability tests prior to adoption in § 940.11(f). Section 940.11(g) addresses the applicability of standards to legacy systems. It is not the intent of the DOT to formally adopt any standard before the standard is mature; and also, not all ITS standards should, or will, be formally adopted by the DOT. Formal adoption of a standard means that the DOT will go through the rulemaking process, including a period of public comment, for all standards that are considered candidates for adoption.

The DOT has developed a set of criteria to determine when a standard could be considered for formal adoption. These criteria include, at a minimum, the following elements:

1. The standard has been approved by a Standard Development Organization (SDO).

2. The standard has been successfully tested in real world applications as appropriate.

3. The standard has received some degree of acceptance by the community served by the standard.

4. Products exist to implement the standard.

5. There is adequate documentation to support the use of the standard.

6. There is training available in the use of the standard where applicable.

Therefore, the intent of the rule is to require the use of a standard only when these criteria have been met, and there has been a separate rulemaking on adoption of the standard.

The only interoperability tests that are currently contemplated by the DOT are those associated with the Commercial Vehicle Operations (CVO) program. These tests are currently being used by States deploying CVO systems and will follow a similar set of criteria for adoption as those defined for standards.

Section 940.13 Project Administration

There were nine comments related to how conformity with the final rule would be determined, and by whom. There were 11 comments about how conformity with the regional ITS architecture would be determined, and by whom. Six comments specifically suggested methods for determining conformance, including a process similar to current Federal planning oversight procedures. Six other commenters suggested that determination be made by the MPO or State. For either case, the comments reflected a lack of clarity as to what documentation would be necessary. There were six related comments suggesting the level of documentation be commensurate with the scale of the planned ITS investments in the region.

In § 940.13 of the final rule, the FHWA has attempted to clarify the process for determining conformance. Conformance of an ITS project with a regional ITS architecture shall be made prior to authorization of funding for project construction or implementation as provided in 23 U.S.C. 106 and 133. We do not intend to create new oversight procedures beyond those provided in 23 U.S.C. 106 and 133, but in those cases where oversight and approval for ITS projects is assumed by the State, the State will be responsible for ensuring compliance with this regulation and the FHWA's oversight will be through existing processes.

There were 14 comments concerning the documentation requirements of the proposed rule and generally suggesting they be reduced. Certainly the development of a regional ITS architecture and evidence of conformance of a specific project to that regional ITS architecture implies some level of documentation be developed. However, to allow flexibility on the part of the State or local agency in demonstrating compliance with the final rule, no specific documentation is required to be developed or submitted to the FHWA for review or approval. The FHWA recognizes the need to be able to scale the regional ITS architecture and the associated documentation to the needs of the region. Section 940.9(a) of the final rule contains specific language allowing such scaling.

Summary of Requirements

I. The Regional ITS Architecture

This final rule on the ITS Architecture and Standards requires the development of a local implementation of the National ITS Architecture referred to as a regional ITS architecture. The regional ITS architecture is tailored to meet local needs, meaning that it does not address the entire National ITS Architecture and can also address services not included in the National ITS Architecture. The regional ITS architecture shall contain a description of the region and the identification of the participating agencies and other stakeholders; the roles and responsibilities of the participating agencies and other stakeholders; any agreements needed for operation; system functional requirements; interface requirements and information exchanges with planned and existing systems; identification of applicable standards; and the sequence of projects necessary for implementation. Any changes made in a project design that impact the regional ITS architecture shall be identified and the appropriate revisions made and agreed to in the regional ITS architecture.

Any region that is currently implementing ITS projects shall have a regional ITS architecture within four years of the effective date of this rule. All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design. In this context, a region is a geographical area that is based on local needs for sharing information and coordinating operational strategies among multiple projects. A region can be specified at a metropolitan, Statewide, multi-State, or corridor level. Within a metropolitan area, the metropolitan planning area should be the minimum area that is considered when establishing the boundaries of a region for purposes of developing a regional ITS architecture. A regional approach promotes integration of transportation systems. The size of the region should reflect the breadth of the integration of transportation systems.

II. Project Development

Additionally, this rule requires that all ITS projects be developed using a systems engineering analysis. All ITS projects that have not yet advanced to final design are required to conform to the system engineering requirements in § 940.11 upon the effective date of this rule. Any ITS project that has advanced to final design by the effective date of this rule is exempt from the requirements of § 940.11. When the regional ITS architecture is completed, project development will be based on the relevant portions of it which the project implements. Prior to completion of the regional ITS architecture, major ITS projects will develop project level ITS architectures that are coordinated with the development of the regional ITS architecture. ITS projects will be required to use applicable ITS standards and interoperability tests that have been officially adopted by the DOT. Where multiple standards exist, it will be the responsibility of the stakeholders to determine how best to achieve the interoperability they desire.

Rulemaking Analyses and Notices

Executive Order 12866 (Regulatory Planning and Review) and DOT Regulatory Policies and Procedures

The FHWA has determined that this action is not a significant regulatory action within the meaning of Executive Order 12866 or significant within the meaning of the Department of Transportation's regulatory policies and procedures. It is anticipated that the economic impact of this rulemaking will be minimal. This determination is based upon preliminary and final regulatory assessments prepared for this action that indicate that the annual impact of the rule will not exceed $100 million nor will it adversely affect the economy, a sector of the economy, productivity, jobs, the environment, public health, safety, or State, local, or tribal governments. In addition, the agency has determined that these changes will not interfere with any action taken or planned by another agency and will not materially alter the budgetary impact of any entitlements, grants, user fees, or loan programs. Copies of the preliminary and final regulatory assessments are included in the docket.

Costs

The FHWA prepared a preliminary regulatory evaluation (PRE) for the NPRM and comments were solicited. That analysis estimated the total costs of this rule over 10 years to be between $38.1 million and $44.4 million (the net present value over 10 years was between $22.3 million and $31.2 million). The annual constant dollar impact was estimated to range between $3.2 million and $4.4 million. We believe that the

cost estimates as stated in the PRE are negligible. The FHWA received only one comment in response to the PRE. That commenter, the Capital District Transportation Committee of Albany, New York suggested that our cost estimates were too low, but provided no further detail or rationale which would cause us to reconsider or increase our cost estimates in the initial regulatory evaluation.

These 10-year cost estimates set forth in the PRE included transportation planning cost increases, to MPOs ranging from $10.8 million to $13.5 million, and to States from $5.2 million to $7.8 million associated with our initial requirement to develop an ITS integration strategy that was proposed as part of the metropolitan and statewide planning rulemaking effort. The agency now plans to advance that proposed ITS integration strategy in the planning rule on a different time schedule than this final rule. Thus, the costs originally set forth in the PRE for the ITS integration strategy have been eliminated from the final cost estimate in the final regulatory evaluation (FRE) for this rule.

In the FRE, the agency estimates the cost of this rule to be between $1 million an $16 million over ten years, which are the estimated costs of this rule to implementing agencies for the development of the regional ITS architectures. These costs do not include any potential additional implementation costs for individual projects which are expected to be minimal and were extremely difficult to estimate. Thus, the costs to the industry are less than that originally estimated in the agency's NPRM.

Benefits

In the PRE, the FHWA indicated that the non-monetary benefits derived from the proposed action included savings from the avoidance of duplicative development, reduced overall development time, and earlier detection of potential incompatibilities. We stated that, as with project implementation impacts, the benefits of the rule are very difficult to quantify in monetary terms. Thus, we estimated that the coordination guidance provided through implementation of the rule could provide savings of approximately $150,000 to any potential entity seeking to comply with the requirements of section 5206(e) of the TEA–21 as compared with an entity having to undertake compliance individually. The costs may be offset by benefits derived from the reduction of duplicative deployments, reduced overall development time, and earlier detection of potential incompatibilities.

In developing a final regulatory evaluation for this action, we did not denote a significant change in any of the benefits anticipated by this rule. This is so notwithstanding the fact that our planning costs for the ITS integration strategy have been eliminated from the final cost estimate. The primary benefits of this action that result from avoidance of duplicative development, reduced overall development time, and earlier detection of potential incompatibilities will remain the same.

In sum the agency believes that the option chosen in this action will be most effective at helping us to implement the requirements of section 5206(e) of the TEA–21. In developing the rule, the FHWA has sought to allow broad discretion to those entities impacted, in levels of response and approach that are appropriate to particular plans and projects, while conforming to the requirements of the TEA–21. The FHWA has considered the costs and benefits of effective implementation of ITS through careful and comprehensive planning. Based upon the information above, the agency anticipates that the economic impact associated with this rulemaking action is minimal and a full regulatory evaluation is not necessary.

Regulatory Flexibility Act

In compliance with the Regulatory Flexibility Act (5 U.S.C. 601–612), the FHWA has evaluated, through the regulatory assessment, the effects of this action on small entities and has determined that this action will not have a significant economic impact on a substantial number of small entities. Small businesses and small organizations are not subject to this rule, which applies to government entities only. Since § 940.9(a) of this rule provides for regional ITS architectures to be developed on a scale commensurate with the scope of ITS investment in the region, and § 940.11(b) provides for the ITS project systems engineering analysis to be on a scale commensurate with the project scope, compliance requirements will vary with the magnitude of the ITS requirements of the entity. Small, less complex ITS projects have correspondingly small compliance documentation requirements, thereby accommodating the interest of small government entities. Small entities, primarily transit agencies, are accommodated through these scaling provisions that impose only limited requirements on small ITS activities. For these reasons, the FHWA certifies that this action will not have a significant impact on a substantial number of small entities.

Unfunded Mandates Reform Act of 1995

This action does not impose unfunded mandates as defined by the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4, March 22, 1995, 109 Stat. 48). This rule will not result in an expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.

Executive Order 13132 (Federalism)

This action has been analyzed in accordance with the principles and criteria contained in Executive Order 13132, dated August 4, 1999, and the FHWA has determined that this action does not have sufficient federalism implications to warrant the preparation of a federalism assessment. The FHWA has also determined that this action does not preempt any State law or State regulation or affect the State's ability to discharge traditional State governmental functions.

Executive Order 12372 (Intergovernmental Review)

Catalog of Federal Domestic Assistance Program Number 20.205, Highway planning and construction. The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities apply to this program.

Paperwork Reduction Act of 1995

This action does not contain information collection requirements for the purposes of the Paperwork Reduction Act of 1995, 44 U.S.C. 3501–3520.

Executive Order 12988 (Civil Justice Reform)

This action meets applicable standards in sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

Executive Order 13045 (Protection of Children)

We have analyzed this action under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This rule is not an economically significant rule and does not concern an environmental risk to health or safety that may disproportionately affect children.

Executive Order 12630 (Taking of Private Property)

This rule does not effect a taking of private property or otherwise have taking implications under Executive Order 12630, Government Actions and Interference with Constitutionally Protected Property Rights.

National Environmental Policy Act

The agency has analyzed this action for the purposes of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321–4347), and has determined that this action will not have any effect on the quality of the environment.

Regulation Identification Number

A regulation identification number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross reference this proposed action with the Unified Agenda.

List of Subjects

23 CFR Part 655

Design standards, Grant programs-transportation, Highways and roads, Incorporation by reference, Signs and symbols, Traffic regulations.

23 CFR Part 940

Design standards, Grant programs-transportation, Highways and roads, Intelligent transportation systems.

Issued on: January 2, 2001.

Kenneth R. Wykle,

Federal Highway Administrator.

In consideration of the foregoing, the FHWA amends Chapter I of title 23, Code of Federal Regulations, as set forth below:

PART 655—[AMENDED]

1. The authority citation for part 655 continues to read as follows:

Authority: 23 U.S.C. 101(a), 104, 109(d), 114(a), 217, 315, and 402(a); 23 CFR 1.32, and 49 CFR 1.48(b).

Subpart D—[Removed and reserved]

2. Remove and reserve subpart D of part 655, consisting of §§ 655.401, 655.403, 655.405, 655.407, 655.409, 655.411.

3. Add a new subchapter K, consisting of part 940, to read as follows:

Subchapter K—Intelligent Transportation Systems

PART 940—INTELLIGENT TRANSPORTATION SYSTEM ARCHITECTURE AND STANDARDS

Sec.

Authority: 23 U.S.C. 101, 106, 109, 133, 315, and 508; sec 5206(e), Public Law 105–178, 112 Stat. 457 (23 U.S.C. 502 note); and 49 CFR 1.48.

§ 940.1 Purpose.

This regulation provides policies and procedures for implementing section 5206(e) of the Transportation Equity Act for the 21st Century (TEA–21), Public Law 105–178, 112 Stat. 457, pertaining to conformance with the National Intelligent Transportation Systems Architecture and Standards.

§ 940.3 Definitions.

Intelligent Transportation System (ITS) means electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.

ITS project means any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture.

Major ITS project means any ITS project that implements part of a regional ITS initiative that is multi-jurisdictional, multi-modal, or otherwise affects regional integration of ITS systems.

National ITS Architecture (also ''national architecture'') means a common framework for ITS interoperability. The National ITS Architecture comprises the logical architecture and physical architecture which satisfy a defined set of user services. The National ITS Architecture is maintained by the United States Department of Transportation (DOT) and is available on the DOT web site at *http://www.its.dot.gov.*

Project level ITS architecture is a framework that identifies the institutional agreement and technical integration necessary to interface a major ITS project with other ITS projects and systems.

Region is the geographical area that identifies the boundaries of the regional ITS architecture and is defined by and based on the needs of the participating agencies and other stakeholders. In metropolitan areas, a region should be no less than the boundaries of the metropolitan planning area.

Regional ITS architecture means a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects.

Systems engineering is a structured process for arriving at a final design of a system. The final design is selected from a number of alternatives that would accomplish the same objectives and considers the total life-cycle of the project including not only the technical merits of potential solutions but also the costs and relative value of alternatives.

§ 940.5 Policy.

ITS projects shall conform to the National ITS Architecture and standards in accordance with the requirements contained in this part. Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture, and the subsequent adherence of all ITS projects to that regional ITS architecture. Development of the regional ITS architecture should be consistent with the transportation planning process for Statewide and Metropolitan Transportation Planning.

§ 940.7 Applicability.

(a) All ITS projects that are funded in whole or in part with the highway trust fund, including those on the National Highway System (NHS) and on non-NHS facilities, are subject to these provisions.

(b) The Secretary may authorize exceptions for:

(1) Projects designed to achieve specific research objectives outlined in the National ITS Program Plan under section 5205 of the TEA–21, or the Surface Transportation Research and Development Strategic Plan developed under 23 U.S.C. 508; or

(2) The upgrade or expansion of an ITS system in existence on the date of enactment of the TEA–21, if the Secretary determines that the upgrade or expansion:

(i) Would not adversely affect the goals or purposes of Subtitle C (Intelligent Transportation Systems Act of 1998) of the TEA–21;

(ii) Is carried out before the end of the useful life of such system; and

(iii) Is cost-effective as compared to alternatives that would meet the conformity requirement of this rule.

(c) These provisions do not apply to funds used for operations and maintenance of an ITS system in existence on June 9, 1998.

§ 940.9 Regional ITS architecture.

(a) A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (*e.g.,* police, fire, emergency/medical); transit operators; Federal lands agencies; State motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration.

(b) Any region that is currently implementing ITS projects shall have a regional ITS architecture by February 7, 2005.

(c) All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design.

(d) The regional ITS architecture shall include, at a minimum, the following:

(1) A description of the region;

(2) Identification of participating agencies and other stakeholders;

(3) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;

(4) Any agreements (existing or new) required for operations, including at a minimum those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture;

(5) System functional requirements;

(6) Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);

(7) Identification of ITS standards supporting regional and national interoperability; and

(8) The sequence of projects required for implementation.

(e) Existing regional ITS architectures that meet all of the requirements of paragraph (d) of this section shall be considered to satisfy the requirements of paragraph (a) of this section.

(f) The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining it, as needs evolve within the region.

§ 940.11 Project implementation.

(a) All ITS projects funded with highway trust funds shall be based on a systems engineering analysis.

(b) The analysis should be on a scale commensurate with the project scope.

(c) The systems engineering analysis shall include, at a minimum:

(1) 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);

(2) Identification of participating agencies roles and responsibilities;

(3) Requirements definitions;

(4) Analysis of alternative system configurations and technology options to meet requirements;

(5) Procurement options;

(6) Identification of applicable ITS standards and testing procedures; and

(7) Procedures and resources necessary for operations and management of the system.

(d) Upon completion of the regional ITS architecture required in §§ 940.9(b) or 940.9(c), the final design of all ITS projects funded with highway trust funds shall accommodate the interface requirements and information exchanges as specified in the regional ITS architecture. If the final design of the ITS project is inconsistent with the regional ITS architecture, then the regional ITS architecture shall be updated as provided in the process defined in § 940.9(f) to reflect the changes.

(e) Prior to the completion of the regional ITS architecture, any major ITS project funded with highway trust funds that advances to final design shall have a project level ITS architecture that is coordinated with the development of the regional ITS architecture. The final design of the major ITS project shall accommodate the interface requirements and information exchanges as specified in this project level ITS architecture. If the project final design is inconsistent with the project level ITS architecture, then the project level ITS architecture shall be updated to reflect the changes. The project level ITS architecture is based on the results of the systems engineering analysis, and includes the following:

(1) A description of the scope of the ITS project;

(2) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the ITS project;

(3) Functional requirements of the ITS project;

(4) Interface requirements and information exchanges between the ITS project and other planned and existing systems and subsystems; and

(5) Identification of applicable ITS standards.

(f) All ITS projects funded with highway trust funds shall use applicable ITS standards and interoperability tests that have been officially adopted through rulemaking by the DOT.

(g) Any ITS project that has advanced to final design by February 7, 2001 is exempt from the requirements of paragraphs (d) through (f) of this section.

§ 940.13 Project administration.

(a) Prior to authorization of highway trust funds for construction or implementation of ITS projects, compliance with § 940.11 shall be demonstrated.

(b) Compliance with this part will be monitored under Federal-aid oversight procedures as provided under 23 U.S.C. 106 and 133.

[FR Doc. 01–391 Filed 1–5–01; 8:45 am]

BILLING CODE 4910–22–P

APPENDIX B

FTA NATIONAL ITS ARCHITECTURE POLICY ON TRANSIT PROJECTS

Federal Register

Monday,

January 8, 2001

Part IV

Department of Transportation

Federal Highway Administration

23 CFR Parts 655 and 940
Intelligent Transportation System Architecture and Standards; Final Rule

Federal Transit Administration

Federal Transit Administration National ITS Architecture Policy on Transit Projects; Notice

DEPARTMENT OF TRANSPORTATION

Federal Transit Administration

Federal Transit Administration National ITS Architecture Policy on Transit Projects

AGENCY: Federal Transit Administration (FTA), DOT.

ACTION: Notice.

SUMMARY: The Federal Transit Administration (FTA) announces the FTA National ITS Architecture Policy on Transit Projects, which is defined in this document. The National ITS Architecture Policy is a product of statutory changes made by the Transportation Equity Act for the 21st Century (TEA–21) (Pub. L. 105–178) enacted on June 9, 1998. The National ITS Architecture Policy is also a product of the Request for Comment on the National ITS Architecture Consistency Policy for Project Development that was published in the **Federal Register** on May 25, 2000. Because it is highly unlikely that the entire National ITS Architecture would be fully implemented by any single metropolitan area or State, this policy requires that the National ITS Architecture be used to develop a local implementation of the National ITS Architecture, which is referred to as a ''regional ITS architecture.'' Therefore, conformance with the National ITS Architecture is defined under this policy as development of a regional ITS architecture within four years after the first ITS project advancing to final design, and the subsequent adherence of ITS projects to the regional ITS architecture. The regional ITS architecture is based on the National ITS Architecture and consists of several parts including the system functional requirements and information exchanges with planned and existing systems and subsystems and identification of applicable standards, and would be tailored to address the local situation and ITS investment needs.

DATE: *Effective Date:* This policy is effective from February 7, 2001.

ADDRESSES: For FTA staff, Federal Transit Administration, Department of Transportation (DOT), 400 Seventh Street, SW., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: *For Technical Information:* Ron Boenau, Chief, Advanced Public Transportation Systems Division (TRI–11), at (202) 366–0195 or Brian Cronin, Advanced Public Transportation Systems Division (TRI–11), at (202) 366–8841. *For Legal Information:* Richard Wong, Office of the Chief Council (202) 366–1936. The policy is posted on the FTA website on the Internet under http://www.fta.dot.gov.

Electronic Access: An electronic copy of this document may be downloaded using a computer, modem and suitable communications software from the Government Printing Office's Electronic Bulletin Board Service at (202) 512–1661. Internet users may reach the Office of the Federal Register's home page at: *http://www.nara.gov/fedreg* and the Government Printing Office's web page at: *http://www.access.gpo.gov/nara.*

Internet users may access all comments received by the U.S. DOT Dockets, Room PL–401, for the Request for Comment that was issued on May 25, 2000 which were used to clarify this Policy, by using the universal resource locator (URL): *http://dms.dot.gov.* It is available 24 hours each day, 365 days each year. Please follow the instructions online for more information and help. The docket number for the Request for Comment was FTA–99–6417.

SUPPLEMENTARY INFORMATION:

I. Background

The Federal Transit Administration (FTA) published a Request for Comment on May 25, 2000, to implement section 5206(e) of the Transportation Equity Act for the 21st Century (TEA–21) (Pub.L. 105–178), which was enacted on June 9, 1998.

Section 5206(e) of TEA–21 requires that the Secretary of the DOT must

> Ensure that intelligent transportation system projects carried out using funds made available from the Highway Trust Fund, * * * conform to the national architecture, applicable standards or provisional standards, and protocols developed under subsection(a).

The objectives for the FTA's National ITS Architecture Policy for Transit Projects are to:

- Provide requirements for ITS project development for projects implemented wholly or partially with highway trust funds.
- Achieve system integration of ITS projects funded through the highway trust fund with other transportation projects planned for the region, which will thereby enable electronic information and data sharing for advanced management and operations of the ITS infrastructure.
- Engage stakeholders (state DOT's, transit agencies, public safety agencies, other transportation operating agencies) in the project development and implementation process.
- Facilitate future expansion capability of the ITS infrastructure.
- Save design time through use of the National ITS Architecture requirements definitions and market packages.

FTA has developed this policy to meet the TEA–21 requirement contained in Section 5206(e) and the DOT/FTA goal to encourage effective deployment of ITS projects. Additionally, DOT and FTA encourage the coordination of local ITS strategies and projects to help meet national and local goals for mobility, accessibility, safety, security, economic growth and trade, and the environment.

The National ITS Architecture documents were developed by the US DOT, and are updated on an as-needed basis. Current work to update the National ITS Architecture is the Archive Data User Service, which provides the ability to store and process data over an extended period of time. FTA is pursuing the addition of a Rail ITS program for travel management, vehicles, and users. New versions of the documents, when they are issued, will be available from the US DOT on the DOT website at *www.its.dot.gov.* Version 3.0 is the latest version of the National ITS Architecture.

The first section of this policy contains a complete analysis of and response to the comments provided to the docket. The remainder of the Notice contains the FTA National ITS Architecture Policy for Transit Projects.

II. Public Comments

Eighteen comments were submitted to the FTA National ITS Architecture Consistency Policy for Project Development docket by the September 23, 2000, close of the comment period. Comments were submitted by transit operators (3), state and local governments (5), metropolitan planning organizations (4), industry associations (3), and consultants (3). As indicated earlier, a complete analysis and response to the docket comments is provided. In order to facilitate focused comments, FTA asked a series of questions about the policy. The public comment section is organized first by analysis and response to the specific questions asked; second by responses to comments not specifically related to one of the nine questions; and finally by an explanation of other changes. In general, the comments received were positive. Therefore, the FTA has kept the scope of the policy and made appropriate clarifications to the text of the policy to address concerns raised in comments. In response to the many comments requesting it, the FTA, in association with the ITS Joint Program Office, in the Federal Highway Administration (FHWA) will also provide a program of guidance, training, and technical

support to assist with the implementation of this policy.

Questions

1. Do reviewers understand the definition of a major ITS investment as defined in Section IV, ''Regional ITS Architecture,'' or is more clarification needed, and if so please explain?

Comments: Nine commenters submitted responses to this question. In general, commenters found the definition confusing, and did not understand why major ITS projects need to be called out over other ITS projects. One commenter noted that small dollar projects can have a major impact on future development, while an expensive system may have no impact. Another commenter was unclear about the term ''supporting national interoperability.''

Response: Of specific concern to the agency is the timing in which requirements for this policy are enacted. As such, the terms ''major ITS investment'' and ''major ITS project'' were provided so as to distinguish between projects that will require immediate correlation to the regional ITS architecture and those that do not. The term ''major ITS investment'' was also found to be redundant to ''major ITS project'' and was removed from the policy. Guidance on the classification of ''ITS projects'' and ''major ITS projects'' will be provided upon enactment of the policy.

2. Do reviewers understand the definition of an ITS project, or is more clarification needed, and if so please explain?

Comments: Nine commenters submitted responses to this question. Commenters found this term less confusing than ''major ITS investments,'' but requested more clarification. Some commenters proposed alternative language or asked for clarification on particular examples.

Response: The agency has clarified the definition by deleting the potentially ambiguous examples provided and will develop guidance material that provides examples of projects that will be considered ITS projects and those that will not be considered ITS projects. In general, unless a technology project is implementing one of the ITS user services defined in the National ITS Architecture, it would not be considered an ITS project.

3. Do reviewers understand the difference between a ''major ITS investment,'' and an ''ITS project'', or is more clarification needed, and if so please explain?

Comments: Eight commenters submitted responses to this question. Commenters had mixed responses, as some commenters found the differences to be clear, while others requested that guidance material be provided to further explain the differences. Commenters did suggest that a ''project'' is a ''project'' and should not be quantified in terms of dollar amounts.

Response: As described in the response to question 1, the agency has removed the term ''major ITS investment'' and will provide guidance on the term ''ITS project.''

4. Are the requirements for development of a Regional ITS Architecture clear? If not, what is not clear about the requirement?

Comment: Nine commenters provided responses to the question. Most commenters found the requirements to be unclear and/or did not agree with the requirements. One commenter suggested that a region will have different definitions. One commenter noted that a concept of operations and conceptual design are normally conducted at the project level. One commenter requested clarification as to the appropriate place to program projects, in the regional ITS architecture, or in the planning process.

Response: Of specific concern to the agency is providing a flexible policy that allows the transportation stakeholders to define their region and the roles and responsibilities of each stakeholder during the development of a regional ITS architecture. As such, the agency has clarified the requirements of a regional ITS architecture and also removed the specific requirements for a Concept of Operations and a Conceptual Design. Instead, the agency has listed the specific requirements for a regional ITS architecture and has left the development, documentation, and maintenance of the regional ITS architecture to the stakeholders involved. Also, the region is defined as ''a geographical area that is based on local needs for sharing information and coordinating operational strategies among multiple projects.'' A region can be specified at a metropolitan, Statewide, multi-State, or corridor level. Additional guidance on this topic will be provided after enactment of the policy.

5. What additional guidance, if any, is required to explain how to implement this proposed policy?

Comments: Ten commenters provided responses to this question. All the comments called for additional guidance on the specifics of implementing this policy. Commenters requested guidance on the definition of a ''region,'' the ownership of the regional ITS architecture, determination of stakeholders, regional ITS architecture maintenance, certification and simplification of definitions. One commenter requested that the policy be limited to only the ITS Integration Requirements defined in the Metropolitan and Statewide Planning NPRM.

Response: The agency will provide guidance materials to address the comments suggested. The ITS Integration Strategy, as defined in the NPRM, is part of the planning process and as such does not satisfactorily address project level requirements.

6. The proposed rule allows regions to develop a Regional Architecture as a separate activity, or incrementally, as major ITS investments are developed within a region. Do reviewers anticipate particular difficulties with implementing and documenting either approach?

Comments: Nine commenters provided responses to this question. Commenters largely did not favor one approach over the other. One commenter suggested that a regional ITS architecture with a twenty year time horizon is impractical and infeasible. One commenter suggested that either approach would require additional staff resources.

Response: The agency was concerned about the time horizon and development process needed to create a regional ITS architecture within the time period required and as a result suggested both an incremental and initial comprehensive approach. Based on the responses, the agency has modified the policy to be silent on the approach used to develop the regional ITS architecture. Instead, the agency focused on the products included in the regional ITS architecture, the effective date of the requirements, and the catalyst for requiring the development of a regional ITS architecture.

7. Do reviewers understand the relationships between the Integration Strategy, the Regional ITS Architecture, and the ITS Project Architecture?

Comment: Seven commenters provided a response to this question. In general, commenters did not understand the relationship between the Integration Strategy, regional ITS architecture, and the ITS Project Architecture. One commenter suggested that flexibility in application of project architecture must be maintained to accommodate legacy systems and to take advantage of technological innovation, while maintaining the outcome of interoperability, where applicable.

Response: The Agency is concerned with linkage between the planning process and the project development process. However, this policy only deals with the project level requirements.

Planning level requirements, including the Integration Strategy, will be explained as the Metropolitan and Statewide Planning Process rulemaking process is advanced. This policy only requires that the regional ITS architecture should be consistent with the transportation planning process. A definition for a project level ITS architecture has been added to the policy.

8. What additional guidance, if any, is required regarding phasing of this rule?

Comments: Six commenters submitted responses to this question. In general, the commenters stated that the phasing was clear. However, one commenter requested a three-year phase-in period. Several commenters requested that existing projects be exempt from the policy.

Response: The agency has clarified the policy statements that refer to the project status and the applicability of this policy. Projects that have reached final design by the date of this policy are exempt from the policy requirements. The agency has extended the time period for regional ITS architecture development to four years. Any region that is currently implementing ITS projects shall have a regional architecture within four years of the effective date of the final policy. All other regions not currently implementing ITS projects shall have a regional ITS architecture in place within four years of the first ITS project for that region advancing to final design.

9. Are the oversight and documentation requirements clear? If not, what is not clear about the requirements?

Comments: Eight commenters submitted responses to this question. Commenters in general requested more guidance from FTA on oversight and documentation requirements, but few provided suggestions to clarify the requirements. One commenter suggested that checklists to verify consistency requirements will be needed. Other commenters suggested that self-certification should be allowed, but also needs to be clearly defined.

Response: The agency will continue to use normal existing oversight procedures to review grantee compliance with FTA policies and regulations. Normal oversight procedures include the annual risk assessment of grantees performed by regional office staff, triennial reviews, planning process reviews, and project management oversight reviews, as applicable. In TEA–21, FTA was granted authority to use oversight funds to provide technical assistance to grantees in which oversight activities suggested non-compliance with agency policies and regulations. FTA is using oversight funds to specifically hire contractors with ITS experience who will monitor and assist grantees who are at risk of NOT meeting the National ITS Architecture Policy requirements. Additional guidance on oversight and documentation requirements will be provided.

Additional Comments

One commenter suggested that the proposed guidance circular requires that all of the agencies in a region agree before a project can be implemented, thus conferring ''veto'' power over the project. The agency does not intend for the policy to halt ITS deployment in areas where agencies cannot agree on project designs. As part of the regional ITS Architecture development, the agencies can agree to disagree, however, the regional ITS architecture should include a representation of the stand-alone ITS deployments.

One commenter suggests that the proposal infers that existing agreements between agencies will now need to be amended or redone, which would result in a halt in operations of successful ITS projects and prevent the completion of other ITS projects. In response to the comment, the agency has clarified the regional ITS architecture requirements to specify that existing agreements that address the regional ITS architecture requirements are sufficient and that new agreements are not necessarily required.

One commenter noted that a definition of ITS was not included in the policy. The commenter suggested that the definition provided in TEA–21 section 5206(e) should be included in the policy. The agency agrees and has added the definition of ITS to the list of definitions. However, the legislative definition of ITS is broad and other commenters have suggested that if the policy is written to include every new piece of electronics or hardware, then the policy would be too limiting. As a result, the policy is intended to apply only to projects meeting the definition of an ''ITS project'' listed in the ''Definitions'' section of the policy.

One commenter suggested that DOT should ensure that the Federal Highway Administration's (FHWA's) regulation and the FTA policy have the same statutory standing and that their requirements in ITS planning and deployment be consistent if not identical. The FTA and FHWA have different processes and procedures for project development. Therefore, the FHWA has issued a regulation, and FTA has issued the policy. The policy language in each document is consistent and will be carried out in a coordinated fashion, as applicable under FTA and FHWA project management and oversight procedures. FTA and FHWA planning procedures are a joint regulation and as such will be identical.

FTA received some comments regarding the use of standards. Several comments concern the premature use of required standards and interoperability tests, their impact on legacy systems, and confusion regarding the term ''adopted by the USDOT.''

In response to the comments, FTA has significantly modified the final policy to eliminate reference to the use of standards and interoperability tests prior to adoption through formal rulemaking. It is not the intent of the USDOT to formally adopt any standard before the standard is mature; also, not all ITS standards should, or will, be formally adopted by the USDOT. The only interoperability tests that are currently contemplated by the USDOT are those associated with the Commercial Vehicle Operations (CVO) program. These tests are currently being used by States deploying CVO systems and will follow a similar set of criteria for adoption as those defined for standards.

Other Changes

Several commenters expressed concern about linkages to the planning rule and the integration strategy. Comments regarding the portions of the National ITS Architecture conformity process included in the proposed transportation planning rule will be addressed as that rule proceeds to its issuance. The FHWA rule and the parallel FTA policy have been developed without direct reference to the proposed changes to the transportation planning process, including no mention of the development of an integration strategy. However, the policy statement of this guidance notes a link to transportation planning processes, and fully supports those collaborative methods for establishing transportation goals and objectives.

Policy Contents

I. Purpose

This policy provides procedures for implementing section 5206(e) of the Transportation Equity Act for the 21st

Century, Public Law 105–178, 112 Stat. 547, pertaining to conformance with the National Intelligent Transportation Systems Architecture and Standards.

II. Definitions

Intelligent Transportation Systems (ITS) means electronics, communications or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.

ITS project means any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture.

Major ITS project means any ITS project that implements part of a regional ITS initiative that is multi-jurisdictional, multi-modal, or otherwise affects regional integration of ITS systems.

National ITS Architecture (also ''national architecture'') means a common framework for ITS interoperability. The National ITS Architecture comprises the logical architecture and physical architecture which satisfy a defined set of user services. The National ITS Architecture is maintained by U.S. DOT (Department of Transportation) and is available on the DOT web site at *http://www.its.dot.gov.*

Project level ITS architecture is a framework that identifies the institutional agreement and technical integration necessary to interface a major ITS project with other ITS projects and systems.

Region is the geographical area that identifies the boundaries of the regional ITS architecture and is defined by and based on the needs of the participating agencies and other stakeholders. A region can be specified at a metropolitan, Statewide, multi-State, or corridor level. In metropolitan areas, a region should be no less than the boundaries of the metropolitan planning area.

Regional ITS architecture means a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects.

Systems engineering is a structured process for arriving at a final design of a system. The final design is selected from a number of alternatives that would accomplish the same objectives and considers the total life-cycle of the project including not only the technical merits of potential solutions but also the costs and relative value of alternatives.

III. Policy

ITS projects shall conform to the National ITS Architecture and standards in accordance with the requirements contained in this part. Conformance with the National ITS Architecture is interpreted to mean the use of the National ITS Architecture to develop a regional ITS architecture in support of integration and the subsequent adherence of all ITS projects to that regional ITS architecture. Development of the regional ITS architecture should be consistent with the transportation planning process for Statewide and Metropolitan Transportation Planning (49 CFR part 613 and 621).

IV. Applicability

(a) All ITS projects that are funded in whole or in part with the Highway Trust Fund (including the mass transit account) are subject to these provisions.

(b) The Secretary may authorize exceptions for:

1. Projects designed to achieve specific research objectives outlined in the National ITS Program Plan under section 5205 of the Transportation Equity Act for the 21st Century or the Surface Transportation Research and Development Strategic Plan developed under section 5208 of Title 23, United States Code; or

2. The upgrade or expansion of an ITS system in existence on the date of enactment of the Transportation Equity Act for the 21st Century if the Secretary determines that the upgrade or expansion—

a. Would not adversely affect the goals or purposes of Subtitle C (Intelligent Transportation Systems) of the Transportation Equity Act for the 21st Century and

b. Is carried out before the end of the useful life of such system; and

c. Is cost-effective as compared to alternatives that would meet the conformity requirement of this rule

(c) These provisions do not apply to funds used for Operations and Maintenance of an ITS system in existence on June 9, 1998.

V. Regional ITS Architecture

(a) A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The National ITS Architecture shall be used as a resource in the development of the regional ITS architecture. The regional ITS architecture shall be on a scale commensurate with the scope of ITS investment in the region. Provision should be made to include participation from the following agencies, as appropriate, in the development of the regional ITS architecture: Highway agencies; public safety agencies (*e.g.,* police, fire, emergency/medical); transit agencies; federal lands agencies; state motor carrier agencies; and other operating agencies necessary to fully address regional ITS integration.

(b) Any region that is currently implementing ITS projects shall have a regional ITS architecture February 7, 2005.

(c) All other regions not currently implementing ITS projects shall have a regional ITS architecture within four years of the first ITS project for that region advancing to final design.

(d) The regional ITS architecture shall include, at a minimum, the following:

(1) A description of the region;

(2) Identification of participating agencies and other stakeholders;

(3) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture;

(4) Any agreements (existing or new) required for operations, including at a minimum those affecting integration of ITS projects; interoperability of different ITS technologies, utilization of ITS-related standards, and the operation of the projects identified in the regional ITS architecture;

(5) System functional requirements;

(6) Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture);

(7) Identification of ITS standards supporting regional and national interoperability;

(8) The sequence of projects required for implementation of the regional ITS architecture.

(e) Existing regional ITS architectures that meet all of the requirements of section V(d) shall be considered to satisfy the requirements of V(a).

(f) The agencies and other stakeholders participating in the development of the regional ITS architecture shall develop and implement procedures and responsibilities for maintaining the regional ITS architecture, as needs evolve within the region.

VI. Project Implementation

(a) All ITS projects funded with mass transit funds from the highway trust

fund shall be based on a systems engineering analysis.

(b) The analysis should be on a scale commensurate with the project scope.

(c) The systems engineering analysis shall include, at a minimum:

(1) 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).

(2) Identification of participating agencies' roles and responsibilities;

(3) Requirements definitions:

(4) Analysis of alternative system configurations and technology options to meet requirements;

(5) Analysis of financing and procurement options;

(6) Identification of applicable ITS standards and testing procedures; and

(7) Procedures and resources necessary for operations and management of the system;

(d) Upon completion of the regional ITS architecture required in section V, the final design of all ITS projects funded with highway trust funds shall accommodate the interface requirements and information exchanges as specified in the regional ITS architecture. If the final design of the ITS project is inconsistent with the regional ITS architecture, then the regional ITS architecture shall be updated as per the process defined in V(f) to reflect the changes.

(e) Prior to completion of the regional ITS architecture, any major ITS project funded with highway trust funds that advances to final design shall have a project level ITS architecture that is coordinated with the development of the regional ITS architecture. The final design of the major ITS project shall accommodate the interface requirements and information exchanges as specified in this project level ITS architecture. If the project final design is inconsistent with the project level architecture, then the project level ITS architecture shall be updated to reflect the changes. The project level ITS architecture is based on results of the systems engineering analysis, and includes the following:

(1) A description of the scope of the ITS project

(2) An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the ITS project;

(3) Functional requirements of the ITS project;

(4) Interface requirements and information exchanges between the ITS project and other planned and existing systems and subsystems; and

(5) Identification of applicable ITS standards

(b) All ITS projects funded with Mass Transit Funds from the Highway Trust Funds shall use applicable ITS standards and interoperability tests that have been officially adopted through rulemaking by the United States Department of Transportation (US DOT).

(c) Any ITS project that has advanced to final design by (effective date of policy) is exempt from the requirements of VI.

VII. Project Oversight

(a) Prior to authorization of Mass Transit Funds from the Highway Trust Fund for acquisition or implementation of ITS projects, grantees shall self-certify compliance with sections V and VI. Compliance with this policy shall be monitored under normal FTA oversight procedures, to include annual risk assessments, triennial reviews, and program management oversight reviews as applicable.

(b) Compliance with the following FTA Circulars shall also be certified:

- C5010.1C, Grant Management Guidelines
- C6100.1B, Application Instructions and Program Management Guidelines

VIII. FTA Guidance

FTA will develop appropriate guidance materials regarding the National ITS Architecture Consistency Policy.

Issued on: January 2, 2001.

Nuria I. Fernandez,

Acting Administrator.

[FR Doc. 01–392 Filed 1–5–01; 8:45 am]

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APPENDIX C

ACRONYMS, ABBREVIATIONS, AND GLOSSARY OF ITS TERMS

ACRONYMS AND ABBREVIATIONS

AASHTO – American Association of State Highway and Transportation Officials
ACT – Alliance for Community Transportation
AD – Archived Data Management
ANSI – American National Standards Institute
APTA – American Public Transportation Association
APTS – Advanced Public Transportation Systems
ASTM – American Society for Testing and Material
ATIS – Advanced Traveler Information System
ATMS – Advances Traffic Management System
AVL – Automatic Vehicle Location
AVSS – Advanced Vehicle Safety System
CART – Cooperative Alliance for Regional Transportation
CMS – Changeable Message Sign
CNHRPC – Central New Hampshire Regional Planning Commission
COAST – Cooperative Alliance for Seacoast Transportation
CV – Commercial Vehicle
CVAS – Commercial Vehicle Administration Subsystem
CVO – Commercial Vehicle Operations
DMS – Dynamic Message Sign
DMV – Department of Motor Vehicles
DPW – Department of Public Works
EM – Emergency Management
EOC – Emergency Operations Center
FEMA – Federal Emergency Management Agency
FHWA – Federal Highway Administration
FMCSA – Federal Motor Carrier Safety Administration
FTA – Federal Transit Administration
GPS – Global Positioning System
HOV – High Occupancy Vehicle
IEEE – Institute of Electrical and Electronics Engineers
ISP – Internet Service Provider
ISTEA – Inter-modal Surface Transportation Efficiency Act
ITE – Institute of Transportation Engineers
ITS – Intelligent Transportation Systems
MaineDOT – Maine Department of Transportation
MassDOT – Massachusetts Department of Transportation
MC, MCM – Maintenance and Construction Management
MCV – Maintenance and Construction Vehicle
MOU – Memorandum of Understanding
MPO – Metropolitan Planning Organization
MTA – Maine Turnpike Authority
MVPC – Merrimack Valley Planning Commission
MVRTA – Merrimack Valley Regional Transit Authority
NEMA – National Electrical Manufacturers Association
NHDOS – New Hampshire Department of Safety
NHDOT – New Hampshire Department of Transportation
NNEPRA – Northern New England Passenger Rail Authority
NRPC – Nashua Regional Planning Commission
NTCIP – National Transportation Communications for ITS Protocols
ORT – Open Road Tolling
OTP – Office of Transportation Planning (MassDOT)
RPC – Rockingham Planning Commission
RTP – Regional Transportation Plan
RWIS – Road Weather Information System
SAE – Society of Automotive Engineers
SDO – Standards Development Organization

SMRPC – Southern Maine Regional Planning Commission
SNHPC – Southern New Hampshire Planning Commission
SRPC – Strafford Regional Planning Commission
STIP – Statewide Transportation Improvement Program
TEA-21 – Transportation Equity Act for the 21st Century
TMC – Transportation Management Center
TOC – Transportation Operations Center
TIP – Transportation Improvement Program
TSP – Transit Signal Priority
UNH – University of New Hampshire
USDOT – United States Department of Transportation
VMT – Vehicle Miles Traveled
WIM – Weigh-In-Motion

GLOSSARY OF ITS TERMS

Full glossary available online at: www.iteris.com/itsarch/html/glossary/glossary.htm

Item	Definition
Architecture	A framework within which a system can be built. Requirements dictate what functionality the architecture must satisfy. An architecture functionally defines what the pieces of the system are and the information that is exchanged between them. An architecture is functionally oriented and not technology-specific which allows the architecture to remain effective over time. It defines "what must be done," not "how it will be done."
Architecture Flow	Information that is exchanged between subsystems and terminators in the physical architecture of the National ITS Architecture. Architecture flows are the primary tool that is used to define interfaces in regional ITS architectures and project ITS architectures. Architecture flows and their communication requirements define the interfaces which form the basis for much of the ongoing standards work in the national ITS program. The terms "information flow" and "architecture flow" are used interchangeably.
Element	An ITS system or piece of a system named as the name used by stakeholders. Elements are the basic building blocks of regional ITS architectures and project ITS architectures.
Equipment Package	The building blocks of the subsystems of the physical architecture subsystems. Equipment packages group similar processes of a particular subsystem together into an “implementable” package. The grouping also takes into account the user services and the need to accommodate various levels of functionality. The equipment packages were used as a basis for estimating deployment costs (as part of the evaluation that was performed). Since equipment packages are both the most detailed elements of the physical architecture of the National ITS Architecture and tied to specific service packages, they provide the common link between the interface-oriented architecture definition and the deployment-oriented service packages.

Item	Definition
Information Flow	Information that is exchanged between subsystems and terminators in the physical architecture of the National ITS Architecture. The terms "information flow" and "architecture flow" are used interchangeably. Information flows are the primary tool that is used to define the ITS architecture interfaces. These information flows and their communication requirements define the interfaces which form the basis for much of the ongoing standards work in the national ITS program.
Intelligent Transportation System	The system defined as the electronics, communications or information processing in transportation infrastructure and in vehicles used singly or integrated to improve transportation safety and mobility and enhance productivity. Intelligent transportation systems (ITS) encompass a broad range of wireless and wire line communications-based information and electronics technologies.
Inventory	See *System Inventory*.
ITS Architecture	Defines an architecture of interrelated systems that work together to deliver transportation services. An ITS architecture defines how systems functionally operate and the interconnection of information exchanges that must take place between these systems to accomplish transportation services.
ITS Project	Any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services.
Logical Architecture	The part of the National ITS Architecture that defines what has to be done to support the ITS user services. It defines the processes that perform ITS functions and the information or data flows that are shared between these processes. The logical architecture was developed using Structured Analysis techniques and consists of data flow diagrams, process specifications, and data dictionary entries. The logical architecture has also been called an "Essential Model" because it is not technology specific, nor does it dictate a particular implementation. This implementation independence makes the logical architecture accommodating to innovation, scalable from small scale implementations to large regional systems, and supportive of widely varied system designs.
National ITS Architecture	A common, established framework for developing integrated transportation systems. The National ITS Architecture is comprised of the logical architecture and the physical architecture, which satisfy a defined set of user service requirements. The National ITS Architecture is maintained by the United States Department of Transportation (USDOT).

Item	Definition
Physical Architecture	The physical architecture is the part of the National ITS Architecture that provides agencies with a physical representation (though not a detailed design) of the important ITS interfaces and major system components. It provides a high-level structure around the processes and data flows defined in the logical architecture. The principal elements in the physical architecture are the subsystems and architecture flows that connect these subsystems and terminators into an overall structure. The physical architecture takes the processes identified in the logical architecture and assigns them to subsystems. In addition, the data flows (also from the logical architecture) are grouped together into architecture flows. These architecture flows and their communication requirements define the interfaces required between subsystems, which form the basis for much of the ongoing standards work in the ITS program.
Project ITS Architecture	A framework that identifies the institutional agreement and technical integration necessary to interface a major ITS project with other ITS projects and systems.
Region	The geographical area that identifies the boundaries of the Regional ITS Architecture and is defined by and based on the needs of the participating agencies and other stakeholders. In metropolitan areas, a region should be no less than the boundaries of the metropolitan planning area.
Regional ITS Architecture	A specific, tailored framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects in a particular region. It functionally defines what pieces of the system are linked to others and what information is exchanged between them.
Service Package	The service packages, formerly known as market packages, provide an accessible, service-oriented perspective to the National ITS Architecture. They are tailored to fit, separately or in combination, real world transportation problems and needs. Service packages collect together one or more equipment packages that must work together to deliver a given ITS service and the architecture flows that connect them and other important external systems. In other words, they identify the pieces of the physical architecture that are required to implement a particular ITS service. Service packages are implemented through projects (or groups of projects, aka programs) and in transportation planning, are directly related to ITS strategies used to meet regional goals and objectives.
Stakeholders	A widely used term that notates a public agency, private organization or the traveling public with a vested interest, or a "stake" in one or more transportation elements within a regional ITS architecture or project ITS architecture.

Item	Definition
Standards	Documented technical specifications sponsored by a Standards Development Organization (SDO) to be used consistently as rules, guidelines, or definitions of characteristics for the interchange of data. A broad array of ITS standards is currently under development that will specifically define the interfaces identified in the National ITS Architecture.
Subsystem	The principle structural element of the physical architecture of the National ITS Architecture. Subsystems are individual pieces of the Intelligent Transportation System defined by the National ITS Architecture. Subsystems are grouped into four classes: Centers, Field, Vehicles, and Travelers. Example subsystems are the Traffic Management Subsystem, the Vehicle Subsystem, and the Roadway Subsystem. These correspond to the physical world: respectively traffic operations centers, automobiles, and roadside signal controllers. Due to this close correspondence between the physical world and the subsystems, the subsystem interfaces are prime candidates for standardization.
System	A collection of hardware, software, data, processes, and people that work together to achieve a common goal. Note the scope of a "system" depends on one's viewpoint. To a sign manufacturer, a dynamic message sign is a "system". To a state DOT, the same sign is only a component of a larger Freeway Management "System". In a regional ITS architecture or project ITS architecture, a Freeway Management System is a part of the overall surface transportation "system" for the region.
System Inventory	The list of all ITS-related elements in a regional ITS architecture or project ITS architecture.
Terminator	Terminators define the boundary of an architecture. The National ITS Architecture terminators represent the people, systems, and general environment that interface to ITS. The interfaces between terminators and the subsystems and processes within the National ITS Architecture are defined, but no functional requirements are allocated to terminators. The logical architecture and physical architecture of the National ITS Architecture both contain the same set of terminators.
Turbo Architecture	An automated software tool used to input and manage system inventory, service packages, architecture flows and interconnects of a regional ITS architecture and/or multiple project ITS architectures.

Item	Definition
User Services	User services document what ITS should do from the user's perspective. A broad range of users are considered, including the traveling public as well as many different types of system operators. User services, including the corresponding user service requirements, form the basis for the National ITS Architecture development effort. The initial user services were jointly defined by USDOT and ITS America with significant stakeholder input and documented in the National Program Plan. The concept of user services allows system or project definition to begin by establishing the high level services that will be provided to address identified problems and needs. New or updated user services have been and will continue to be satisfied by the National ITS Architecture over time.

APPENDIX D

STAKEHOLDER PARTICIPATION

KICK-OFF MEETING/WORKING SESSION
FEBRUARY 10, 2012

ATTENDEES

Name	Organization
Steve Pesci	University of New Hampshire (UNH)
Mike Amicangioli	University of New Hampshire (UNH)
Martin Calawa	Federal Highway Administration (FHWA) - NH Division
Marc Ambrosi	Strafford Regional Planning Commission
Daniel Camara	Strafford Regional Planning Commission
Tim Roache	Nashua RPC
Rad Nichols	Cooperative Alliance for Seacoast Transportation (COAST)
Cynthia Copeland	Strafford Regional Planning Commission
Jeremy LaRose	Cooperative Alliance for Seacoast Transportation (COAST)
Connie Brawders	Town of Barrington
Denise Markow	NHDOT
Leigh Levine	Federal Highway Administration (FHWA) - NH Division
Tom Reinauer	Southern Maine Regional Planning Commission & Kittery MPO (KACTS)
David Walker	Rockingham Planning Commission
Tom Morgan	Town of Newington
Tegin Teich	IBI Group
James Sorensen	IBI Group

STAKEHOLDER INPUT MEETING
MARCH 15, 2012

ATTENDEES

Name	Organization
Rad Nichols	Cooperative Alliance for Seacoast Transportation (COAST)
Mike Amicangioli	University of New Hampshire (UNH)
Connie Brawders	Town of Barrington
Julie Glover	Town of Lee
Marc Ambrosi	Strafford Regional Planning Commission
Daniel Camara	Strafford Regional Planning Commission
Tom Falk	Rockingham Planning Commission
Cliff Sinnott	Rockingham Planning Commission
Jon Frederick	City of Portsmouth
Dirk Grotenhuis	Town of Nottingham
Tegin Teich	IBI Group
Myranda McGowan	SMRPC
Kevin Walsh	Town of Rye
Denise Markow	NHDOT
Tom Morgan	Town of Newington
James Sorensen	IBI Group

STRATEGIC PLAN WORKSHOP
APRIL 13, 2012

ATTENDEES

Name	Organization
Dave Sharples	City of Somersworth
Jeremy LaRose	Cooperative Alliance for Seacoast Transportation (COAST)
David Walker	Rockingham Planning Commission
Daniel Camara	Strafford Regional Planning Commission
Marc Ambrosi	Strafford Regional Planning Commission
Tegin Teich	IBI Group
James Sorensen	IBI Group

STAKEHOLDER REVIEW MEETING
MAY 17, 2012

ATTENDEES

Name	Organization
Martin Calawa	Federal Highway Administration (FHWA) - NH Division
David Walker	Rockingham Planning Commission
Daniel Camara	Strafford Regional Planning Commission
Jon Frederick	City of Portsmouth
Jeremy LaRose	Cooperative Alliance for Seacoast Transportation (COAST)
Cynthia Copeland	Strafford Regional Planning Commission
Steve Pesci	University of New Hampshire (UNH)
George Melchior	Portsmouth Naval Shipyard
Dave Sharples	City of Somersworth
Tegin Teich	IBI Group
James Sorensen	IBI Group

APPENDIX E

LIST OF SERVICE PACKAGES

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
AD1	ITS Data Mart	This service package provides a focused archive that houses data collected and owned by a single agency, district, private sector provider, research institution, or other organization.	**Portsmouth Data Repository**		Many municipalities/agencies already have the capability to collect data, but many do not have the formal institutional capacity to store and process it. This service package provides the technology to accomplish this. Local municipalities will collect transportation data, store it in a local "Data Repository" which may be as simple as software on a single PC, and make it available to users (i.e. through the internet, direct access).	(None)
			Salem Data Repository			
			Somersworth Data Repository			
			Local Data Repositories			
			CART Data Repository		Transit agencies will collect transit data, such as passenger boardings and alightings, schedule adherence, etc., and store this data into a "Data Repository", which may be as simple as software on a single PC, and make it available to users (i.e., through the internet or direct access.)	
			COAST Data Repository			
			UNH Data Repository			
AD2	ITS Data Warehouse	This service package includes all the data collection and management capabilities provided by the ITS Data Mart, and adds the functionality and interface definitions that allow collection of data from multiple agencies and data sources spanning across modal and jurisdictional boundaries.	**DMV Crash Records Archive**	✓	This data archive collects, archives, manages, and distributes data generated from crash reports statewide.	See Statewide ITS Architecture
			Archived Data Management System (NHDOT)	✓	This planned data archive collects, archives, manages, and distributes data generated from ITS sources for use in transportation administration, policy evaluation, safety, planning, performance monitoring, program assessment, operations, and research applications.	See Statewide ITS Architecture
AD3	ITS Virtual Data Warehouse	This service package is similar to the ITS Data Warehouse Service Package, but provides access using enhanced interoperability between physically distributed ITS archives that are each locally managed.	**RPC Data Warehouse**		Facilitates regional consolidation of transportation data by the Regional Planning Commissions. This service package would facilitate data sharing among regional entities, thereby improving cooperation and coordination of the regional traffic system.	AD3 – ITS Data Warehouse (RPC Virtual Data Warehouse)
			SRPC Data Warehouse			AD3 – ITS Data Warehouse (SRPC Virtual Data Warehouse)

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
APTS01	**Transit Vehicle Tracking**	This service package monitors current transit vehicle location using an Automated Vehicle Location System. The location data may be used to determine real time schedule adherence and update the transit system's schedule in real-time.	**CART**		COAST has procured AVL for vehicles, though this information is currently not available to the public. CART, Flight Line and UNH could all procure CAD/AVL systems in the near future.	(None)
			COAST			
			Flight Line			
			UNH			
APTS02	**Transit Fixed-Route Operations**	This service package performs vehicle routing and scheduling, as well as automatic operator assignment and system monitoring for fixed-route and flexible-route transit services.	**COAST**		COAST, Flight Line, and UNH either currently own and operate or are pursuing fixed-route scheduling software.	APTS 2, APTS 3 – Transit Fixed-Route/Demand Response Operations (COAST)
			Flight Line			(None)
			UNH			APTS 2 – Transit Fixed-Route Operations (UNH)
APTS03	**Demand Response Transit Operations**	This service package performs vehicle routing and scheduling as well as automatic operator assignment and monitoring for demand responsive transit services.	**CART**		CART, COAST, and Other Transit Providers are interested in procuring scheduling software that will increase efficiency of demand response transit services and coordinate demand response and fixed route travel services.	APTS03 - Transit Demand Response Operations (CART and Other Transit Providers)
			COAST			APTS 2, APTS 3 – Transit Fixed-Route/Demand Response Operations (COAST)

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
APTS03 (Conti-nued)	**Demand Response Transit Operations**	This service package performs vehicle routing and scheduling as well as automatic operator assignment and monitoring for demand responsive transit services.	**Other Transit Providers**		CART, COAST, and Other Transit Providers are interested in procuring scheduling software that will increase efficiency of demand response transit services and coordinate demand response and fixed route travel services.	APTS03 - Transit Demand Response Operations (CART and Other Transit Providers)
APTS04	**Transit Fare Collection Management**	This service package manages passenger loading and fare payments on-board transit vehicles using electronic means. It allows transit users to use a traveler card or other electronic payment device.	**Electronic Fare Collection**		In the future, transit agencies may pursue a regional fare card.	APTS4 – Transit Fare Collection Management
APTS05	**Transit Security**	This service package provides for the physical security of transit passengers and transit vehicle operators. On-board equipment is deployed to perform surveillance and sensor monitoring in order to warn of potentially hazardous situations.	**CART**		CART, COAST, and UNH have or are interested in mounting security cameras on board vehicles and at transit facilities.	APTS5 – Transit Security (All Instances)
			COAST			
			UNH			
APTS06	**Transit Maintenance**	This service package supports automatic transit maintenance scheduling and monitoring.			Real-time monitoring of bus maintenance conditions was not identified as a priority need among the region's transit operators.	(None)
APTS07	**Multi-modal Coordination**	This service package establishes two way communications between multiple transit and traffic agencies to improve service coordination.	**Regional Coordination**		Facilitates future coordination among CART, COAST, UNH, other transit providers, traffic management centers, and transit providers from adjacent regions.	APTS7 – Multimodal Coordination
APTS08	**Transit Traveler Information**	This service package provides transit users at transit stops and on-board transit vehicles with ready access to transit information.	**CART**		CART, COAST, and UNH are working to provide transit traveler information through on-board vehicle annunciation, bus stop and transfer facility signage, and via the Internet.	APTS8 – Transit Traveler Information (All Instances)
			COAST			
			UNH			
APTS09	**Transit Signal Priority**	This service package allows transit vehicles to receive traffic signal priority when running behind schedule.	**COAST**		CART and UNH are interested in working with local municipalities to develop transit signal priority.	APTS9 – Transit Signal Priority (All Instances)
			UNH			

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
APTS10	**Transit Passenger Counting**	This service package counts the number of passengers entering and exiting a transit vehicle using sensors mounted on the vehicle and communicates this information back to the management center.	**COAST**		COAST and UNH are interested in pursuing automatic passenger counting technology in the future.	(None)
			UNH			
APTS11	**Multimodal Connection Protection**	This service package coordinates between multimodal services to optimize the travel time of travelers as they move from mode to mode (or to different routes within a single mode).			No local need for such a system was perceived within the timeframe of this architecture.	(None)
ATIS01	**Broadcast Traveler Information**	This service package collects traffic conditions, advisories, general public transportation, toll and parking information, incident information, roadway maintenance and construction information, air quality and weather information, and broadly disseminates this information through existing infrastructures and low cost user equipment (e.g., FM subcarrier, cellular data broadcast).	**NHDOT 511 System**	✓	This service package describes the collection and distribution of transportation information by the state's 511 system.	See Statewide ITS Architecture
ATIS02	**Interactive Traveler Information**	This service package provides tailored information in response to a traveler request. Both real-time interactive request/response systems and information systems that 'push' a tailored stream of information to the traveler based on a submitted profile are supported.	**Local Municipal Websites**		Municipalities may collect traffic, construction, and parking information, then disseminate it on their municipal websites to the media and travelers.	ATIS2 – Interactive Traveler Information (Local Websites)
			NHDOT 511 System	✓	NHDOT's 511 system currently offers interactive traveler information. NHDOT has plans to expand the functionality of this system for both telephone and website services, to offer additional personalized travel information. Transit information provided under APTS service packages.	See Statewide ITS Architecture

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
ATIS03	**Autonomous Route Guidance**	This service package relies on in-vehicle sensory, location determination, computational, map database, and interactive driver interface equipment to enable route planning and detailed route guidance based on static, stored information.			Infrastructure, data sources not available to support this package at the present time. Nationally this application is still in a research and development stage.	(None)
ATIS04	**Dynamic Route Guidance**	This service package offers advanced route planning and guidance that is responsive to current conditions.				
ATIS05	**ISP Based Route Guidance**	This service package offers the user pre-trip route planning and turn-by-turn route guidance services.				
ATIS06	**Transportation Operations Data Sharing**	This service package makes real-time transportation operations data available to transportation system operators.				
ATIS07	**Yellow Pages and Reservation**	This service package provides yellow pages and reservation services to the user.	**NHDOT 511 System**	✓	Based on the Statewide ITS Architecture, NHDOT's 511 system has future plans to integrate yellow pages and reservation services.	See Statewide ITS Architecture
ATIS08	**Dynamic Ridesharing**	This service package provides dynamic ridesharing/ride matching services to travelers.			No local need for such a system was perceived.	(None)
ATIS09	**In Vehicle Signing**	This service package supports distribution of traffic and travel advisory information to drivers through in-vehicle devices.			Infrastructure, data sources not available to support this package at the present time. Nationally this application is still in a research and development stage. Transit applications supported under APTS packages.	(None)
ATIS10	**Short Range Communications Traveler Information**	This service package provides location-specific information or situation-relevant information to travelers in vehicles using Dedicated Short Range Communications infrastructure.				
ATMS01	**Network Surveillance**	This service package includes traffic detectors, cameras, other surveillance equipment, the supporting field equipment, and fixed-point to fixed-point communications to transmit the collected data back to the Traffic Management Subsystem… (cont.)	**Salem Traffic Management**		Salem has traffic cameras along the Route 28 corridor to aid in traffic and emergency management activities.	(None)
			Local Traffic Management		General service package to represent local municipalities' efforts to monitor the transportation network.	(None)

Service Package*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See Statewide ITS Architecture	Local Notes	Applicable Operational Concept
ATMS01 (Continued)	**Network Surveillance**	(cont.) … The data generated by this service package enables traffic managers to monitor traffic and road conditions, identify and verify incidents, detect faults in indicator operations, and collect data for traffic strategy development and long range planning.	**Statewide Transportation Management System (NHDOT)**	✓	NHDOT owns and operates traffic cameras and traffic sensors in the region. These cameras and sensors will be monitored from the Statewide TOC in Concord.	See Statewide ITS Architecture
ATMS02	**Traffic Probe Surveillance**	Two general implementation paths are supported by this service package: 1) wide-area wireless communications between the vehicle and Information Service Provider is used to communicate current vehicle location and status, and 2) dedicated short range communications between the vehicle and roadside is used to provide equivalent information directly to the Traffic Management Subsystem.			No local need for such a system was perceived.	(None)
ATMS03	**Surface Street Control**	This service package provides the central control and monitoring equipment, communication links, and the signal control equipment that support local surface street control and/or arterial traffic management.	**Dover Traffic Management**		These cities and towns have interconnected signal corridors and have the capacity to control these signals remotely.	(None)
			Kingston Traffic Management			(None)
			Plaistow Traffic Management			(None)
			Portsmouth Traffic Management			(None)
			Salem Traffic Management		Salem has an existing interconnected signal corridor and can control traffic signals remotely and implement prepared traffic plans in response to changing traffic patterns.	ATMS03 - Surface Street Control (Salem Traffic Management)
			Somersworth Traffic Management		Somersworth has an interconnected signal corridor and has the capability to control these signals remotely.	(None)
			Local Traffic Management		This general service package allows for other municipalities to implement surface street control.	(None)

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
ATMS04	**Freeway Control**	This service package provides the communications and roadside equipment to support ramp control, lane controls, and interchange control for freeways. Coordination and integration of ramp meters are included as part of this service package.	**Statewide Transportation Management System (NHDOT)**	✓	NHDOT freeway control is managed from its Statewide TOC in Concord.	See Statewide ITS Architecture
ATMS05	**HOV Lane Management**	This service package manages HOV lanes by coordinating freeway ramp meters and connector signals with HOV lane usage signals.			No HOV Lanes exist in the region at this time.	(None)
ATMS06	**Traffic Information Dissemination**	This service package provides driver information using roadway equipment such as dynamic message signs or highway advisory radio.	**Local Traffic Information Dissemination**		This service package represents municipal traffic management entities disseminating information via DMS or HAR. Some municipalities currently rent portable VMS, but are considering purchasing VMS/DMS in the future.	ATMS06 – Traffic Information Dissemination (Local)
			Statewide Transportation Management System (NHDOT)	✓	NHDOT has permanent DMS and plans to implement additional DMS.	See Statewide ITS Architecture
ATMS07	**Regional Traffic Control**	This service package provides for the sharing of traffic information and control among traffic management centers to support a regional control strategy.	**Statewide Transportation Management System (NHDOT)**	✓	NHDOT's Statewide TOC will coordinate with Municipal traffic management systems to allow for transfer of control during off-hours and on weekends.	See Statewide ITS Architecture
ATMS08	**Traffic Incident Management System**	This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized.	**Kingston Traffic Management**		These instances of this service packages provide interfaces for municipalities and emergency management entities to communicate and cooperatively respond to traffic incidents.	ATMS08 - Incident Management (All Local Instances)
			Plaistow Traffic Management			
			Portsmouth Traffic Management			
			Salem Traffic Management			
			Somersworth Traffic Management			
			Local Traffic Management			
			Private Tow and Wrecker Dispatch		This service package instance describes the dispatch activities of Private Tow and Wrecker companies.	(None)

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
ATMS08 (Conti-nued)	**Traffic Incident Management System**	This service package manages both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized.	**Statewide Transportation Management System (NHDOT)**	✓	This instance reflects coordination between regional emergency management entities and the NHDOT Statewide TOC, to more effectively respond to traffic incidents throughout the state.	See Statewide ITS Architecture
ATMS09	**Transportati on Decision Support and Demand Management**	This service package includes courses of action to traffic operations personnel based on an assessment of current and forecast road network performance			No local need for such a system was perceived.	(None)
ATMS10	**Electronic Toll Collection**	This service package provides toll operators with the ability to collect tolls electronically and detect and process violations.	**Electronic Toll Collection**	✓	The state utilizes the EZ-Pass system for electronic toll collection at toll plazas located at Hampton, Dover, and Rochester.	See Statewide ITS Architecture
ATMS11	**Emissions Monitoring and Management**	This service package monitors individual vehicle emissions and provides general air quality monitoring using distributed sensors to collect the data.			No local need for such a system was perceived.	(None)
ATMS12	**Roadside Lighting System Control**	This service package provides systems that manage electrical lighting systems by monitoring operational conditions.				
ATMS13	**Standard Railroad Grade Crossing**	This service package manages highway traffic at highway-rail intersections (HRIs) where operational requirements do not dictate more advanced features (e.g., where rail operational speeds are less than 80 miles per hour).	**General Railroad Grade Crossing**	✓	This service package instance represents railroad grade crossings in the region.	See Statewide ITS Architecture
ATMS14	**Advanced Railroad Grade Crossing**	This service package manages highway traffic at highway-rail intersections (HRIs) where operational requirements demand advanced features (e.g., where rail operational speeds are greater than 80 miles per hour).			There are no high-speed rail corridors (>80mph) in the study area, nor was this service package deemed applicable at the statewide level.	(None)

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
ATMS15	**Railroad Operations Coordination**	This service package provides an additional level of strategic coordination between freight rail operations and traffic management centers. Rail operations provides train schedules, maintenance schedules, and any other forecast events that will result in highway-rail intersection (HRI) closures. This information is used to develop forecast HRI closure times and durations that may be used in advanced traffic control strategies or to enhance the quality of traveler information.			There is currently little strategic coordination between freight rail operations and traffic management centers in the region.	(None)
ATMS16	**Parking Facility Management**	This service package provides enhanced monitoring and management of parking facilities. It assists in the management of parking operations, coordinates with transportation authorities, and supports electronic collection of parking fees.			No local need for such a system was perceived.	(None)
ATMS17	**Regional Parking Management**	This service package supports coordination between parking facilities to enable regional parking management strategies.	**Local Parking Management System**		There exists some interest in future regional parking management and provision of public information for park-and-ride lots.	(None)
ATMS18	**Reversible Lane Management**	This service package provides for the management of reversible lane facilities.	**NHDOT Reversible Lane Management**	✓	This instance represents the possibility that reversible lane equipment may exist in the future, and NHDOT would be responsible for operating it.	See Statewide ITS Architecture
ATMS19	**Speed Warning and Enforcement**	This service package monitors the speeds of vehicles traveling through a roadway system and supports warning drivers when their speed is excessive.			No local need for such a system was perceived.	(None)
ATMS20	**Drawbridge Management**	This service package supports systems that manage drawbridges at rivers and canals and other multimodal crossings (other than railroad grade crossings which are specifically covered by other service packages).	**Drawbridge Management**	✓	This package generic drawbridge management activities operated statewide.	See Statewide ITS Architecture

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
ATMS21	**Roadway Closure Management**	This service package closes roadways to vehicular traffic when driving conditions are unsafe, maintenance must be performed, and other scenarios where access to the roadway must be prohibited.			No local need for such a system was perceived. Most applicable to locations prone to severe weather (e.g. mountain passes).	(None)
ATMS22	**Variable Speed Limits**	This service package supports systems that monitor traffic and environmental conditions along the roadway and set variable speed limits along a roadway to improve safety, congestion, and emissions.	**NHDOT**		This was a new service package in this version of the National ITS Architecture, therefore it is not included in the Statewide ITS Architecture. In the meantime, a service package was created for the regional ITS architecture.	(None)
ATMS23	**Dynamic Lane Management and Shoulder Use**	This service package provides for active management of travel lanes along a roadway using field equipment, physical overhead lane signs and associated control electronics.			No local need for such a system was perceived.	(None)
ATMS24	**Dynamic Roadway Warning**	This service package includes systems that dynamically warn drivers approaching hazards on a roadway, such as roadway weather conditions, road surface conditions, and traffic conditions.				(None)
ATMS25	**VMT Road User Payment**	This service package facilitates charging fees to roadway vehicle owners for using specific roadways with potentially differential payment rates based on time-of-day, which specific roadway is used, and class of vehicle.				(None)
ATMS26	**Mixed Use Warning Systems**	This service package supports the sensing and warning systems used to interact with pedestrians, bicyclists, and other vehicles that operate on the main vehicle roadways, or on pathways which intersect the main vehicle roadways.				(None)

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
AVSS01	**Vehicle Safety Monitoring**	This service package will diagnose critical components of the vehicle and warn the driver of potential dangers.			AVSS service packages are very forward looking and are likely to be spearheaded by national efforts and through private industry (e.g., vehicle manufacturers).	(None)
AVSS02	**Driver Safety Monitoring**	This service package will determine the driver's condition, and warn the driver of potential dangers.				
AVSS03	**Longitudinal Safety Warning**	This service package allows for longitudinal warning. It utilizes safety sensors and collision sensors. It requires on-board sensors to monitor the areas in front of and behind the vehicle and present warnings to the driver about potential hazards.				
AVSS04	**Lateral Safety Warning**	This service package allows for lateral warning. It utilizes safety sensors and collision sensors. It requires on-board sensors to monitor the areas to the sides of the vehicle and present warnings to the driver about potential hazards.				
AVSS05	**Intersection Safety Warning**	This service package will determine the probability of a collision in an equipped intersection (either highway-highway or highway-rail) and provide timely warnings to drivers in response to hazardous conditions.				
AVSS06	**Pre-Crash Restraint Deployment**	This service package provides in-vehicle sensors to monitor the vehicle's local environment, determine collision probability and deploy a pre-crash safety system.			AVSS service packages are very forward looking and are likely to be spearheaded by national efforts and through private industry (e.g., vehicle manufacturers).	(None)
AVSS07	**Driver Visibility Improvement**	This service package will enhance driver visibility using an enhanced vision system.				
AVSS08	**Advanced Vehicle Longitudinal Control**	This service package automates the speed and headway control functions on board the vehicle.				

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
AVSS09	**Advanced Vehicle Lateral Control**	This service package automates the steering control on board the vehicle.			AVSS service packages are very forward looking and are likely to be spearheaded by national efforts and through private industry (e.g., vehicle manufacturers).	(None)
AVSS10	**Intersection Collision Avoidance**	This service package will determine the probability of an intersection collision and provide timely warnings to approaching vehicles so that avoidance actions can be taken.				
AVSS11	**Automated Vehicle Operations**	This service package enables 'hands-off' operation of the vehicle on the automated portion of the highway system.				
AVSS12	**Cooperative Vehicle Safety Systems**	This service package enhances the on-board longitudinal and lateral warning stand-alone systems by exchanging messages with other surrounding vehicles and roadside equipment.				
CVO01	**Carrier Operations and Fleet Management**	This service package provides the capabilities to manage a fleet of commercial vehicles. The Fleet and Freight Management subsystem provides the route for a commercial vehicle by either utilizing an in-house routing software package or an Information Service Provider. Routes generated by either approach are constrained by hazardous materials and other restrictions (such as height or weight).			Most CVO ITS applications are administered at the statewide level and are not applicable to the region at this time.	(None)
CVO02	**Freight Administrati on**	This service package tracks the movement of cargo and monitors the cargo condition.				
CVO03	**Electronic Clearance**	This service package provides for automated clearance at roadside check facilities.	**Electronic Clearance**	✓	This package represents statewide efforts to allow for automated clearance of commercial vehicles in the future.	See Statewide ITS Architecture
CVO04	**CV Administrati ve Processes**	This service package provides for electronic application, processing, fee collection, issuance, and distribution of CVO credential and tax filing.	**CV Administration**	✓	This package represents statewide efforts to allow for online administrative processes for commercial vehicles in the future.	See Statewide ITS Architecture

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
CVO05	**International Border Electronic Clearance**	This service package provides for automated clearance at international border crossings.			While the state is moving to implement international border electronic clearance technology, it does not directly affect this region.	(None)
CVO06	**Weigh-In-Motion**	This service package provides for high speed weigh-in-motion with or without Automated Vehicle Identification (AVI) capabilities.	**Portable WIM**	✓	CVO ITS applications are administered at the statewide level.	See Statewide ITS Architecture
CVO07	**Roadside CVO Safety**	This service package provides for automated roadside safety monitoring and reporting. It automates commercial vehicle safety inspections at the roadside check facilities.	**Roadside Inspection Stations**	✓	CVO ITS applications are administered at the statewide level.	See Statewide ITS Architecture
CVO08	**On-board CVO Safety**	This service package provides for on-board commercial vehicle safety monitoring and reporting.			Most CVO ITS applications are administered at the statewide level and are not applicable to the region at this time.	(None)
CVO09	**CVO Fleet Maintenance**	This service package supports maintenance of CVO fleet vehicles with on-board monitoring equipment and Automated Vehicle Location (AVL) capabilities within the Fleet and Freight Management Subsystem.				
CVO10	**HAZMAT Management**	This service package integrates incident management capabilities with commercial vehicle tracking to assure effective treatment of HAZMAT material and incidents.			CVO ITS applications are administered at the statewide level, but the statewide architecture does not utilize this service package.	(None)
CVO11	**Roadside HAZMAT Security Detection and Mitigation**	This service package provides the capability to detect and classify security sensitive HAZMAT on commercial vehicles using roadside sensing and imaging technology.			Most CVO ITS applications are administered at the statewide level and are not applicable to the region at this time.	(None)
CVO12	**CV Driver Security Authenticati on**	This service package provides the ability for Fleet and Freight Management to detect when an unauthorized commercial vehicle driver attempts to drive their vehicle based on stored driver identity information.				

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
CVO13	**Freight Assignment Tracking**	This service package provides for the planning and tracking of three aspects of commercial vehicle shipments.			Most CVO ITS applications are administered at the statewide level and are not applicable to the region at this time.	(None)
EM01	**Emergency Call-Taking and Dispatch**	This service package provides basic public safety call-taking and dispatch services. It includes emergency vehicle equipment, equipment used to receive and route emergency calls, and wireless communications that enable safe and rapid deployment of appropriate resources to an emergency.	**Local Public Safety Centers**			EM01 – Emergency Call-Taking and Dispatch (Local Public Safety Centers)
			State Police Dispatch	✓		
EM02	**Emergency Routing**	This service package supports automated vehicle location and dynamic routing of emergency vehicles. Traffic information, road conditions, and suggested routing information are provided to enhance emergency vehicle routing.	**Portsmouth Dispatch Center**			EM02 – Emergency Routing (All Local Instances)
			Salem Dispatch Center			
			Somersworth Dispatch Center			
			Local Public Safety Centers			
			State Police Dispatch	✓		See Statewide ITS Architecture
			Statewide Emergency Operations Center	✓		
EM03	**Mayday Support**	This service package allows the user (driver or non-driver) to initiate a request for emergency assistance and enables the Emergency Management Subsystem to locate the user, gather information about the incident, and determine the appropriate response.	**Statewide Emergency Operations Center**	✓	This service package is addressed at a Statewide level.	See Statewide ITS Architecture
EM04	**Roadway Service Patrols**	This service package supports roadway service patrol vehicles that monitor roads that aid motorists, offering rapid response to minor incidents (flat tire, accidents, out of gas) to minimize disruption to the traffic stream.	**NHDOT Courtesy Patrols**	✓	This service package is addressed at a Statewide level.	See Statewide ITS Architecture

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
EM05	**Transportation Infrastructure Protection**	This service package includes the monitoring of transportation infrastructure (e.g., bridges, tunnels and management centers) for potential threats using sensors and surveillance equipment and barrier and safeguard systems to preclude an incident, control access during and after an incident or mitigate impact of an incident.	**Port Security System**		NH Division of Ports and Harbors has plans to install underwater sonar detection/deterrent system to provide port security and surveillance.	EM05 - Transportation Infrastructure Protection (Port Security System)
			NHDOT Infrastructure Protection	✓	This service package is addressed at a Statewide level.	See Statewide ITS Architecture
EM06	**Wide-Area Alert**	This service package uses ITS driver and traveler information systems to alert the public in emergency situations such as child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property.	**Statewide Emergency Operations Center**	✓	Supports AMBER alert and other wide-area traveler information/emergency management applications, such as alerts from the Seabrook Nuclear Power Plant. This service package is addressed at the Statewide level.	See Statewide ITS Architecture
EM07	**Early Warning System**	This service package monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents, nuclear power plant accidents, and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks).	**Statewide Emergency Operations Center**	✓	This service package is addressed at a Statewide level.	See Statewide ITS Architecture
EM08	**Disaster Response and Recovery**	This service package enhances the ability of the surface transportation system to respond to and recover from disasters. It addresses the most severe incidents that require an extraordinary response from outside the local community.	**Statewide Emergency Operations Center**	✓	This service package is addressed at a Statewide level.	See Statewide ITS Architecture
EM09	**Evacuation and Reentry Management**	This service package supports evacuation of the general public from a disaster area and manages subsequent reentry to the disaster area.	**Statewide Emergency Operations Center**	✓	This service package is addressed at a Statewide level.	See Statewide ITS Architecture

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
EM10	**Disaster Traveler Information**	This service package uses ITS to provide disaster-related traveler information to the general public, including evacuation and reentry information and other information concerning the operation of the transportation system during a disaster.	**Statewide Emergency Operations Center**	✓	This service package is addressed at a Statewide level.	See Statewide ITS Architecture
MC01	**Maintenance and Construction Vehicle and Equipment Tracking**	This service package will track the location of maintenance and construction vehicles and other equipment to ascertain the progress of their activities.	**Local DPWs**		Supports local construction and maintenance activities by facilitating the tracking of maintenance vehicles by maintenance dispatchers at municipal DPWs.	(None)
MC02	**Maintenance and Construction Vehicle Maintenance**	This service package performs vehicle maintenance scheduling and manages both routine and corrective maintenance activities on vehicles and other maintenance and construction equipment.			Package not perceived as applicable for short-term implementation by local entities.	(None)
MC03	**Road Weather Data Collection**	This service package collects current road and weather conditions using data collected from environmental sensors deployed on and about the roadway (or guideway in the case of transit related rail systems).	**Local Road Weather Stations**		Local municipalities and airports often have their own weather information collection devices. This weather information is sometimes made available to local DPWs and local traffic management systems.	(None)
			NHDOT RWIS	✓	Roadway Weather Information System (RWIS) is deployed at the statewide level. NHDOT has plans to deploy additional RWIS in the next few years.	See Statewide ITS Architecture
MC04	**Weather Information Processing and Distribution**	This service package processes and distributes the environmental information collected from the Road Weather Data Collection service package.	**NHDOT RWIS**	✓	This instance shows the distribution of road weather information through CARS.	See Statewide ITS Architecture
MC05	**Roadway Automated Treatment**	This service package automatically treats a roadway section based on environmental or atmospheric conditions. Treatments include fog dispersion, anti-icing chemicals, etc.	**NHDOT Maintenance Districts**	✓	NHDOT Maintenance Districts are interested in developed automated treatments based on environmental or atmospheric conditions.	See Statewide ITS Architecture

Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
MC06	**Winter Maintenance**	This service package supports winter road maintenance including snow plow operations, roadway treatments (e.g., salt spraying and other anti-icing material applications), and other snow and ice control activities.	**Local DPW**		Functions applicable to all municipal and NHDOT winter road maintenance operations.	MC06 - Winter Maintenance (Local DPW)
			NHDOT Maintenance Districts	✓		See Statewide ITS Architecture
MC07	**Roadway Maintenance and Construction**	This service package supports numerous services for scheduled and unscheduled maintenance and construction on a roadway system or right-of-way.	**Local DPW**		Supports a variety of construction/maintenance support functions applicable to the region.	(None)
			NHDOT Maintenance Districts	✓		See Statewide ITS Architecture
MC08	**Work Zone Management**	This service package directs activity in work zones, controlling traffic through portable dynamic message signs (DMS) and informing other groups of activity (e.g., ISP, traffic management, other maintenance and construction centers) for better coordination management.	**NHDOT Work Zone Management**	✓	Provides for work zone traffic management and safety enhancements.	See Statewide ITS Architecture
MC09	**Work Zone Safety Monitoring**	This service package includes systems that improve work crew safety and reduce collisions between the motoring public and maintenance and construction vehicles. This service package detects vehicle intrusions in work zones and warns crew workers and drivers of imminent encroachment or other potential safety hazards.			Package not perceived as applicable for short-term implementation by local entities	(None)
MC10	**Maintenance and Construction Activity Coordination**	This service package supports the dissemination of maintenance and construction activity to centers that can utilize it as part of their operations, or to the Information Service Providers who can provide the information to travelers.	**NHDOT 511 System**	✓	There is a need for regional maintenance/construction coordination, as road closings and other activities have widespread impacts on traffic. If these activities can be communicated, municipalities can cooperate to manage traffic issues.	See Statewide ITS Architecture
MC11	**Environmental Probe Surveillance**	This service package includes systems that use on-board vehicle sensors to collect environmental conditions data.			No local need for such a system was perceived.	(None)

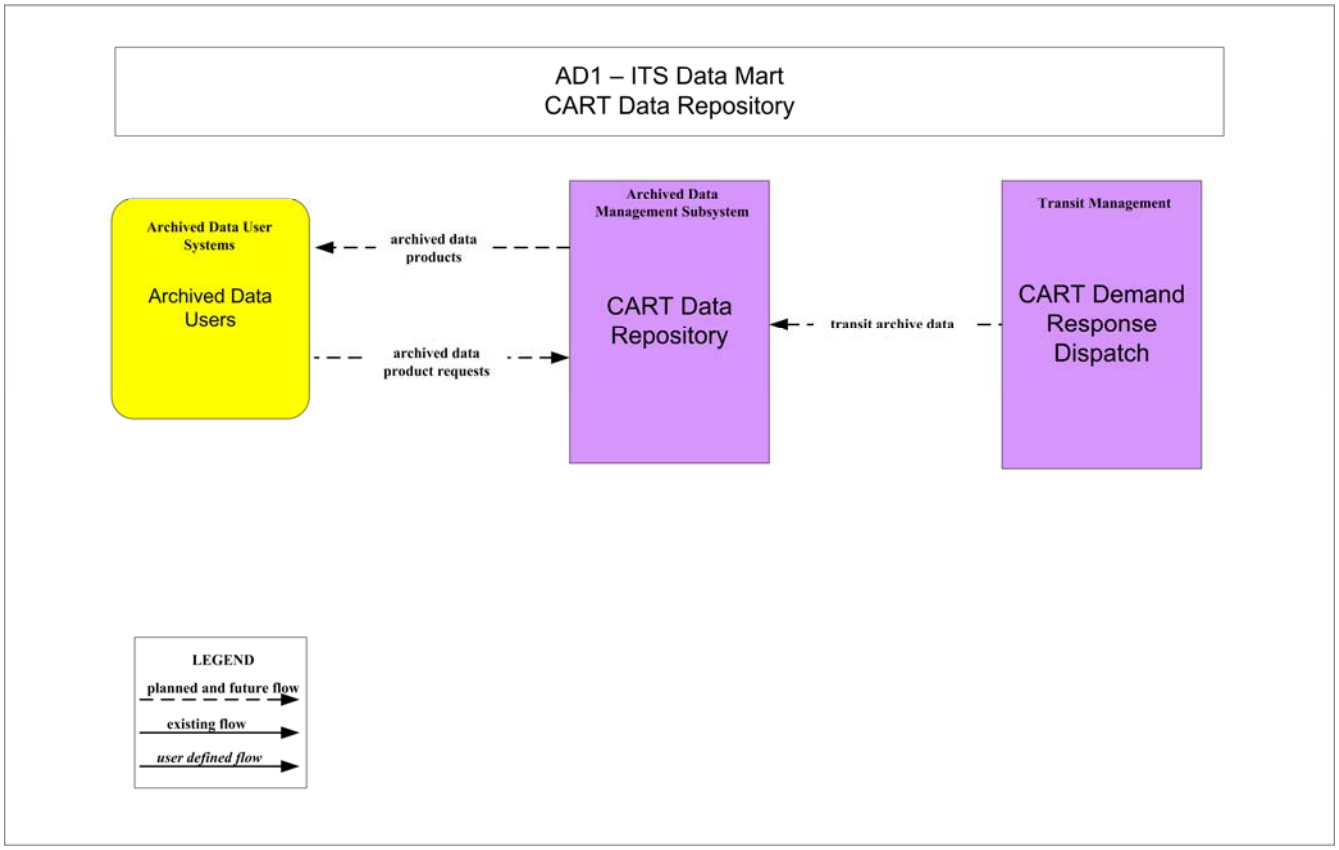
Service Pack-age*	Service Package Name*	Service Package Description*	Instances in Strafford-Rockingham Region ITS Architecture	See State-wide ITS Arch-itecture	Local Notes	Applicable Operational Concept
MC12	**Infrastructure Monitoring**	This service package includes systems that use fixed and vehicle-based sensors to monitor vibration, stress, temperature, continuity, etc., of transportation infrastructure.	**Local Infrastructure Monitoring**		Some local municipalities have infrastructure monitoring systems. In particular, some municipalities have stream gauges to measure the height and flow of streams below bridges.	(None)
* Excerpt of Service Package Description from the National ITS Architecture Version 7.0, U.S. Department of Transportation. Full descriptions can be found online at: http://itsarch.iteris.com/itsarch/html/mp/mpindex.htm						

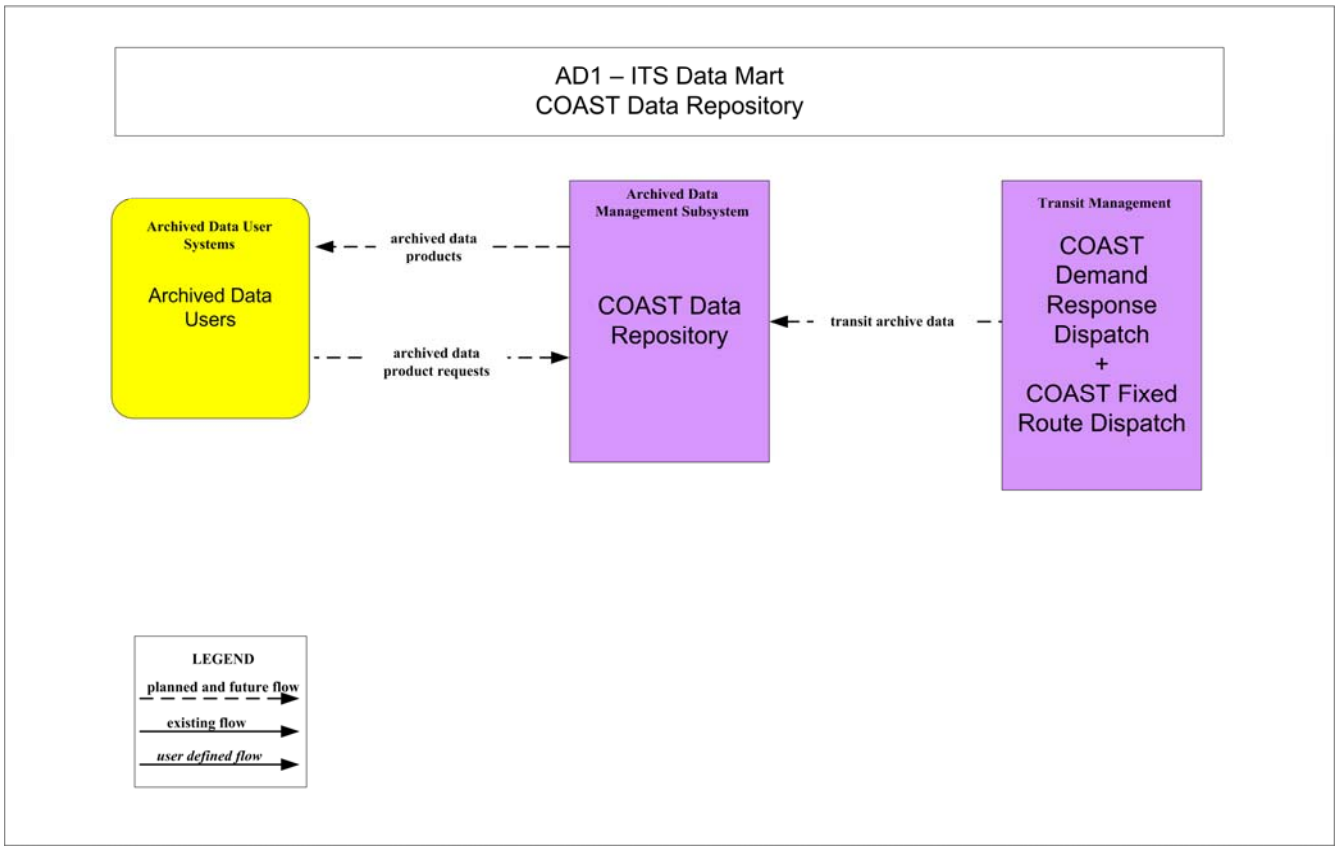
APPENDIX F

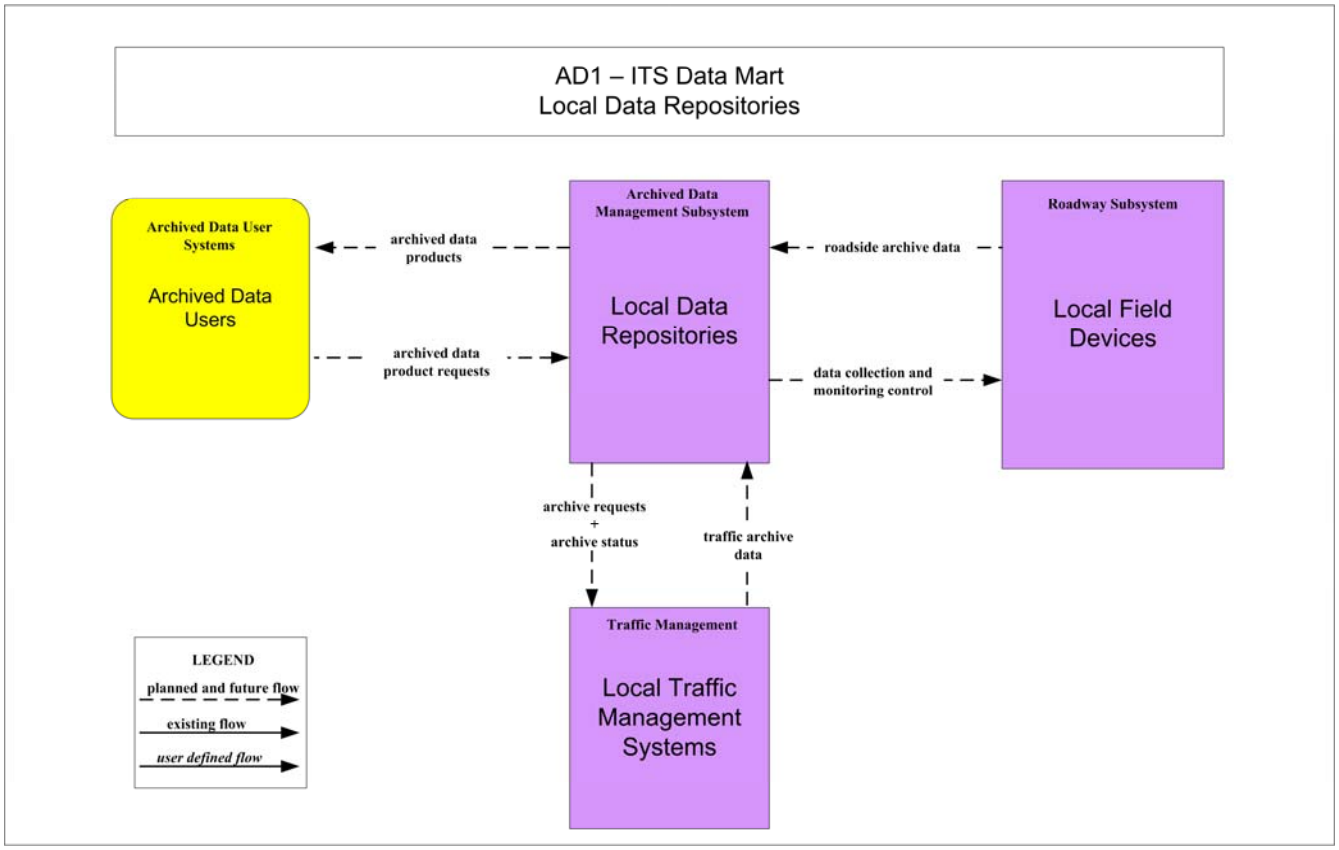
SERVICE PACKAGE DIAGRAMS

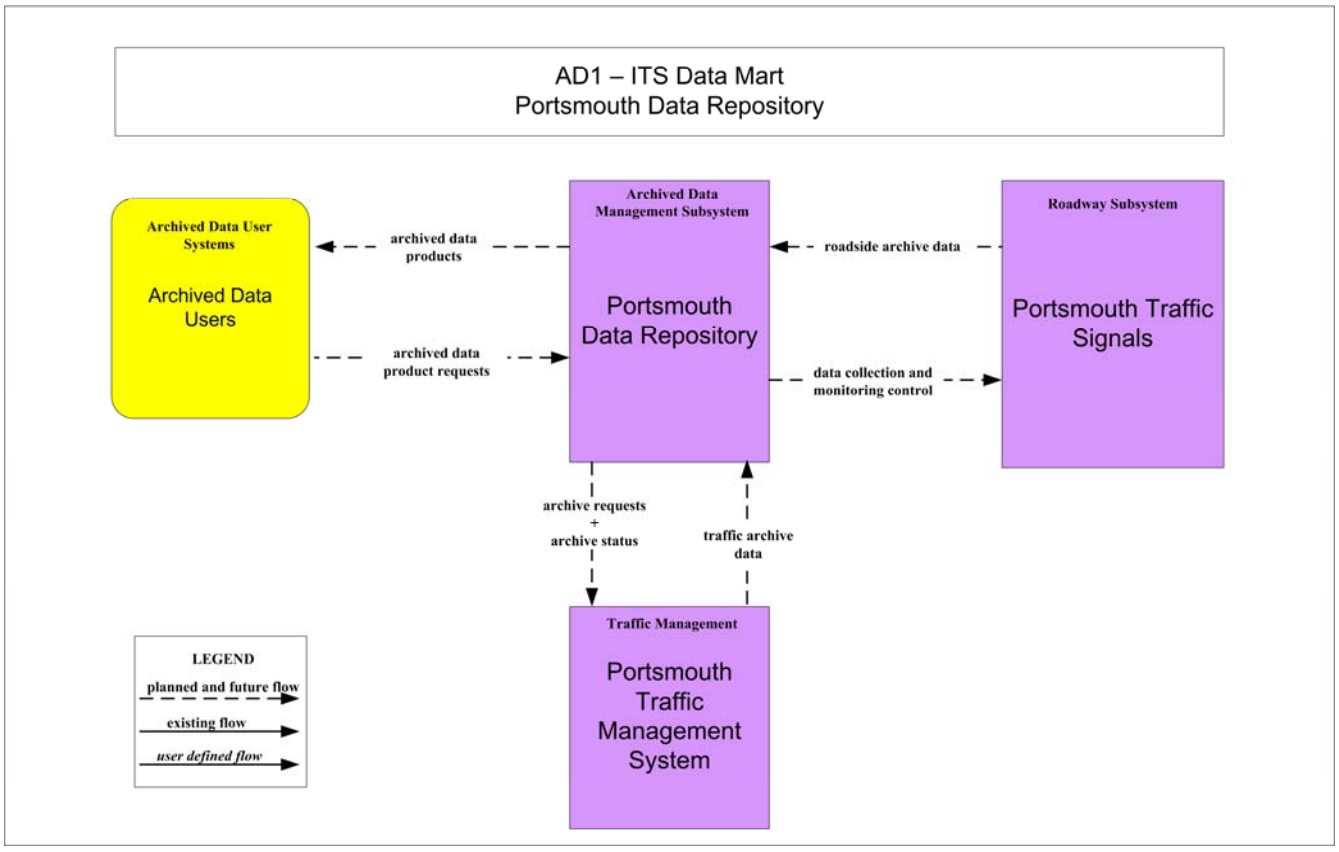
ARCHIVED DATA MANAGEMENT

SERVICE PACKAGE DIAGRAMS


AD1 – ITS Data Mart
CART Data Repository
Archived Data User Systems
Archived Data Users
archived data products
archived data product requests
Archived Data Management Subsystem
CART Data Repository
transit archive data
Transit Management
CART Demand Response Dispatch
LEGEND
planned and future flow
existing flow
user defined flow


AD1 – ITS Data Mart
COAST Data Repository
Archived Data User Systems
Archived Data Users
archived data products
archived data product requests
Archived Data Management Subsystem
COAST Data Repository
transit archive data
Transit Management
COAST Demand Response Dispatch
+
COAST Fixed Route Dispatch
LEGEND
planned and future flow
existing flow
user defined flow


AD1 – ITS Data Mart
Local Data Repositories
Archived Data User Systems
Archived Data Users
archived data products
archived data product requests
Archived Data Management Subsystem
Local Data Repositories
roadside archive data
data collection and monitoring control
Roadway Subsystem
Local Field Devices
archive requests + archive status
traffic archive data
Traffic Management
Local Traffic Management Systems
LEGEND
planned and future flow
existing flow
user defined flow


AD1 – ITS Data Mart
Portsmouth Data Repository
Archived Data User Systems
Archived Data Users
archived data products
archived data product requests
Archived Data Management Subsystem
Portsmouth Data Repository
roadside archive data
data collection and monitoring control
Roadway Subsystem
Portsmouth Traffic Signals
archive requests + archive status
traffic archive data
Traffic Management
Portsmouth Traffic Management System
LEGEND
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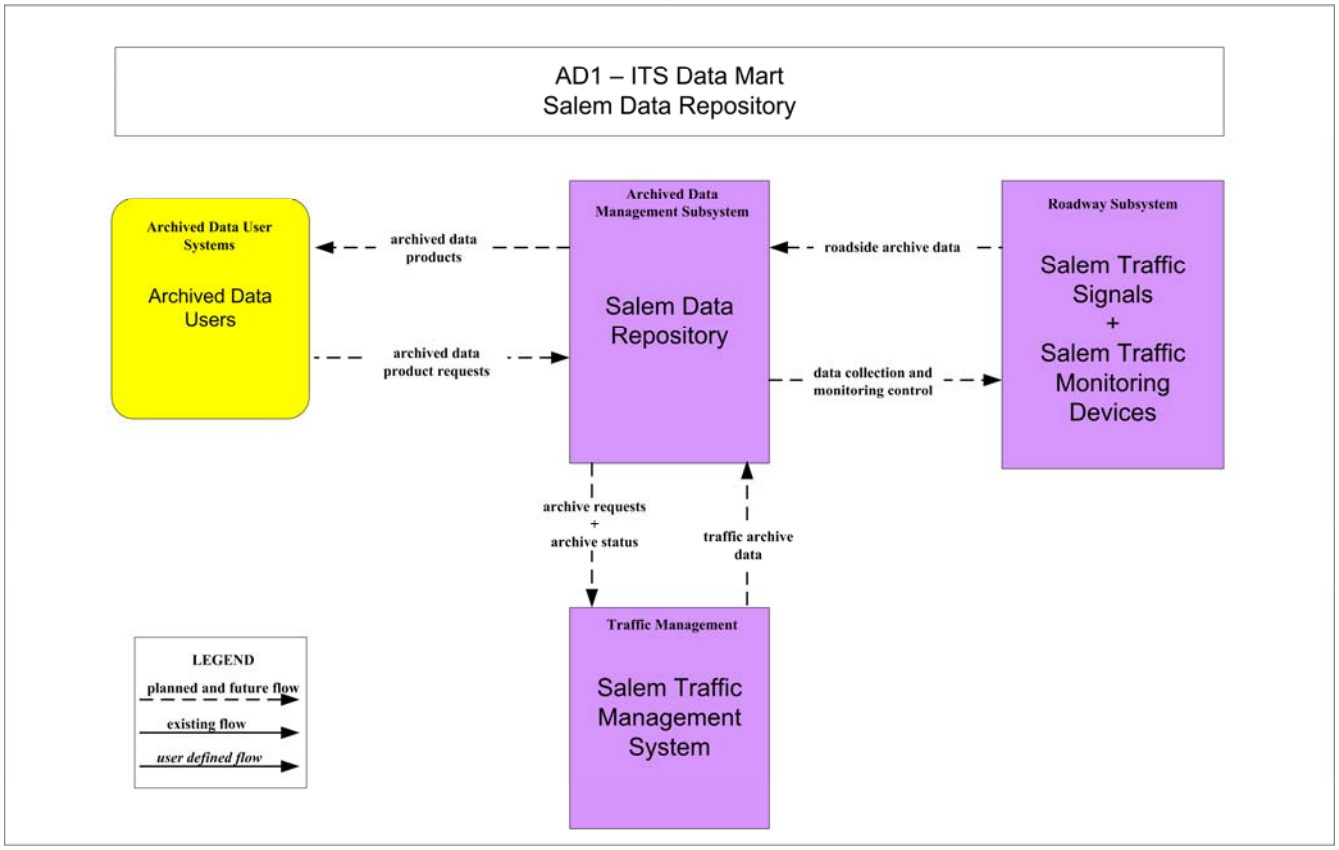
user defined flow


AD1 – ITS Data Mart
Salem Data Repository
Archived Data User Systems
Archived Data Users
archived data products
archived data product requests
Archived Data Management Subsystem
Salem Data Repository
roadside archive data
data collection and monitoring control
Roadway Subsystem
Salem Traffic Signals
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Salem Traffic Monitoring Devices
archive requests
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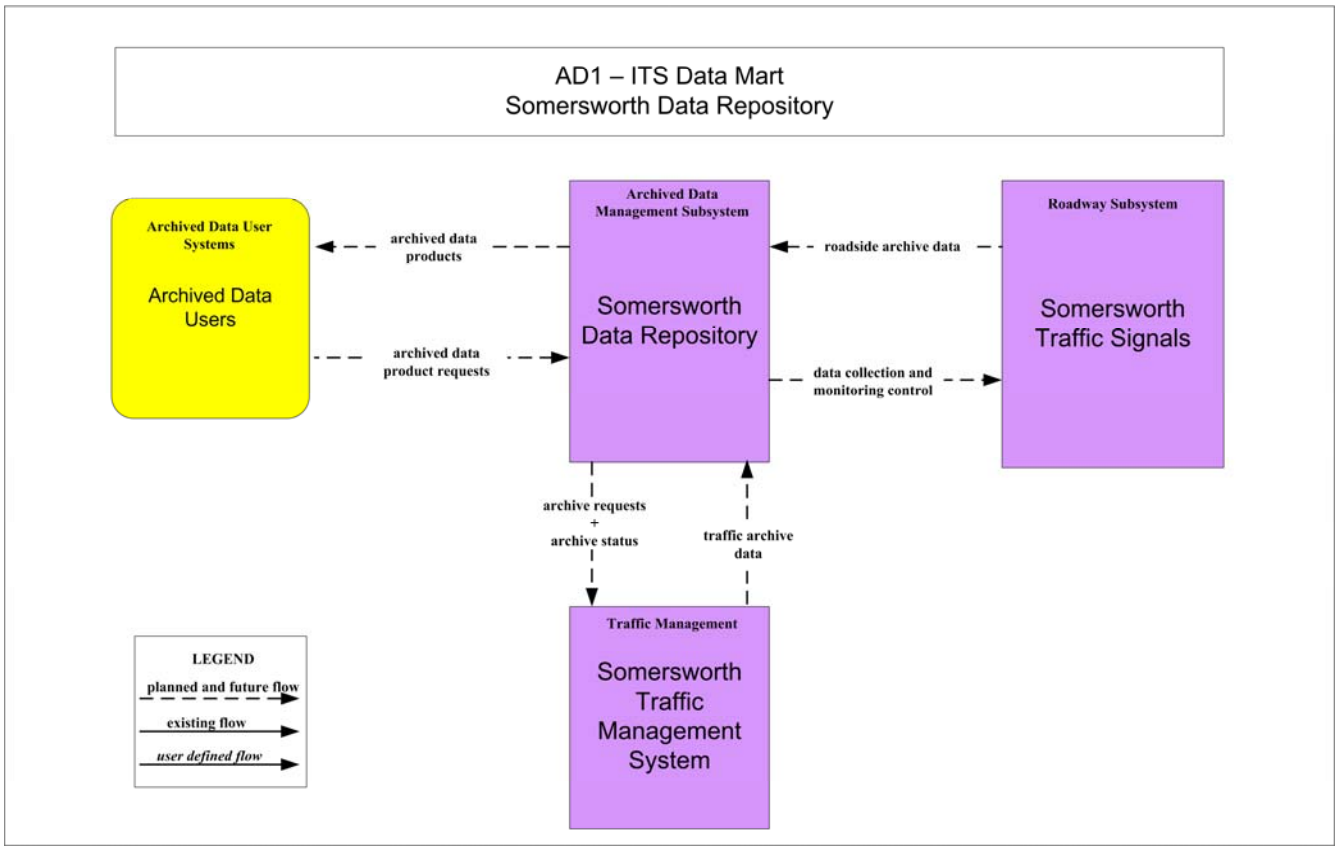
archive status
traffic archive data
Traffic Management
Salem Traffic Management System
LEGEND
planned and future flow
existing flow
user defined flow


AD1 – ITS Data Mart
Somersworth Data Repository
Archived Data User Systems
Archived Data Users
archived data products
archived data product requests
Archived Data Management Subsystem
Somersworth Data Repository
roadside archive data
data collection and monitoring control
Roadway Subsystem
Somersworth Traffic Signals
archive requests
+
archive status
traffic archive data
Traffic Management
Somersworth Traffic Management System
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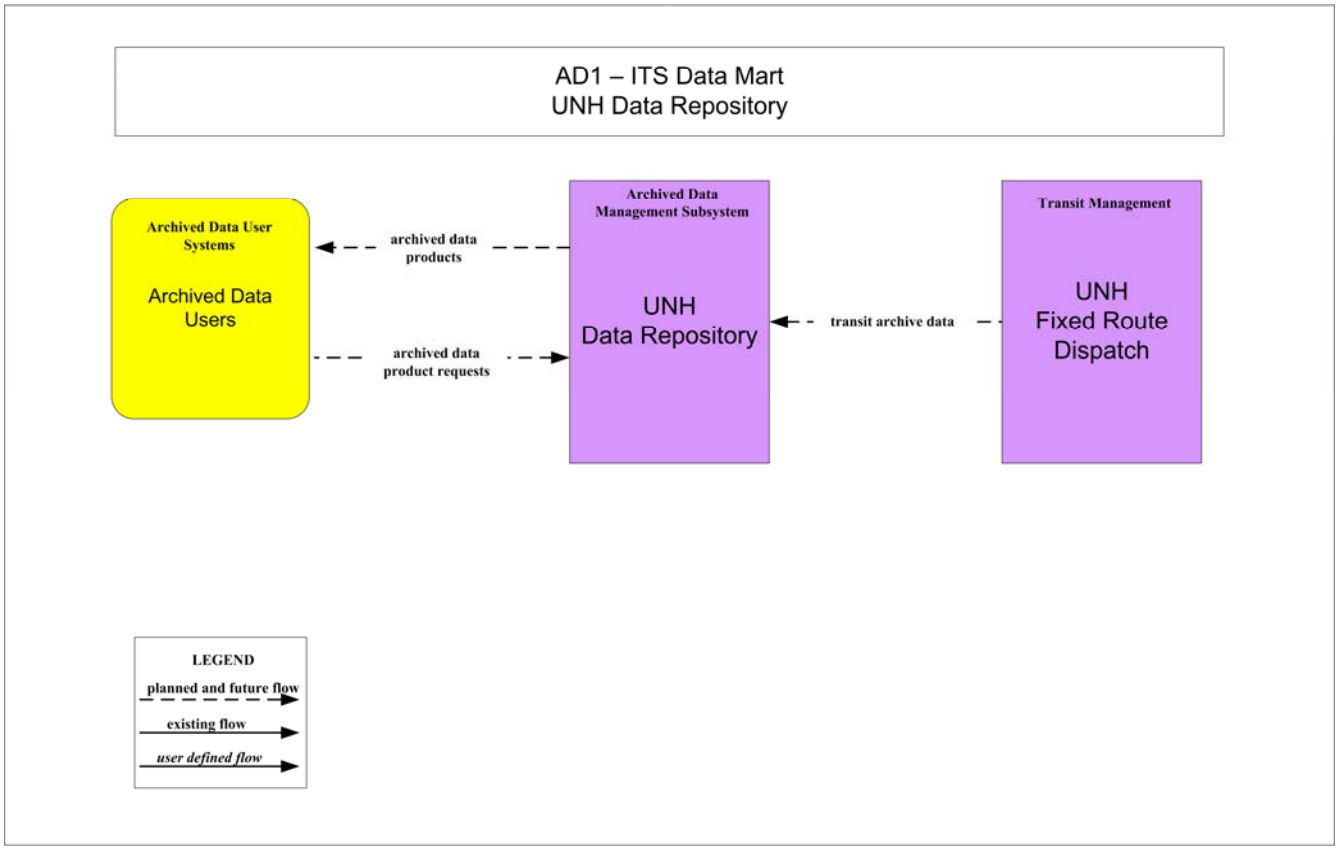
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UNH Data Repository
Archived Data User Systems
Archived Data Users
archived data products
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Archived Data Management Subsystem
UNH Data Repository
transit archive data
Transit Management
UNH Fixed Route Dispatch
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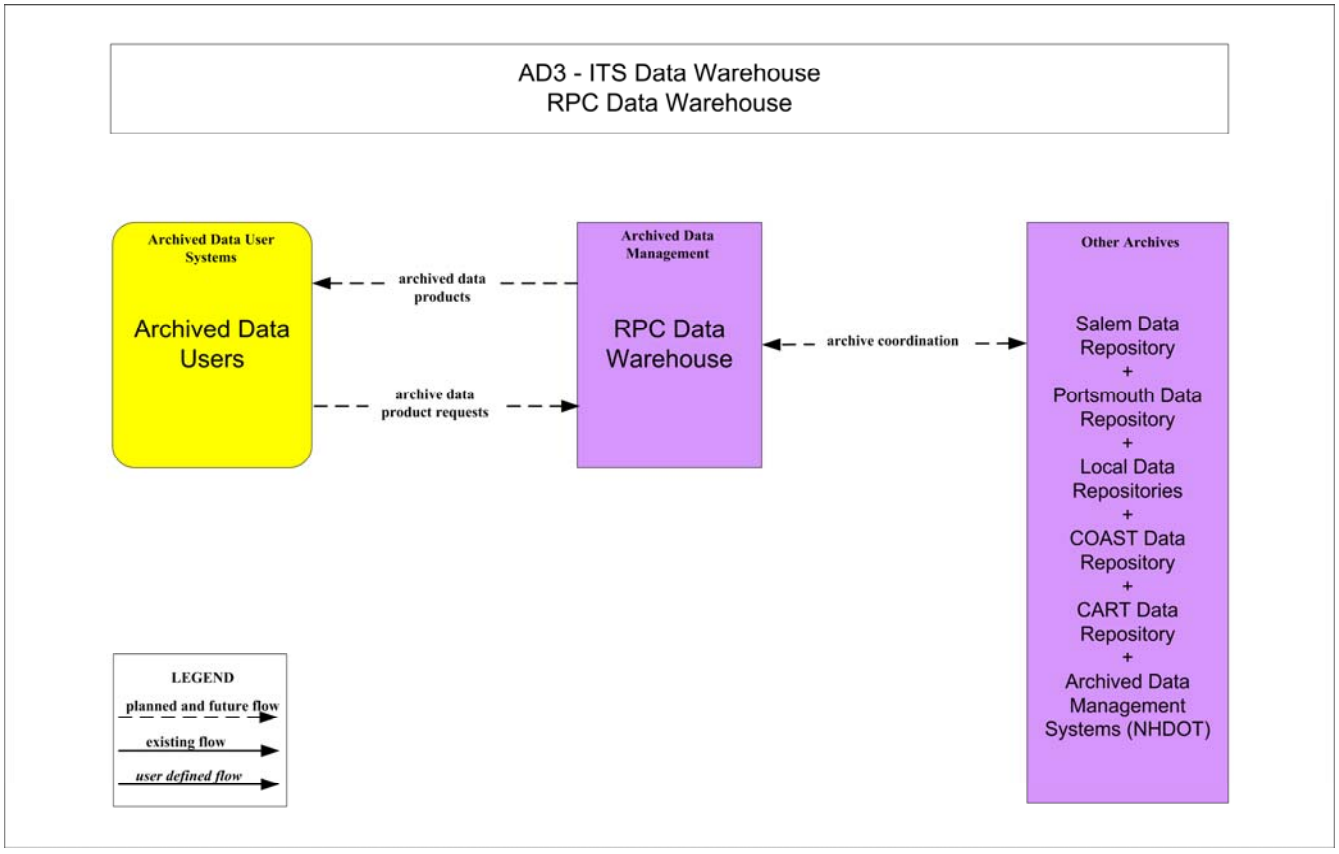
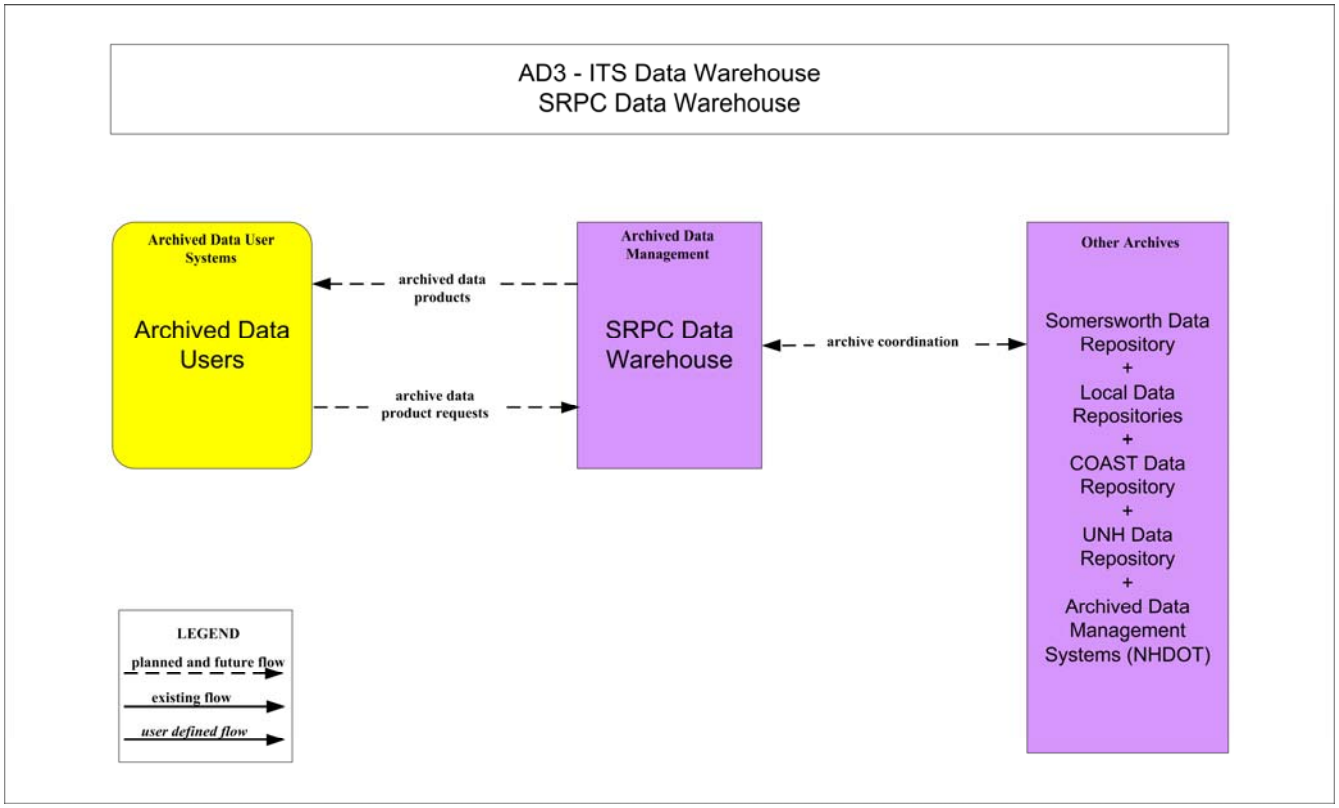
user defined flow


AD3 - ITS Data Warehouse
RPC Data Warehouse
Archived Data User Systems
Archived Data Users
archived data products
archive data product requests
Archived Data Management
RPC Data Warehouse
archive coordination
Other Archives
Salem Data Repository
+
Portsmouth Data Repository
+
Local Data Repositories
+
COAST Data Repository
+
CART Data Repository
+
Archived Data Management Systems (NHDOT)
LEGEND
planned and future flow
existing flow
user defined flow


AD3 - ITS Data Warehouse
SRPC Data Warehouse
Archived Data User Systems
Archived Data Users
archived data products
archive data product requests
Archived Data Management
SRPC Data Warehouse
archive coordination
Other Archives
Somersworth Data Repository
+
Local Data Repositories
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COAST Data Repository
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UNH Data Repository
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Archived Data Management Systems (NHDOT)
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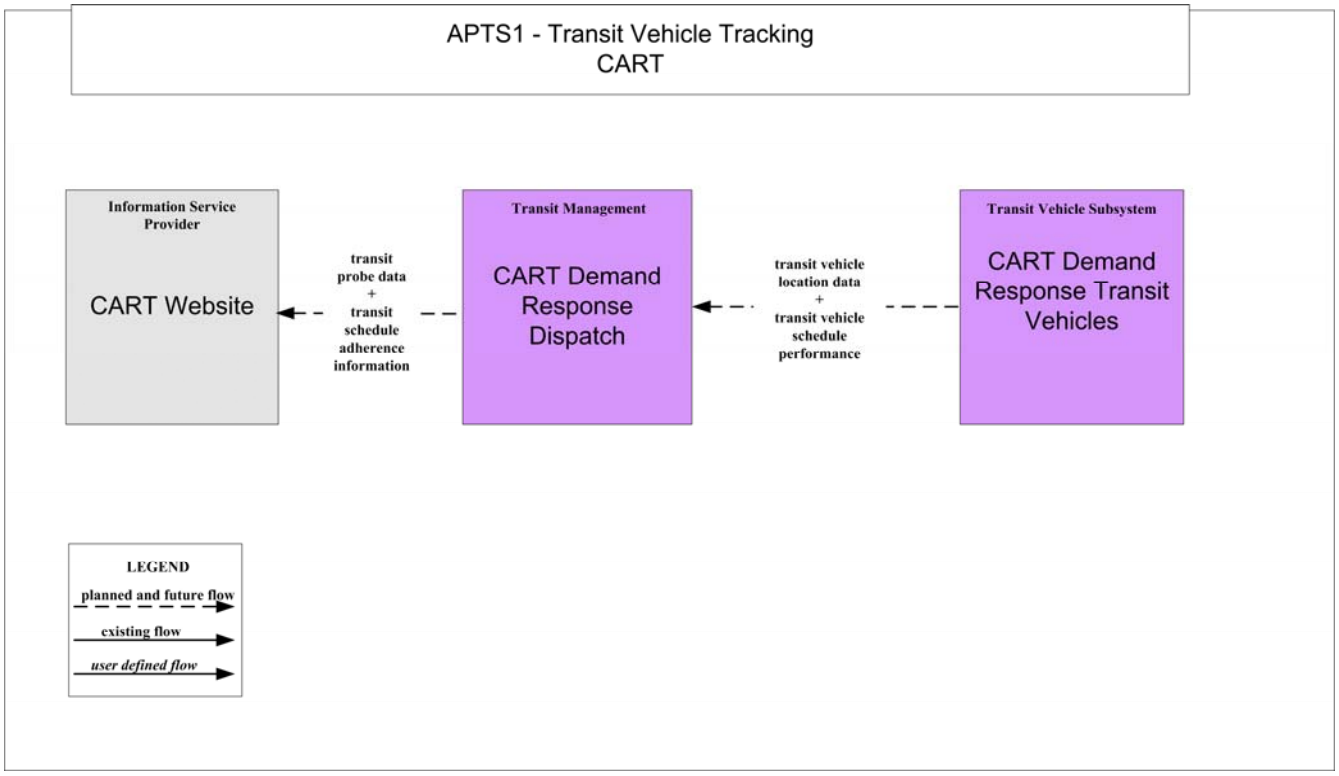
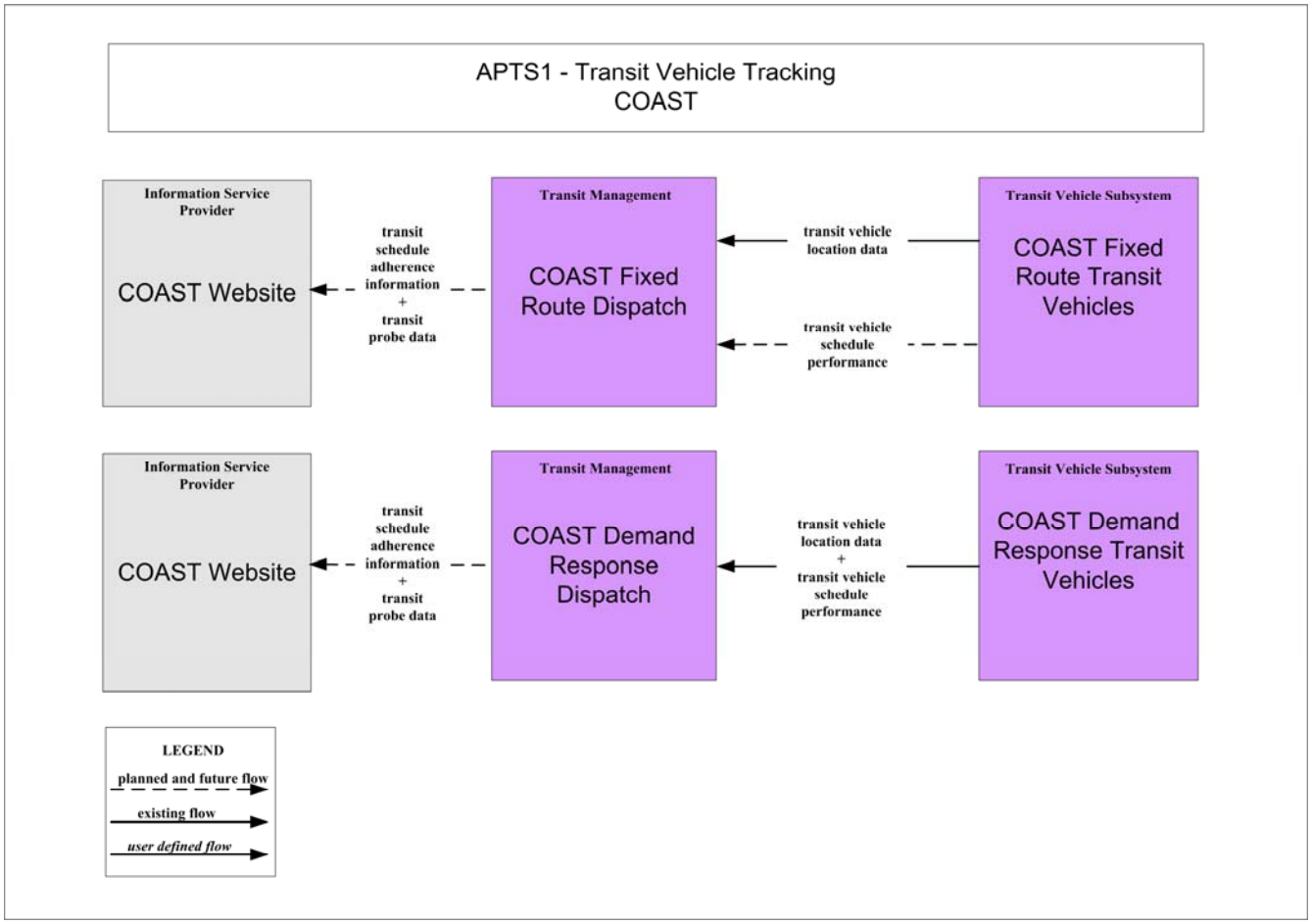
PUBLIC TRANSPORTATION

SERVICE PACKAGE DIAGRAMS


APTS1 - Transit Vehicle Tracking
CART
Information Service Provider
CART Website
transit probe data + transit schedule adherence information
Transit Management
CART Demand Response Dispatch
transit vehicle location data + transit vehicle schedule performance
Transit Vehicle Subsystem
CART Demand Response Transit Vehicles
LEGEND
planned and future flow
existing flow
user defined flow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transit schedule adherence information + transit probe data
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transit vehicle location data
transit vehicle schedule performance
Transit Vehicle Subsystem
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transit vehicle location data + transit vehicle schedule performance
Transit Vehicle Subsystem
COAST Demand Response Transit Vehicles
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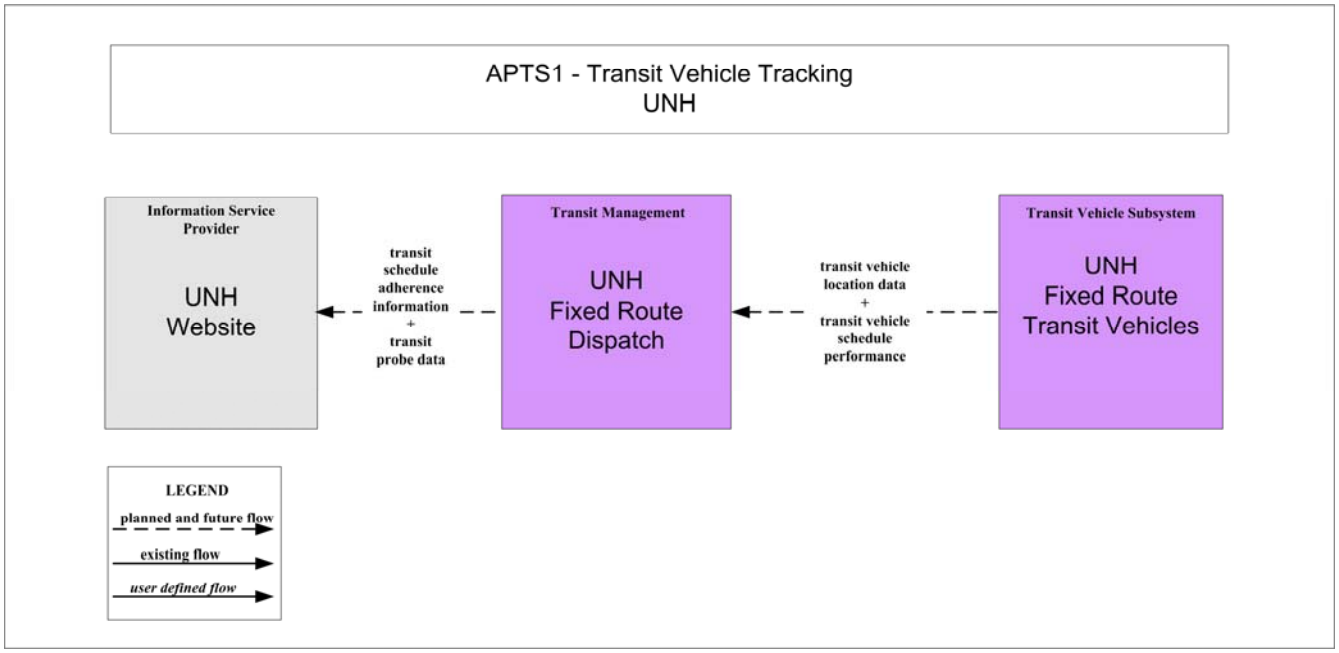
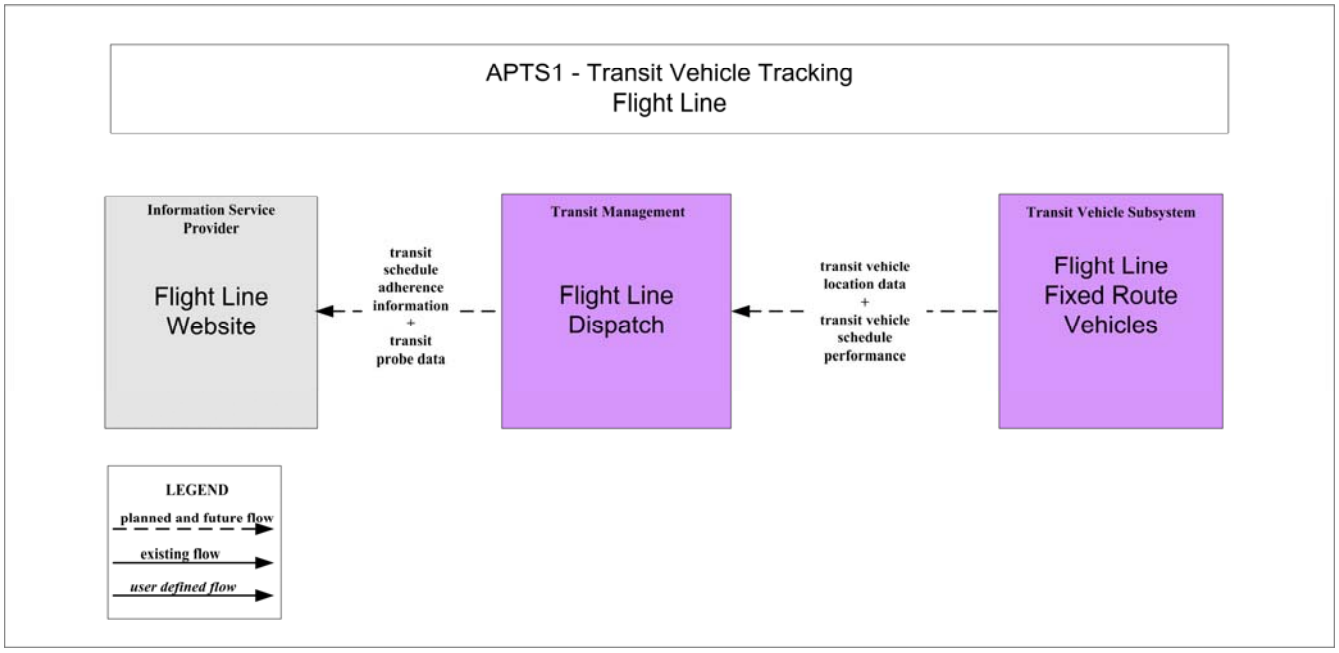
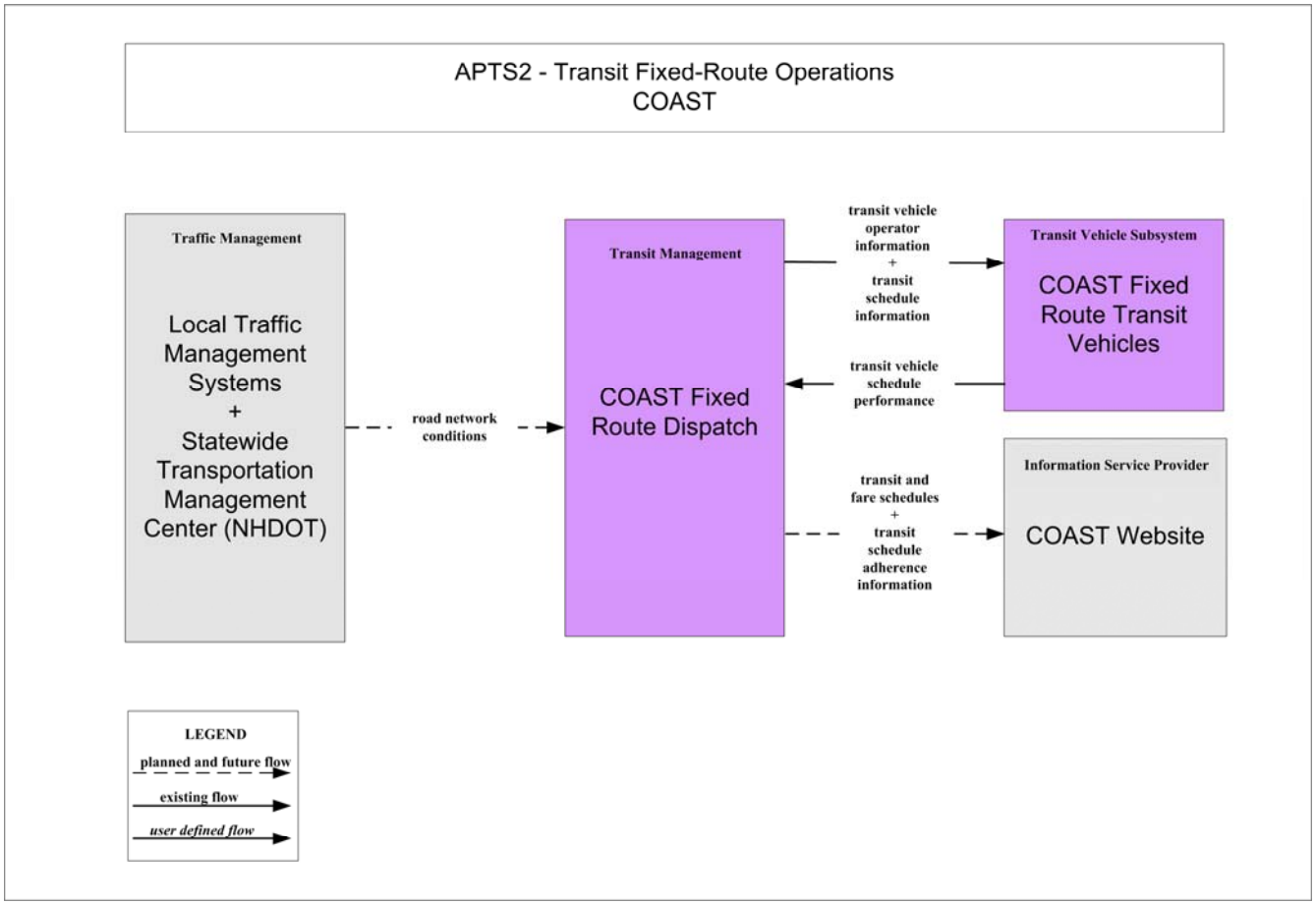
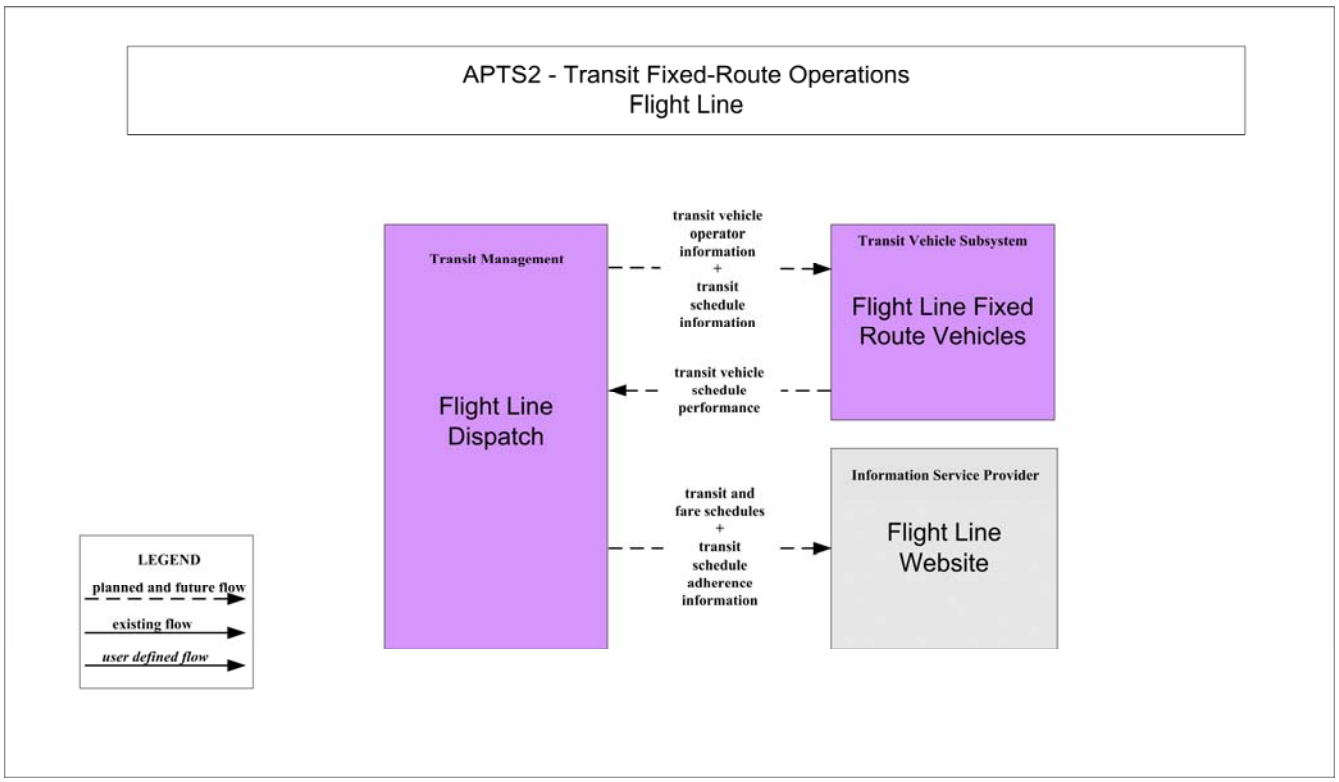
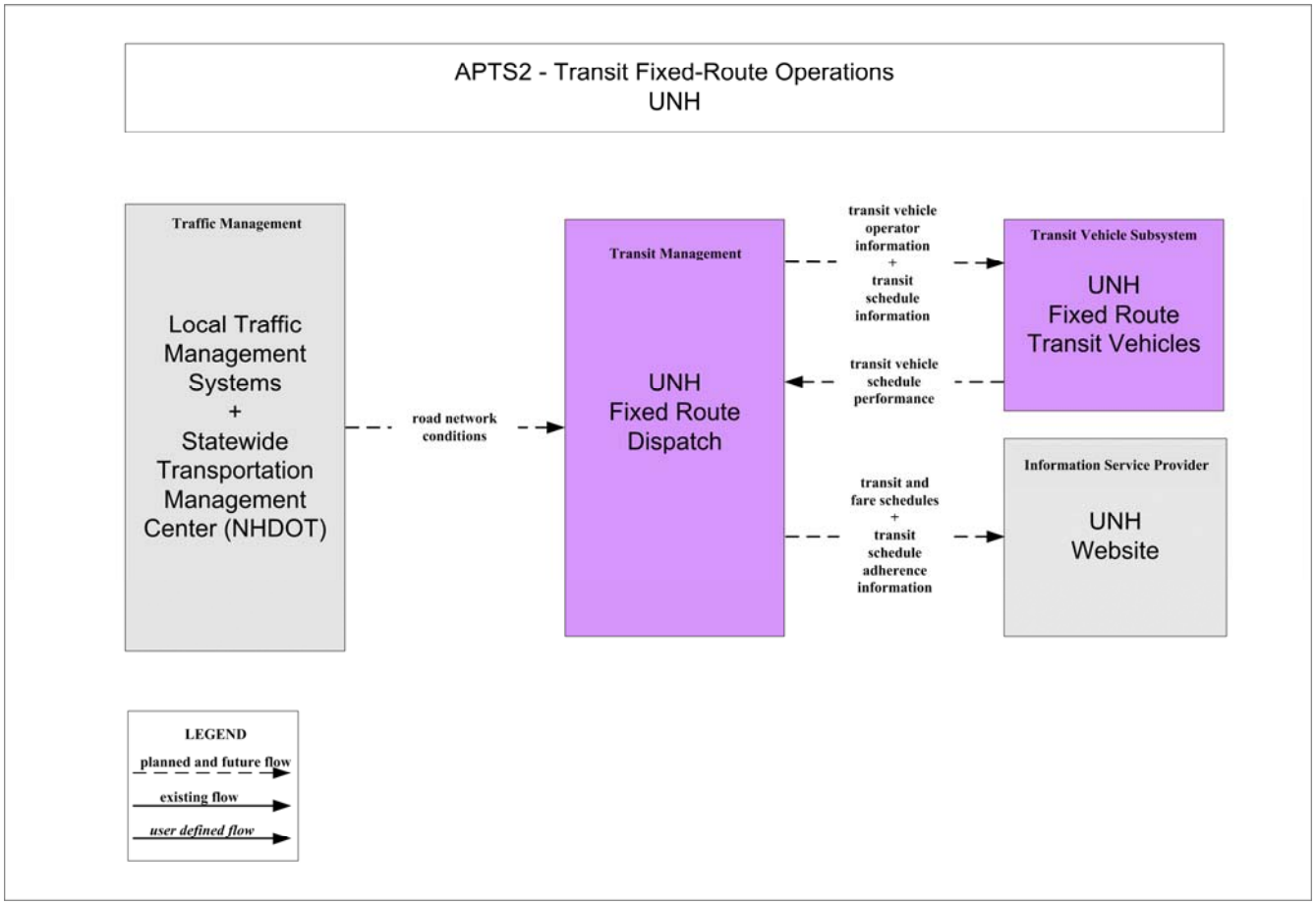
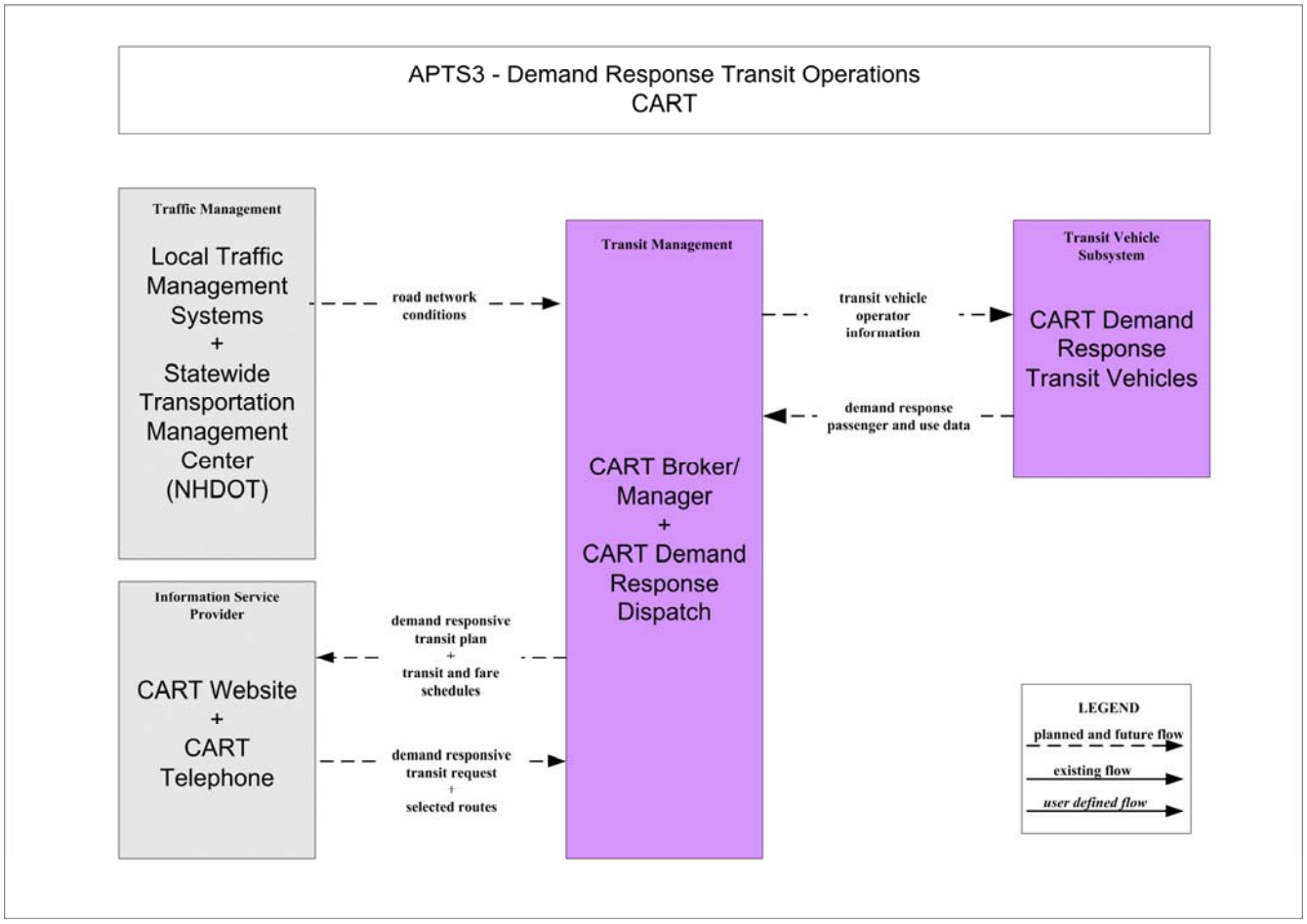

APTS1 - Transit Vehicle Tracking
UNH
Information Service Provider
UNH Website
transit schedule adherence information + transit probe data
Transit Management
UNH Fixed Route Dispatch
transit vehicle location data + transit vehicle schedule performance
Transit Vehicle Subsystem
UNH Fixed Route Transit Vehicles
LEGEND
planned and future flow
existing flow
user defined flow

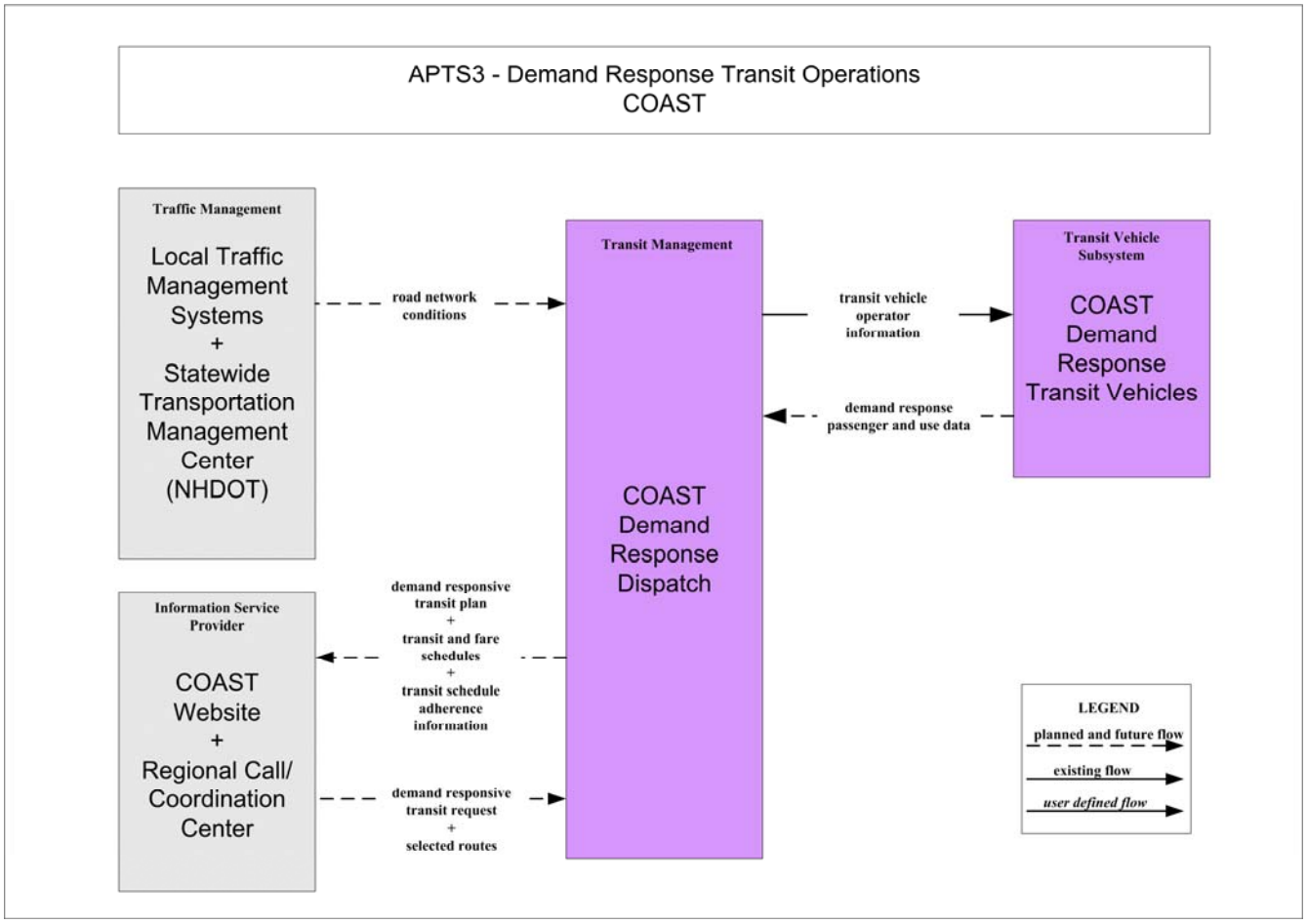

APTS1 - Transit Vehicle Tracking
Flight Line
Information Service Provider
Flight Line Website
transit schedule adherence information + transit probe data
Transit Management
Flight Line Dispatch
transit vehicle location data + transit vehicle schedule performance
Transit Vehicle Subsystem
Flight Line Fixed Route Vehicles
LEGEND
planned and future flow
existing flow
user defined flow

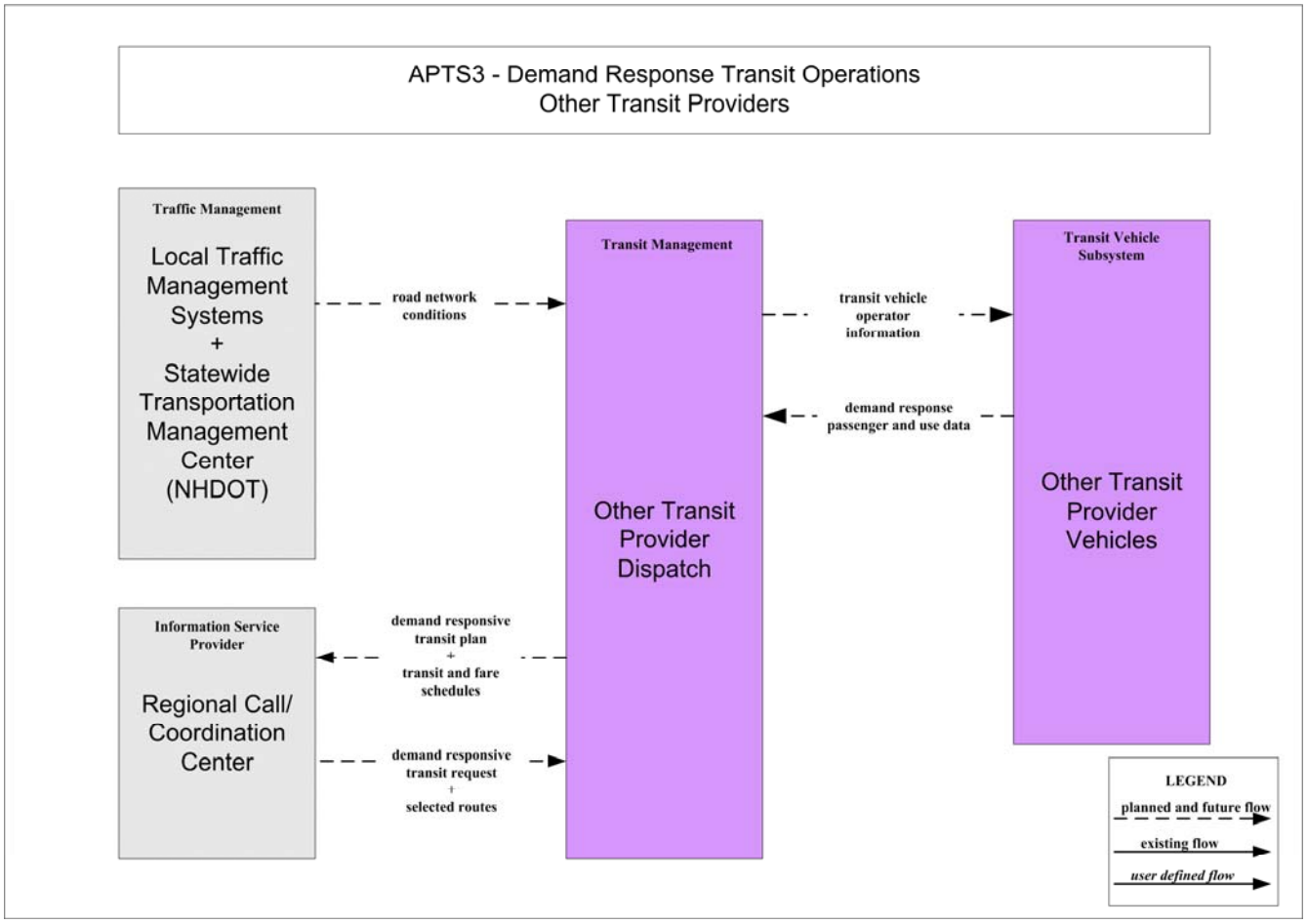

APTS2 - Transit Fixed-Route Operations
COAST
Traffic Management
Local Traffic Management Systems + Statewide Transportation Management Center (NHDOT)
road network conditions
Transit Management
COAST Fixed Route Dispatch
transit vehicle operator information + transit schedule information
transit vehicle schedule performance
Transit Vehicle Subsystem
COAST Fixed Route Transit Vehicles
transit and fare schedules + transit schedule adherence information
Information Service Provider
COAST Website
LEGEND
planned and future flow
existing flow
user defined flow

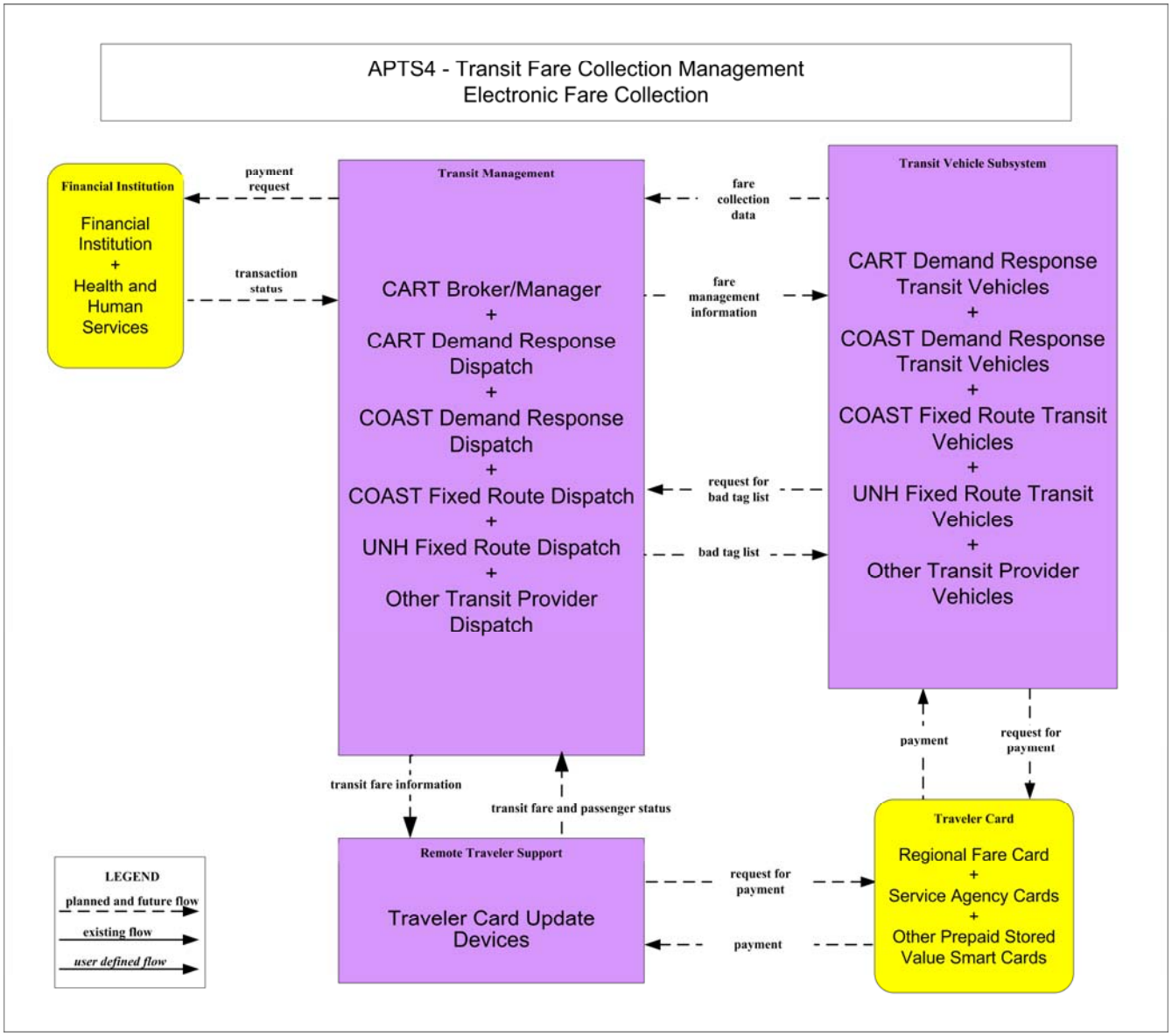

APTS2 - Transit Fixed-Route Operations
Flight Line
Transit Management
Flight Line Dispatch
transit vehicle operator information + transit schedule information
transit vehicle schedule performance
Transit Vehicle Subsystem
Flight Line Fixed Route Vehicles
transit and fare schedules + transit schedule adherence information
Information Service Provider
Flight Line Website
LEGEND
planned and future flow
existing flow
user defined flow

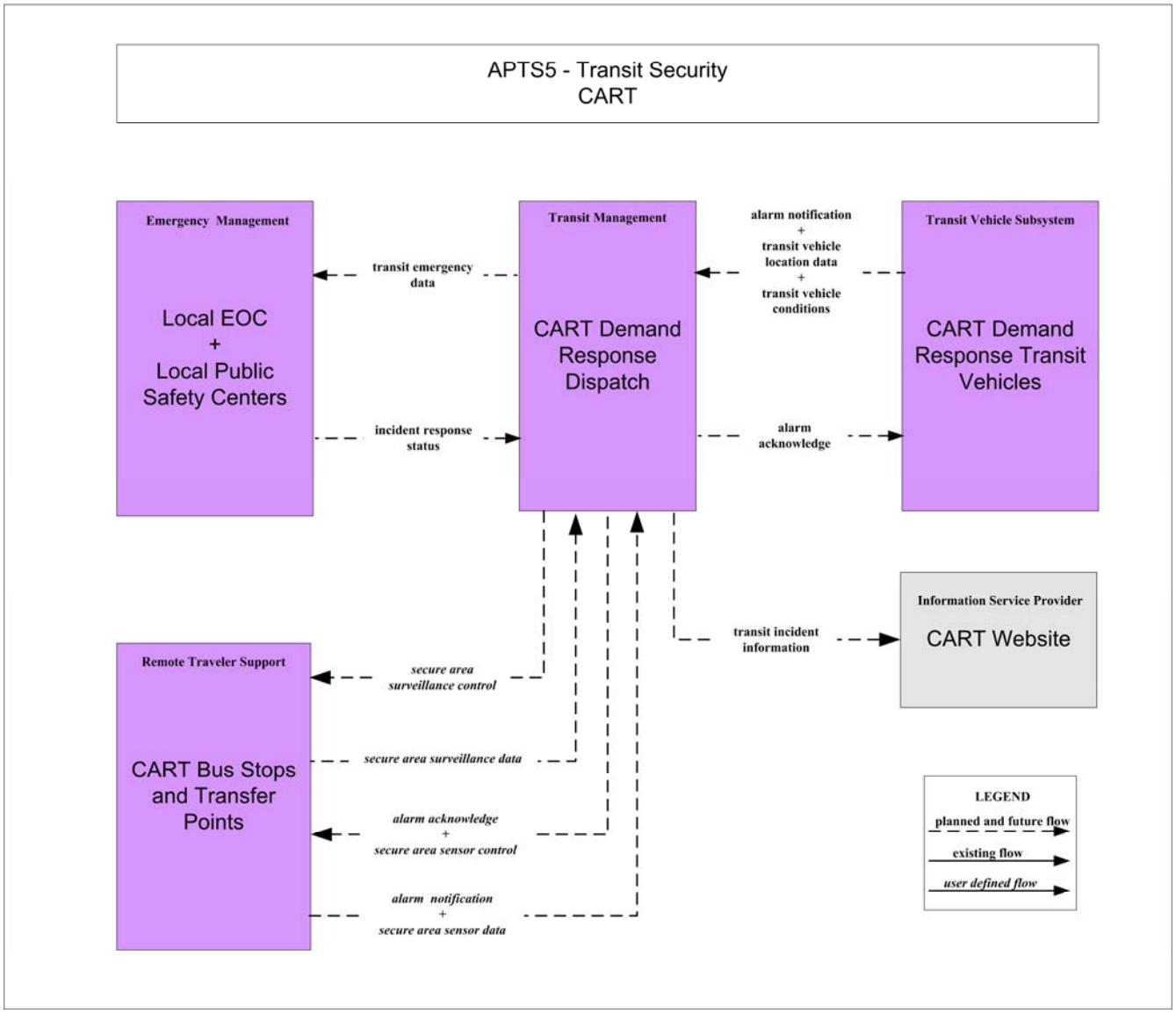

APTS2 - Transit Fixed-Route Operations
UNH
Traffic Management
Local Traffic Management Systems + Statewide Transportation Management Center (NHDOT)
road network conditions
Transit Management
UNH Fixed Route Dispatch
transit vehicle operator information + transit schedule information
transit vehicle schedule performance
Transit Vehicle Subsystem
UNH Fixed Route Transit Vehicles
transit and fare schedules + transit schedule adherence information
Information Service Provider
UNH Website
LEGEND
planned and future flow
existing flow
user defined flow

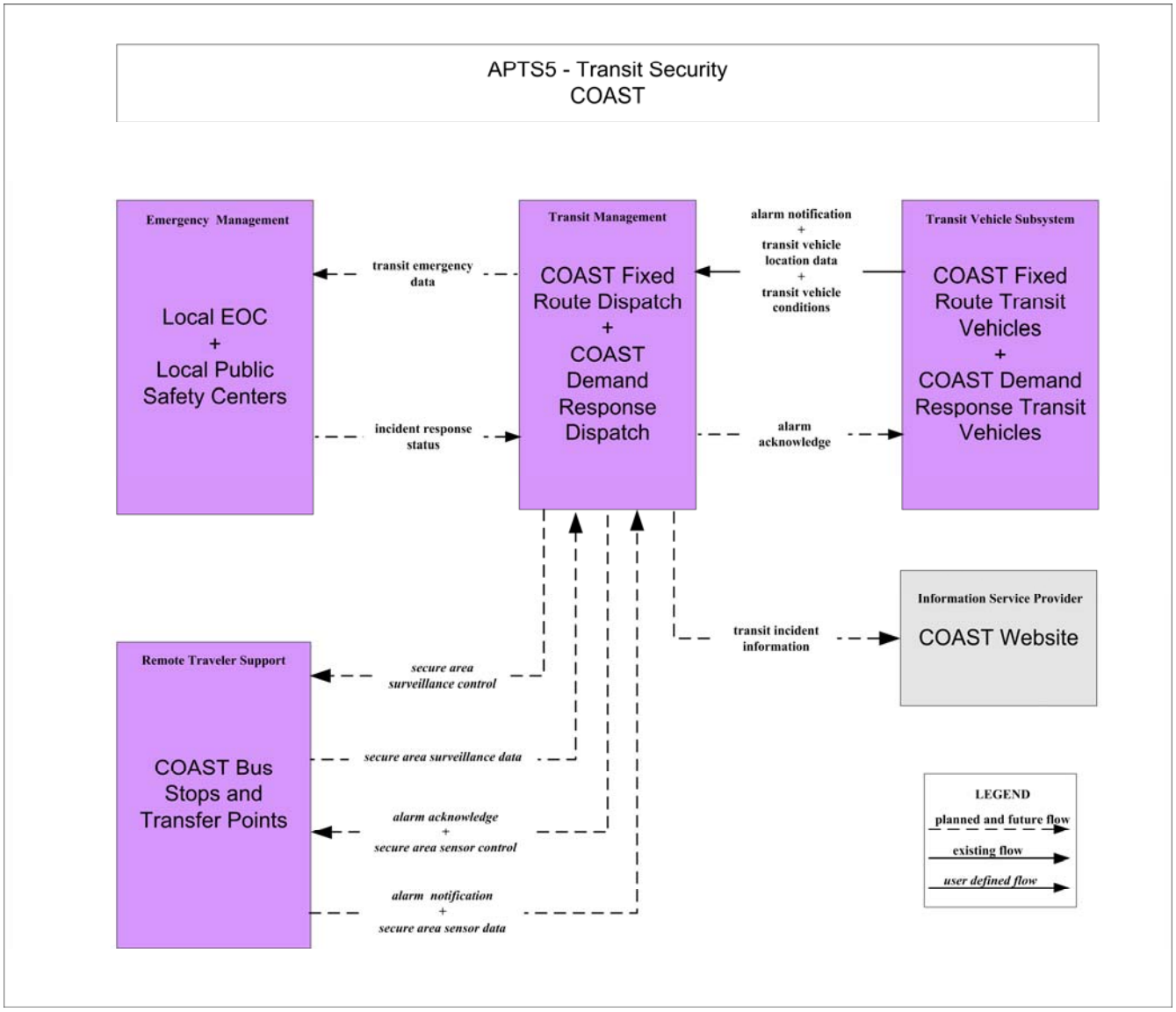

APTS3 - Demand Response Transit Operations
CART
Traffic Management
Local Traffic Management Systems
+
Statewide Transportation Management Center (NHDOT)
road network conditions
Transit Management
CART Broker/ Manager
+
CART Demand Response Dispatch
transit vehicle operator information
demand response passenger and use data
Transit Vehicle Subsystem
CART Demand Response Transit Vehicles
Information Service Provider
CART Website
+
CART Telephone
demand responsive transit plan
+
transit and fare schedules
demand responsive transit request
+
selected routes
LEGEND
planned and future flow
existing flow
user defined flow

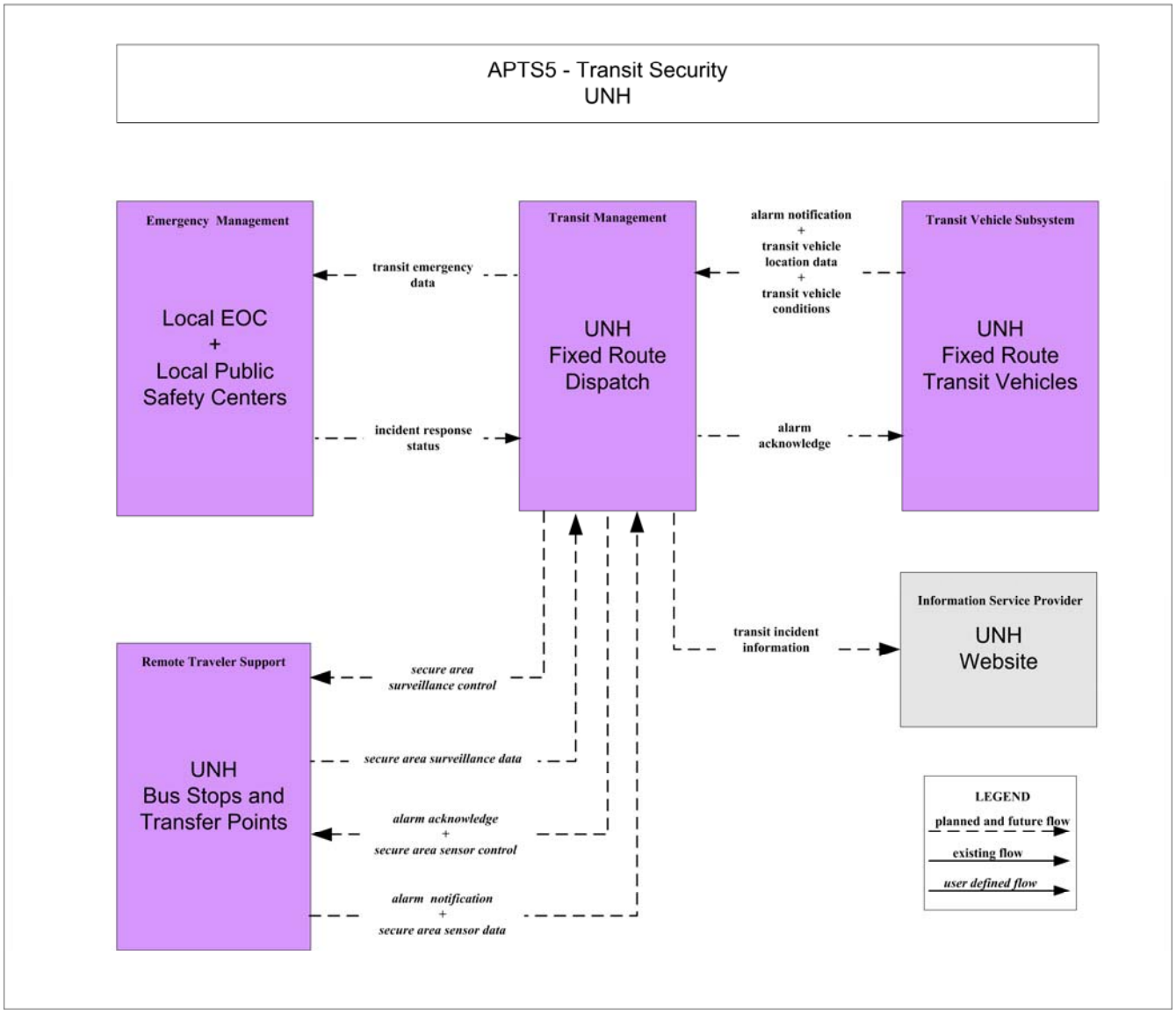

APTS3 - Demand Response Transit Operations
COAST
Traffic Management
Local Traffic Management Systems
+
Statewide Transportation Management Center (NHDOT)
road network conditions
Transit Management
COAST Demand Response Dispatch
transit vehicle operator information
demand response passenger and use data
Transit Vehicle Subsystem
COAST Demand Response Transit Vehicles
Information Service Provider
COAST Website
+
Regional Call/ Coordination Center
demand responsive transit plan
+
transit and fare schedules
+
transit schedule adherence information
demand responsive transit request
+
selected routes
LEGEND
planned and future flow
existing flow
user defined flow

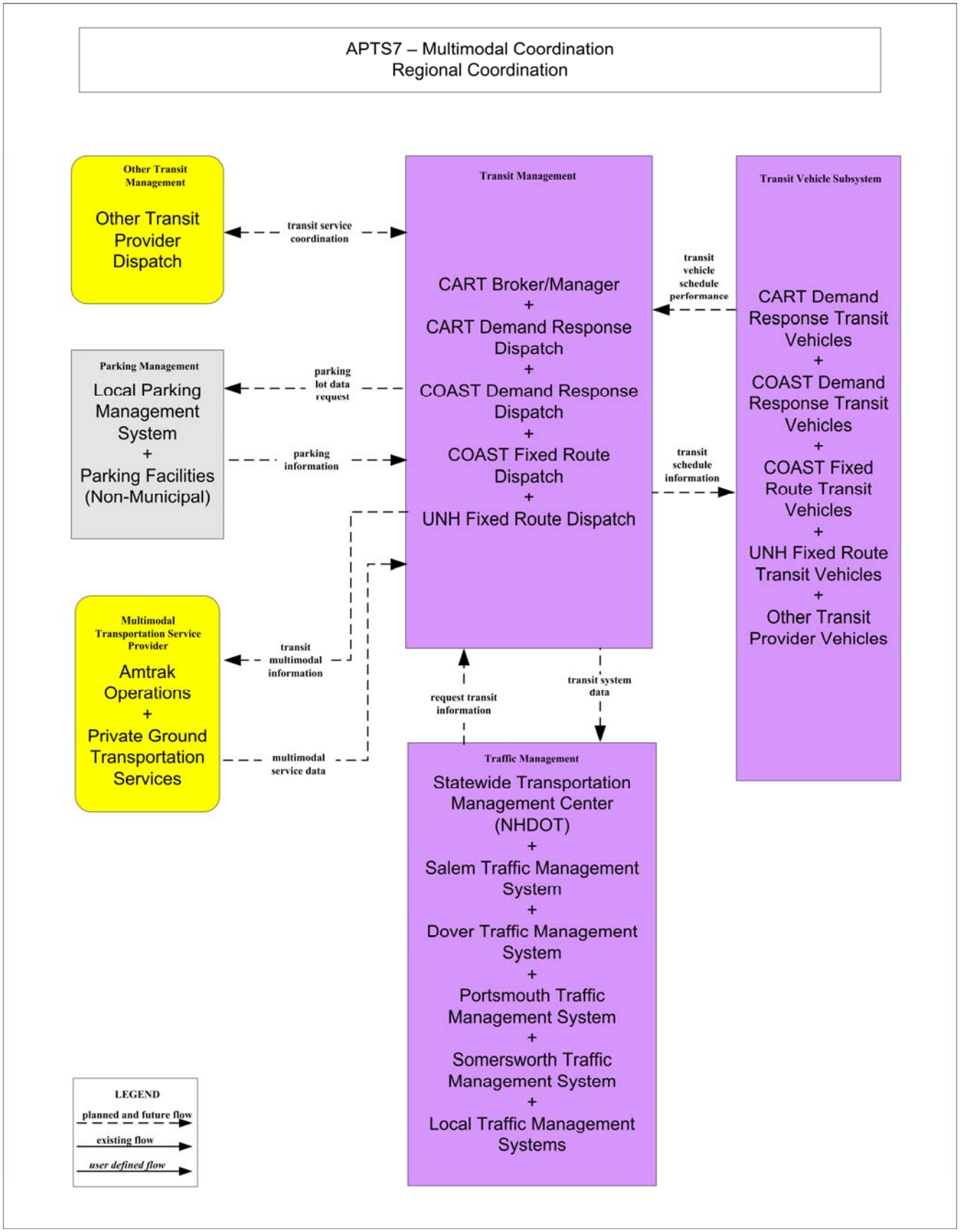

APTS3 - Demand Response Transit Operations
Other Transit Providers
Traffic Management
Local Traffic Management Systems + Statewide Transportation Management Center (NHDOT)
road network conditions
Transit Management
Other Transit Provider Dispatch
transit vehicle operator information
demand response passenger and use data
Transit Vehicle Subsystem
Other Transit Provider Vehicles
Information Service Provider
Regional Call/ Coordination Center
demand responsive transit plan + transit and fare schedules
demand responsive transit request + selected routes
LEGEND
planned and future flow
existing flow
user defined flow

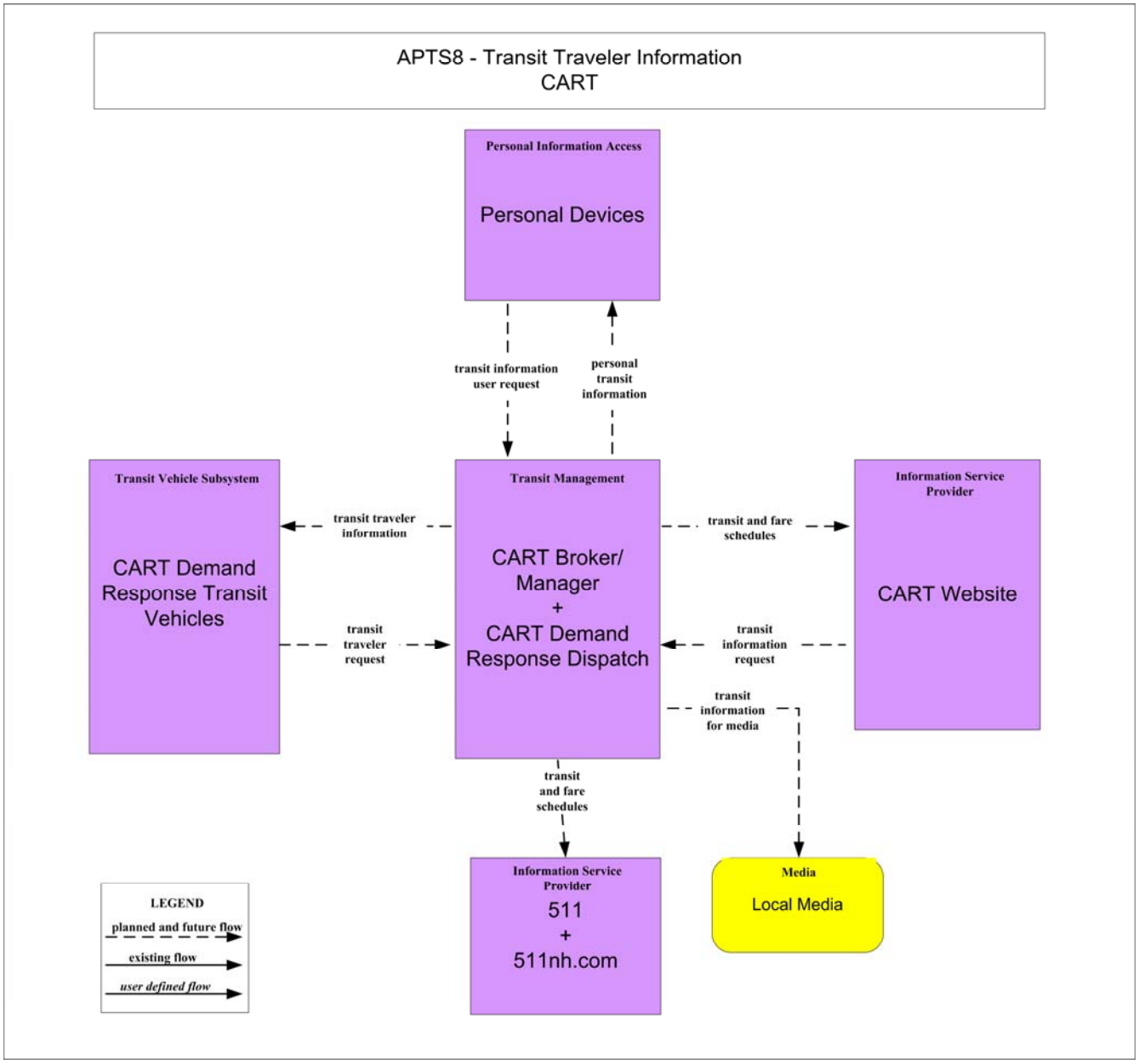

APTS4 - Transit Fare Collection Management
Electronic Fare Collection
Financial Institution
Financial Institution + Health and Human Services
payment request
transaction status
Transit Management
CART Broker/Manager + CART Demand Response Dispatch + COAST Demand Response Dispatch + COAST Fixed Route Dispatch + UNH Fixed Route Dispatch + Other Transit Provider Dispatch
fare collection data
fare management information
request for bad tag list
bad tag list
Transit Vehicle Subsystem
CART Demand Response Transit Vehicles + COAST Demand Response Transit Vehicles + COAST Fixed Route Transit Vehicles + UNH Fixed Route Transit Vehicles + Other Transit Provider Vehicles
payment
request for payment
transit fare information
transit fare and passenger status
Remote Traveler Support
Traveler Card Update Devices
request for payment
payment
Traveler Card
Regional Fare Card + Service Agency Cards + Other Prepaid Stored Value Smart Cards
LEGEND
planned and future flow
existing flow
user defined flow

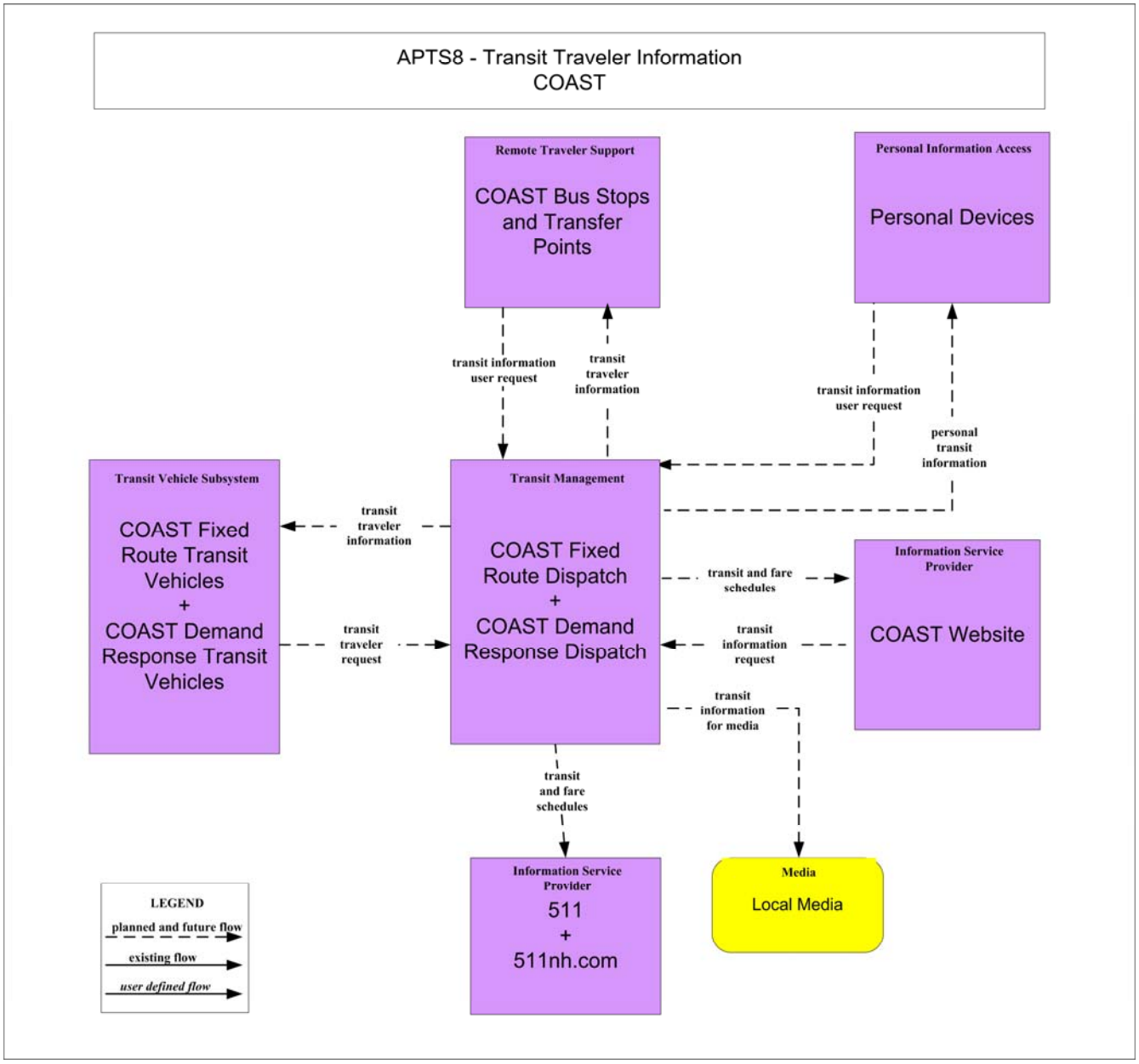

APTS5 - Transit Security
CART
Emergency Management
Local EOC
+
Local Public Safety Centers
Transit Management
CART Demand Response Dispatch
Transit Vehicle Subsystem
CART Demand Response Transit Vehicles
transit emergency data
incident response status
alarm notification
+
transit vehicle location data
+
transit vehicle conditions
alarm acknowledge
Information Service Provider
CART Website
transit incident information
Remote Traveler Support
CART Bus Stops and Transfer Points
secure area surveillance control
secure area surveillance data
alarm acknowledge
+
secure area sensor control
alarm notification
+
secure area sensor data
LEGEND
planned and future flow
existing flow
user defined flow

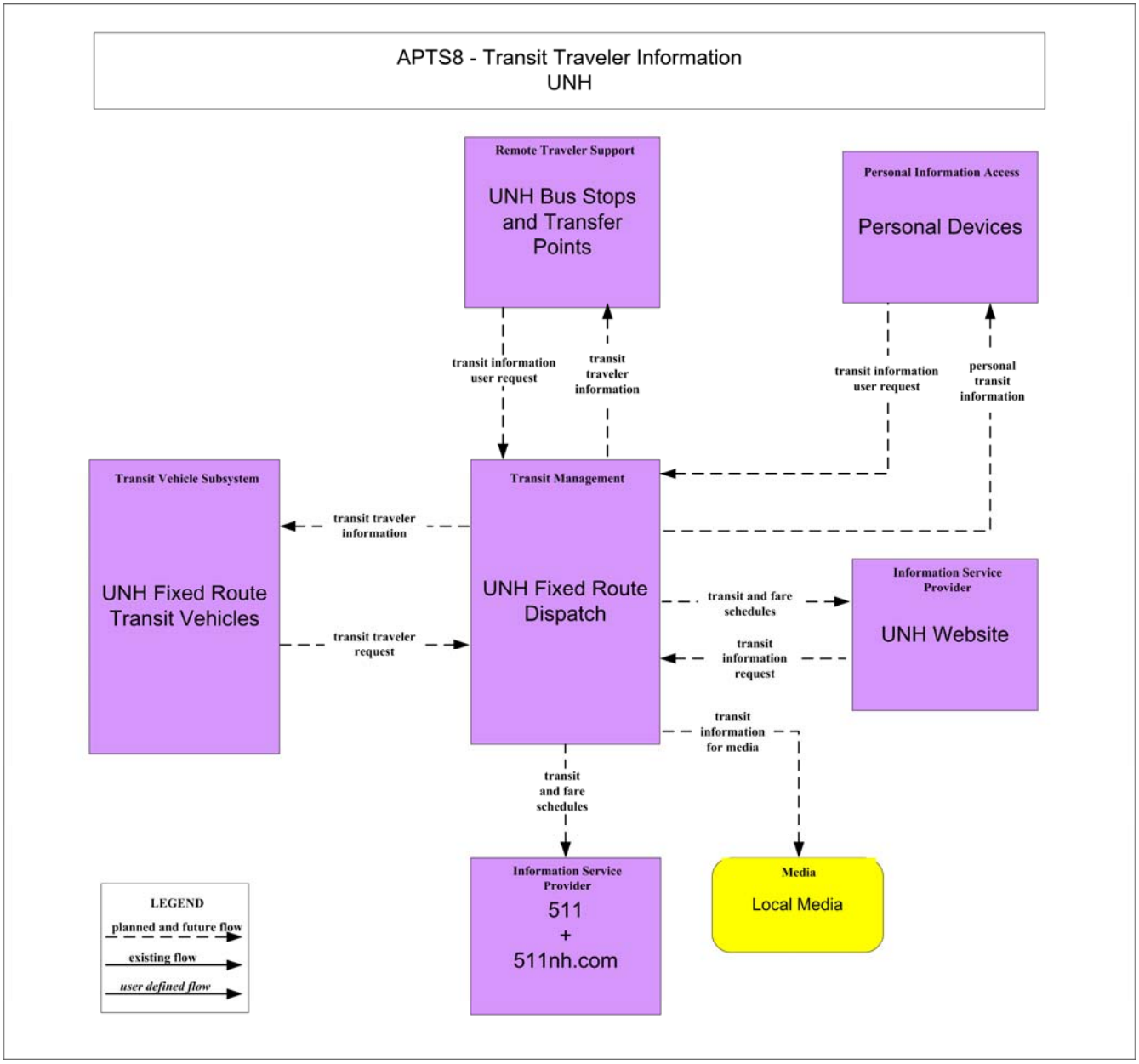

APTS5 - Transit Security
COAST
Emergency Management
Local EOC
+
Local Public Safety Centers
transit emergency data
incident response status
Transit Management
COAST Fixed Route Dispatch
+
COAST Demand Response Dispatch
alarm notification
+
transit vehicle location data
+
transit vehicle conditions
alarm acknowledge
Transit Vehicle Subsystem
COAST Fixed Route Transit Vehicles
+
COAST Demand Response Transit Vehicles
transit incident information
Information Service Provider
COAST Website
Remote Traveler Support
COAST Bus Stops and Transfer Points
secure area surveillance control
secure area surveillance data
alarm acknowledge
+
secure area sensor control
alarm notification
+
secure area sensor data
LEGEND
planned and future flow
existing flow
user defined flow

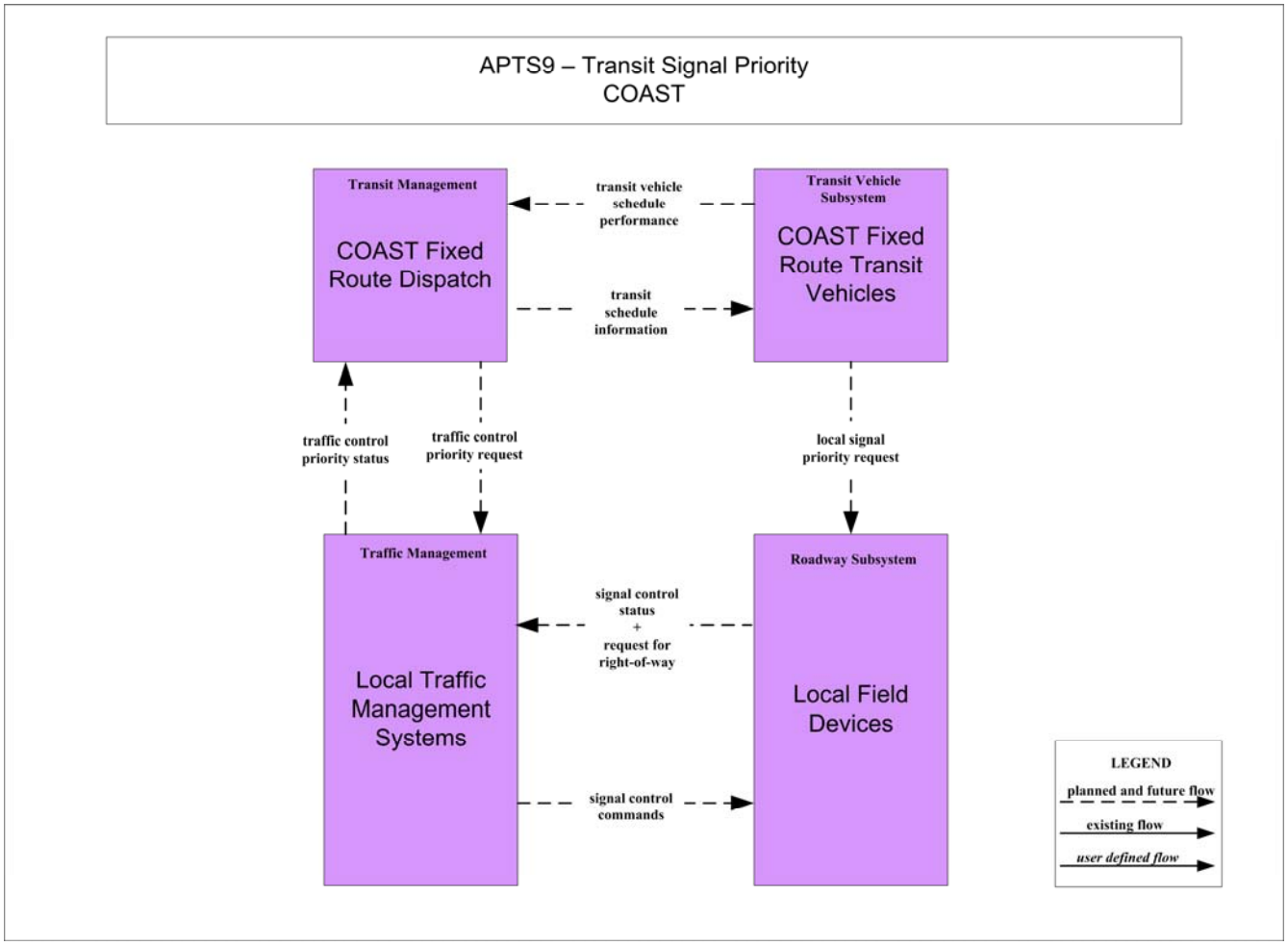

APTS5 - Transit Security
UNH
Emergency Management
Local EOC
+
Local Public
Safety Centers
Transit Management
UNH
Fixed Route
Dispatch
Transit Vehicle Subsystem
UNH
Fixed Route
Transit Vehicles
transit emergency data
incident response status
alarm notification
+
transit vehicle location data
+
transit vehicle conditions
alarm acknowledge
Information Service Provider
UNH
Website
transit incident information
Remote Traveler Support
UNH
Bus Stops and
Transfer Points
secure area surveillance control
secure area surveillance data
alarm acknowledge
+
secure area sensor control
alarm notification
+
secure area sensor data
LEGEND
planned and future flow
existing flow
user defined flow

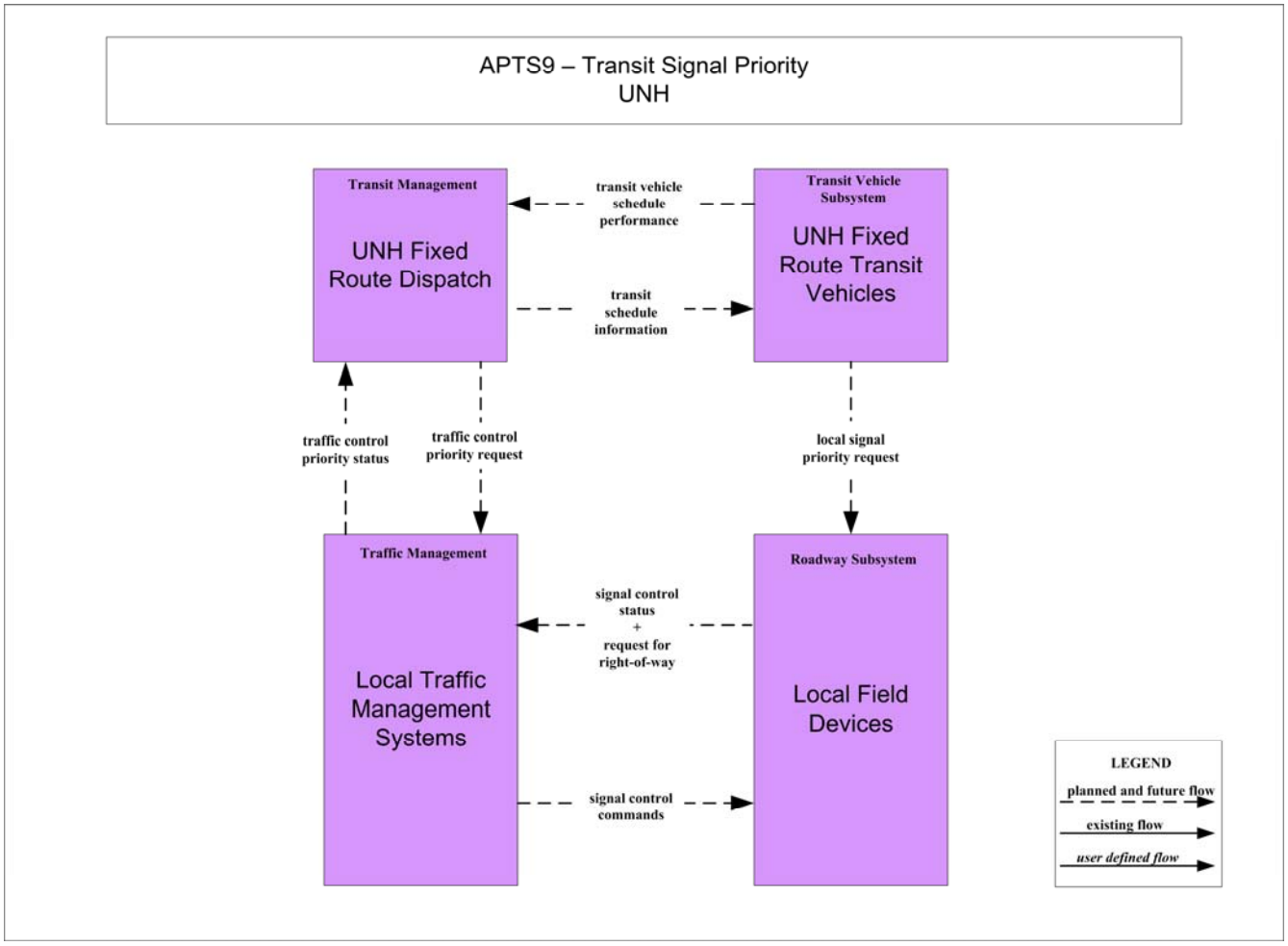

APTS7 – Multimodal Coordination
Regional Coordination
Other Transit Management
Other Transit Provider Dispatch
transit service coordination
Transit Management
CART Broker/Manager
+
CART Demand Response Dispatch
+
COAST Demand Response Dispatch
+
COAST Fixed Route Dispatch
+
UNH Fixed Route Dispatch
transit vehicle schedule performance
Transit Vehicle Subsystem
CART Demand Response Transit Vehicles
+
COAST Demand Response Transit Vehicles
+
COAST Fixed Route Transit Vehicles
+
UNH Fixed Route Transit Vehicles
+
Other Transit Provider Vehicles
Parking Management
Local Parking Management System
+
Parking Facilities (Non-Municipal)
parking lot data request
parking information
transit schedule information
Multimodal Transportation Service Provider
Amtrak Operations
+
Private Ground Transportation Services
transit multimodal information
multimodal service data
request transit information
transit system data
Traffic Management
Statewide Transportation Management Center (NHDOT)
+
Salem Traffic Management System
+
Dover Traffic Management System
+
Portsmouth Traffic Management System
+
Somersworth Traffic Management System
+
Local Traffic Management Systems
LEGEND
planned and future flow
existing flow
user defined flow

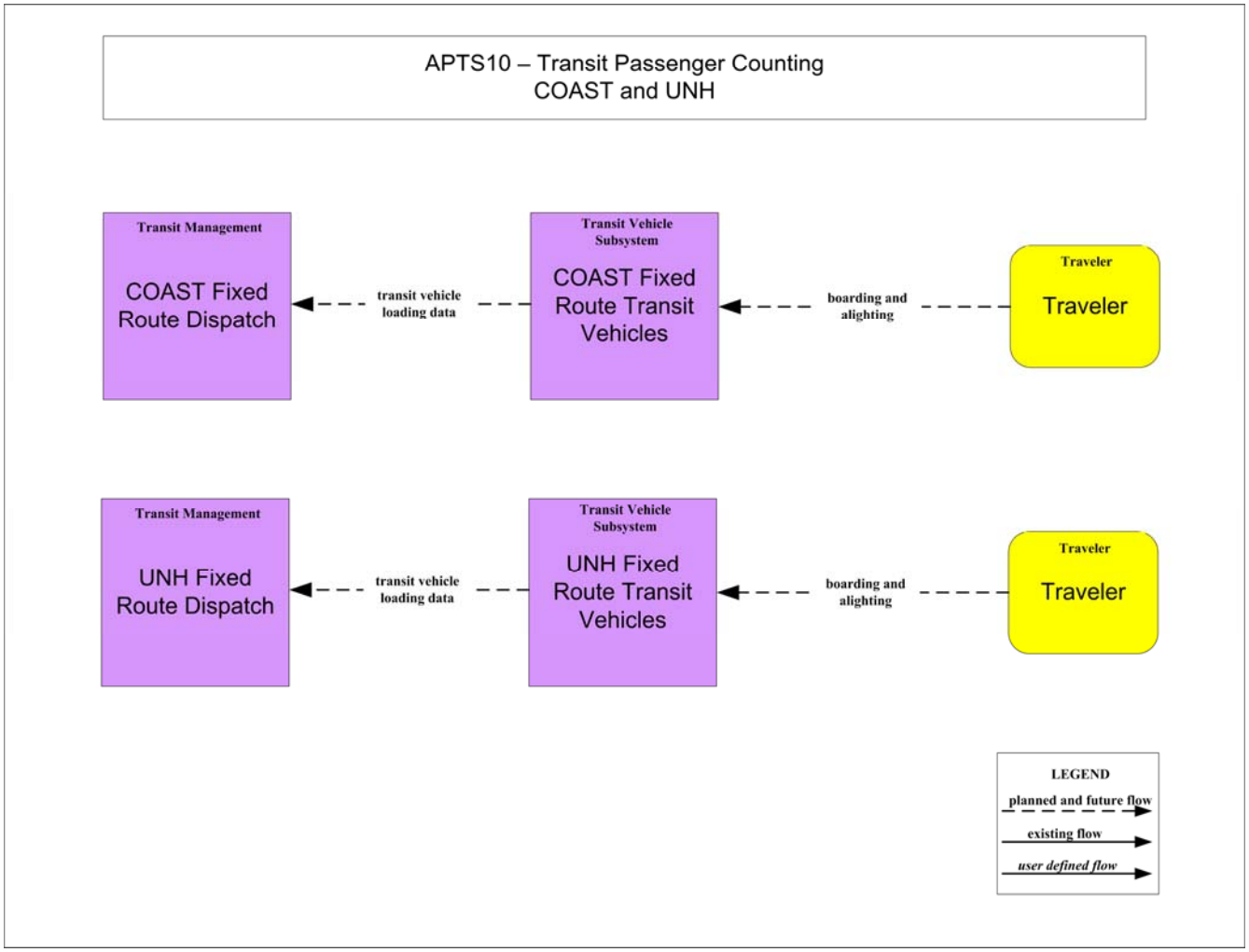

APTS8 - Transit Traveler Information
CART
Personal Information Access
Personal Devices
transit information user request
personal transit information
Transit Vehicle Subsystem
CART Demand Response Transit Vehicles
transit traveler information
transit traveler request
Transit Management
CART Broker/ Manager
+
CART Demand Response Dispatch
transit and fare schedules
transit information request
transit information for media
Information Service Provider
CART Website
transit and fare schedules
Information Service Provider
511
+
511nh.com
Media
Local Media
LEGEND
planned and future flow
existing flow
user defined flow


APTS8 - Transit Traveler Information
COAST
Remote Traveler Support
COAST Bus Stops and Transfer Points
Personal Information Access
Personal Devices
transit information user request
transit traveler information
transit information user request
personal transit information
Transit Vehicle Subsystem
COAST Fixed Route Transit Vehicles + COAST Demand Response Transit Vehicles
Transit Management
COAST Fixed Route Dispatch + COAST Demand Response Dispatch
transit traveler information
transit traveler request
transit and fare schedules
transit information request
Information Service Provider
COAST Website
transit information for media
transit and fare schedules
Information Service Provider
511 + 511nh.com
Media
Local Media
LEGEND
planned and future flow
existing flow
user defined flow


APTS8 - Transit Traveler Information
UNH
Remote Traveler Support
UNH Bus Stops and Transfer Points
Personal Information Access
Personal Devices
transit information user request
transit traveler information
transit information user request
personal transit information
Transit Vehicle Subsystem
UNH Fixed Route Transit Vehicles
Transit Management
UNH Fixed Route Dispatch
transit traveler information
transit traveler request
transit and fare schedules
transit information request
Information Service Provider
UNH Website
transit information for media
transit and fare schedules
Information Service Provider
511 + 511nh.com
Media
Local Media
LEGEND
planned and future flow
existing flow
user defined flow

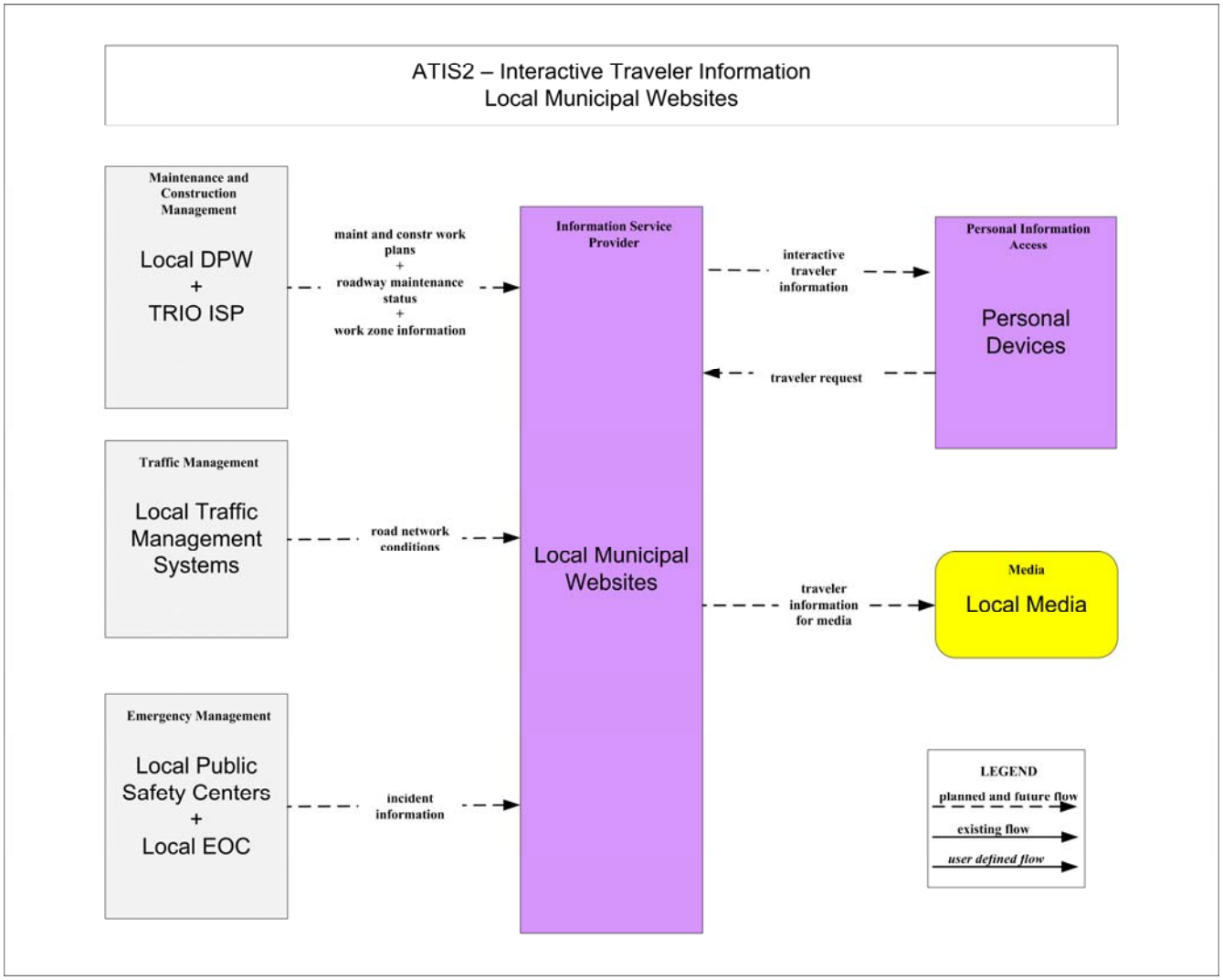

APTS9 – Transit Signal Priority
COAST
Transit Management
COAST Fixed Route Dispatch
transit vehicle schedule performance
transit schedule information
Transit Vehicle Subsystem
COAST Fixed Route Transit Vehicles
traffic control priority status
traffic control priority request
local signal priority request
Traffic Management
Local Traffic Management Systems
signal control status + request for right-of-way
signal control commands
Roadway Subsystem
Local Field Devices
LEGEND
planned and future flow
existing flow
user defined flow


APTS9 – Transit Signal Priority
UNH
Transit Management
UNH Fixed Route Dispatch
transit vehicle schedule performance
transit schedule information
Transit Vehicle Subsystem
UNH Fixed Route Transit Vehicles
traffic control priority status
traffic control priority request
local signal priority request
Traffic Management
Local Traffic Management Systems
signal control status + request for right-of-way
signal control commands
Roadway Subsystem
Local Field Devices
LEGEND
planned and future flow
existing flow
user defined flow


APTS10 – Transit Passenger Counting
COAST and UNH
Transit Management
COAST Fixed Route Dispatch
transit vehicle loading data
Transit Vehicle Subsystem
COAST Fixed Route Transit Vehicles
boarding and alighting
Traveler
Traveler
Transit Management
UNH Fixed Route Dispatch
transit vehicle loading data
Transit Vehicle Subsystem
UNH Fixed Route Transit Vehicles
boarding and alighting
Traveler
Traveler
LEGEND
planned and future flow
existing flow
user defined flow

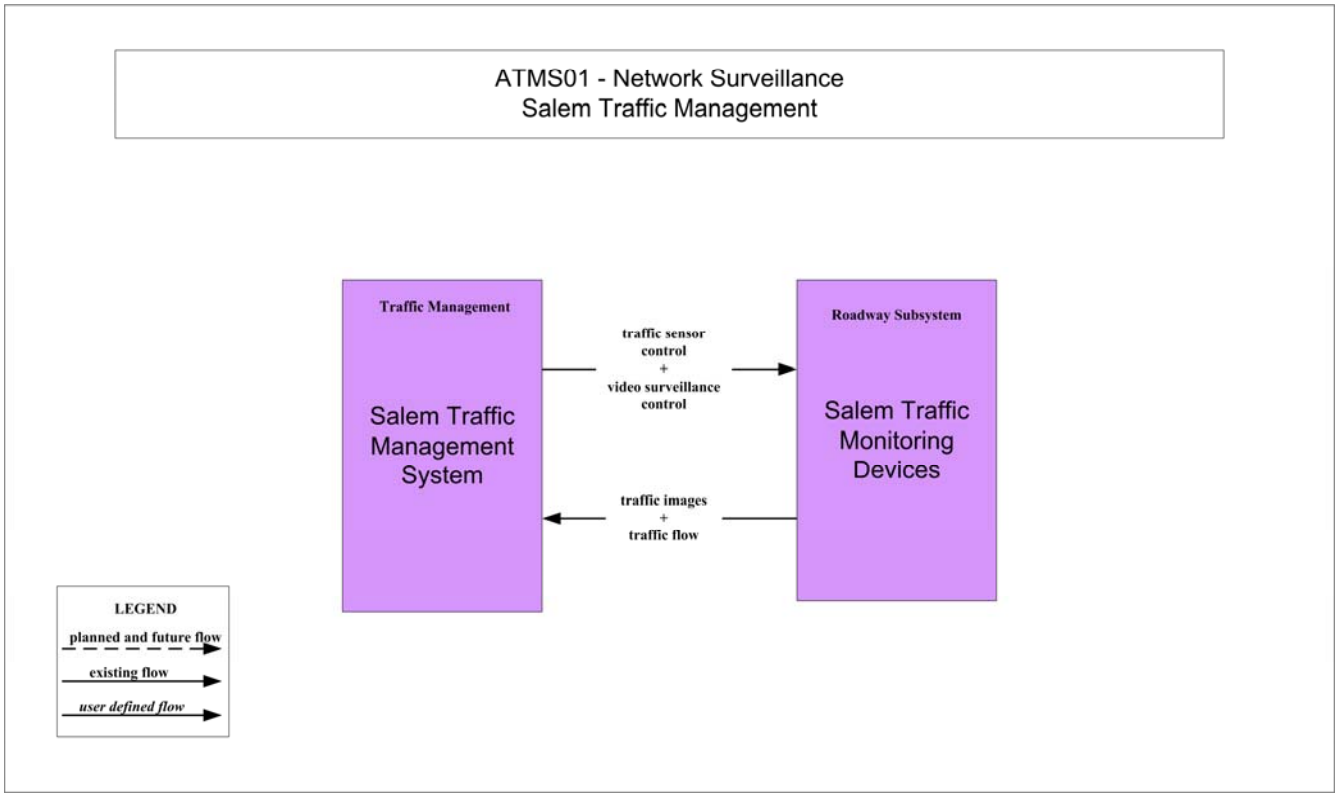
TRAVELER INFORMATION

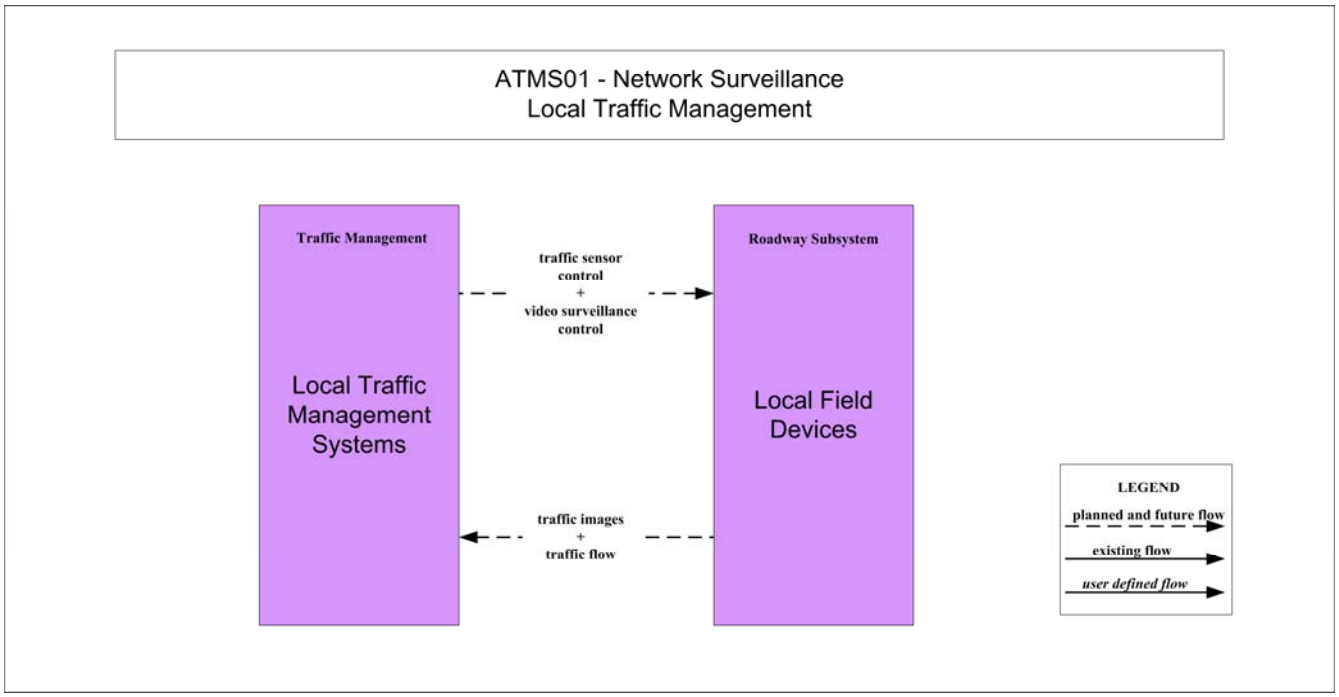
SERVICE PACKAGE DIAGRAMS

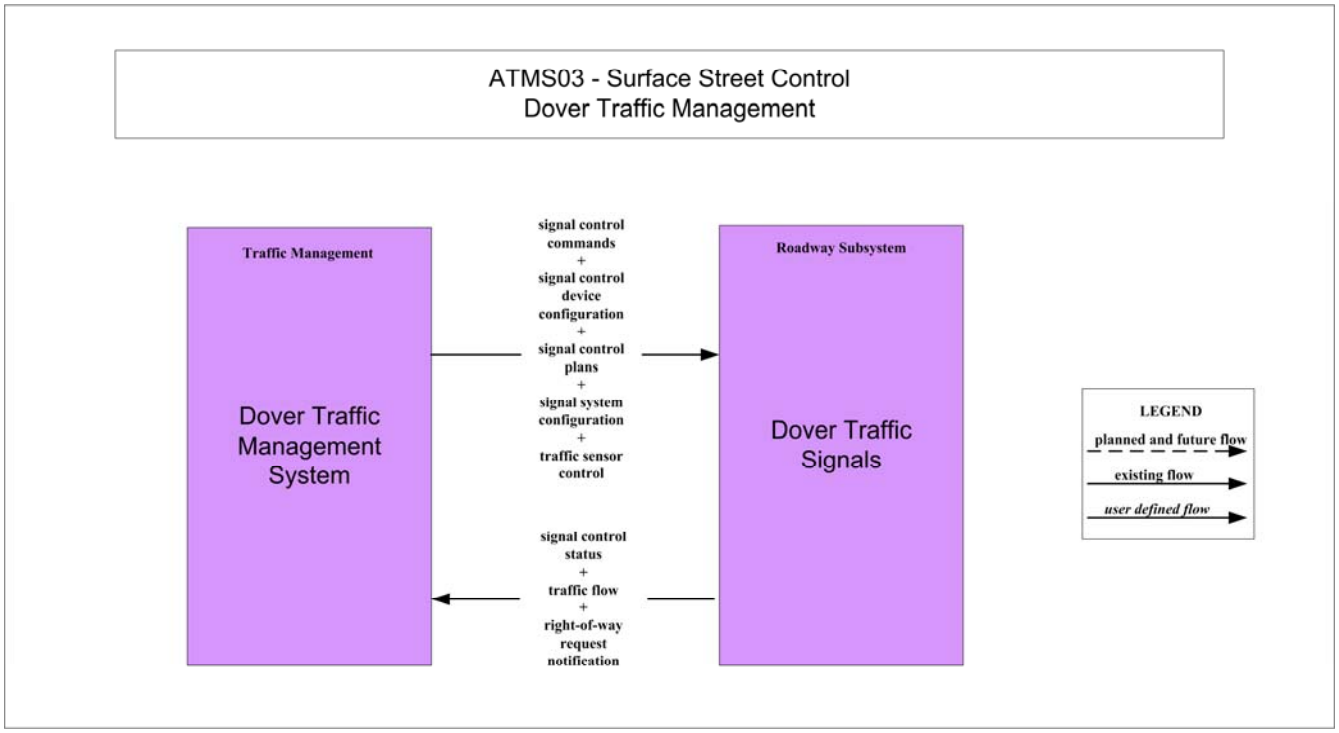

ATIS2 – Interactive Traveler Information
Local Municipal Websites
Maintenance and Construction Management
Local DPW
+
TRIO ISP
maint and constr work plans
+
roadway maintenance status
+
work zone information
Information Service Provider
Local Municipal Websites
interactive traveler information
traveler request
Personal Information Access
Personal Devices
Traffic Management
Local Traffic Management Systems
road network conditions
traveler information for media
Media
Local Media
Emergency Management
Local Public Safety Centers
+
Local EOC
incident information
LEGEND
planned and future flow
existing flow
user defined flow

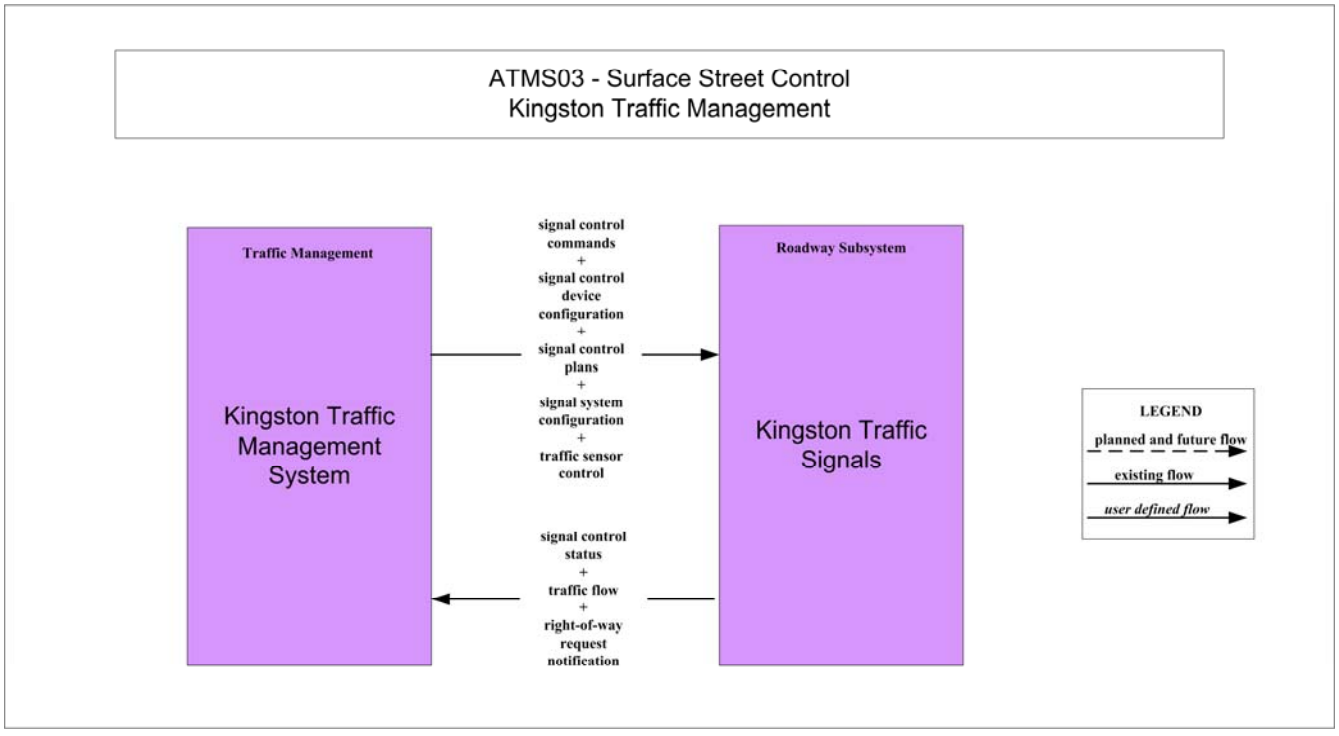
TRAFFIC MANAGEMENT

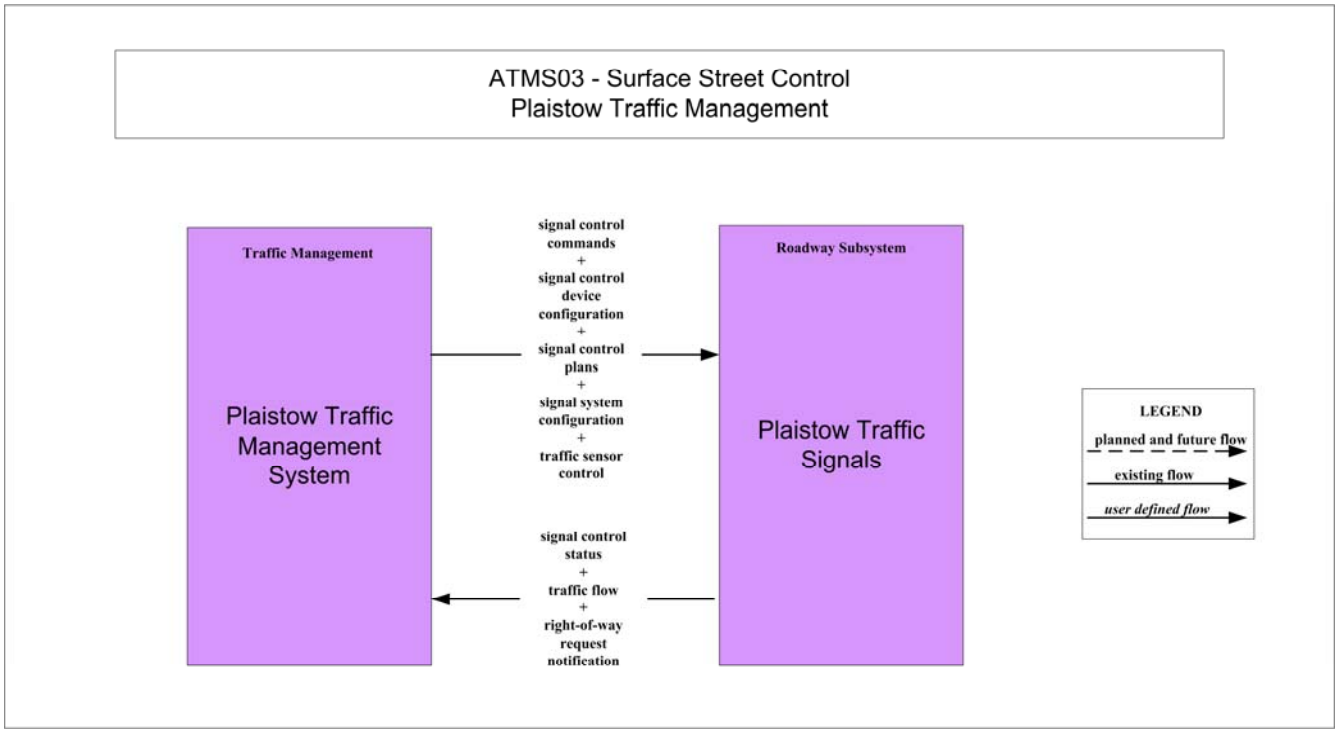
SERVICE PACKAGE DIAGRAMS

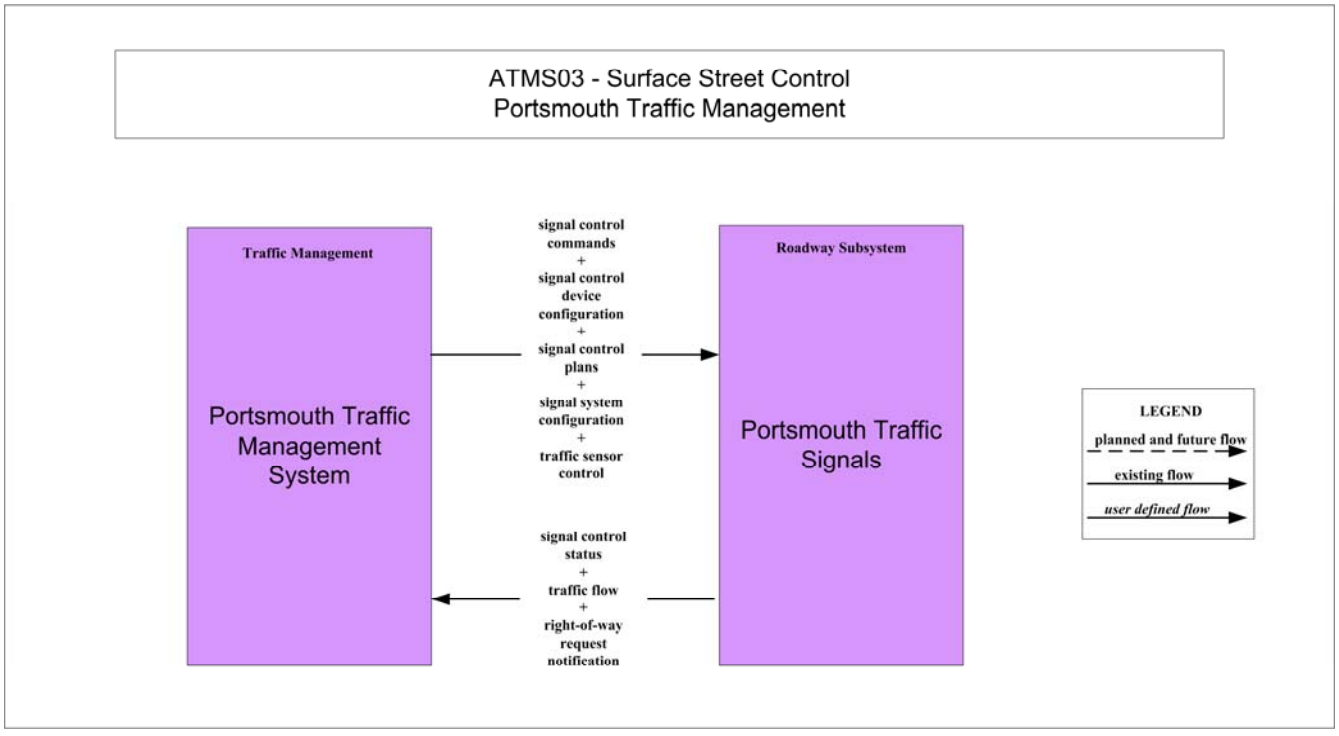

ATMS01 - Network Surveillance
Salem Traffic Management
Traffic Management
Salem Traffic Management System
traffic sensor control + video surveillance control
traffic images + traffic flow
Roadway Subsystem
Salem Traffic Monitoring Devices
LEGEND
planned and future flow
existing flow
user defined flow

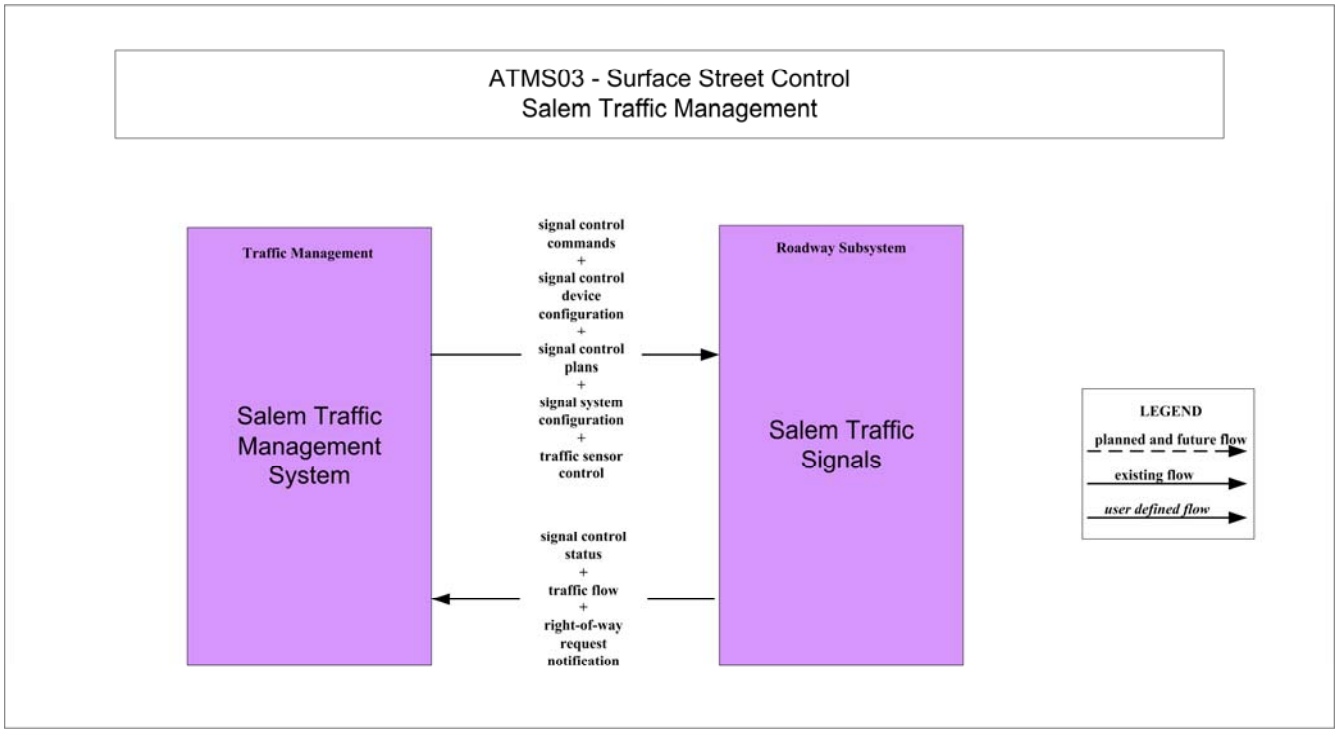

ATMS01 - Network Surveillance
Local Traffic Management
Traffic Management
Local Traffic Management Systems
traffic sensor control + video surveillance control
traffic images + traffic flow
Roadway Subsystem
Local Field Devices
LEGEND
planned and future flow
existing flow
user defined flow

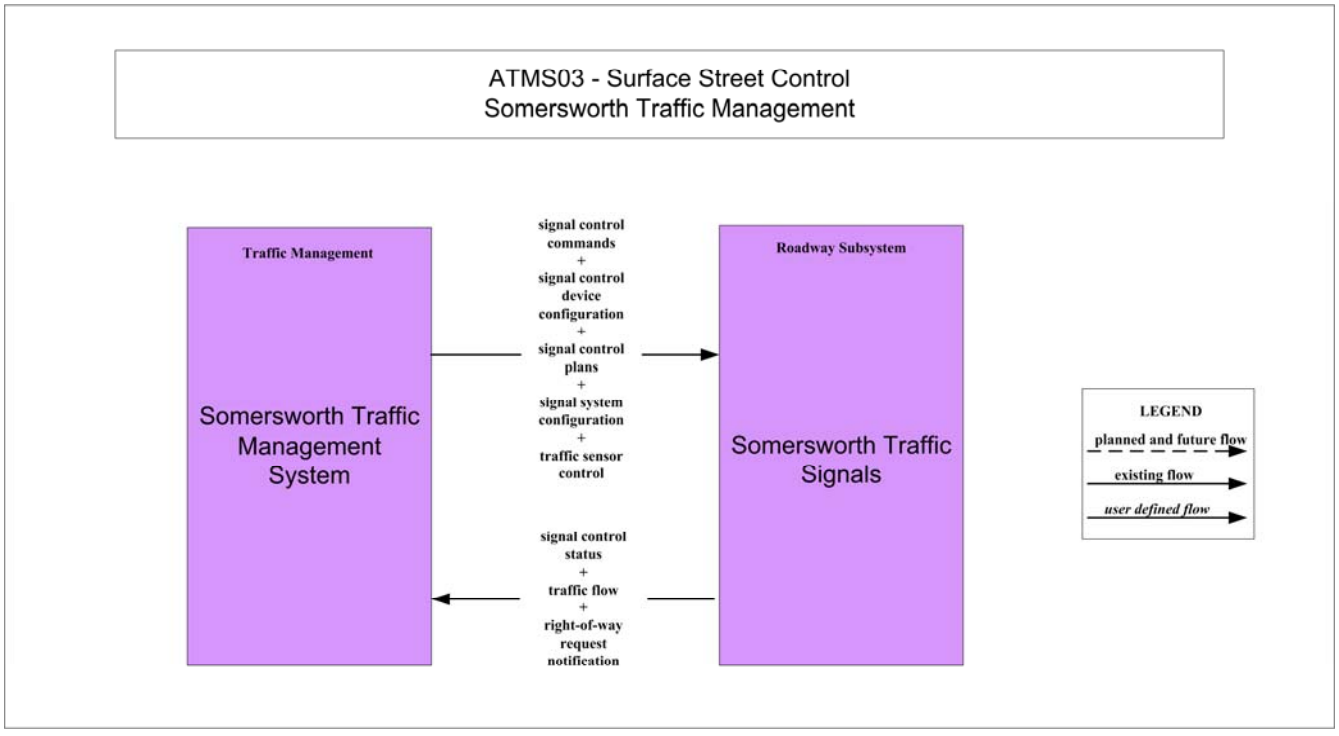

ATMS03 - Surface Street Control
Dover Traffic Management
Traffic Management
Dover Traffic Management System
signal control commands + signal control device configuration + signal control plans + signal system configuration + traffic sensor control
signal control status + traffic flow + right-of-way request notification
Roadway Subsystem
Dover Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

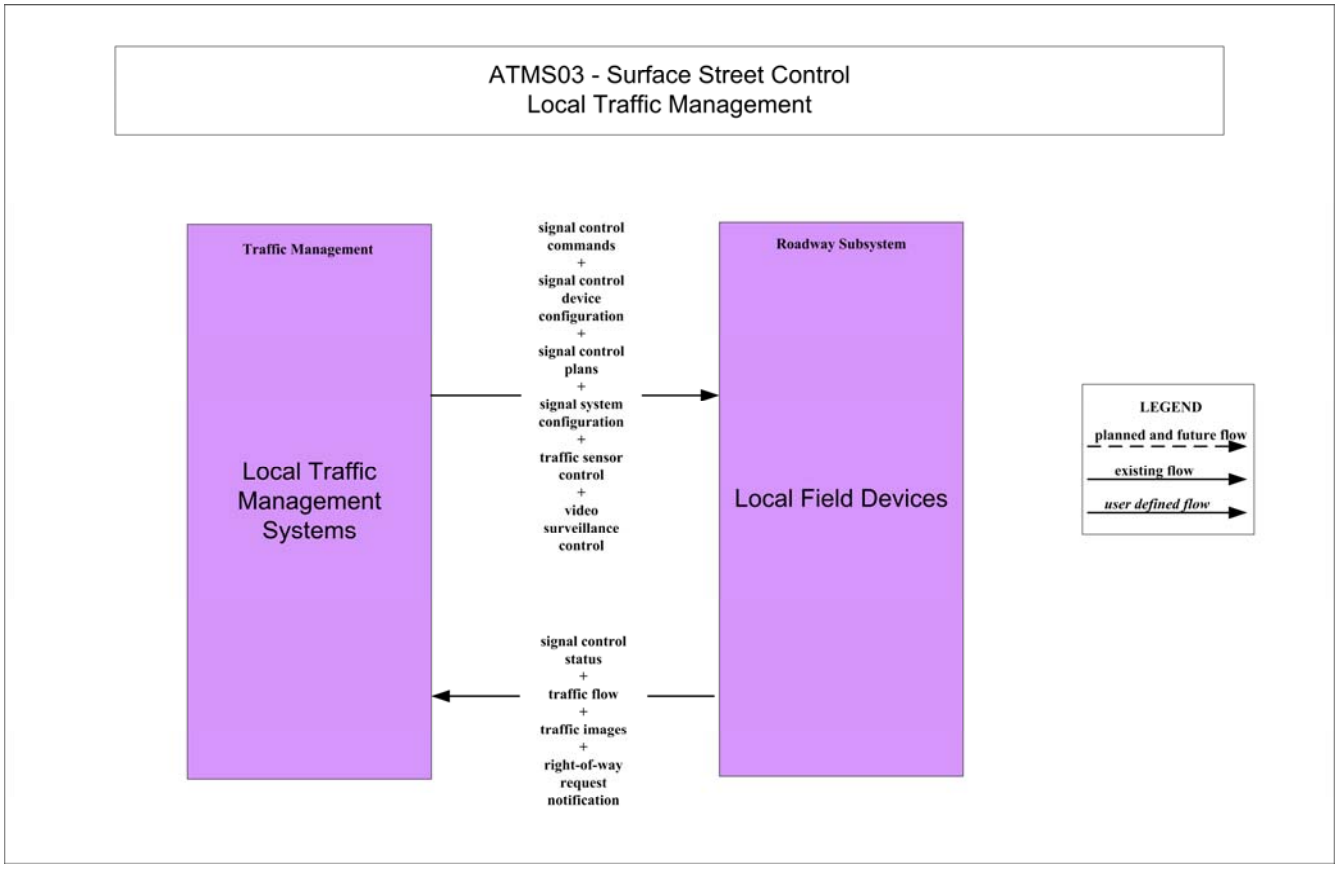

ATMS03 - Surface Street Control
Kingston Traffic Management
Traffic Management
Kingston Traffic Management System
signal control commands + signal control device configuration + signal control plans + signal system configuration + traffic sensor control
signal control status + traffic flow + right-of-way request notification
Roadway Subsystem
Kingston Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

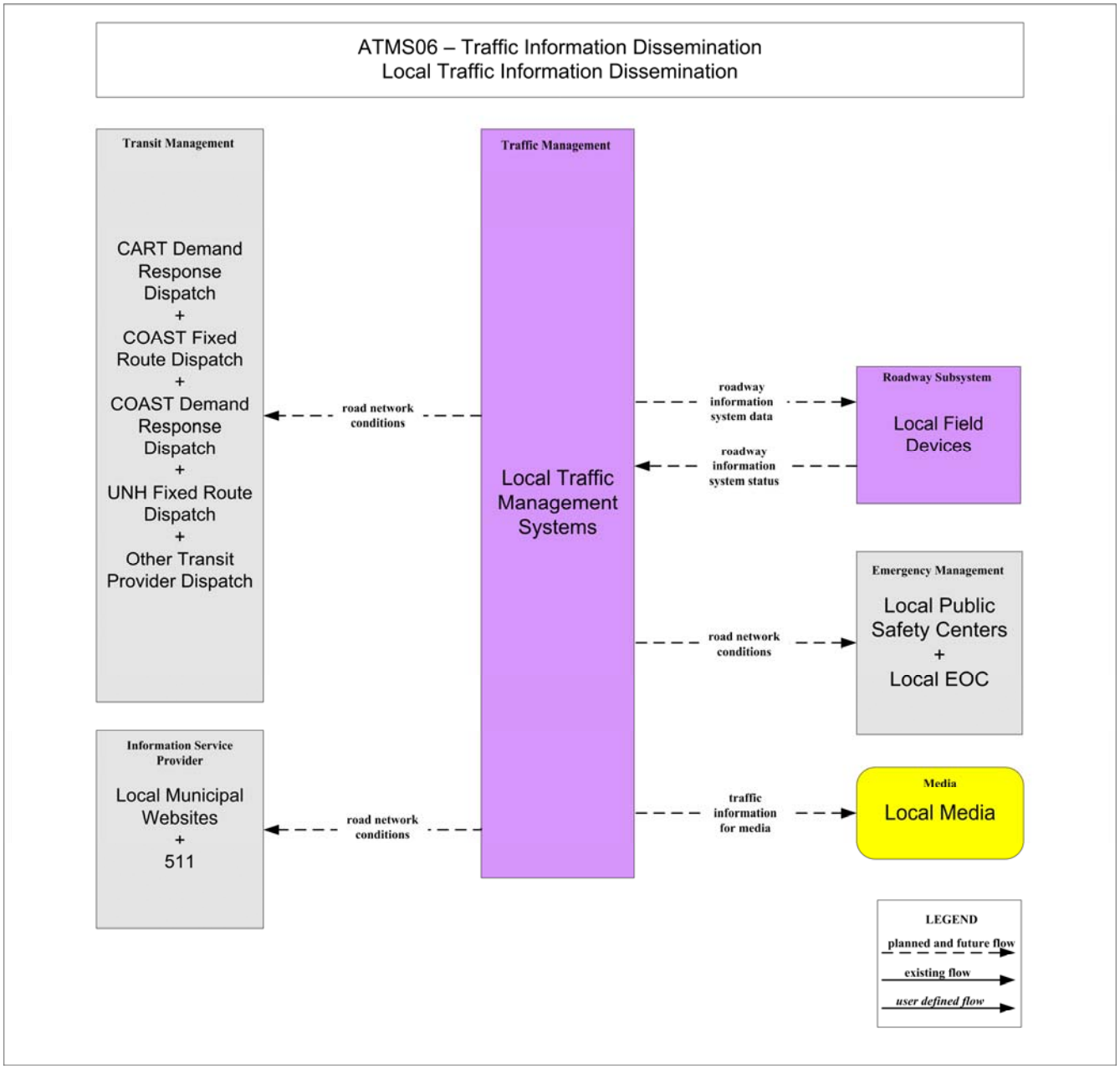

ATMS03 - Surface Street Control
Plaistow Traffic Management
Traffic Management
Plaistow Traffic Management System
signal control commands + signal control device configuration + signal control plans + signal system configuration + traffic sensor control
signal control status + traffic flow + right-of-way request notification
Roadway Subsystem
Plaistow Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

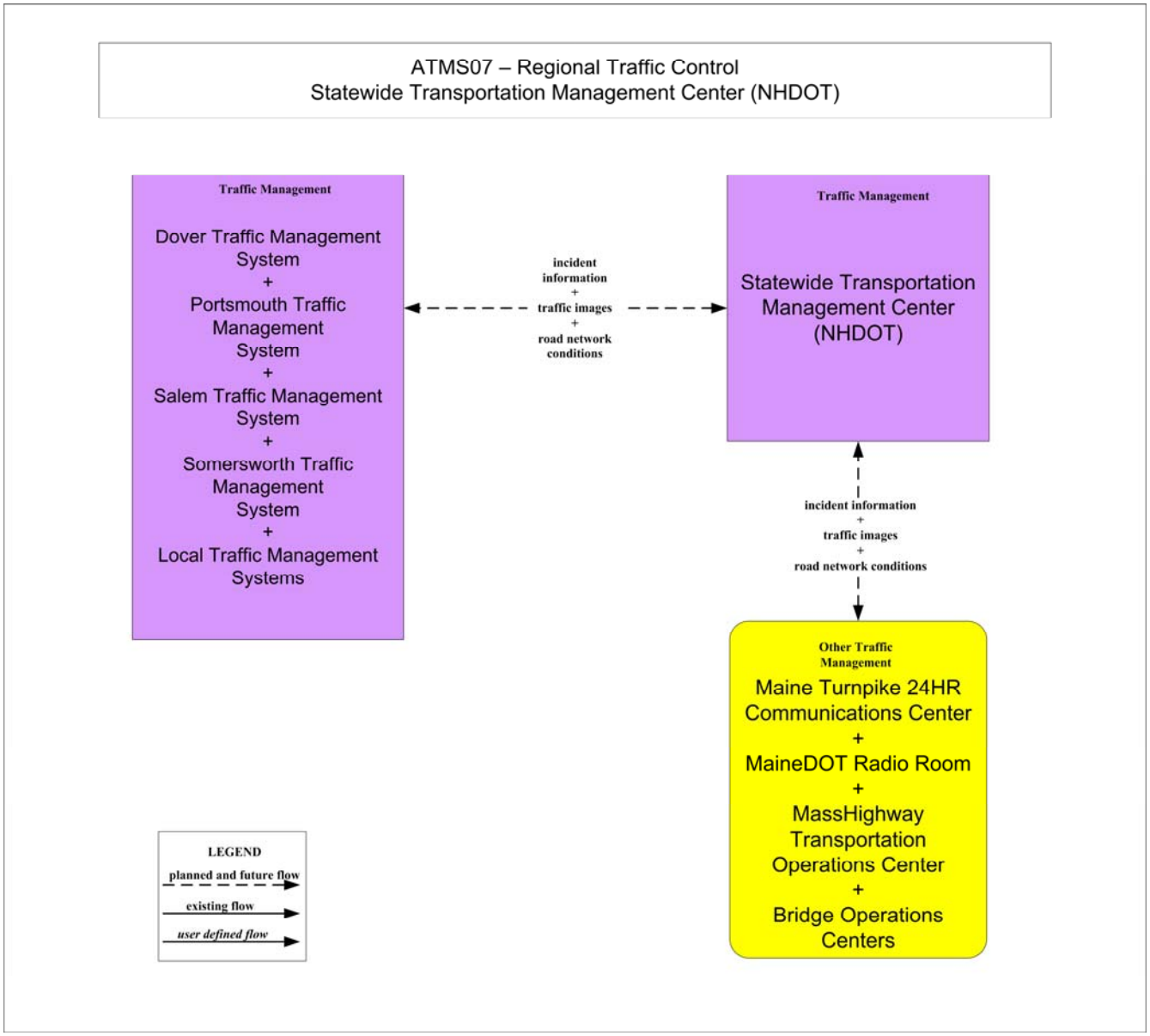

ATMS03 - Surface Street Control
Portsmouth Traffic Management
Traffic Management
Portsmouth Traffic Management System
signal control commands + signal control device configuration + signal control plans + signal system configuration + traffic sensor control
signal control status + traffic flow + right-of-way request notification
Roadway Subsystem
Portsmouth Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

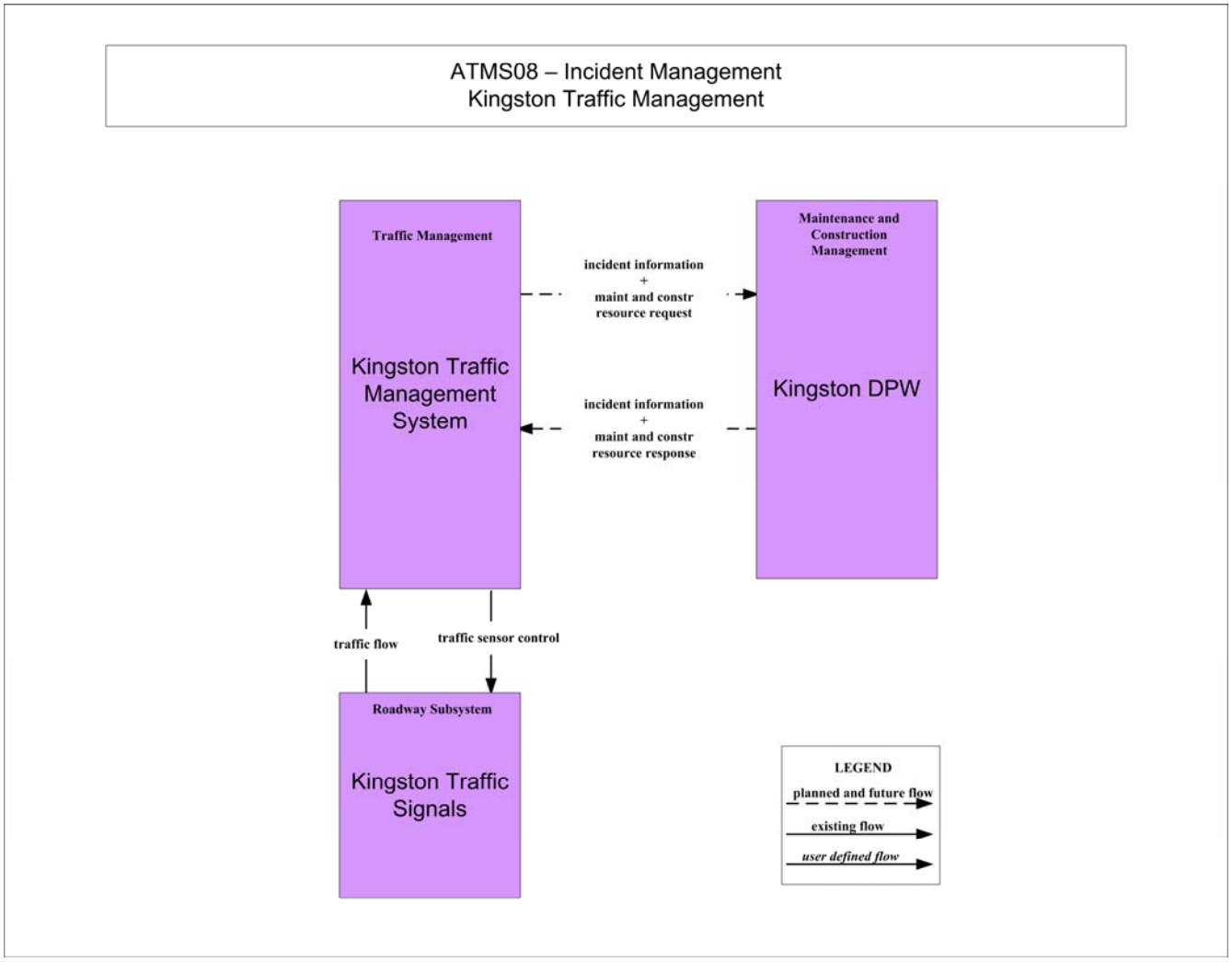

ATMS03 - Surface Street Control
Salem Traffic Management
Traffic Management
Salem Traffic Management System
signal control commands + signal control device configuration + signal control plans + signal system configuration + traffic sensor control
signal control status + traffic flow + right-of-way request notification
Roadway Subsystem
Salem Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

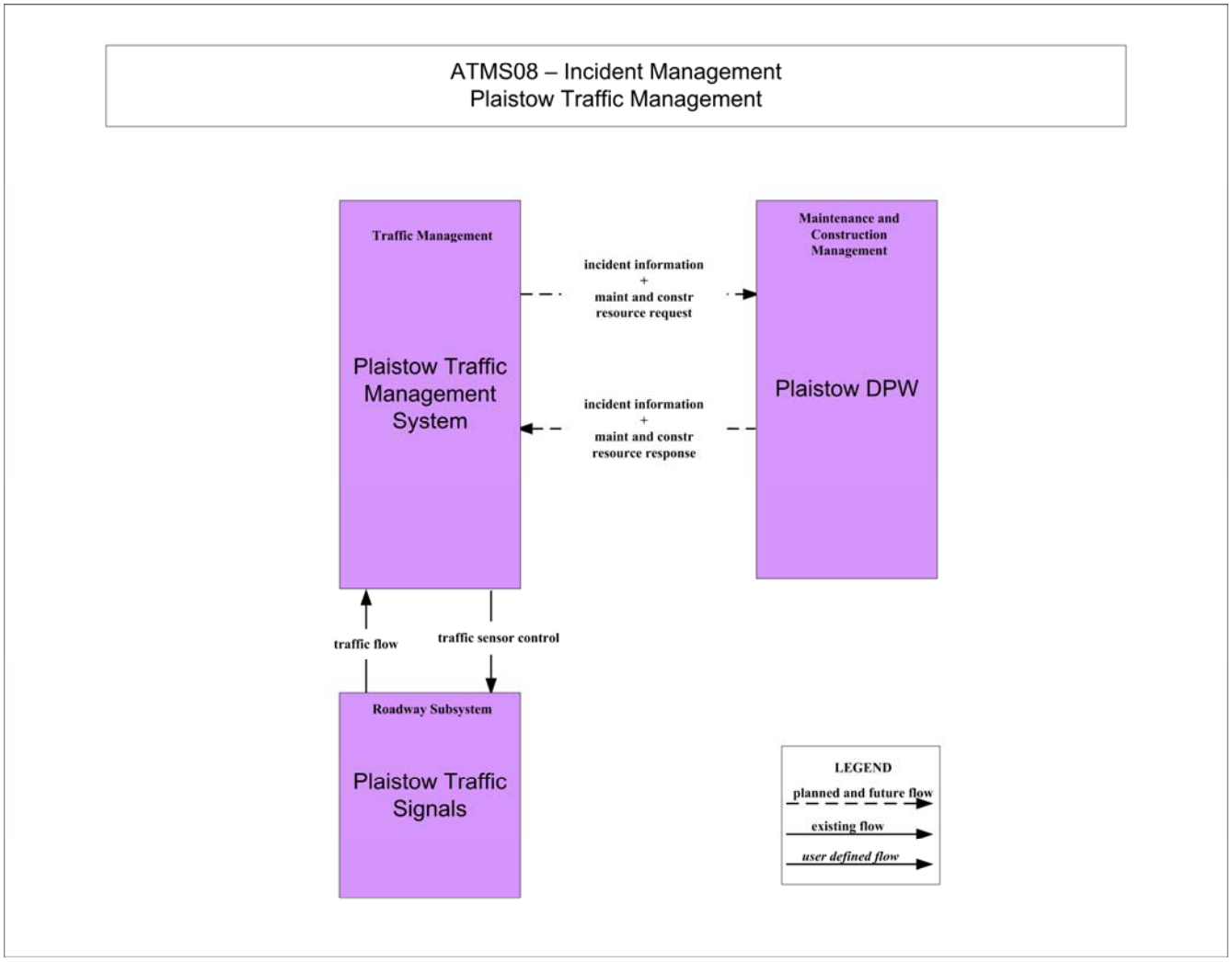

ATMS03 - Surface Street Control
Somersworth Traffic Management
Traffic Management
Somersworth Traffic Management System
signal control commands + signal control device configuration + signal control plans + signal system configuration + traffic sensor control
signal control status + traffic flow + right-of-way request notification
Roadway Subsystem
Somersworth Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

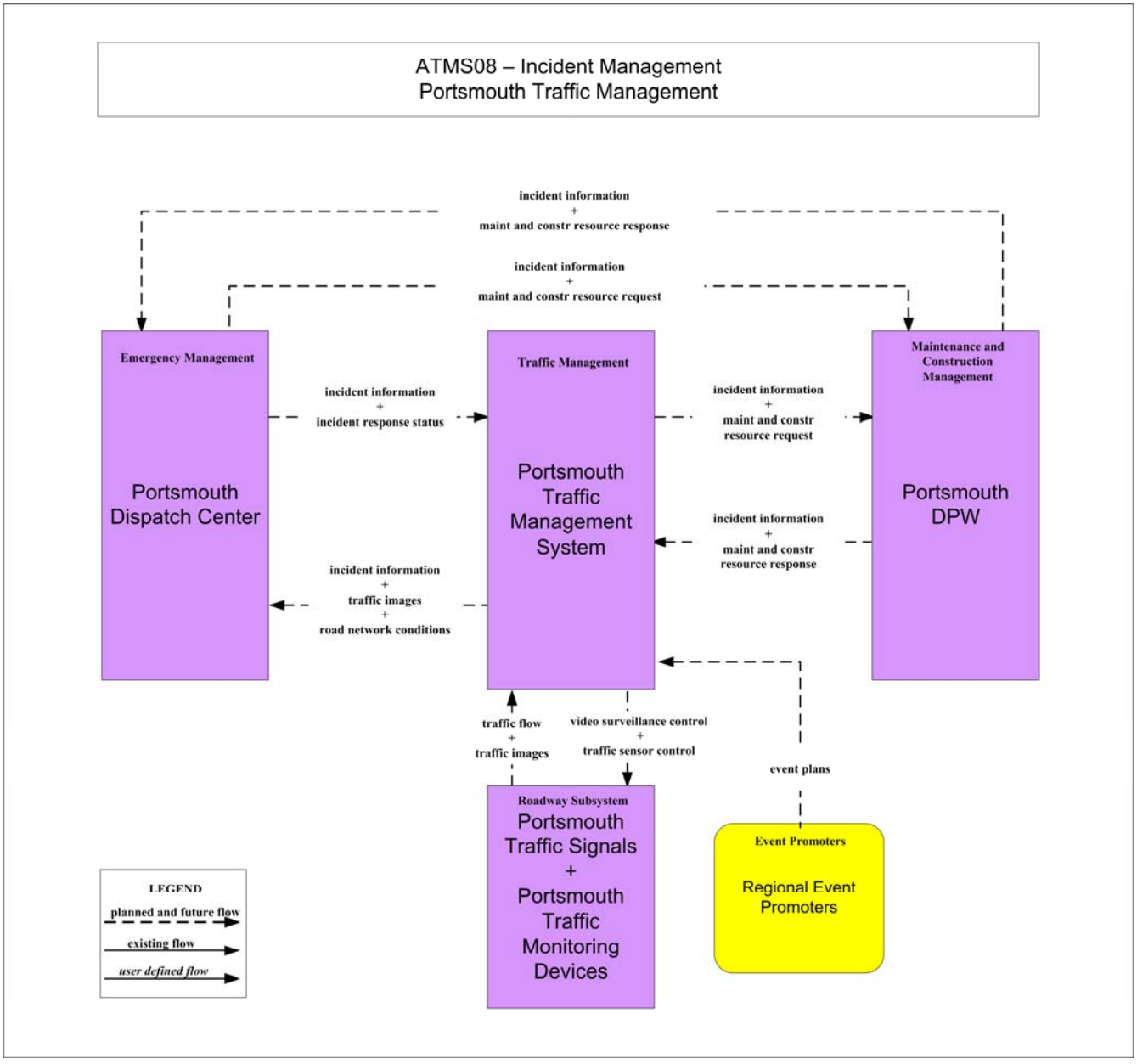

ATMS03 - Surface Street Control
Local Traffic Management
Traffic Management
Local Traffic Management Systems
signal control commands
+
signal control device configuration
+
signal control plans
+
signal system configuration
+
traffic sensor control
+
video surveillance control
signal control status
+
traffic flow
+
traffic images
+
right-of-way request notification
Roadway Subsystem
Local Field Devices
LEGEND
planned and future flow
existing flow
user defined flow

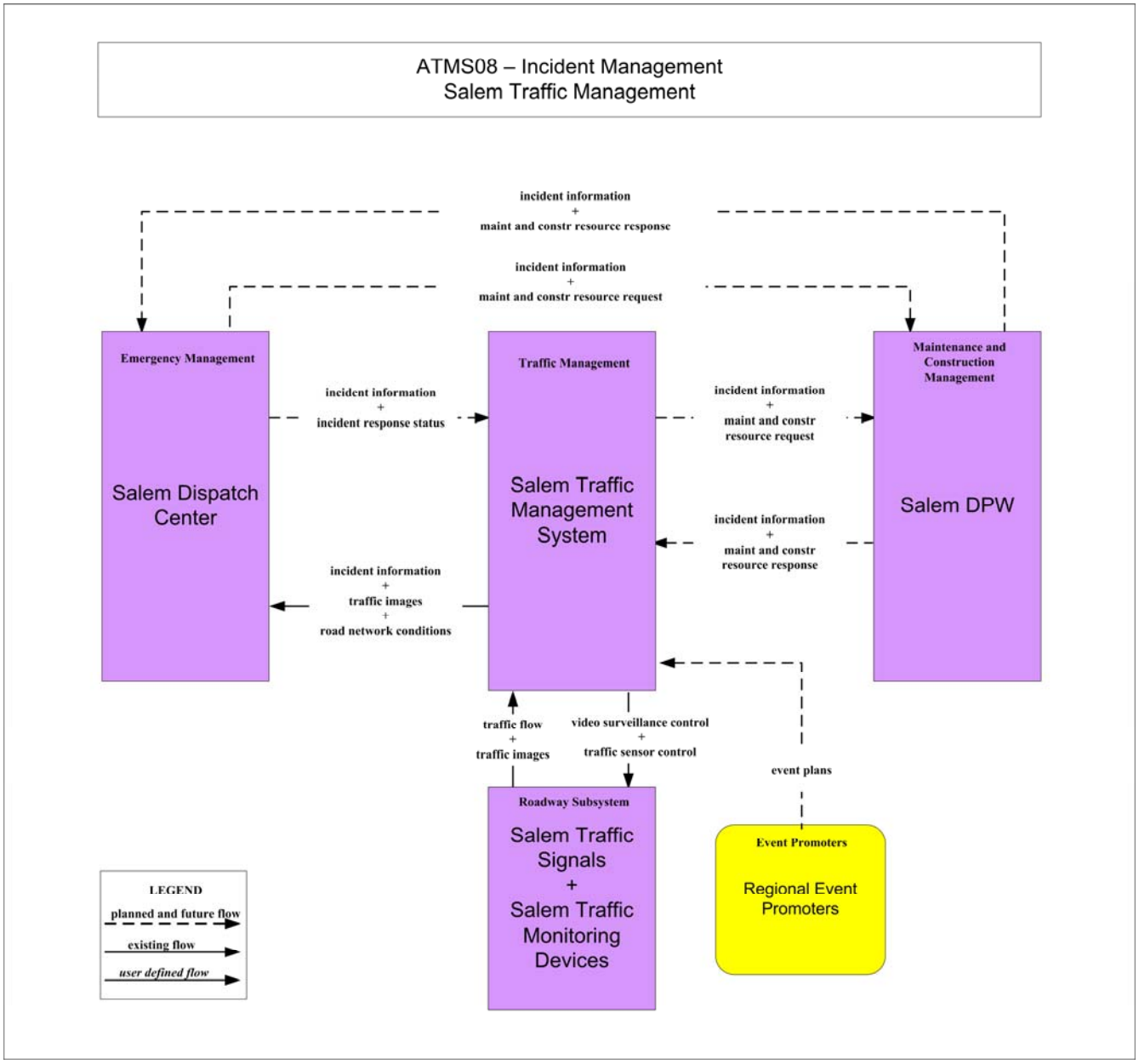

ATMS06 – Traffic Information Dissemination
Local Traffic Information Dissemination
Transit Management
CART Demand Response Dispatch
+
COAST Fixed Route Dispatch
+
COAST Demand Response Dispatch
+
UNH Fixed Route Dispatch
+
Other Transit Provider Dispatch
Traffic Management
Local Traffic Management Systems
road network conditions
roadway information system data
roadway information system status
Roadway Subsystem
Local Field Devices
Emergency Management
Local Public Safety Centers
+
Local EOC
road network conditions
Information Service Provider
Local Municipal Websites
+
511
road network conditions
traffic information for media
Media
Local Media
LEGEND
planned and future flow
existing flow
user defined flow

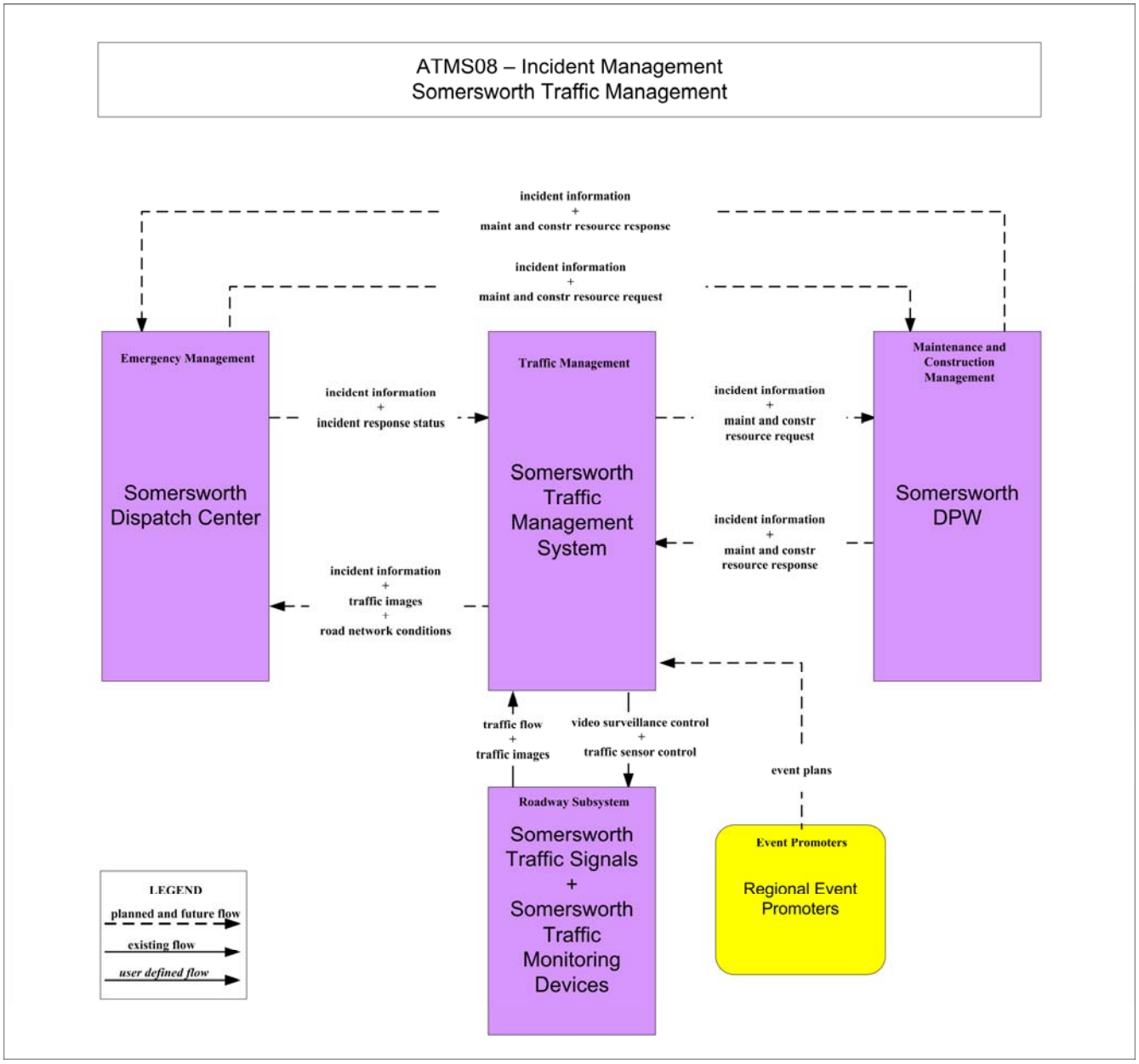

ATMS07 – Regional Traffic Control
Statewide Transportation Management Center (NHDOT)
Traffic Management
Dover Traffic Management System
+
Portsmouth Traffic Management System
+
Salem Traffic Management System
+
Somersworth Traffic Management System
+
Local Traffic Management Systems
incident information
+
traffic images
+
road network conditions
Traffic Management
Statewide Transportation Management Center (NHDOT)
incident information
+
traffic images
+
road network conditions
Other Traffic Management
Maine Turnpike 24HR Communications Center
+
MaineDOT Radio Room
+
MassHighway Transportation Operations Center
+
Bridge Operations Centers
LEGEND
planned and future flow
existing flow
user defined flow

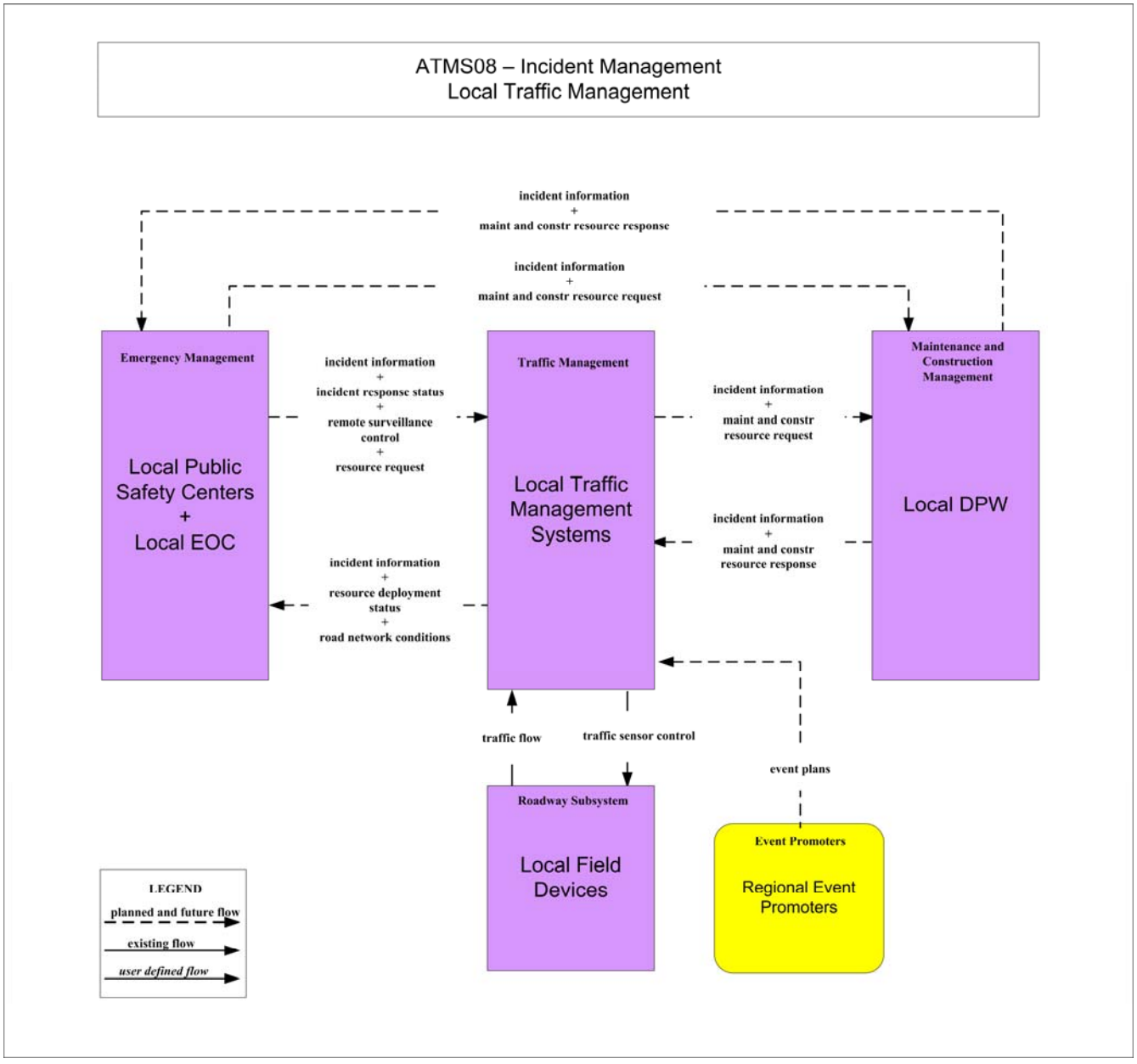

ATMS08 – Incident Management
Kingston Traffic Management
Traffic Management
Kingston Traffic Management System
Maintenance and Construction Management
Kingston DPW
incident information + maint and constr resource request
incident information + maint and constr resource response
traffic flow
traffic sensor control
Roadway Subsystem
Kingston Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

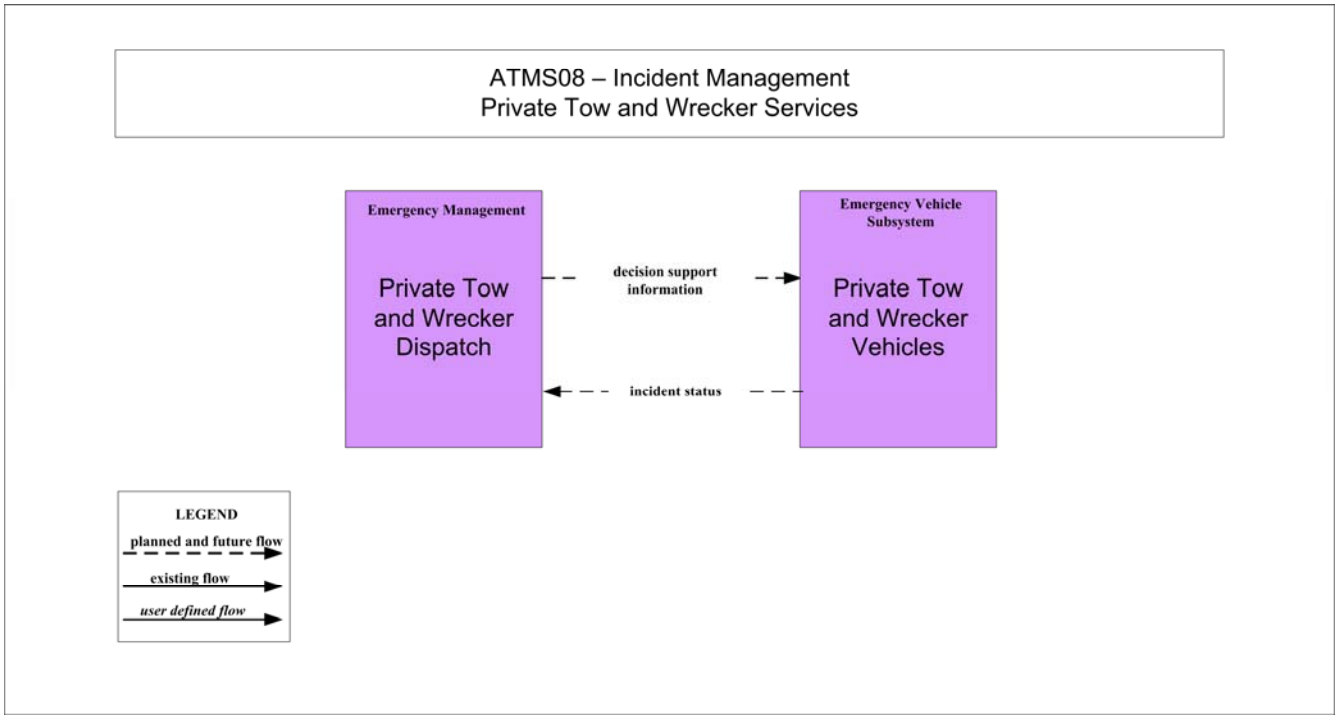

ATMS08 – Incident Management
Plaistow Traffic Management
Traffic Management
Plaistow Traffic Management System
Maintenance and Construction Management
Plaistow DPW
incident information + maint and constr resource request
incident information + maint and constr resource response
traffic flow
traffic sensor control
Roadway Subsystem
Plaistow Traffic Signals
LEGEND
planned and future flow
existing flow
user defined flow

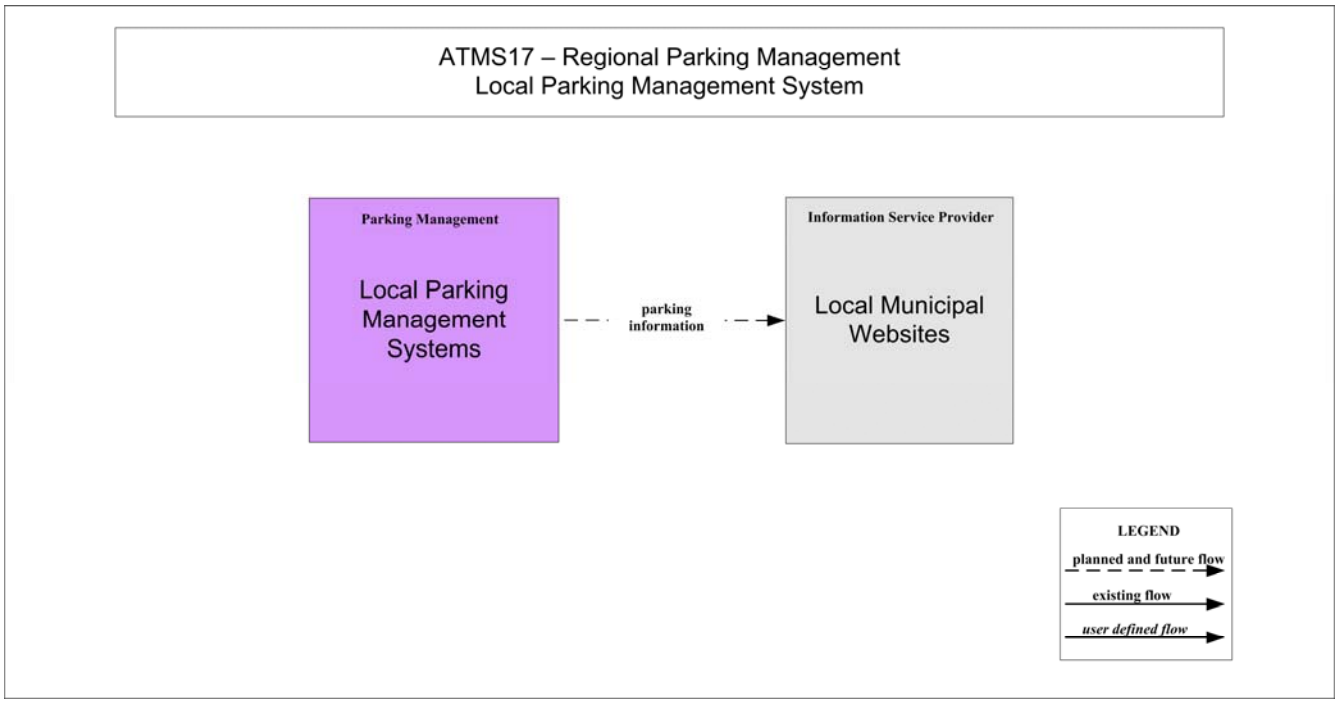

ATMS08 – Incident Management
Portsmouth Traffic Management
incident information + maint and constr resource response
incident information + maint and constr resource request
Emergency Management
Portsmouth Dispatch Center
incident information + incident response status
Traffic Management
Portsmouth Traffic Management System
incident information + maint and constr resource request
Maintenance and Construction Management
Portsmouth DPW
incident information + maint and constr resource response
incident information + traffic images + road network conditions
traffic flow + traffic images
video surveillance control + traffic sensor control
event plans
Roadway Subsystem
Portsmouth Traffic Signals + Portsmouth Traffic Monitoring Devices
Event Promoters
Regional Event Promoters
LEGEND
planned and future flow
existing flow
user defined flow

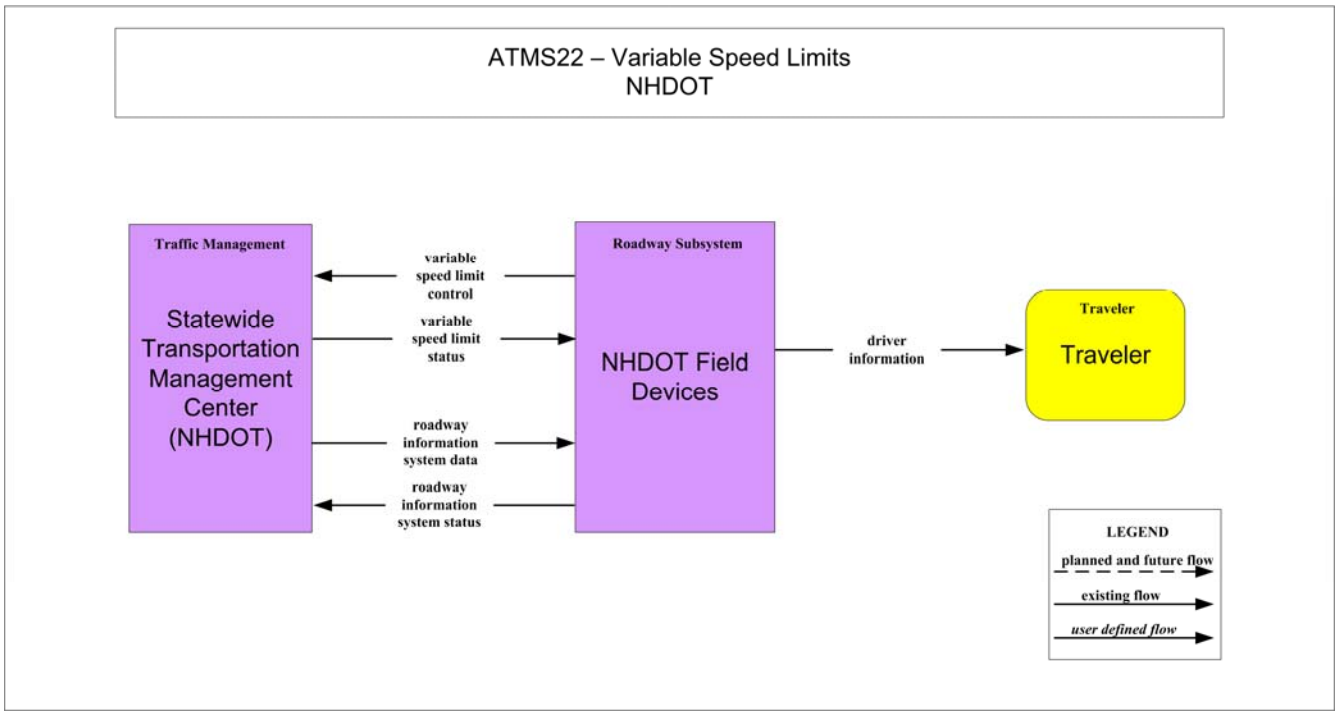

ATMS08 – Incident Management
Salem Traffic Management
incident information + maint and constr resource response
incident information + maint and constr resource request
Emergency Management
Salem Dispatch Center
incident information + incident response status
Traffic Management
Salem Traffic Management System
incident information + maint and constr resource request
Maintenance and Construction Management
Salem DPW
incident information + maint and constr resource response
incident information + traffic images + road network conditions
traffic flow + traffic images
video surveillance control + traffic sensor control
event plans
Roadway Subsystem
Salem Traffic Signals + Salem Traffic Monitoring Devices
Event Promoters
Regional Event Promoters
LEGEND
planned and future flow
existing flow
user defined flow


ATMS08 – Incident Management
Somersworth Traffic Management
incident information + maint and constr resource response
incident information + maint and constr resource request
Emergency Management
Somersworth Dispatch Center
incident information + incident response status
Traffic Management
Somersworth Traffic Management System
incident information + maint and constr resource request
Maintenance and Construction Management
Somersworth DPW
incident information + maint and constr resource response
incident information + traffic images + road network conditions
traffic flow + traffic images
video surveillance control + traffic sensor control
event plans
Roadway Subsystem
Somersworth Traffic Signals + Somersworth Traffic Monitoring Devices
Event Promoters
Regional Event Promoters
LEGEND
planned and future flow
existing flow
user defined flow


ATMS08 – Incident Management
Local Traffic Management
incident information + maint and constr resource response
incident information + maint and constr resource request
Emergency Management
Local Public Safety Centers + Local EOC
incident information + incident response status + remote surveillance control + resource request
incident information + resource deployment status + road network conditions
Traffic Management
Local Traffic Management Systems
incident information + maint and constr resource request
incident information + maint and constr resource response
Maintenance and Construction Management
Local DPW
traffic flow
traffic sensor control
event plans
Roadway Subsystem
Local Field Devices
Event Promoters
Regional Event Promoters
LEGEND
planned and future flow
existing flow
user defined flow

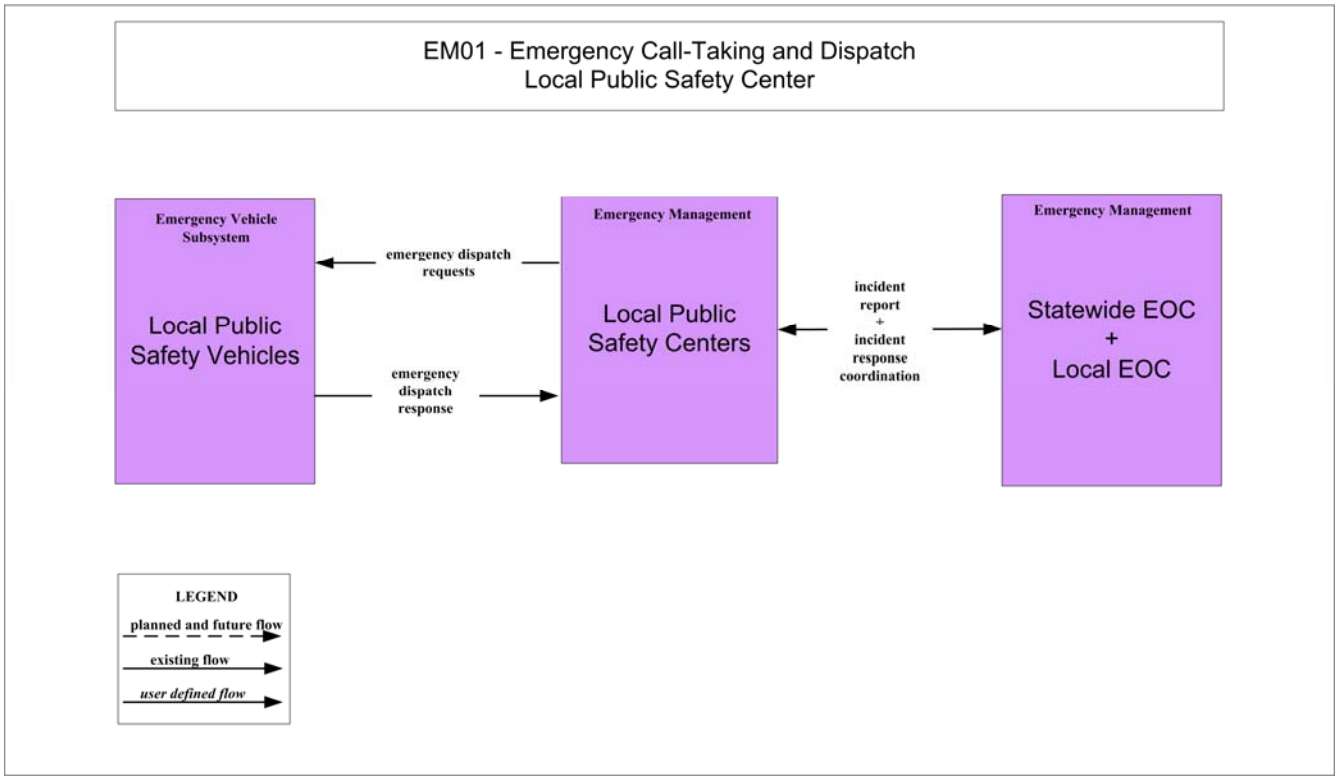

ATMS08 – Incident Management
Private Tow and Wrecker Services
Emergency Management
Private Tow and Wrecker Dispatch
decision support information
incident status
Emergency Vehicle Subsystem
Private Tow and Wrecker Vehicles
LEGEND
planned and future flow
existing flow
user defined flow

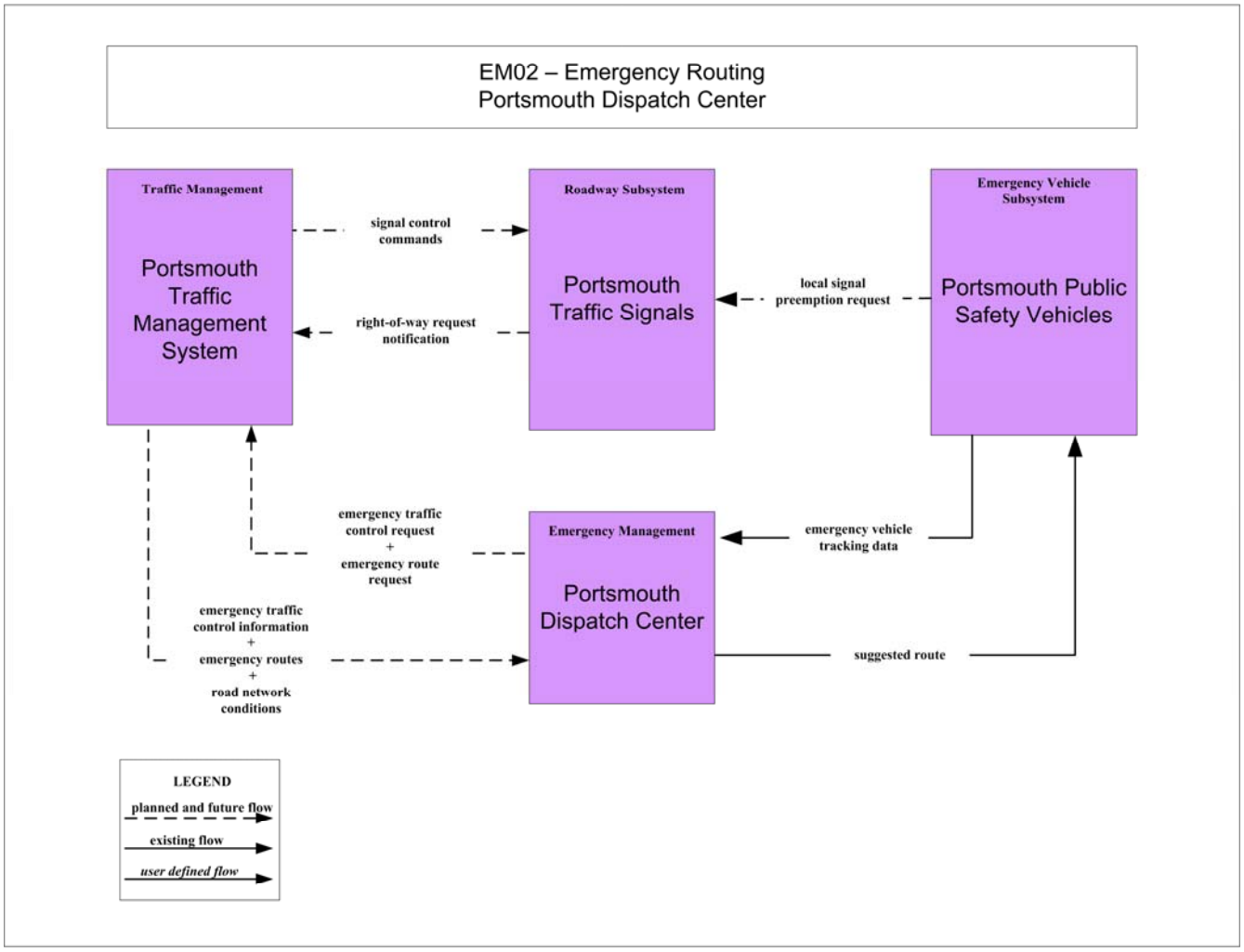

ATMS17 – Regional Parking Management
Local Parking Management System
Parking Management
Local Parking Management Systems
parking information
Information Service Provider
Local Municipal Websites
LEGEND
planned and future flow
existing flow
user defined flow

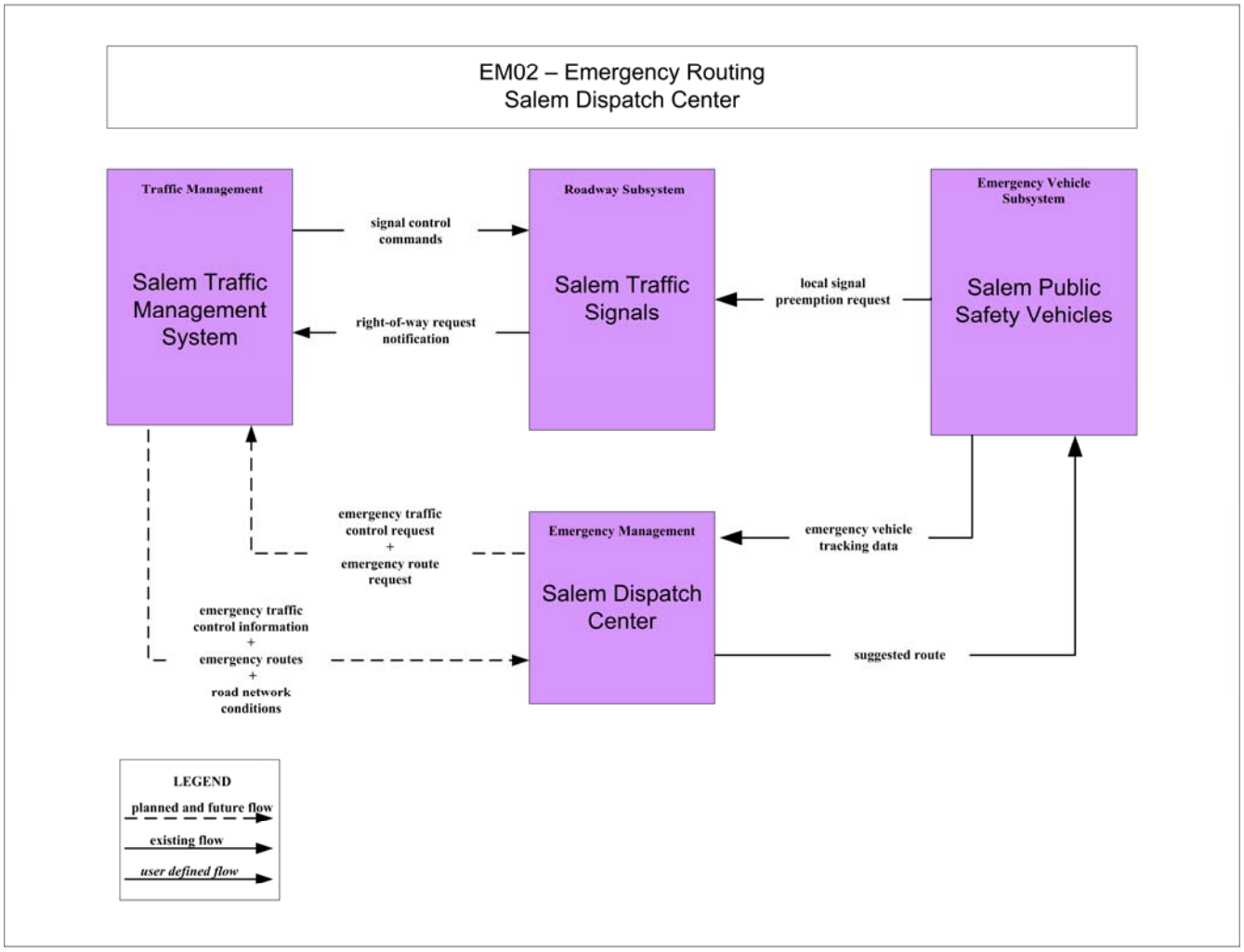

ATMS22 – Variable Speed Limits
NHDOT
Traffic Management
Statewide Transportation Management Center (NHDOT)
variable speed limit control
variable speed limit status
roadway information system data
roadway information system status
Roadway Subsystem
NHDOT Field Devices
driver information
Traveler
Traveler
LEGEND
planned and future flow
existing flow
user defined flow

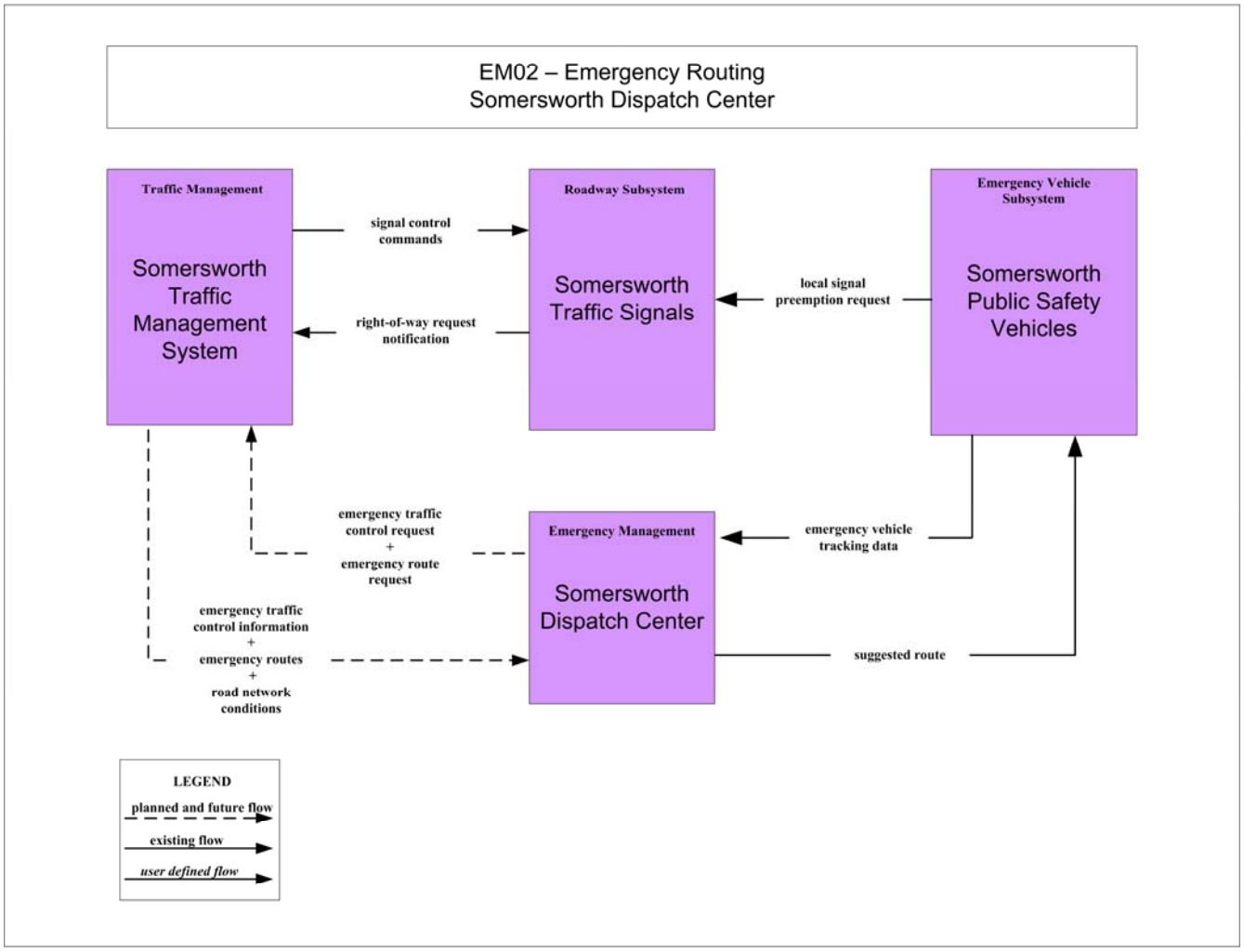
EMERGENCY MANAGEMENT

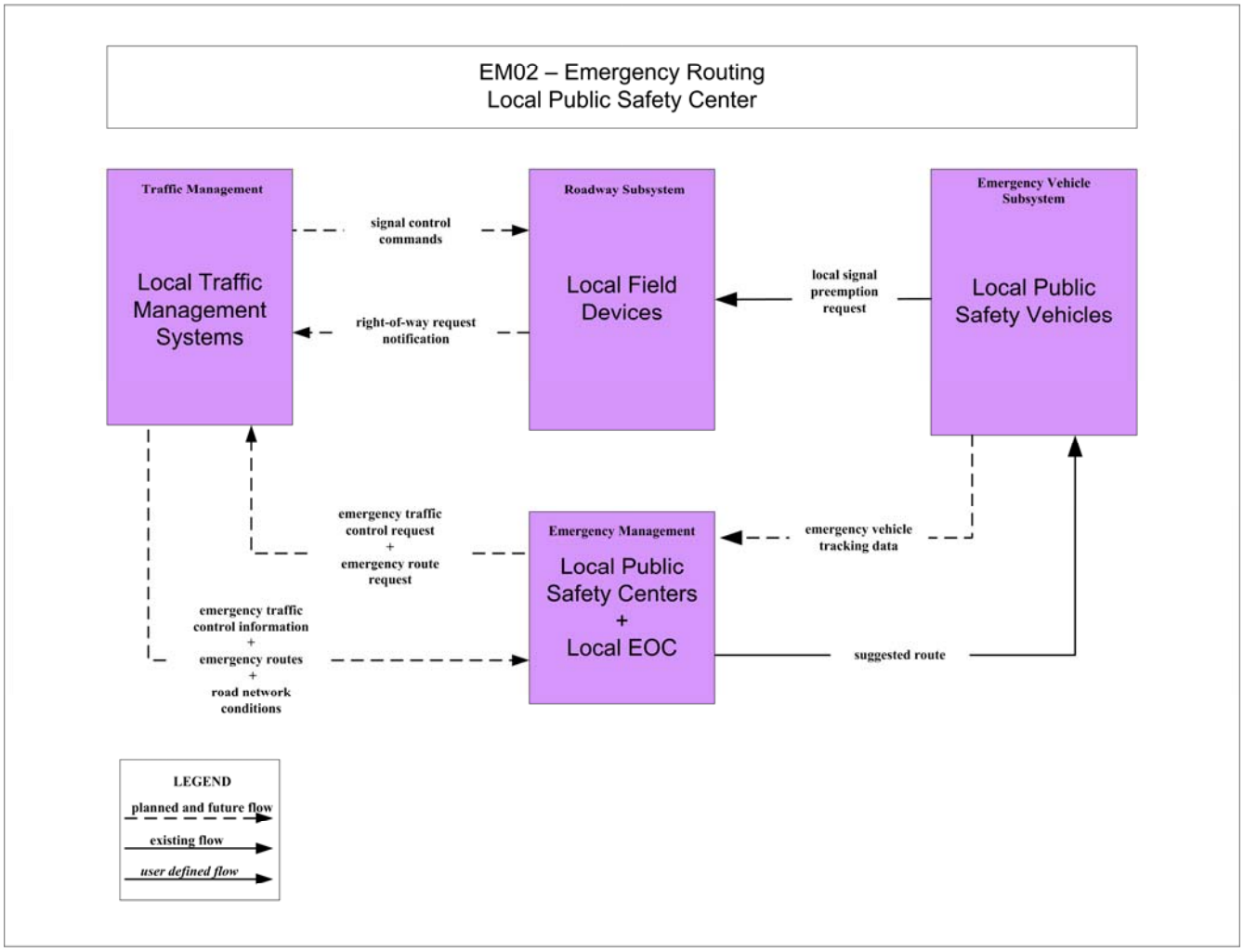
SERVICE PACKAGE DIAGRAMS

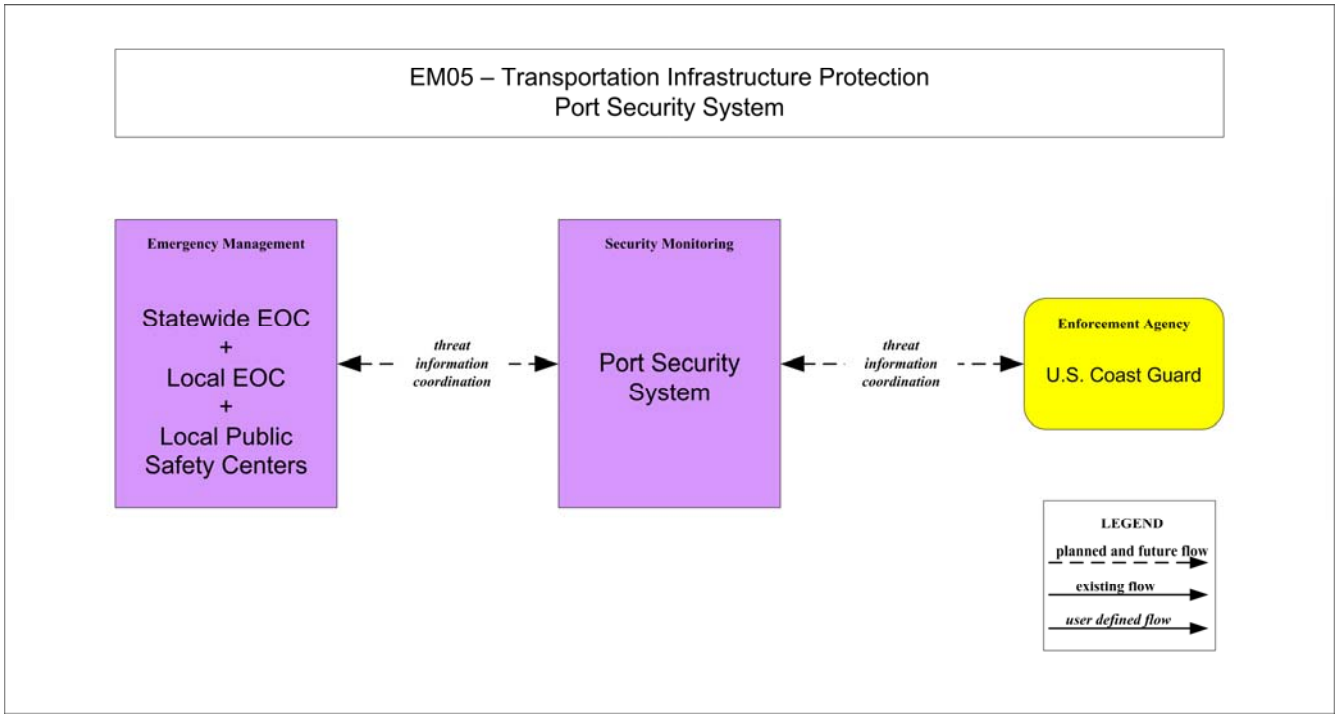

EM01 - Emergency Call-Taking and Dispatch
Local Public Safety Center
Emergency Vehicle Subsystem
Local Public Safety Vehicles
emergency dispatch requests
emergency dispatch response
Emergency Management
Local Public Safety Centers
incident report
+
incident response coordination
Emergency Management
Statewide EOC
+
Local EOC
LEGEND
planned and future flow
existing flow
user defined flow


EM02 – Emergency Routing
Portsmouth Dispatch Center
Traffic Management
Portsmouth Traffic Management System
signal control commands
right-of-way request notification
Roadway Subsystem
Portsmouth Traffic Signals
local signal preemption request
Emergency Vehicle Subsystem
Portsmouth Public Safety Vehicles
emergency traffic control request + emergency route request
Emergency Management
Portsmouth Dispatch Center
emergency vehicle tracking data
emergency traffic control information + emergency routes + road network conditions
suggested route
LEGEND
planned and future flow
existing flow
user defined flow


EM02 – Emergency Routing
Salem Dispatch Center
Traffic Management
Salem Traffic Management System
signal control commands
right-of-way request notification
Roadway Subsystem
Salem Traffic Signals
local signal preemption request
Emergency Vehicle Subsystem
Salem Public Safety Vehicles
emergency traffic control request + emergency route request
Emergency Management
Salem Dispatch Center
emergency vehicle tracking data
emergency traffic control information + emergency routes + road network conditions
suggested route
LEGEND
planned and future flow
existing flow
user defined flow

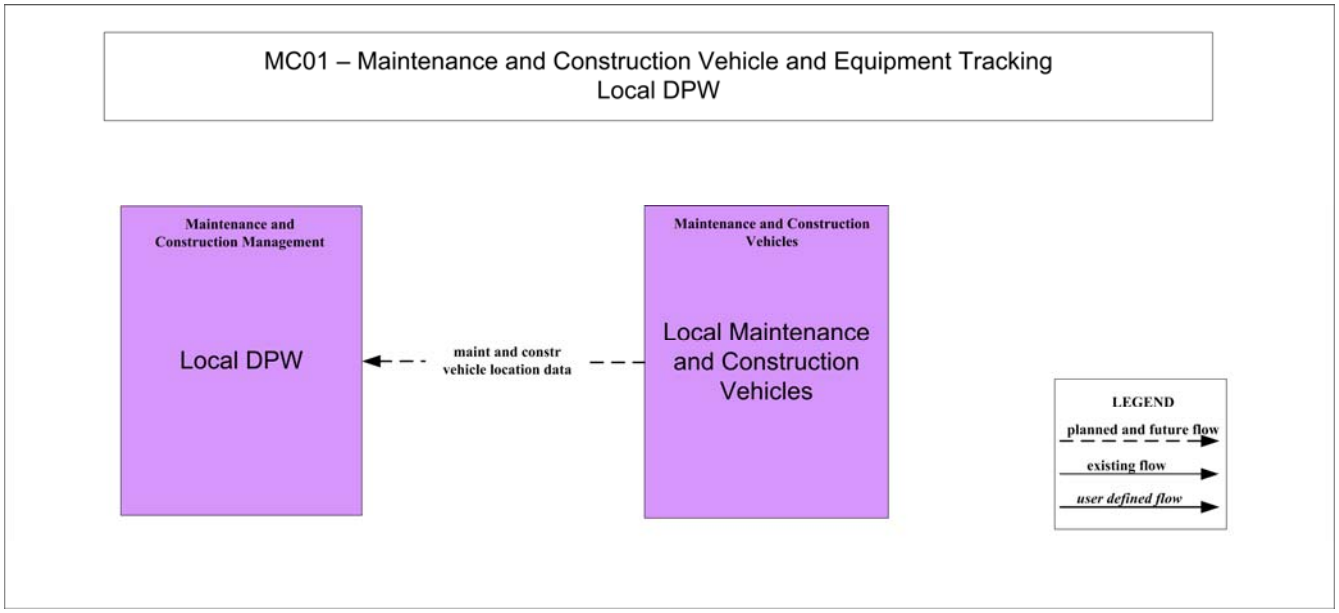

EM02 – Emergency Routing
Somersworth Dispatch Center
Traffic Management
Somersworth Traffic Management System
signal control commands
right-of-way request notification
Roadway Subsystem
Somersworth Traffic Signals
local signal preemption request
Emergency Vehicle Subsystem
Somersworth Public Safety Vehicles
emergency traffic control request + emergency route request
Emergency Management
Somersworth Dispatch Center
emergency vehicle tracking data
emergency traffic control information + emergency routes + road network conditions
suggested route
LEGEND
planned and future flow
existing flow
user defined flow

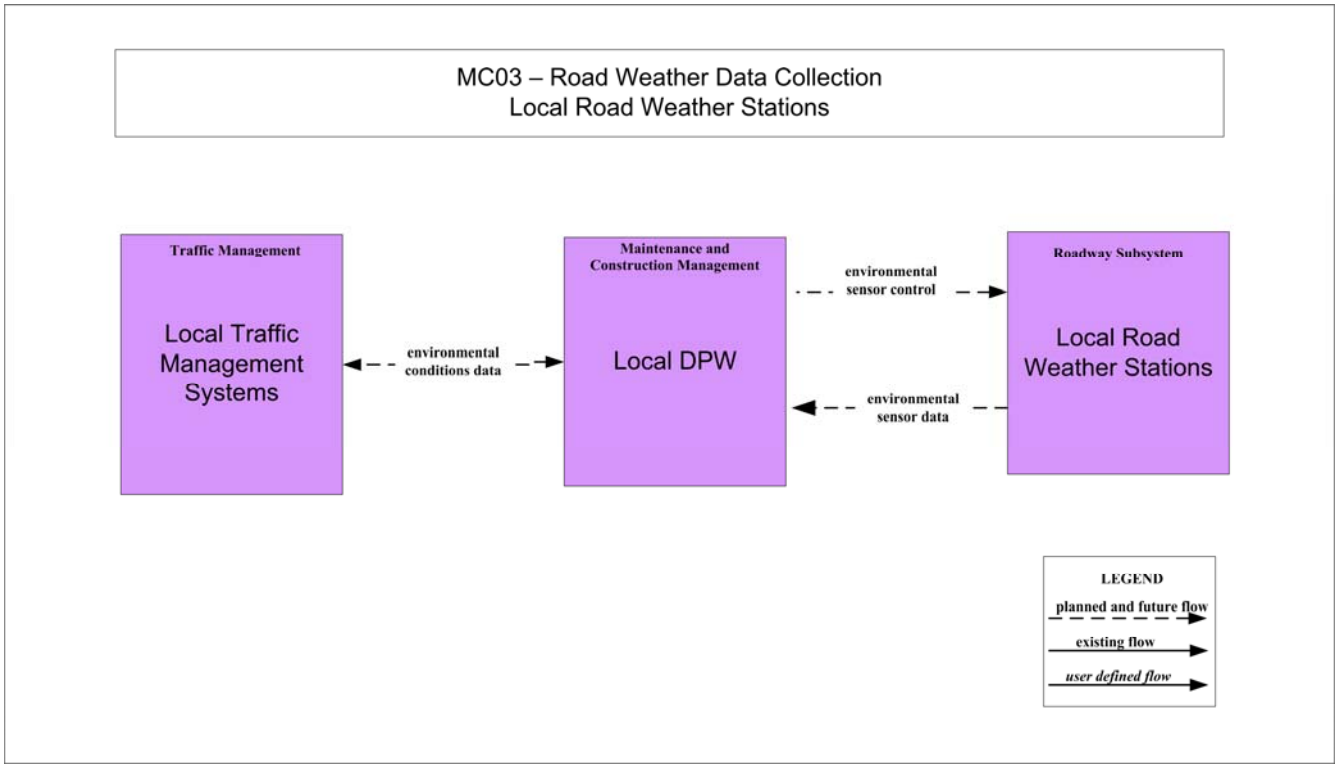

EM02 – Emergency Routing
Local Public Safety Center
Traffic Management
Local Traffic Management Systems
Roadway Subsystem
Local Field Devices
Emergency Vehicle Subsystem
Local Public Safety Vehicles
signal control commands
right-of-way request notification
local signal preemption request
emergency traffic control request + emergency route request
Emergency Management
Local Public Safety Centers + Local EOC
emergency vehicle tracking data
emergency traffic control information + emergency routes + road network conditions
suggested route
LEGEND
planned and future flow
existing flow
user defined flow

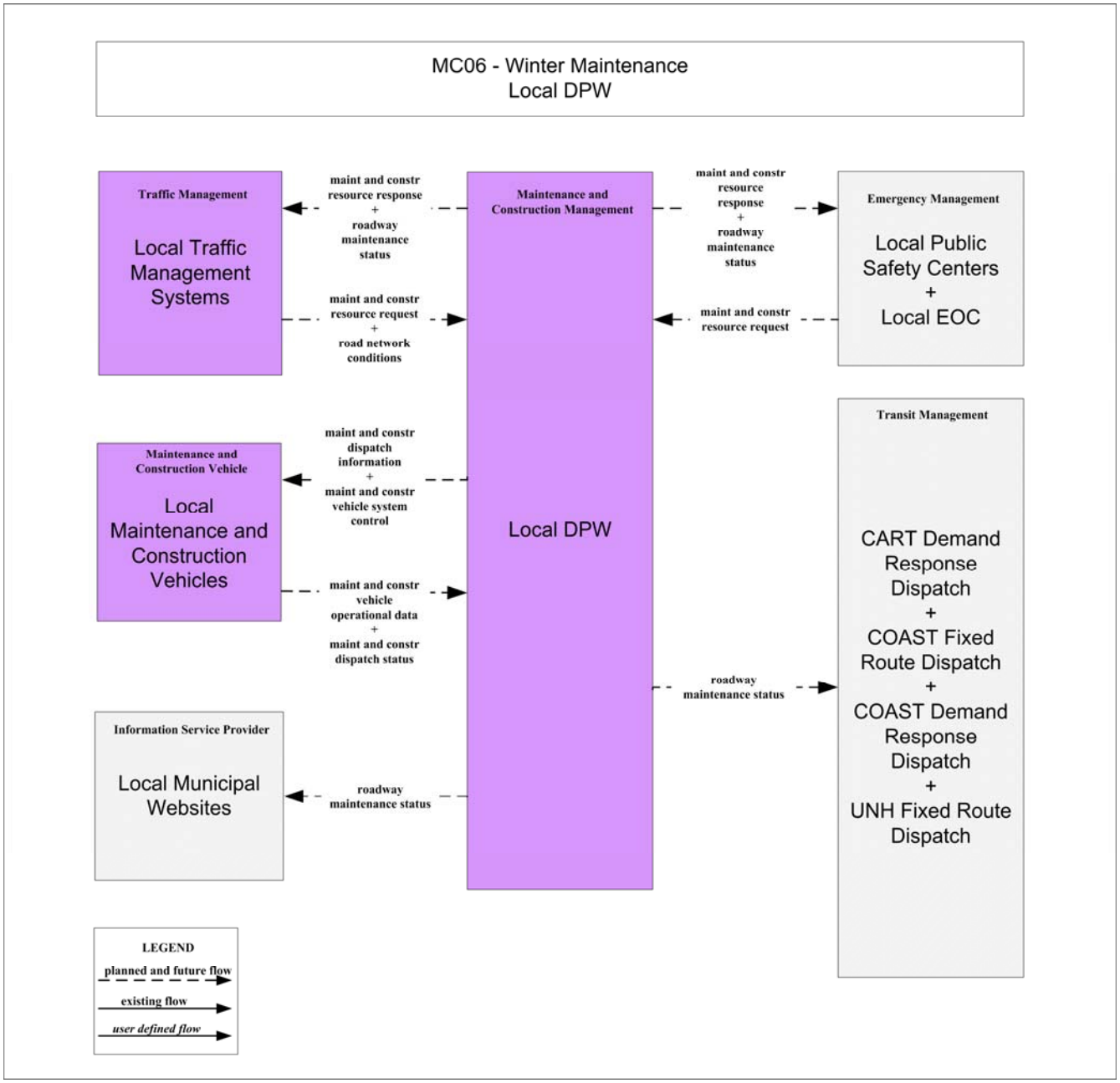

EM05 – Transportation Infrastructure Protection
Port Security System
Emergency Management
Statewide EOC
+
Local EOC
+
Local Public
Safety Centers
threat
information
coordination
Security Monitoring
Port Security
System
threat
information
coordination
Enforcement Agency
U.S. Coast Guard
LEGEND
planned and future flow
existing flow
user defined flow

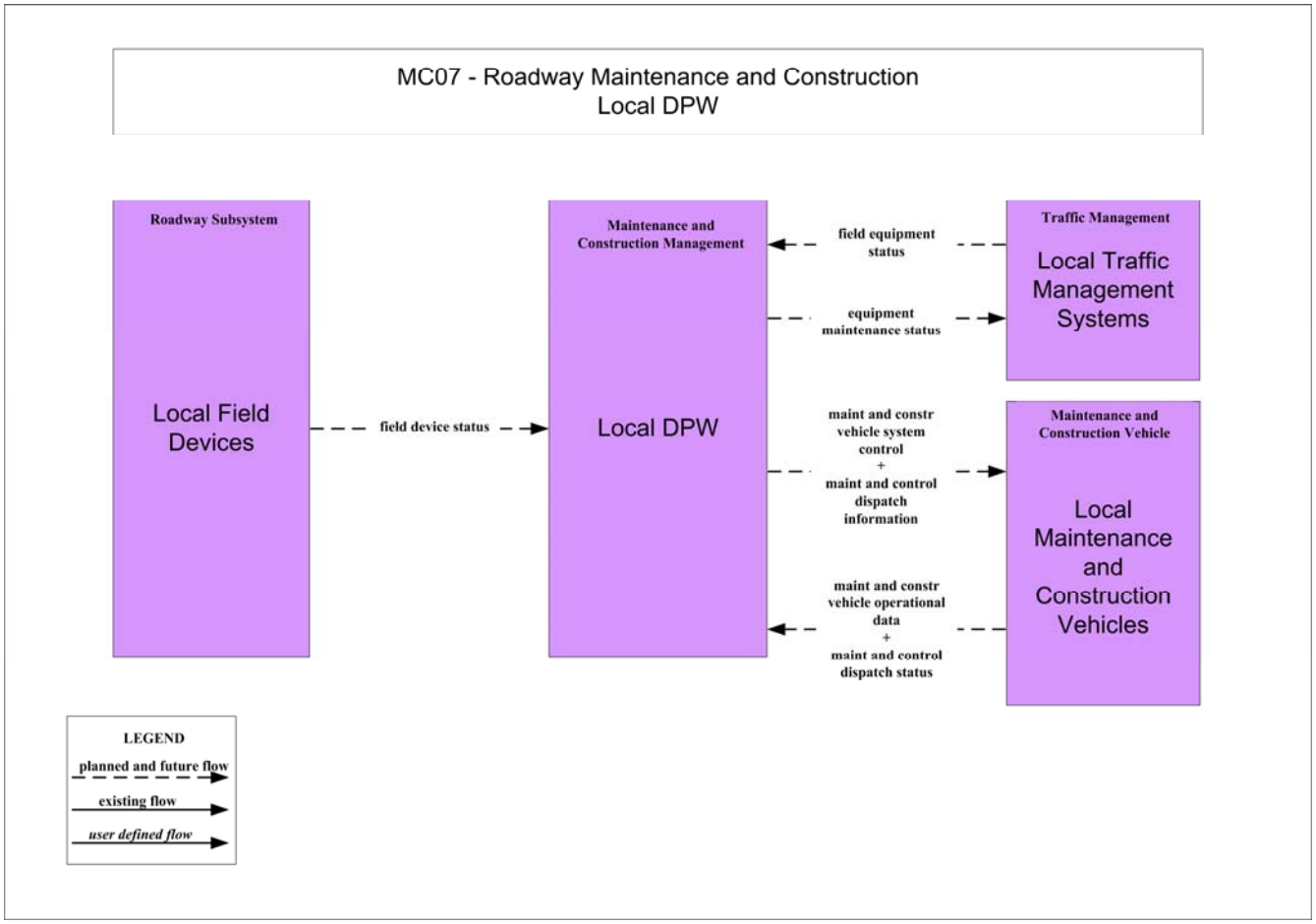
MAINTENANCE AND CONSTRUCTION MANAGEMENT

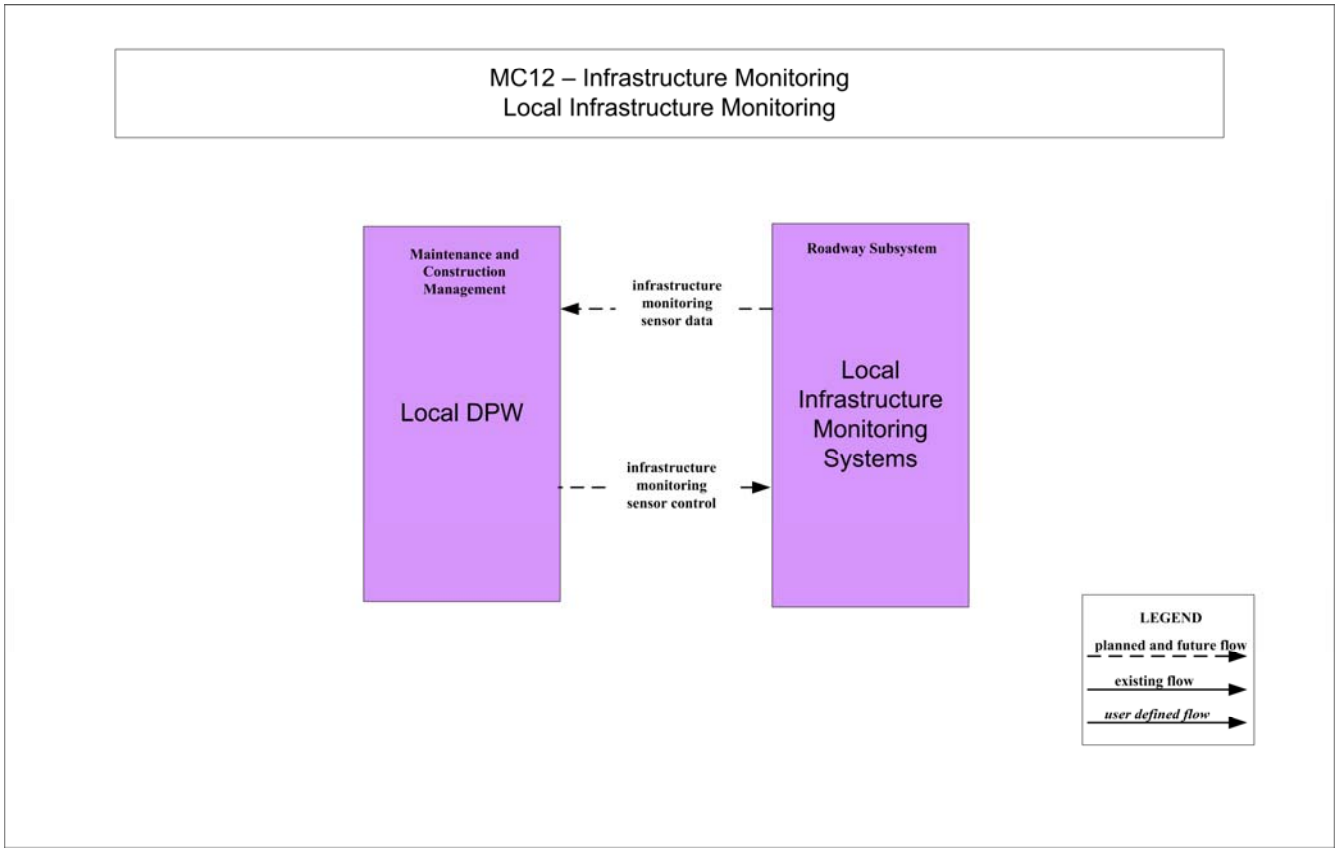
SERVICE PACKAGE DIAGRAMS


MC01 – Maintenance and Construction Vehicle and Equipment Tracking
Local DPW
Maintenance and Construction Management
Local DPW
maint and constr vehicle location data
Maintenance and Construction Vehicles
Local Maintenance and Construction Vehicles
LEGEND
planned and future flow
existing flow
user defined flow


MC03 – Road Weather Data Collection
Local Road Weather Stations
Traffic Management
Local Traffic Management Systems
environmental conditions data
Maintenance and Construction Management
Local DPW
environmental sensor control
environmental sensor data
Roadway Subsystem
Local Road Weather Stations
LEGEND
planned and future flow
existing flow
user defined flow


MC06 - Winter Maintenance
Local DPW
Traffic Management
Local Traffic Management Systems
maint and constr resource response + roadway maintenance status
maint and constr resource request + road network conditions
Maintenance and Construction Management
Local DPW
maint and constr resource response + roadway maintenance status
maint and constr resource request
Emergency Management
Local Public Safety Centers + Local EOC
Maintenance and Construction Vehicle
Local Maintenance and Construction Vehicles
maint and constr dispatch information + maint and constr vehicle system control
maint and constr vehicle operational data + maint and constr dispatch status
Transit Management
CART Demand Response Dispatch + COAST Fixed Route Dispatch + COAST Demand Response Dispatch + UNH Fixed Route Dispatch
roadway maintenance status
Information Service Provider
Local Municipal Websites
roadway maintenance status
LEGEND
planned and future flow
existing flow
user defined flow


MC07 - Roadway Maintenance and Construction
Local DPW
Roadway Subsystem
Local Field Devices
field device status
Maintenance and Construction Management
Local DPW
field equipment status
equipment maintenance status
Traffic Management
Local Traffic Management Systems
maint and constr vehicle system control
+
maint and control dispatch information
maint and constr vehicle operational data
+
maint and control dispatch status
Maintenance and Construction Vehicle
Local Maintenance and Construction Vehicles
LEGEND
planned and future flow
existing flow
user defined flow


MC12 – Infrastructure Monitoring
Local Infrastructure Monitoring
Maintenance and Construction Management
Local DPW
infrastructure monitoring sensor data
infrastructure monitoring sensor control
Roadway Subsystem
Local Infrastructure Monitoring Systems
LEGEND
planned and future flow
existing flow
user defined flow

APPENDIX G

LIST OF RELEVANT ITS STANDARDS

The following set of standards was identified for inclusion in the Strafford-Rockingham Region ITS Architecture. These standards support interoperability among ITS devices in the region. It is in the interest of all parties to promote statewide, regional, and local coordination in the development of ITS standards. Due to the influence of the statewide architecture on ITS initiatives in the region and the benefits of leveraging statewide ITS deployments to address local transportation needs, stakeholders should also refer to the standards identified in the New Hampshire Statewide ITS Architecture. The Strafford-Rockingham Region ITS Architecture's deferral to state-level ITS standards, whenever possible, is both appropriate and advantageous.

Table G-1: Relevant ITS Standard Activities

SDO	Standard Title	Document ID	Internal Reference
AASHTO/ITE/NEMA	NTCIP Center-to-Center Standards Group	NTCIP C2C	See Table G-2
AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group	NTCIP C2F	See Table G-3
AASHTO/ITE	Traffic Management Data Dictionary (TMDD) and Message Sets for External Traffic Management Center Communications (MS/ETMCC)	ITE TMDD	
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	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 Closed Circuit Television (CCTV) Camera Control	NTCIP 1205	
AASHTO/ITE/NEMA	Object Definitions for Closed Circuit Television (CCTV) Switching	NTCIP 1208	
AASHTO/ITE/NEMA	Object Definitions for Conflict Monitor Units (CMU)	NTCIP 1214	
AASHTO/ITE/NEMA	Object Definitions for Data Collection and Monitoring (DCM) Devices	NTCIP 1206	
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 Ramp Meter Control (RMC) Units	NTCIP 1207	
AASHTO/ITE/NEMA	Object Definitions for Signal Control and Prioritization (SCP)	NTCIP 1211	
ASTM	Dedicated Short Range Communication at 915 MHz Standards Group	DSRC 915MHz	See Table G-4
ASTM/IEEE/SAE	Dedicated Short Range Communication at 5.9 GHz Standards Group	DSRC 5GHz	See Table G-5
IEEE	Incident Management Standards Group	IEEE IM	See Table G-6
IEEE	Standard for Wireless Access in Vehicular Environments (WAVE) - Over- the-Air Data Exchange Protocol for Intelligent Transportation Systems (ITS)	IEEE P1609.11	
SAE	Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group	ATIS Low Bandwidth	See Table G-7
SAE	Advanced Traveler Information Systems (ATIS) General Use Standards Group	ATIS General Use	See Table G-8
SAE	On-board Vehicle Mayday Standards Group	Mayday	See Table G-9

Table G-2: NTCIP Center-to-Center Standards Group

SDO	Standard Name	Document ID
AASHTO/ITE/NEMA	Octet Encoding Rules (OER) Base Protocol	NTCIP 1102
AASHTO/ITE/NEMA	Center-to-Center Naming Convention Specification	NTCIP 1104
AASHTO/ITE/NEMA	Ethernet Subnetwork Profile	NTCIP 2104
AASHTO/ITE/NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE/NEMA	File Transfer Protocol (FTP) Application Profile	NTCIP 2303
AASHTO/ITE/NEMA	Application Profile for DATEX-ASN (AP-DATEX)	NTCIP 2304
AASHTO/ITE/NEMA	Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications (C2C XML)	NTCIP 2306

Table G-3: NTCIP Center-to-Field Standards Group

SDO	Standard Name	Document ID
AASHTO/ITE/NEMA	Octet Encoding Rules (OER) Base Protocol	NTCIP 1102
AASHTO/ITE/NEMA	Transportation Management Protocols (TMP)	NTCIP 1103
AASHTO/ITE/NEMA	Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	NTCIP 2101
AASHTO/ITE/NEMA	Point to Multi-Point Protocol Using FSK Modem Subnetwork Profile	NTCIP 2102
AASHTO/ITE/NEMA	Point-to-Point Protocol Over RS-232 Subnetwork Profile	NTCIP 2103
AASHTO/ITE/NEMA	Ethernet Subnetwork Profile	NTCIP 2104
AASHTO/ITE/NEMA	Transportation Transport Profile	NTCIP 2201
AASHTO/ITE/NEMA	Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202
AASHTO/ITE/NEMA	Simple Transportation Management Framework (STMF) Application Profile	NTCIP 2301
AASHTO/ITE/NEMA	Trivial File Transfer Protocol (TFTP) Application Profile	NTCIP 2302
AASHTO/ITE/NEMA	File Transfer Protocol (FTP) Application Profile	NTCIP 2303

Table G-4: Dedicated Short Range Communication at 915 MHz Standards Group

SDO	Standard Name	Document ID
ASTM	Standard Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz Band	ASTM E2158-01

Table G-5: Dedicated Short Range Communication at 915 MHz Standards Group

SDO	Standard Name	Document ID
ASTM/IEEE/SAE	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	ASTM E2213-03
ASTM/IEEE/SAE	Standard for Wireless Access in Vehicular Environments (WAVE) - Resource Manager	IEEE 1609.1-2006
ASTM/IEEE/SAE	Standard for Wireless Access in Vehicular Environments (WAVE) - Security Services for Applications and Management Messages	IEEE 1609.2-2006
ASTM/IEEE/SAE	Standard for Wireless Access in Vehicular Environments (WAVE) - Networking Services	IEEE 1609.3
ASTM/IEEE/SAE	Standard for Wireless Access in Vehicular Environments (WAVE) - Multi-Channel Operation	IEEE 1609.4-2006
ASTM/IEEE/SAE	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 802.11p
ASTM/IEEE/SAE	Standard for Wireless Access in Vehicular Environments (WAVE) - Architecture	IEEE P1609.0

Table G-6: Incident Management Standards Group

SDO	Standard Name	Document ID
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 Common Traffic Incident Management Message Sets for Use in Entities External to Centers	IEEE P1512.4

Table G-7: Advanced Traveler Information Systems (ATIS) Bandwidth Limited Standards Group

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

Table G-8: Advanced Traveler Information Systems (ATIS) General Use Standards Group

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

Table G-9: On-board Vehicle Mayday Standards Group

SDO	Standard Name	Document ID
SAE	Location Referencing Message Specification (LRMS)	SAE J2266
SAE	On-Board Land Vehicle Mayday Reporting Interface	SAE J2313
SAE	Message Set for Advanced Traveler Information System (ATIS)	SAE J2354
SAE	Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540
SAE	RDS (Radio Data System) Phrase Lists	SAE J2540/1
SAE	ITIS (International Traveler Information Systems) Phrase Lists	SAE J2540/2
SAE	National Names Phrase List	SAE J2540/3

APPENDIX H

OPERATIONAL CONCEPTS

ARCHIVED DATA MANAGEMENT

OPERATIONAL CONCEPTS

AD3 - ITS VIRTUAL DATA WAREHOUSE (RPC VIRTUAL DATA WAREHOUSE)

Operational Description

This service package creates a central data storage facility for regional ITS data, operated by RPC, and shows the interoperability between it and other locally managed archives or repositories. ITS data will continue to be collected by local traffic management systems, NHDOT's Archived Data Management System, regional transit agencies, and RPC. The collected data will be electronically submitted to RPC's data storage equipment (which may simply consist of one PC or an entire system of machines). The information will be made available to users at RPC's office and potentially via their website.

Lead Agency	RPC

Agency Responsibilities*

		Party B				
		RPC (RPC Data Warehouse)	Local Agencies** (Local Data Repositories)	NHDOT (Archived Data Management System)	CART (CART Data Repository)	COAST (COAST Data Repository)
Party A	RPC		Collect, archive, and make regional ITS data accessible to users			
	Local Agencies**	Provide local ITS data				
	NHDOT	Provide statewide ITS data				
	CART	Provide transit ITS data				
	COAST	Provide transit ITS data				

*To be read directionally: Party A is responsible to Party B.

**Local Agencies in this case include the municipalities and/or DPWs of Atkinson, Brentwood, Danville, East Kingston, Epping, Exeter, Fremont, Greenland, Hampstead, Hampton, Hampton Falls, Kensington, Kingston, New Castle, Newfields, Newington, Newton, North Hampton, Plaistow, Portsmouth, Rye, Salem, Sandown, Seabrook, South Hampton, Stratham, Windham, as well as any others that may be applicable in the future. This includes the Salem Data Repository and the Portsmouth Data Repository.

Interagency Agreements

Participants	*Type of Agreement****
RPC Local Agencies**	SI
RPC NHDOT	SI
RPC CART	SI
RPC COAST	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

AD3 - ITS VIRTUAL DATA WAREHOUSE (SRPC VIRTUAL DATA WAREHOUSE)

Operational Description	
This service package creates a central data storage facility for regional ITS data, operated by SRPC, and shows the interoperability between it and other locally managed archives or repositories. ITS data will continue to be collected by local traffic management systems, NHDOT's Archived Data Management System, regional transit agencies, and SRPC. The collected data will be electronically submitted to SRPC's data storage equipment (which may simply consist of one PC or an entire system of machines). The information will be made available to users at SRPC's office and potentially via their website.	
Lead Agency	SRPC

Agency Responsibilities*

		Party B				
		SRPC (SRPC Data Warehouse)	Local Agencies** (Local Data Repositories)	NHDOT (Archived Data Management System)	COAST (COAST Data Repository)	University of New Hampshire (UNH Data Repository)
Party A	SRPC		Collect, archive, and make regional ITS data accessible to users			
	Local Agencies**	Provide local ITS data				
	NHDOT	Provide statewide ITS data				
	COAST	Provide transit ITS data				
	University of New Hampshire	Provide transit ITS data				

*To be read directionally: Party A is responsible to Party B.

**Local Agencies in this case include the municipalities and/or DPWs of Barrington, Brookfield, Dover, Durham, Farmington, Lee, Madbury, Middleton, New Durham, Newmarket, Northwood, Nottingham, Rochester, Rollinsford, Somersworth, Strafford, and Wakefield, as well as any others that may be applicable in the future. This includes the Somersworth Data Repository.

Interagency Agreements

Participants	*Type of Agreement****
SRPC Local Agencies**	SI
SRPC NHDOT	SI
SRPC COAST	SI
SRPC University of New Hampshire	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

PUBLIC TRANSPORTATION

OPERATIONAL CONCEPTS

APTS02, APTS03 - TRANSIT FIXED-ROUTE/DEMAND RESPONSE OPERATIONS (COAST)

Operational Description	
These service packages describe COAST fixed-route and demand response transit operations. Interagency coordination includes the provision of transit information to the Regional Call/Coordination Center, which will coordinate requests for demand responsive services and demand response service plans with transit agency demand response dispatches. In addition, the Statewide Transportation Management Center (NHDOT) and Local Traffic Management Systems will provide road network conditions to COAST Fixed Route/Demand Response Dispatch.	
Lead Agency	COAST

Agency Responsibilities*

		Party B			
		COAST (COAST Fixed Route/Demand Response Dispatch)	ACT (Regional Call/Coordination Center)	Local Municipalities** (Local Traffic Management Systems)	NHDOT (Statewide Transportation Management Center)
Party A	COAST		Provide transit and fare schedule information and coordinate demand response transit plans		
	ACT	Request information and coordinate demand response transit plans			
	Local Municipalities**	Provide road network conditions			
	NHDOT	Provide road network conditions			

*To be read directionally: Party A is responsible to Party B.

**Local Municipalities in this case include the municipalities and/or DPWs that operate traffic management systems within the COAST operating area.

Interagency Agreements

Participants	*Type of Agreement****
COAST ACT	C
COAST Local Municipalities**	SI
COAST NHDOT	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

APTS02 - TRANSIT FIXED-ROUTE OPERATIONS (UNH)

Operational Description			
This service package describes University of New Hampshire (UNH) Campus Connector and Wildcat Transit fixed-route transit operations. The only interagency interaction in either is the provision of road network conditions from the Statewide Transportation Management Center (NHDOT) and Local Traffic Management Systems to UNH Fixed Route Dispatch.			
Lead Agency	University of New Hampshire		
Agency Responsibilities*			
		Party B		
		University of New Hampshire (UNH Fixed Route Dispatch)	Local Municipalities** (Local Traffic Management Systems)	NHDOT (Statewide Transportation Management Center)
Party A	University of New Hampshire			
	Local Municipalities**	Provide road network conditions		
	NHDOT	Provide road network conditions		
*To be read directionally: Party A is responsible to Party B.				
**Local Municipalities in this case include the municipalities and/or DPWs that operate traffic management systems within the UNH operating area.				

Interagency Agreements	
Participants	*Type of Agreement****
University of New Hampshire Local Municipalities**	SI
University of New Hampshire NHDOT	SI
***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control	

APTS03 - TRANSIT DEMAND RESPONSE OPERATIONS (CART AND OTHER TRANSIT PROVIDERS)

Operational Description	
These service packages describe CART and other transit providers' demand response transit operations. The Statewide Transportation Management Center (NHDOT) and Local Traffic Management Systems will provide road network conditions to transit agency dispatches.	
Lead Agency	CART

Agency Responsibilities*

		Party B		
		CART (CART Demand Response Dispatch)	Local Municipalities** (Local Traffic Management Systems)	NHDOT (Statewide Transportation Management Center)
Party A	CART			
	Local Municipalities**	Provide road network conditions		
	NHDOT	Provide road network conditions		

*To be read directionally: Party A is responsible to Party B.

** Local Municipalities in this case include the municipalities and/or DPWs that operate traffic management systems within the CART operating area. This potentially includes the Salem Traffic Management System.

Interagency Agreements

Participants	*Type of Agreement****
CART Other Transit Providers**	A
CART Local Municipalities**	SI
CART NHDOT	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

APTS04 - TRANSIT FARE COLLECTION MANAGEMENT (Electronic Fare Collection)

Operational Description

This service package describes the future establishment of a standard electronic farecard technology for the region's transit providers. CART, COAST, University of New Hampshire, human health service agencies, and other participating entities would distribute fare cards that are compatible with the revenue management systems on transit vehicles. Other types of farecards would be prepaid or include specific negotiated arrangements with the region's transit agencies.

Lead Agencies	CART/COAST/University of New Hampshire

Agency Responsibilities*

		Party B			
		CART (CART Broker/Manager, CART Demand Response Dispatch, CART Transit Vehicles)	COAST (COAST Broker/Manager, COAST Fixed Route/Demand Response Dispatch, COAST Transit Vehicles)	University of New Hampshire (UNH Fixed Route Dispatch, UNH Transit Vehicles)	Other Transit Providers** (Local Traffic Management Systems)
Party A	CART		Coordinate farebox and farecard technology		
	COAST	Coordinate farebox and farecard technology		Coordinate farebox and farecard technology	
	University of New Hampshire	Coordinate farebox and farecard technology			Coordinate farebox and farecard technology
	Other Transit Providers**	Coordinate farebox and farecard technology			

*To be read directionally: Party A is responsible to Party B.

**Other Transit Providers in this case refer to other public and private sector transit providers interested in coordinating farecard and farebox technology within the region.

Interagency Agreements

Participants	*Type of Agreement****
CART COAST	C
CART University of New Hampshire	C
CART Other Transit Providers**	C
COAST University of New Hampshire	C
COAST Other Transit Providers**	C
University of New Hampshire Other Transit Providers**	C

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

APTS05 - TRANSIT SECURITY (All Instances)

Operational Description

These service packages describe the transit security applications for CART, COAST, and University of New Hampshire. This includes surveillance on board vehicles and at bus stops/transfer points. The transit agencies will send transit emergency data to Local EOCs and Local Public Safety Centers.

Lead Agencies	CART/COAST/University of New Hampshire

Agency Responsibilities*

		Party B			
		CART (CART Broker/Manager, CART Demand Response Dispatch, CART Transit Vehicles)	COAST (COAST Broker/Manager, COAST Fixed Route/Demand Response Dispatch, COAST Transit Vehicles, COAST Bus Stops and Transfer Points)	University of New Hampshire (UNH Fixed Route Dispatch, UNH Transit Vehicles, UNH Bus Stops and Transfer Points)	Local Public Safety Agencies** (Local EOC, Local Public Safety Centers)
Party A	CART				Send transit emergency data
	COAST				Send transit emergency data
	University of New Hampshire				Send transit emergency data
	Local Public Safety Agencies**	Send incident response status regarding transit emergencies			

*To be read directionally: Party A is responsible to Party B.

**Local Public Safety Agencies in this case refers to police, fire, emergency medical, and other agencies operating emergency operations centers and public safety dispatch in the region.

Interagency Agreements

Participants	*Type of Agreement****
CART Local Public Safety Agencies**	SI, A
COAST Local Public Safety Agencies**	SI, A
University of New Hampshire Local Public Safety Agencies**	SI, A

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

APTS07 - MULTIMODAL COORDINATION (Regional Coordination)

Operational Description

This service package facilitates coordination between transit dispatch and other transportation providers. CART, COAST, and University of New Hampshire will coordinate their service information among themselves, with Other Transit Providers, with Amtrak Operations, and with Private Ground Transportation Services. These transit agencies will also provide transit system data to the Statewide Transportation Management Center and Local Traffic Management Systems. Lastly, parking lot information will also be coordinated with transit dispatch.

Lead Agencies	CART/COAST/University of New Hampshire

Agency Responsibilities*

		Party B								
		CART (CART Broker/Manager, CART Fixed Route/Demand Response Dispatch, CART Transit Vehicles)	COAST (COAST Broker/Manager, COAST Fixed Route/Demand Response Dispatch, COAST Transit Vehicles)	University of New Hampshire (UNH Fixed Route Dispatch, UNH Transit Vehicles)	Other Transit Providers ** (Other Transit Provider Dispatch)	Amtrak (Amtrak Operation)	Private Ground Transportation Services (Private Ground Transportation Services)	NHDOT (Statewide Transportation Management Center)	Local Municipalities ** (Local Traffic Management Systems, Local Parking Management Systems)	Parking Facility Operators (Parking Facilities-Non-Municipal)
Party A	CART		Coordinate transit service			Send transit multimodal information		Send transit system data	Send transit system data Request parking lot data	Request parking lot data
	COAST	Coordinate transit service				Send transit multimodal information		Send transit system data	Send transit system data Request parking lot data	Request parking lot data
	University of New Hampshire	Coordinate transit service			Coordinate transit service	Send transit multimodal information		Send transit system data	Send transit system data Request parking lot data	Request parking lot data
	Other Transit Providers**	Coordinate transit service								
	Amtrak	Send transit multimodal information								
	Private Ground Transportation Services	Send transit multimodal information								
	NHDOT	Request transit data								
	Local Municipalities**	Request transit data Send parking information								
	Parking Facility Operators	Send parking information								

*To be read directionally: Party A is responsible to Party B.

**Other Transit Providers refers to public and private sector organizations providing services within or to the region. Local Municipalities refers to towns and cities within the region operating parking and/or traffic management systems. This may or may not include the Dover Traffic Management System, Salem Traffic Management System, Portsmouth Traffic Management System, Somersworth Traffic Management System and others.

Interagency Agreements			
Participants	*Type of Agreement****	*Participants*	*Type of Agreement****
CART COAST	C	COAST Private Ground Transportation Services	SI
CART University of New Hampshire	C	COAST NHDOT	SI, A
CART Other Transit Providers**	C	COAST Local Municipalities	SI, A
CART Amtrak	SI	COAST Parking Facility Operators	SI, A
CART Private Ground Transportation Services	SI	University of New Hampshire Other Transit Providers**	C
CART NHDOT	SI, A	University of New Hampshire Amtrak	SI
CART Local Municipalities	SI, A	University of New Hampshire Private Ground Transportation Services	SI
CART Parking Facility Operators	SI, A	University of New Hampshire NHDOT	SI, A
COAST University of New Hampshire	C	University of New Hampshire Local Municipalities	SI, A
COAST Other Transit Providers**	C	University of New Hampshire Parking Facility Operators	SI, A
COAST Amtrak	SI		
***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control			

APTS08 - TRANSIT TRAVELER INFORMATION (All Instances)

Operational Description

These service packages describe the distribution of transit information (such as schedules and real-time service information) to transit customers. CART, COAST, and University of New Hampshire have plans to distribute this transit information to their respective websites and potentially to the NHDOT 511 System and the local media. In some cases, such as COAST and UNH, such information is already being gathered and processed, but is not yet available to the public. University of New Hampshire also has near-term plans to distribute transit information to travelers at transit facilities as well as providing that information to personal devices through mobile phone applications.

Lead Agencies	CART/COAST/University of New Hampshire

Agency Responsibilities*

		Party B				
		CART (CART Broker/Manager, CART Demand Response Dispatch, CART Transit Vehicles)	COAST (COAST Broker/Manager, COAST Fixed Route/Demand Response Dispatch, COAST Transit Vehicles, COAST Bus Stops and Transfer Points)	University of New Hampshire (UNH Fixed Route Dispatch, UNH Transit Vehicles, UNH Bus Stops and Transfer Points)	NHDOT (511, 511nh.com)	Local Media** (Local Media)
Party A	CART				Send transit information	
	COAST				Send transit information	
	University of New Hampshire				Send transit information	
	NHDOT					
	Local Media**					

*To be read directionally: Party A is responsible to Party B.

**Local Media in this case refers to non-specific media outlets in the region.

Interagency Agreements

Participants	*Type of Agreement****
CART NHDOT	SI
CART Local Media**	SI
COAST NHDOT	SI
COAST Local Media**	SI
University of New Hampshire NHDOT	SI
University of New Hampshire Local Media**	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

APTS09 - TRANSIT SIGNAL PRIORITY (All Instances)

Operational Description	
These service packages describe the provision of signal priority to transit vehicles. Transit vehicles will communicate directly with traffic signal priority devices in the field. This information will then be relayed back to transit dispatch centers and traffic management systems. Information coordination between transit dispatch and traffic management systems is also a possibility.	
Lead Agencies	COAST/University of New Hampshire

Agency Responsibilities*

		Party B		
		COAST (COAST Fixed Route Dispatch, COAST Transit Vehicles)	University of New Hampshire (UNH Fixed Route Dispatch, UNH Transit Vehicles)	Local Municipalities** (Local Traffic Management Systems, Local Field Devices)
Party A	COAST			Send signal priority request
	University of New Hampshire			Send signal priority request
	Local Municipalities**			

*To be read directionally: Party A is responsible to Party B.

**Local Municipalities in this case refer to any municipality and/or DPW that operates traffic signals and traffic management systems in the region. This may or may not include the Portsmouth, Salem, Somersworth, Plaistow, and Kingston Traffic Management Systems.

Interagency Agreements

Participants	*Type of Agreement****
COAST Local Municipalities**	A
University of New Hampshire Local Municipalities**	A

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

TRAVELER INFORMATION

OPERATIONAL CONCEPTS

ATIS02 - INTERACTIVE TRAVELER INFORMATION (Local Websites)

Operational Description	
In this service package, traveler information is interactively distributed through local municipal websites. This includes maintenance and construction information from Local DPWs, road network conditions from Local Traffic Management Systems, tri-state region road conditions from TRIO, and incident information from Local EOCs and Local Public Safety Centers.	
Lead Agency	Local Municipalities**

Agency Responsibilities*

		Party B			
		Local Municipalities** (Local Municipal Websites, Local DPW, Local Traffic Management Systems)	TRIO (TRIO ISP)	Local Public Safety Agencies** (Local EOC, Local Public Safety Centers)	Local Media** (Local Media)
Party A	Local Municipalities**				Send traveler information to the media.
	TRIO	Send incident information to local websites.			
	Local Public Safety Agencies**	Send incident information to local websites.			
	Local Media**				

*To be read directionally: Party A is responsible to Party B.

**Local Municipalities in this case refer to municipalities and/or DPWs in the region that contribute maintenance, construction, and/or road network condition information to a local website. Local Public Safety Agencies in this case refers to police, fire, emergency medical, and other agencies providing incident information to a local website. Local Media in this case refers to non-specific media outlets in the region.

Interagency Agreements

Participants	*Type of Agreement****
Local Municipalities** Local Media**	SI
Local Municipalities** TRIO	SI
Local Municipalities** Local Public Safety Agencies**	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

TRAFFIC MANAGEMENT

OPERATIONAL CONCEPTS

ATMS06 - TRAFFIC INFORMATION DISSEMINATION (Local Traffic Information Dissemination)

Operational Description

This service package describes the distribution of traffic information collected by Traffic Management entities. Local Traffic Management Systems collect traffic information, then distribute road network conditions to transit agencies, websites and information service providers, the media, and public safety agencies.

Lead Agency	Local Municipalities**

Agency Responsibilities*

		Party B				
		Local Municipalities** (Local Traffic Management Systems, Local Municipal Websites)	Transit Agencies** (CART Fixed Route/Demand Response Dispatch, COAST Fixed Route/Demand Response Dispatch, UNH Transit Fixed Route Dispatch, Other Transit Provider Dispatch)	NHDOT (511nh.com)	Local Public Safety Agencies** (Local EOC, Local Public Safety Centers)	Local Media** (Local Media)
Party A	Local Municipalities**		Provide road network conditions			
	Transit Agencies**					
	NHDOT					
	Local Public Safety Agencies**					
	Local Media**					

*To be read directionally: Party A is responsible to Party B.

** Local Municipalities in this case refer to all towns and cities in the region operating a traffic management system. Transit Agencies in this case includes CART, COAST, UNH Transit, and other transit providers. Local Public Safety Agencies refers to police, fire, emergency medical and other public safety agencies that operate emergency operations centers and public safety dispatch. Local Media refers to non-specific media outlets in the region.

Interagency Agreements

Participants	*Type of Agreement****
Local Municipalities** Transit Agencies**	SI
Local Municipalities** NHDOT	SI
Local Municipalities** Local Public Safety Agencies**	SI
Local Municipalities** Local Media**	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

ATMS08 - INCIDENT MANAGEMENT (All Local Instances)

Operational Description

In these service packages, local traffic management systems (including the Portsmouth, Salem, Somersworth, Plaistow, and Kingston Traffic Management Systems, as well as all other local traffic management systems in the region) manage traffic incidents by interacting with law enforcement and maintenance agencies. When the local traffic management system detects an incident, emergency management dispatchers are notified. Public safety agencies respond to the incident, and all agencies continue to exchange incident information, road network conditions, and updates about their response status. At the same time, the traffic management systems contact nearby municipal DPWs to provide incident information and request maintenance/construction resources as necessary. Event promoters also send information to the traffic management systems regarding anticipated event impact on the local transportation network.

Lead Agency	Local Municipalities**

Agency Responsibilities*

		Party B		
		Local Municipalities** (Local Traffic Management Systems, Local DPW)	Local Public Safety Agencies** (Local EOC, Local Public Safety Centers)	Event Promoters** (Regional Event Promoters)
Party A	Local Municipalities**		Provide incident detection and road network condition information Coordinate incident response	
	Local Public Safety Agencies**	Coordinate incident response		
	Event Promoters**	Provide event information and plans for large-scale events		

*To be read directionally: Party A is responsible to Party B.

** Local Municipalities in this case refer to all towns and cities in the region operating a traffic management system. In particular, this includes the instances of the Portsmouth, Salem, Somersworth, Plaistow, and Kingston Traffic Management Systems, as well as other Local Traffic Management Systems in the region. Local Public Safety Agencies refers to police, fire, emergency medical and other public safety agencies that operate emergency operations centers and public safety dispatch. Event Promoters refer to non-specific promoters of large-scale events with transportation impacts.

Interagency Agreements

Participants	*Type of Agreement****
Local Municipalities** Local Public Safety Agencies**	SI, C
Local Municipalities** Event Promoters**	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

EMERGENCY MANAGEMENT

OPERATIONAL CONCEPTS

EM01 - EMERGENCY CALL-TAKING AND DISPATCH (Local Public Safety Centers)

Operational Description	
This service package describes the emergency call-taking and dispatch protocol in the region. When a citizen reports an emergency by calling 911, the call is directed, based on the location of the caller, to a local public safety center for emergency dispatch. These various public safety centers dispatch appropriate personnel including police, fire, emergency medical, and other emergency responders. For certain types of incidents and large-scale incidents, incident information is also coordinated with Local and Statewide Emergency Operations Centers.	
Lead Agency	Local Public Safety Agencies**

Agency Responsibilities*			
		Party B	
		Local Public Safety Agencies** (Local Public Safety Centers, Local EOC, Local Public Safety Vehicles)	New Hampshire Department of Safety (Statewide Emergency Operations Center)
Party A	Local Public Safety Agencies**		Report large-scale and specialized incidents. Coordinate incident response.
	New Hampshire Department of Safety	Coordinate incident response.	

*To be read directionally: Party A is responsible to Party B.

**Local Public Safety Agencies in this case include the police, fire, emergency medical, and other public safety agencies operating emergency dispatch functions in the region. It includes the Salem Dispatch Center, the Portsmouth Dispatch Center, the Somersworth Dispatch Center, and other Local Public Safety Centers and Local EOCs that perform dispatch for emergencies.

Interagency Agreements	
Participants	*Type of Agreement****
Local Public Safety Agencies** New Hampshire Department of Safety	SI, C

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

EM02 - EMERGENCY ROUTING (All Local Instances)

Operational Description			
These service package instances combine to describe emergency vehicle routing activities. Vehicles are dispatched by one of the dispatch centers and provided with a suggested route. While driving to their destinations, the vehicles will be able to request signal priority at municipal traffic signals. The Traffic Management entities provide road network conditions to the dispatch centers and monitor the signal priority activity.			
Lead Agency		Local Public Safety Agencies**	
Agency Responsibilities*			
		Party B	
		Local Public Safety Agencies** (Local Public Safety Centers, Local EOC, Local Public Safety Vehicles)	Local Municipalities** (Local Traffic Management Centers, Local Field Devices)
Party A	Local Public Safety Agencies**		Request emergency traffic control. Request signal pre-emption.
	Local Municipalities**	Provide emergency traffic control and road network conditions.	
*To be read directionally: Party A is responsible to Party B.			
**Local Public Safety Agencies in this case include the police, fire, emergency medical, and other public safety agencies operating emergency dispatch functions in the region. It includes the Salem Dispatch Center, the Portsmouth Dispatch Center, the Somersworth Dispatch Center, and other Local Public Safety Centers and Local EOCs that perform dispatch for emergencies. Local Municipalities in this case includes all municipalities and/or DPWs that operate traffic management systems and/or field devices (traffic signals) that allow for emergency vehicle pre-emption. This includes the Portsmouth Traffic Management System, the Salem Traffic Management System, the Somersworth Traffic Management System, and other Local Traffic Management Systems in the region.			
Interagency Agreements			
Participants			*Type of Agreement****
Local Public Safety Agencies** Local Municipalities**			SI, A
***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control			

EM05 - TRANSPORTATION INFRASTRUCTURE PROTECTION (Port Security System)

Operational Description	
This service package instance describes a security system to protect the port infrastructure. An underwater sonar detection/deterrent security and surveillance system is used to protect the port. Surveillance, sensor, and threat information is then shared, as necessary, with the U.S. Coast Guard, the Statewide Emergency Operations Center, and local EOCs and Public Safety Centers.	
Lead Agency	New Hampshire Division of Ports and Harbors

Agency Responsibilities*

		Party B			
		New Hampshire Division of Ports and Harbors (Port Security System)	New Hampshire Department of Safety (Statewide Emergency Operations Center)	U.S. Coast Guard (U.S. Coast Guard)	Local Public Safety Agencies** (Local Public Safety Centers, Local EOC)
Party A	New Hampshire Division of Ports and Harbors		Coordinate threat information		
	New Hampshire Department of Safety	Coordinate threat information.			
	U.S. Coast Guard	Coordinate threat information.			
	Local Public Safety Agencies**	Coordinate threat information.			

*To be read directionally: Party A is responsible to Party B.

**Local Public Safety Agencies in this case include the police, fire, emergency medical, and other public safety agencies operating emergency dispatch functions in the region. It includes the Local Public Safety Centers and Local EOCs that provide emergency dispatch functions.

Interagency Agreements

Participants	*Type of Agreement****
New Hampshire Division of Ports and Harbors New Hampshire Department of Safety	C
New Hampshire Division of Ports and Harbors Local Public Safety Agencies**	C
New Hampshire Division of Ports and Harbors U.S. Coast Guard	C

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

MAINTENANCE AND CONSTRUCTION MANAGEMENT

OPERATIONAL CONCEPTS

MC06 - WINTER MAINTENANCE (Local DPW)

Operational Description	
This service package describes the ways that local DPWs manage winter maintenance activities (such as snowplowing). Municipal DPWs are responsible for responding to requests from traffic management centers and public safety agencies for maintenance action, then deploying vehicles and personnel. They then provide maintenance status information to those entities, as well as to transit agencies and municipal websites. The DPWs receive road network conditions from traffic management centers to supplement their activities.	
Lead Agency	Local Municipalities**

Agency Responsibilities*

		Party B		
		Local Municipalities** (Local DPW, Local Municipal Websites, Local Maintenance and Construction Vehicles, Local Traffic Management Systems)	Local Public Safety Agencies** (Local Public Safety Centers, Local EOC)	Transit Agencies** (CART Demand Response Dispatch, COAST Fixed Route/Demand Response Dispatch, UNH Fixed Route Dispatch)
Party A	Local Municipalities**		Respond to requests for roadway maintenance. Provide roadway maintenance status.	Provide roadway maintenance status.
	Local Public Safety Agencies**	Request roadway maintenance		
	Transit Agencies**			

*To be read directionally: Party A is responsible to Party B.

**Local Municipalities include all municipalities and/or DPWs that operate winter maintenance activities and traffic management in the region. Local Public Safety Agencies in this case include the police, fire, emergency medical, and other public safety agencies operating emergency dispatch functions in the region. It includes the Local Public Safety Centers and Local EOCs that provide emergency dispatch functions. Transit Agencies in this case refer to CART, COAST, and UNH.

Interagency Agreements

Participants	*Type of Agreement****
Local Municipalities** Local Public Safety Agencies**	SI, A
Local Municipalities** Transit Agencies**	SI

***SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control

APPENDIX I

RECOMMENDED INTERAGENCY AGREEMENTS

Stakeholders	ACT	Amtrak	City of Dover DPW	City of Portsmouth DPW	City of Portsmouth Public Safety Agencies	City of Somersworth DPW	City of Somersworth Public Safety Agencies	CART	COAST	Easter Seals NH	Event Promoters	Local Media	Local Municipalities**	Local Public Safety Agencies**	Local Public Works Agencies **	NHDOS	NHDOT	NH Ports & Harbors	Other Transit Providers***	Parking Facility Operators	Private Ground Transportation Providers***	RPC	SRPC	Town of Salem	Town of Salem DPW	Town of Salem Public Safety Departments	U.S. Coast Guard	UNH
Alliance for Community Transportation (ACT)																												
Amtrak																												
City of Dover DPW																												
City of Portsmouth DPW																												
City of Portsmouth Public Safety Agencies				SI, A																								
City of Somersworth DPW																												
City of Somersworth Public Safety Agencies						SI, A																						
CART		SI																										
COAST		SI						C																				
Easter Seals NH								C																				
Event Promoters																												
Local Media								SI	SI																			
Local Municipalities**								SI	SI, A		SI	SI																
Local Public Safety Agencies**								SI, A	SI, A				SI, A, C															
Local Public Works Agencies **													SI, A															
New Hampshire Department of Safety (NHDOS)														SI, A, C														
New Hampshire Department of Transportation (NHDOT)					SI, C		SI, C	SI, A	SI, A				SI	SI, C														
New Hampshire Division of Ports and Harbors (NH Ports & Harbors)														C		C												
Other Transit Providers***	C							C	C																			
Parking Facility Operators (Non-Municipal)								SI, A	SI, A																			
Private Ground Transportation Providers***								SI	SI																			
Rockingham Planning Commission (RPC)				SI				SI	SI				SI		SI		SI											
Strafford Regional Planning Commission (SRPC)			SI			SI			SI				SI		SI		SI											
Town of Salem								SI, A														SI						
Town of Salem DPW																							SI, A, SC					
Town of Salem Public Safety Departments																	SI, C						SI, A, SC					
TRIO													SI															
U.S. Coast Guard																		C										
UNH		SI						C	C			SI	SI, A	SI, A			SI, A		C	SI, A	SI		SI					

SI = Share Information; A = Request/Perform Action; C = Coordinate Activity; SC = Share Control;

*These agreements include only those specific to the region and do not include the agreements defined in the *New Hampshire Statewide ITS Architecture*. For example, agreements between the Statewide EOC and Federal Public Safety Agencies is included in the New Hampshire Statewide ITS Architecture, and therefore is not included herein. Internal agency agreements are also not depicted.

**Local Municipalities, Local Public Safety Agencies, and Local Public Works Agencies includes town and city administrative departments, public works departments, police departments, fire departments, emergency medical dispatch, and other municipal agencies involved in regional intelligent transportation for the communities within the study area.

***Other Transit Providers and Private Ground Transportation Providers include all public and private sector transit service providers not specifically identified in the regional ITS architecture, including the Merrimack Valley Transit Authority, MBTA, C&J, human service transportation providers, and other transit providers operating in the region and in adjoining regions.

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APPENDIX J

FUNCTIONAL REQUIREMENTS

Functional Requirements

Strafford-Rockingham Region ITS Architecture (Region)

6/12/2012

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **511**	
Entity: **Information Service Provider**	
Functional Area: [Not Defined]	
Entity: **Personal Information Access**	
Functional Area: [Not Defined]	
Entity: **Telecommunications System for Traveler Information**	
Functional Area: [Not Defined]	
Entity: **Travel Services Provider**	
Functional Area: [Not Defined]	
Element: **511nh.com**	
Entity: **Information Service Provider**	
Functional Area: [Not Defined]	
Entity: **Remote Traveler Support**	
Functional Area: [Not Defined]	
Element: **ACT Website**	
Entity: **Information Service Provider**	
Functional Area: [Not Defined]	
Element: **Alerting and Advisory Systems**	
Entity: **Alerting and Advisory Systems**	
Functional Area: [Not Defined]	
Element: **Amtrak Operations**	
Entity: **Multimodal Transportation Service Provider**	
Functional Area: [Not Defined]	
Element: **Archived Data Management System**	
Entity: **Archived Data Management**	
Functional Area: [Not Defined]	
Entity: **Other Archives**	
Functional Area: [Not Defined]	
Element: **Archived Data Users**	
Entity: **Archived Data User Systems**	
Functional Area: [Not Defined]	
Element: **Bridge Operations Center Field Devices**	
Entity: **Roadway**	
Functional Area: [Not Defined]	
Element: **Bridge Operations Centers**	
Entity: **Traffic Management**	
Functional Area: [Not Defined]	
Entity: **Other Traffic Management**	
Functional Area: [Not Defined]	
Element: **CART Broker/Manager**	
Entity: **Transit Management**	

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **CART Broker/Manager**		
Entity: **Transit Management**		
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.		
Requirement:	1 The center shall monitor the locations of all transit vehicles within its network.	Planned
Requirement:	2 The center shall determine adherence of transit vehicles to their assigned schedule.	Planned
Requirement:	4 The center shall provide transit operational data to traveler information service providers.	Planned
Functional Area: **Transit Center Fare Management** Management of fare collection at the center - includes setting and distributing fare information, central processing of fares for transit as well as other ITS services, links to financial institutions and enforcement agencies.		
Requirement:	1 The center shall manage the actual value of transit fares for each segment of each regular transit route, including the transmission of the information to transit vehicles and transit stops or stations.	Planned
Requirement:	4 The center shall support the payment of transit fare transactions using data provided by the traveler cards / payment instruments.	Planned
Requirement:	10 The center shall collect fare statistics data to implement variable and flexible fare structures.	Planned
Requirement:	12 The center shall provide transit fare information to other centers, including traveler information providers upon request.	Planned
Functional Area: **Transit Vehicle Operator Assignment** Assignment of transit operators to runs in a fair manner while minimizing labor and overtime services, considering operator preferences, qualifications, accumulated work hours, and other information about each operator.		
Requirement:	1 The center shall maintain records of a transit vehicle operator's performance. This may be done utilizing standardized performance evaluation criteria set forth by governmental regulations and transit operating company policies, assessing the transit vehicle operator's driving history, and assessing comments from the transit vehicle operator's supervisor(s) as well as noting any moving violations or accidents, supervisor comments, government regulations, and company policies.	Planned
Requirement:	2 The center shall assess the transit vehicle operator's availability based on previous work assignments, accumulated hours, plus health and vacation commitments.	Planned
Requirement:	3 The center shall assign transit vehicle operators to transit schedules based on their eligibility, route preferences, seniority, and transit vehicle availability.	Planned
Requirement:	4 The center shall provide an interface through which the transit vehicle operator information can be maintained - either from the transit vehicle operator, center personnel, or other functions.	Planned
Requirement:	5 The center shall generate supplemental vehicle operator assignments as required due to change events that occur during the operating day.	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)

Element: **CART Broker/Manager**

Entity: **Transit Management**

Functional Area: **Transit Vehicle Assignment**
Assigns individual transit vehicles to vehicle blocks and downloads this information to the transit vehicle, updating assignments as necessitated by changes. It also provides an inventory management function that stores attributes about each of the transit vehicles.

Requirement:	1	The center shall assign individual transit vehicles to transit blocks.	Planned
Requirement:	4	The center shall provide an inventory management function for the transit facility that stores functional attributes about each vehicle owned by the transit operator. The functional attributes permit the planning and assignment functions to match vehicles with routes based on suitability for the types of service required by the particular routes.	Planned
Requirement:	5	The center shall generate transit vehicle availability listings, current and forecast, to support transit vehicle assignment planning.	Planned
Requirement:	6	The center shall provide transit operations personnel with the capability to update transit vehicle assignments and receive reports on transit vehicle inventory status.	Planned

Functional Area: **Transit Center Information Services**
Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.

Requirement:	1	The center shall provide travelers using public transportation with traffic and advisory information upon request. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events.	Existing
Requirement:	2	The center shall provide transit information to the media including details of deviations from schedule of regular transit services.	Planned
Requirement:	3	The center shall exchange transit schedules, real-time arrival information, fare schedules, and general transit service information with other transit organizations to support transit traveler information systems.	Planned
Requirement:	4	The center shall provide transit service information to traveler information service providers including routes, schedules, schedule adherence, and fare information as well as transit service information during evacuation.	Planned

Functional Area: **Transit Center Multi-Modal Coordination**
Coordinate schedules with other agencies and modes, including transit transfer cluster and transfer point information.

Requirement:	1	The center shall coordinate schedules and services between transit agencies, traffic management, maintenance and construction operations, parking management, and other surface or air transportation modes.	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)

Element: **CART Broker/Manager**

Entity: **Transit Management**

Functional Area: **Transit Center Multi-Modal Coordination**
Coordinate schedules with other agencies and modes, including transit transfer cluster and transfer point information.

Requirement:	2	The center shall share transfer cluster and transfer point information with multimodal transportation service providers, other transit agencies, and traveler information service providers. A transfer cluster is a collection of stop points, stations, or terminals where transfers can be made conveniently.	Planned
Requirement:	5	The center shall provide transit operations personnel with the capability to control and monitor transit service coordination activities.	Planned

Element: **CART Data Repository**

Entity: **Archived Data Management**

Functional Area: **ITS Data Repository**
Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.

Requirement:	1	The center shall collect data to be archived from one or more data sources.	Planned
Requirement:	2	The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement:	3	The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned
Requirement:	4	The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement:	5	The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement:	6	The center shall include capabilities for archive to archive coordination.	Planned
Requirement:	10	The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned

Entity: **Other Archives**

Functional Area: [Not Defined]

Element: **CART Demand Response Dispatch**

Entity: **Transit Management**

Functional Area: **Transit Center Vehicle Tracking**
Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.

Requirement:	1	The center shall monitor the locations of all transit vehicles within its network.	Planned
Requirement:	2	The center shall determine adherence of transit vehicles to their assigned schedule.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **CART Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.		
Requirement:	3 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for transit tracking and dispatch.	Planned
Requirement:	4 The center shall provide transit operational data to traveler information service providers.	Planned
Functional Area: **Transit Center Paratransit Operations** Management of demand response transit services, including paratransit. Planning and scheduling of these services. Supports automated vehicle dispatch and automatically updates customer service operator systems.		
Requirement:	1 The center shall process trip requests for demand responsive transit services, i.e. paratransit. Sources of the requests may include traveler information service providers.	Existing
Requirement:	2 The center shall monitor the operational status of the demand response vehicles including status of passenger pick-up and drop-off.	Planned
Requirement:	3 The center shall generate demand response transit (including paratransit) routes and schedules based on such factors as parameters input by the system operator, what other demand responsive transit schedules have been planned, the availability and location of vehicles, the relevance of any fixed transit routes and schedules, road network information, and incident information.	Existing
Requirement:	4 The center shall dispatch demand response (paratransit) transit vehicles.	Existing
Requirement:	5 The center shall exchange information with Maintenance and Construction Operations concerning work zones, roadway conditions, asset restrictions, work plans, etc.	Planned
Requirement:	6 The center shall disseminate up-to-date schedules and route information to other centers for demand responsive transit services (paratransit).	Planned
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.		
Requirement:	1 The center shall analyze transit vehicle schedule performance to determine the need for priority along certain routes or at certain intersections.	Planned
Requirement:	2 The center shall send requests for priority along routes or at intersections to traffic management.	Planned
Requirement:	3 The center shall define business rules that govern use of transit vehicle signal priority, communicate these rules to the transit vehicle, and monitor transit vehicle requests for priority at signalized intersections.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **CART Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.		
Requirement:	4 The center shall provide transit operations personnel with the capability to control and monitor transit signal priority operations.	Planned
Functional Area: **Transit Center Security** Monitor transit vehicle operator or traveler activated alarms; authenticate transit vehicle operators; remotely disable a transit vehicle; alert operators, travelers, and police to potential incidents identified by these security features.		
Requirement:	1 The center shall monitor transit vehicle operational data to determine if the transit vehicle is off-route and assess whether a security incident is occurring.	Planned
Requirement:	2 The center shall receive reports of emergencies on-board transit vehicles entered directly be the transit vehicle operator or from a traveler through interfaces such as panic buttons or alarm switches.	Planned
Requirement:	4 The center shall exchange transit incident information along with other service data with other transit agencies.	Planned
Requirement:	5 The center shall receive information pertaining to a wide-area alert such as weather alerts, disaster situations, or child abductions. This information may come from Emergency Management or from other Alerting and Advisory Systems.	Planned
Requirement:	7 The center shall coordinate the response to security incidents involving transit with other agencies including Emergency Management, other transit agencies, media, traffic management, and traveler information service providers.	Planned
Requirement:	8 The center shall receive threat information and status on the integrity of the transit infrastructure.	Planned
Functional Area: **Transit Center Information Services** Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.		
Requirement:	1 The center shall provide travelers using public transportation with traffic and advisory information upon request. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events.	Planned
Requirement:	2 The center shall provide transit information to the media including details of deviations from schedule of regular transit services.	Planned
Requirement:	3 The center shall exchange transit schedules, real-time arrival information, fare schedules, and general transit service information with other transit organizations to support transit traveler information systems.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **CART Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Information Services** Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.		
Requirement:	4 The center shall provide transit service information to traveler information service providers including routes, schedules, schedule adherence, and fare information as well as transit service information during evacuation.	Planned
Functional Area: **Transit Center Multi-Modal Coordination** Coordinate schedules with other agencies and modes, including transit transfer cluster and transfer point information.		
Requirement:	1 The center shall coordinate schedules and services between transit agencies, traffic management, maintenance and construction operations, parking management, and other surface or air transportation modes.	Planned
Requirement:	2 The center shall share transfer cluster and transfer point information with multimodal transportation service providers, other transit agencies, and traveler information service providers. A transfer cluster is a collection of stop points, stations, or terminals where transfers can be made conveniently.	Planned
Requirement:	5 The center shall provide transit operations personnel with the capability to control and monitor transit service coordination activities.	Planned
Functional Area: **Transit Evacuation Support** Support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency. Coordinate regional evacuation plans and resources including transit and school bus fleets.		
Requirement:	1 The center shall manage the use of transit resources to support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency.	Planned
Requirement:	2 The center shall coordinate regional evacuation plans with Emergency Management - identifying the transit role in an evacuation and the transit resources that would be used.	Planned
Requirement:	3 The center shall coordinate the use of transit and school bus fleets during an evacuation, supporting evacuation of those with special needs and the general population.	Planned
Requirement:	4 The center shall adjust and update transit service and fare schedules and provide that information to other agencies as they coordinate evacuations.	Planned
Functional Area: **Transit Data Collection** Collection and storage of transit management data. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect transit management data such as transit fares and passenger use, transit services, paratransit operations, transit vehicle maintenance data, etc.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **CART Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Data Collection** Collection and storage of transit management data. For use by operations personnel or data archives in the region.		
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the transit data or for the data itself.	Planned
Functional Area: **Transit Transportation Operations Data Collection** Collects real-time information on the state of the regional transportation system for operational use by the center. It establishes communications with a regional repository, requests or subscribes to information relevant to the center, and distributes the received information for use.		
Requirement:	1 The center shall collect real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information.	Planned
Entity: **Multimodal Transportation Service Provider**		
Functional Area: [Not Defined]		
Element: **CART Demand Response Transit Vehicles**		
Entity: **Transit Vehicle**		
Functional Area: **On-board Transit Trip Monitoring** Support fleet management with automatic vehicle location (AVL) and automated mileage and fuel reporting and auditing.		
Requirement:	1 The transit vehicle shall track the current location of the transit vehicle.	Planned
Requirement:	2 The transit vehicle shall support the computation of the location of a transit vehicle using on-board sensors to augment the location determination function. This may include proximity to the transit stops or other known reference points as well as recording trip length.	Planned
Requirement:	4 The transit vehicle shall record transit trip monitoring data including operational status information such as doors open/closed, running times, etc.	Planned
Requirement:	5 The transit vehicle shall send the transit vehicle trip monitoring data to center-based trip monitoring functions.	Planned
Functional Area: **On-board Paratransit Operations** On-board systems to manage paratransit and flexible-route dispatch requests, including multi-stop runs. Passenger data is collected and provided to the center.		
Requirement:	1 The transit vehicle shall manage data input to sensor(s) on-board a transit vehicle to determine the vehicle's availability for use in demand responsive and flexible-route transit services based on identity, type, and passenger capacity.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **CART Demand Response Transit Vehicles**			
Entity: **Transit Vehicle**			
Functional Area:	**On-board Paratransit Operations** On-board systems to manage paratransit and flexible-route dispatch requests, including multi-stop runs. Passenger data is collected and provided to the center.		
Requirement:	2	The transit vehicle shall receive the status of demand responsive or flexible-route transit schedules and passenger loading from the transit vehicle operator.	Planned
Requirement:	3	The transit vehicle shall provide the transit vehicle operator instructions about the demand responsive or flexible-route transit schedule that has been confirmed from the center.	Planned
Functional Area:	**On-board Transit Fare Management** On-board systems provide fare collection using a travelers non-monetary fare medium. Collected fare data are made available to the center.		
Requirement:	1	The transit vehicle shall read data from the traveler card / payment instrument presented by boarding passengers.	Planned
Requirement:	4	The transit vehicle shall calculate the traveler's fare based on the origin and destination provided by the traveler as well as factors such as the transit routing, transit fare category, traveler history, and route-specific information.	Planned
Functional Area:	**On-board Transit Security** On-board video/audio surveillance systems, threat sensors, and object detection sensors to enhance security and safety on-board a transit vehicles. Also includes silent alarms activated by transit user or vehicle operator, operator authentication, and remote vehicle disabling.		
Requirement:	1	The transit vehicle shall perform video and audio surveillance inside of transit vehicles and output raw video or audio data for either local monitoring (for processing or direct output to the transit vehicle operator), remote monitoring or for local storage (e.g., in an event recorder).	Planned
Requirement:	8	The transit vehicle shall monitor and output surveillance and sensor equipment status and fault indications.	Planned
Requirement:	9	The transit vehicle shall accept emergency inputs from either the transit vehicle operator or a traveler through such interfaces as panic buttons, silent or audible alarms, etc.	Planned
Requirement:	10	The transit vehicle shall output reported emergencies to the center.	Planned
Functional Area:	**On-board Transit Signal Priority** On-board systems request signal priority through short range communication directly with traffic control equipment at the roadside (intersections, ramps, interchanges, etc.).		
Requirement:	1	The transit vehicle shall determine the schedule deviation and estimated times of arrival (ETA) at transit stops.	Planned
Requirement:	2	The transit vehicle shall send priority requests to traffic signal controllers at intersections, pedestrian crossings, and multimodal crossings on the roads (surface streets) and freeway (ramp controls) network that enable a transit vehicle schedule deviation to be corrected.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **CART Demand Response Transit Vehicles**			
Entity: **Transit Vehicle**			
Functional Area:	**On-board Transit Signal Priority** On-board systems request signal priority through short range communication directly with traffic control equipment at the roadside (intersections, ramps, interchanges, etc.).		
Requirement:	3	The transit vehicle shall send the schedule deviation data and status of priority requests to the transit vehicle operator and provide the capability for the transit vehicle operator to control the priority system.	Planned
Functional Area:	**On-board Transit Information Services** On-board systems to furnish next-stop annunciation as well as interactive travel-related information, including routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, non-motorized transportation services, and special events.		
Requirement:	3	The transit vehicle shall broadcast advisories about the imminent arrival of the transit vehicle at the next stop via an on-board automated annunciation system.	Planned
Requirement:	4	The transit vehicle shall support input and output forms that are suitable for travelers with physical disabilities.	Planned
Element: **CART System Operator**			
Entity: **Transit Operations Personnel**			
Functional Area:	[Not Defined]		
Element: **CART Telephone**			
Entity: **Information Service Provider**			
Functional Area:	**Traveler Telephone Information** Distribution of traveler information and wide-area alerts to traveler telephone information systems such as 511, based on voice-based traveler requests.		
Requirement:	2	The center shall provide the capability to process dual-tone multifrequency (DTMF)-based requests (touch-tone) for traveler information from a traveler telephone information system.	Planned
Requirement:	3	The center shall provide the capability to process traveler information requests from a traveler telephone information system.	Existing
Element: **CART Transit Vehicle Operator**			
Entity: **Transit Vehicle Operator**			
Functional Area:	[Not Defined]		
Element: **CART Website**			
Entity: **Information Service Provider**			
Functional Area:	**Interactive Infrastructure Information** Personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.		
Requirement:	3	The center shall disseminate customized transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence information to travelers upon request.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **CART Website**		
Entity: **Information Service Provider**		
Functional Area: **Interactive Infrastructure Information** Personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.		
Requirement:	7 The center shall disseminate customized multimodal transportation service information (for example, from ferry and airline operators), including transfer points and other information, to travelers upon request.	Planned
Requirement:	8 The center shall disseminate customized event information to travelers upon request.	Planned
Requirement:	12 The center shall manage payment for services, such as tolls, transit fares, parking lot charges, map updates, and advanced payment for tolls, and provide transaction success or failure details.	Planned
Requirement:	15 The center shall manage updates of digitized map data and provide updates to traveler interface systems upon request.	Planned
Requirement:	17 The center shall provide the capability for a system operator to control the type and update frequency of traveler information.	Planned
Element: **COAST Bus Stops and Transfer Points**		
Entity: **Remote Traveler Support**		
Functional Area: **Traveler Secure Area Surveillance** Security surveillance devices that monitor traveler-frequented areas such as transit stops and rest stops.		
Requirement:	1 The field element shall include video and/or audio surveillance of traveler secure areas including transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and traveler information centers).	Planned
Requirement:	2 The field element shall be remotely controlled by a center.	Planned
Requirement:	3 The field element shall provide equipment status and fault indication of surveillance equipment to a center.	Planned
Requirement:	4 The field element shall provide raw video or audio data.	Planned
Functional Area: **Remote Transit Information Services** Public traveler interface that provides real-time travel-related information at transit stops and multi-modal transfer points, including general annunciation, display of imminent arrival information, the latest available information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence.		
Requirement:	1 The public interface for travelers shall collect and provide real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas.	Planned
Requirement:	2 The public interface for travelers shall collect and present to the transit traveler information on transit routes, schedules, and real-time schedule adherence.	Planned
Requirement:	3 The public interface for travelers shall provide support for general annunciation and/or display of imminent arrival information and other information of general interest to transit users.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **COAST Bus Stops and Transfer Points**		
Entity: **Remote Traveler Support**		
Functional Area: **Remote Transit Information Services** Public traveler interface that provides real-time travel-related information at transit stops and multi-modal transfer points, including general annunciation, display of imminent arrival information, the latest available information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence.		
Requirement:	4 The public interface for travelers shall present information to the traveler in a form suitable for travelers with physical disabilities.	Planned
Element: **COAST Data Repository**		
Entity: **Archived Data Management**		
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.		
Requirement:	1 The center shall collect data to be archived from one or more data sources.	Planned
Requirement:	2 The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement:	3 The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned
Requirement:	4 The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement:	5 The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement:	6 The center shall include capabilities for archive to archive coordination.	Planned
Requirement:	10 The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned
Entity: **Other Archives**		
Functional Area: [Not Defined]		
Element: **COAST Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.		
Requirement:	1 The center shall monitor the locations of all transit vehicles within its network.	Existing
Requirement:	2 The center shall determine adherence of transit vehicles to their assigned schedule.	Existing

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **COAST Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.		
Requirement:	3 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for transit tracking and dispatch.	Planned
Requirement:	4 The center shall provide transit operational data to traveler information service providers.	Planned
Functional Area: **Transit Center Paratransit Operations** Management of demand response transit services, including paratransit. Planning and scheduling of these services. Supports automated vehicle dispatch and automatically updates customer service operator systems.		
Requirement:	1 The center shall process trip requests for demand responsive transit services, i.e. paratransit. Sources of the requests may include traveler information service providers.	Existing
Requirement:	2 The center shall monitor the operational status of the demand response vehicles including status of passenger pick-up and drop-off.	Existing
Requirement:	3 The center shall generate demand response transit (including paratransit) routes and schedules based on such factors as parameters input by the system operator, what other demand responsive transit schedules have been planned, the availability and location of vehicles, the relevance of any fixed transit routes and schedules, road network information, and incident information.	Planned
Requirement:	4 The center shall dispatch demand response (paratransit) transit vehicles.	Existing
Requirement:	5 The center shall exchange information with Maintenance and Construction Operations concerning work zones, roadway conditions, asset restrictions, work plans, etc.	Planned
Requirement:	6 The center shall disseminate up-to-date schedules and route information to other centers for demand responsive transit services (paratransit).	Planned
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.		
Requirement:	1 The center shall analyze transit vehicle schedule performance to determine the need for priority along certain routes or at certain intersections.	Planned
Requirement:	2 The center shall send requests for priority along routes or at intersections to traffic management.	Planned
Requirement:	3 The center shall define business rules that govern use of transit vehicle signal priority, communicate these rules to the transit vehicle, and monitor transit vehicle requests for priority at signalized intersections.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **COAST Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.		
Requirement:	4 The center shall provide transit operations personnel with the capability to control and monitor transit signal priority operations.	Planned
Functional Area: **Transit Center Security** Monitor transit vehicle operator or traveler activated alarms; authenticate transit vehicle operators; remotely disable a transit vehicle; alert operators, travelers, and police to potential incidents identified by these security features.		
Requirement:	1 The center shall monitor transit vehicle operational data to determine if the transit vehicle is off-route and assess whether a security incident is occurring.	Planned
Requirement:	2 The center shall receive reports of emergencies on-board transit vehicles entered directly be the transit vehicle operator or from a traveler through interfaces such as panic buttons or alarm switches.	Planned
Requirement:	4 The center shall exchange transit incident information along with other service data with other transit agencies.	Planned
Requirement:	5 The center shall receive information pertaining to a wide-area alert such as weather alerts, disaster situations, or child abductions. This information may come from Emergency Management or from other Alerting and Advisory Systems.	Planned
Requirement:	7 The center shall coordinate the response to security incidents involving transit with other agencies including Emergency Management, other transit agencies, media, traffic management, and traveler information service providers.	Planned
Requirement:	8 The center shall receive threat information and status on the integrity of the transit infrastructure.	Planned
Functional Area: **Transit Center Information Services** Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.		
Requirement:	1 The center shall provide travelers using public transportation with traffic and advisory information upon request. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events.	Planned
Requirement:	2 The center shall provide transit information to the media including details of deviations from schedule of regular transit services.	Planned
Requirement:	3 The center shall exchange transit schedules, real-time arrival information, fare schedules, and general transit service information with other transit organizations to support transit traveler information systems.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **COAST Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Information Services** Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.		
Requirement:	4 The center shall provide transit service information to traveler information service providers including routes, schedules, schedule adherence, and fare information as well as transit service information during evacuation.	Planned
Functional Area: **Transit Center Multi-Modal Coordination** Coordinate schedules with other agencies and modes, including transit transfer cluster and transfer point information.		
Requirement:	1 The center shall coordinate schedules and services between transit agencies, traffic management, maintenance and construction operations, parking management, and other surface or air transportation modes.	Planned
Requirement:	2 The center shall share transfer cluster and transfer point information with multimodal transportation service providers, other transit agencies, and traveler information service providers. A transfer cluster is a collection of stop points, stations, or terminals where transfers can be made conveniently.	Planned
Requirement:	5 The center shall provide transit operations personnel with the capability to control and monitor transit service coordination activities.	Planned
Functional Area: **Transit Evacuation Support** Support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency. Coordinate regional evacuation plans and resources including transit and school bus fleets.		
Requirement:	1 The center shall manage the use of transit resources to support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency.	Planned
Requirement:	2 The center shall coordinate regional evacuation plans with Emergency Management - identifying the transit role in an evacuation and the transit resources that would be used.	Planned
Requirement:	3 The center shall coordinate the use of transit and school bus fleets during an evacuation, supporting evacuation of those with special needs and the general population.	Planned
Requirement:	4 The center shall adjust and update transit service and fare schedules and provide that information to other agencies as they coordinate evacuations.	Planned
Functional Area: **Transit Data Collection** Collection and storage of transit management data. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect transit management data such as transit fares and passenger use, transit services, paratransit operations, transit vehicle maintenance data, etc.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **COAST Demand Response Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Data Collection** Collection and storage of transit management data. For use by operations personnel or data archives in the region.		
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the transit data or for the data itself.	Planned
Functional Area: **Transit Transportation Operations Data Collection** Collects real-time information on the state of the regional transportation system for operational use by the center. It establishes communications with a regional repository, requests or subscribes to information relevant to the center, and distributes the received information for use.		
Requirement:	1 The center shall collect real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information.	Planned
Entity: **Multimodal Transportation Service Provider**		
Functional Area: [Not Defined]		
Element: **COAST Demand Response Transit Vehicles**		
Entity: **Transit Vehicle**		
Functional Area: **On-board Transit Trip Monitoring** Support fleet management with automatic vehicle location (AVL) and automated mileage and fuel reporting and auditing.		
Requirement:	1 The transit vehicle shall track the current location of the transit vehicle.	Planned
Requirement:	2 The transit vehicle shall support the computation of the location of a transit vehicle using on-board sensors to augment the location determination function. This may include proximity to the transit stops or other known reference points as well as recording trip length.	Planned
Requirement:	4 The transit vehicle shall record transit trip monitoring data including operational status information such as doors open/closed, running times, etc.	Planned
Requirement:	5 The transit vehicle shall send the transit vehicle trip monitoring data to center-based trip monitoring functions.	Planned
Functional Area: **On-board Paratransit Operations** On-board systems to manage paratransit and flexible-route dispatch requests, including multi-stop runs. Passenger data is collected and provided to the center.		
Requirement:	1 The transit vehicle shall manage data input to sensor(s) on-board a transit vehicle to determine the vehicle's availability for use in demand responsive and flexible-route transit services based on identity, type, and passenger capacity.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **COAST Demand Response Transit Vehicles**		
Entity: **Transit Vehicle**		
Functional Area: **On-board Paratransit Operations** On-board systems to manage paratransit and flexible-route dispatch requests, including multi-stop runs. Passenger data is collected and provided to the center.		
Requirement:	2 The transit vehicle shall receive the status of demand responsive or flexible-route transit schedules and passenger loading from the transit vehicle operator.	Planned
Requirement:	3 The transit vehicle shall provide the transit vehicle operator instructions about the demand responsive or flexible-route transit schedule that has been confirmed from the center.	Planned
Functional Area: **On-board Transit Fare Management** On-board systems provide fare collection using a travelers non-monetary fare medium. Collected fare data are made available to the center.		
Requirement:	1 The transit vehicle shall read data from the traveler card / payment instrument presented by boarding passengers.	Planned
Requirement:	4 The transit vehicle shall calculate the traveler's fare based on the origin and destination provided by the traveler as well as factors such as the transit routing, transit fare category, traveler history, and route-specific information.	Planned
Requirement:	6 The transit vehicle shall provide a transit fare payment interface that is suitable for travelers with physical disabilities.	Planned
Requirement:	10 The transit vehicle shall provide fare statistics data to the center.	Planned
Functional Area: **On-board Transit Security** On-board video/audio surveillance systems, threat sensors, and object detection sensors to enhance security and safety on-board a transit vehicles. Also includes silent alarms activated by transit user or vehicle operator, operator authentication, and remote vehicle disabling.		
Requirement:	1 The transit vehicle shall perform video and audio surveillance inside of transit vehicles and output raw video or audio data for either local monitoring (for processing or direct output to the transit vehicle operator), remote monitoring or for local storage (e.g., in an event recorder).	Existing
Requirement:	8 The transit vehicle shall monitor and output surveillance and sensor equipment status and fault indications.	Planned
Requirement:	9 The transit vehicle shall accept emergency inputs from either the transit vehicle operator or a traveler through such interfaces as panic buttons, silent or audible alarms, etc.	Planned
Requirement:	10 The transit vehicle shall output reported emergencies to the center.	Planned
Functional Area: **On-board Transit Signal Priority** On-board systems request signal priority through short range communication directly with traffic control equipment at the roadside (intersections, ramps, interchanges, etc.).		
Requirement:	1 The transit vehicle shall determine the schedule deviation and estimated times of arrival (ETA) at transit stops.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **COAST Demand Response Transit Vehicles**		
Entity: **Transit Vehicle**		
Functional Area: **On-board Transit Signal Priority** On-board systems request signal priority through short range communication directly with traffic control equipment at the roadside (intersections, ramps, interchanges, etc.).		
Requirement:	2 The transit vehicle shall send priority requests to traffic signal controllers at intersections, pedestrian crossings, and multimodal crossings on the roads (surface streets) and freeway (ramp controls) network that enable a transit vehicle schedule deviation to be corrected.	Planned
Requirement:	3 The transit vehicle shall send the schedule deviation data and status of priority requests to the transit vehicle operator and provide the capability for the transit vehicle operator to control the priority system.	Planned
Functional Area: **On-board Transit Information Services** On-board systems to furnish next-stop annunciation as well as interactive travel-related information, including routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, non-motorized transportation services, and special events.		
Requirement:	3 The transit vehicle shall broadcast advisories about the imminent arrival of the transit vehicle at the next stop via an on-board automated annunciation system.	Planned
Requirement:	4 The transit vehicle shall support input and output forms that are suitable for travelers with physical disabilities.	Planned
Element: **COAST Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.		
Requirement:	1 The center shall monitor the locations of all transit vehicles within its network.	Existing
Requirement:	2 The center shall determine adherence of transit vehicles to their assigned schedule.	Existing
Requirement:	3 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for transit tracking and dispatch.	Planned
Requirement:	4 The center shall provide transit operational data to traveler information service providers.	Planned
Functional Area: **Transit Center Fixed-Route Operations** Management of fixed route transit operations. Planning, scheduling, and dispatch associated with fixed and flexible route transit services. Updates customer service operator systems, and provides current vehicle schedule adherence and optimum scenarios for schedule adjustment.		
Requirement:	1 The center shall generate transit routes and schedules based on such factors as parameters input by the system operator, road network conditions, incident information, operational data on current routes and schedules, and digitized map data.	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **COAST Fixed Route Dispatch**	
Entity: **Transit Management**	
Functional Area: **Transit Center Fixed-Route Operations** Management of fixed route transit operations. Planning, scheduling, and dispatch associated with fixed and flexible route transit services. Updates customer service operator systems, and provides current vehicle schedule adherence and optimum scenarios for schedule adjustment.	
Requirement: 2 The center shall provide the interface to the system operator to control the generation of new routes and schedules (transit services) including the ability to review and update the parameters used by the routes and schedules generation processes and to initiate these processes	Planned
Requirement: 3 The center shall be able to generate special routes and schedules to support an incident, disaster, evacuation, or other emergency.	Planned
Requirement: 4 The center shall dispatch fixed route or flexible route transit vehicles	Existing
Requirement: 5 The center shall collect transit operational data for use in the generation of routes and schedules.	Existing
Requirement: 6 The center shall provide instructions or corrective actions to the transit vehicle operators based upon operational needs.	Existing
Requirement: 7 The center shall manage large deviations of individual transit vehicles, deviations in rural areas, and deviations of large numbers of vehicles.	Planned
Requirement: 8 The center shall generate the necessary corrective actions which may involve more than the vehicles concerned and more far reaching action, such as, the introduction of extra vehicles, wide area signal priority by traffic management, the premature termination of some services, etc.	Planned
Requirement: 9 The center shall exchange information with Maintenance and Construction Operations concerning work zones, roadway conditions, asset restrictions, work plans, etc.	Planned
Requirement: 10 The center shall disseminate up-to-date schedules and route information to other centers for fixed and flexible route services.	Planned
Requirement: 11 The center shall provide an interface to the archive data repository to enable the operator to retrieve historical operating data for use in planning transit routes and schedules.	Planned
Functional Area: **Transit Center Passenger Counting** Receives and processes transit vehicle loading data using two-way communications from equipped transit vehicles.	
Requirement: 1 The center shall collect passenger count information from each transit vehicle.	Planned
Requirement: 2 The center shall calculate transit ridership data by route, route segment, transit stop, time of day, and day of week based on the collected passenger count information.	Planned
Requirement: 3 The center shall make the compiled ridership data available to the system operator and other applications.	Planned
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.	

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **COAST Fixed Route Dispatch**	
Entity: **Transit Management**	
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.	
Requirement: 1 The center shall analyze transit vehicle schedule performance to determine the need for priority along certain routes or at certain intersections.	Planned
Requirement: 2 The center shall send requests for priority along routes or at intersections to traffic management.	Planned
Requirement: 3 The center shall define business rules that govern use of transit vehicle signal priority, communicate these rules to the transit vehicle, and monitor transit vehicle requests for priority at signalized intersections.	Planned
Requirement: 4 The center shall provide transit operations personnel with the capability to control and monitor transit signal priority operations.	Planned
Functional Area: **Transit Center Security** Monitor transit vehicle operator or traveler activated alarms; authenticate transit vehicle operators; remotely disable a transit vehicle; alert operators, travelers, and police to potential incidents identified by these security features.	
Requirement: 1 The center shall monitor transit vehicle operational data to determine if the transit vehicle is off-route and assess whether a security incident is occurring.	Planned
Requirement: 2 The center shall receive reports of emergencies on-board transit vehicles entered directly be the transit vehicle operator or from a traveler through interfaces such as panic buttons or alarm switches.	Existing
Requirement: 4 The center shall exchange transit incident information along with other service data with other transit agencies.	Planned
Requirement: 5 The center shall receive information pertaining to a wide-area alert such as weather alerts, disaster situations, or child abductions. This information may come from Emergency Management or from other Alerting and Advisory Systems.	Planned
Requirement: 7 The center shall coordinate the response to security incidents involving transit with other agencies including Emergency Management, other transit agencies, media, traffic management, and traveler information service providers.	Planned
Requirement: 8 The center shall receive threat information and status on the integrity of the transit infrastructure.	Planned
Functional Area: **Transit Center Information Services** Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.	

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **COAST Fixed Route Dispatch**	
Entity: **Transit Management**	
Functional Area: **Transit Center Information Services** — Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.	
Requirement: 1 The center shall provide travelers using public transportation with traffic and advisory information upon request. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events.	Planned
Requirement: 2 The center shall provide transit information to the media including details of deviations from schedule of regular transit services.	Planned
Requirement: 3 The center shall exchange transit schedules, real-time arrival information, fare schedules, and general transit service information with other transit organizations to support transit traveler information systems.	Planned
Requirement: 4 The center shall provide transit service information to traveler information service providers including routes, schedules, schedule adherence, and fare information as well as transit service information during evacuation.	Planned
Functional Area: **Transit Center Multi-Modal Coordination** — Coordinate schedules with other agencies and modes, including transit transfer cluster and transfer point information.	
Requirement: 1 The center shall coordinate schedules and services between transit agencies, traffic management, maintenance and construction operations, parking management, and other surface or air transportation modes.	Planned
Requirement: 2 The center shall share transfer cluster and transfer point information with multimodal transportation service providers, other transit agencies, and traveler information service providers. A transfer cluster is a collection of stop points, stations, or terminals where transfers can be made conveniently.	Planned
Requirement: 5 The center shall provide transit operations personnel with the capability to control and monitor transit service coordination activities.	Planned
Functional Area: **Transit Evacuation Support** — Support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency. Coordinate regional evacuation plans and resources including transit and school bus fleets.	
Requirement: 1 The center shall manage the use of transit resources to support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency.	Planned
Requirement: 2 The center shall coordinate regional evacuation plans with Emergency Management - identifying the transit role in an evacuation and the transit resources that would be used.	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **COAST Fixed Route Dispatch**	
Entity: **Transit Management**	
Functional Area: **Transit Evacuation Support** — Support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency. Coordinate regional evacuation plans and resources including transit and school bus fleets.	
Requirement: 3 The center shall coordinate the use of transit and school bus fleets during an evacuation, supporting evacuation of those with special needs and the general population.	Planned
Requirement: 4 The center shall adjust and update transit service and fare schedules and provide that information to other agencies as they coordinate evacuations.	Planned
Functional Area: **Transit Data Collection** — Collection and storage of transit management data. For use by operations personnel or data archives in the region.	
Requirement: 1 The center shall collect transit management data such as transit fares and passenger use, transit services, paratransit operations, transit vehicle maintenance data, etc.	Planned
Requirement: 2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement: 3 The center shall receive and respond to requests from ITS Archives for either a catalog of the transit data or for the data itself.	Planned
Functional Area: **Transit Transportation Operations Data Collection** — Collects real-time information on the state of the regional transportation system for operational use by the center. It establishes communications with a regional repository, requests or subscribes to information relevant to the center, and distributes the received information for use.	
Requirement: 1 The center shall collect real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information.	Planned
Entity: **Multimodal Transportation Service Provider**	
Functional Area: [Not Defined]	
Element: **COAST Fixed Route Transit Vehicles**	
Entity: **Transit Vehicle**	
Functional Area: **On-board Transit Trip Monitoring** — Support fleet management with automatic vehicle location (AVL) and automated mileage and fuel reporting and auditing.	
Requirement: 1 The transit vehicle shall track the current location of the transit vehicle.	Planned
Requirement: 2 The transit vehicle shall support the computation of the location of a transit vehicle using on-board sensors to augment the location determination function. This may include proximity to the transit stops or other known reference points as well as recording trip length.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **COAST Fixed Route Transit Vehicles**			
Entity: **Transit Vehicle**			
Functional Area:	**On-board Transit Trip Monitoring** Support fleet management with automatic vehicle location (AVL) and automated mileage and fuel reporting and auditing.		
Requirement:	4	The transit vehicle shall record transit trip monitoring data including operational status information such as doors open/closed, running times, etc.	Planned
Requirement:	5	The transit vehicle shall send the transit vehicle trip monitoring data to center-based trip monitoring functions.	Planned
Functional Area:	**On-board Transit Fare Management** On-board systems provide fare collection using a travelers non-monetary fare medium. Collected fare data are made available to the center.		
Requirement:	1	The transit vehicle shall read data from the traveler card / payment instrument presented by boarding passengers.	Planned
Requirement:	4	The transit vehicle shall calculate the traveler's fare based on the origin and destination provided by the traveler as well as factors such as the transit routing, transit fare category, traveler history, and route-specific information.	Planned
Requirement:	6	The transit vehicle shall provide a transit fare payment interface that is suitable for travelers with physical disabilities.	Planned
Requirement:	10	The transit vehicle shall provide fare statistics data to the center.	Planned
Functional Area:	**On-board Passenger Counting** On-board systems collect transit vehicle loading data and make it available to the center.		
Requirement:	1	The transit vehicle shall count passengers boarding and alighting.	Planned
Requirement:	2	The passenger counts shall be related to location to support association of passenger counts with routes, route segments, or bus stops.	Planned
Requirement:	3	The passenger counts shall be timestamped so that ridership can be measured by time of day and day of week.	Planned
Requirement:	4	The transit vehicle shall send the collected passenger count information to the transit center.	Planned
Functional Area:	**On-board Transit Security** On-board video/audio surveillance systems, threat sensors, and object detection sensors to enhance security and safety on-board a transit vehicles. Also includes silent alarms activated by transit user or vehicle operator, operator authentication, and remote vehicle disabling.		
Requirement:	1	The transit vehicle shall perform video and audio surveillance inside of transit vehicles and output raw video or audio data for either local monitoring (for processing or direct output to the transit vehicle operator), remote monitoring or for local storage (e.g., in an event recorder).	Existing
Requirement:	8	The transit vehicle shall monitor and output surveillance and sensor equipment status and fault indications.	Planned
Requirement:	9	The transit vehicle shall accept emergency inputs from either the transit vehicle operator or a traveler through such interfaces as panic buttons, silent or audible alarms, etc.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **COAST Fixed Route Transit Vehicles**			
Entity: **Transit Vehicle**			
Functional Area:	**On-board Transit Security** On-board video/audio surveillance systems, threat sensors, and object detection sensors to enhance security and safety on-board a transit vehicles. Also includes silent alarms activated by transit user or vehicle operator, operator authentication, and remote vehicle disabling.		
Requirement:	10	The transit vehicle shall output reported emergencies to the center.	Planned
Requirement:	11	The transit vehicle shall receive acknowledgments of the emergency request from the center and output this acknowledgment to the transit vehicle operator or to the travelers.	Planned
Functional Area:	**On-board Transit Signal Priority** On-board systems request signal priority through short range communication directly with traffic control equipment at the roadside (intersections, ramps, interchanges, etc.).		
Requirement:	1	The transit vehicle shall determine the schedule deviation and estimated times of arrival (ETA) at transit stops.	Planned
Requirement:	2	The transit vehicle shall send priority requests to traffic signal controllers at intersections, pedestrian crossings, and multimodal crossings on the roads (surface streets) and freeway (ramp controls) network that enable a transit vehicle schedule deviation to be corrected.	Planned
Requirement:	3	The transit vehicle shall send the schedule deviation data and status of priority requests to the transit vehicle operator and provide the capability for the transit vehicle operator to control the priority system.	Planned
Functional Area:	**On-board Transit Information Services** On-board systems to furnish next-stop annunciation as well as interactive travel-related information, including routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, non-motorized transportation services, and special events.		
Requirement:	3	The transit vehicle shall broadcast advisories about the imminent arrival of the transit vehicle at the next stop via an on-board automated annunciation system.	Planned
Requirement:	4	The transit vehicle shall support input and output forms that are suitable for travelers with physical disabilities.	Planned
Element: **COAST System Operator**			
Entity: **Transit Operations Personnel**			
Functional Area:	[Not Defined]		
Element: **COAST Transit Vehicle Operator**			
Entity: **Transit Vehicle Operator**			
Functional Area:	[Not Defined]		
Element: **COAST Website**			
Entity: **Information Service Provider**			
Functional Area:	**Interactive Infrastructure Information**		

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **COAST Website**			
Entity: **Information Service Provider**			
Functional Area: **Interactive Infrastructure Information** Personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.			
Requirement:	3	The center shall disseminate customized transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence information to travelers upon request.	Planned
Requirement:	7	The center shall disseminate customized multimodal transportation service information (for example, from ferry and airline operators), including transfer points and other information, to travelers upon request.	Planned
Requirement:	8	The center shall disseminate customized event information to travelers upon request.	Planned
Requirement:	12	The center shall manage payment for services, such as tolls, transit fares, parking lot charges, map updates, and advanced payment for tolls, and provide transaction success or failure details.	Planned
Requirement:	15	The center shall manage updates of digitized map data and provide updates to traveler interface systems upon request.	Planned
Requirement:	17	The center shall provide the capability for a system operator to control the type and update frequency of traveler information.	Planned
Element: **Commercial Vehicles**			
Entity: **Commercial Vehicle**			
Functional Area: [Not Defined]			
Entity: **Vehicle**			
Functional Area: [Not Defined]			
Entity: **Basic Commercial Vehicle**			
Functional Area: [Not Defined]			
Element: **Critical Transportation Infrastructure Security - Surveillance System**			
Entity: **Security Monitoring**			
Functional Area: [Not Defined]			
Element: **DMV Crash Records Archive**			
Entity: **Archived Data Management**			
Functional Area: [Not Defined]			
Element: **Dover Traffic Management System**			
Entity: **Traffic Management**			
Functional Area: [Not Defined]			
Element: **Dover Traffic Signals**			
Entity: **Roadway**			
Functional Area: [Not Defined]			
Element: **E-911**			
Entity: **Emergency Telecommunications System**			
Functional Area: [Not Defined]			
Element: **Emergency Vehicle**			

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Emergency Vehicle**			
Entity: **Emergency Vehicle**			
Functional Area: [Not Defined]			
Entity: **Vehicle**			
Functional Area: [Not Defined]			
Element: **FEMA**			
Entity: **Other Emergency Management**			
Functional Area: [Not Defined]			
Element: **Financial Institution**			
Entity: **Financial Institution**			
Functional Area: [Not Defined]			
Element: **Flight Line Dispatch**			
Entity: **Transit Management**			
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.			
Requirement:		[Not Defined]	
Functional Area: **Transit Center Fixed-Route Operations** Management of fixed route transit operations. Planning, scheduling, and dispatch associated with fixed and flexible route transit services. Updates customer service operator systems, and provides current vehicle schedule adherence and optimum scenarios for schedule adjustment.			
Requirement:	2	The center shall provide the interface to the system operator to control the generation of new routes and schedules (transit services) including the ability to review and update the parameters used by the routes and schedules generation processes and to initiate these processes	Planned
Requirement:	3	The center shall be able to generate special routes and schedules to support an incident, disaster, evacuation, or other emergency.	Planned
Requirement:	4	The center shall dispatch fixed route or flexible route transit vehicles	Existing
Requirement:	5	The center shall collect transit operational data for use in the generation of routes and schedules.	Planned
Requirement:	6	The center shall provide instructions or corrective actions to the transit vehicle operators based upon operational needs.	Planned
Requirement:	7	The center shall manage large deviations of individual transit vehicles, deviations in rural areas, and deviations of large numbers of vehicles.	Planned
Requirement:	8	The center shall generate the necessary corrective actions which may involve more than the vehicles concerned and more far reaching action, such as, the introduction of extra vehicles, wide area signal priority by traffic management, the premature termination of some services, etc.	Planned
Requirement:	9	The center shall exchange information with Maintenance and Construction Operations concerning work zones, roadway conditions, asset restrictions, work plans, etc.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Flight Line Dispatch**			
Entity: **Transit Management**			
Functional Area: **Transit Center Fixed-Route Operations** Management of fixed route transit operations. Planning, scheduling, and dispatch associated with fixed and flexible route transit services. Updates customer service operator systems, and provides current vehicle schedule adherence and optimum scenarios for schedule adjustment.			
Requirement:	10	The center shall disseminate up-to-date schedules and route information to other centers for fixed and flexible route services.	Planned
Requirement:	11	The center shall provide an interface to the archive data repository to enable the operator to retrieve historical operating data for use in planning transit routes and schedules.	Planned
Functional Area: **Transit Vehicle Operator Assignment** Assignment of transit operators to runs in a fair manner while minimizing labor and overtime services, considering operator preferences, qualifications, accumulated work hours, and other information about each operator.			
Requirement:		[Not Defined]	
Element: **Flight Line Fixed Route Vehicles**			
Entity: **Transit Vehicle**			
Functional Area: [Not Defined]			
Element: **Flight Line Website**			
Entity: **Information Service Provider**			
Functional Area: [Not Defined]			
Element: **Government Reporting System**			
Entity: **Government Reporting Systems**			
Functional Area: [Not Defined]			
Element: **Health And Human Services**			
Entity: **Financial Institution**			
Functional Area: [Not Defined]			
Element: **Homeland Security**			
Entity: **Other Emergency Management**			
Functional Area: [Not Defined]			
Element: **Hospitals**			
Entity: **Care Facility**			
Functional Area: [Not Defined]			
Element: **Kingston Dispatch Center**			
Entity: **Emergency Management**			
Functional Area: [Not Defined]			
Element: **Kingston DPW**			
Entity: **Maintenance and Construction Management**			
Functional Area: [Not Defined]			
Element: **Kingston Traffic Management System**			
Entity: **Traffic Management**			
Functional Area: [Not Defined]			
Element: **Kingston Traffic Signals**			
Entity: **Roadway**			

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Kingston Traffic Signals**			
Entity: **Roadway**			
Functional Area: [Not Defined]			
Element: **Local Data Repositories**			
Entity: **Archived Data Management**			
Functional Area: [Not Defined]			
Entity: **Other Archives**			
Functional Area: [Not Defined]			
Element: **Local DPW**			
Entity: **Maintenance and Construction Management**			
Functional Area: [Not Defined]			
Element: **Local EOC**			
Entity: **Emergency Management**			
Functional Area: **Emergency Response Management** Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.			
Requirement:	1	The center shall provide strategic emergency response capabilities provided by an Emergency Operations Center for large-scale incidents and disasters.	Existing
Requirement:	2	The center shall manage coordinated inter-agency responses to and recovery from large-scale emergencies. Such agencies include traffic management, transit, maintenance and construction management, rail operations, and other emergency management agencies.	Existing
Requirement:	3	The center shall provide the capability to implement response plans and track progress through the incident by exchanging incident information and response status with allied agencies.	Planned
Requirement:	4	The center shall develop, coordinate with other agencies, and store emergency response plans.	Planned
Requirement:	5	The center shall track the availability of resources and coordinate resource sharing with allied agency centers including traffic, maintenance, or other emergency centers.	Planned
Requirement:	6	The center shall allocate the appropriate emergency services, resources, and vehicle (s) to respond to incidents, and shall provide the capability to override the current allocation to suit the special needs of a current incident.	Existing
Requirement:	10	The center shall provide the capability to request transit resource availability from transit centers for use during disaster and evacuation operations.	Planned
Requirement:	12	The center shall provide information to the media concerning the status of an emergency response.	Planned
Requirement:	14	The center shall provide the capability for center personnel to provide inputs to the management of incidents, disasters and evacuations.	Planned
Requirement:	15	The center shall collect information about the status of the recovery efforts for the infrastructure during disasters.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Local EOC**			
Entity: **Emergency Management**			
Functional Area:	**Emergency Response Management** Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.		
Requirement:	16	The center shall provide the overall status of infrastructure recovery efforts to traveler information providers and media.	Planned
Requirement:	17	The center shall provide the capability to communicate information about emergency situations to local population through the Emergency Telecommunications System.	Planned
Functional Area:	**Emergency Evacuation Support** Evacuation planning and coordination to manage evacuation and reentry of a population in the vicinity of a disaster or other emergency that poses a risk to public safety.		
Requirement:	1	The center shall manage inter-agency coordination of evacuation operations, from initial planning through the evacuation process and reentry.	Existing
Requirement:	2	The center shall develop and exchange evacuation plans with allied agencies prior to the occurrence of a disaster.	Planned
Requirement:	3	The center shall provide an interface to the emergency system operator to enter evacuation plans and procedures and present the operator with other agencies' plans.	Planned
Requirement:	4	The center shall coordinate evacuation destinations and shelter needs with shelter providers (e.g., the American Red Cross) in the region.	Planned
Requirement:	5	The center shall provide evacuation information to traffic, transit, maintenance and construction, rail operations, and other emergency management centers as needed.	Planned
Requirement:	6	The center shall request resources from transit agencies as needed to support the evacuation.	Planned
Requirement:	7	The center shall request traffic management agencies to implement special traffic control strategies and to control evacuation traffic, including traffic on local streets and arterials as well as the major evacuation routes.	Planned
Requirement:	8	The center shall provide traveler information systems with evacuation guidance including basic information to assist potential evacuees in determining whether evacuation is necessary and when it is safe to return.	Planned
Requirement:	9	The center shall monitor the progress or status of the evacuation once it begins and exchange tactical plans, prepared during the incident, with allied agencies.	Planned
Requirement:	10	The center shall monitor the progress of the reentry process.	Planned
Requirement:	11	The center shall submit evacuation information to toll administration centers along with requests for changes in the toll services or fee collection during an evacuation.	Planned
Requirement:	12	The center shall retrieve information from public health systems to plan for and implement evacuations or in-place sheltering for biological, chemical, radiation, and other public health emergencies.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Local EOC**			
Entity: **Emergency Management**			
Element: **Local Field Devices**			
Entity: **Roadway**			
Functional Area:	**Roadway Basic Surveillance** Field elements that monitor traffic conditions using loop detectors and CCTV cameras.		
Requirement:	1	The field element shall collect, process, digitize, and send traffic sensor data (speed, volume, and occupancy) to the center for further analysis and storage, under center control.	Planned
Requirement:	2	The field element shall collect, process, and send traffic images to the center for further analysis and distribution.	Planned
Requirement:	4	The field element shall return sensor and CCTV system operational status to the controlling center.	Planned
Requirement:	5	The field element shall return sensor and CCTV system fault data to the controlling center for repair.	Planned
Functional Area:	**Roadway Signal Controls** Field elements including traffic signal controllers for use at signalized intersections; also supports pedestrian crossings.		
Requirement:	1	The field element shall control traffic signals under center control.	Planned
Requirement:	4	The field element shall report the current signal control information to the center.	Planned
Requirement:	5	The field element shall report current preemption status to the center.	Planned
Requirement:	6	The field element shall return traffic signal controller operational status to the center.	Planned
Requirement:	7	The field element shall return traffic signal controller fault data to the center.	Planned
Functional Area:	**Roadway Signal Priority** Field elements that provide the capability to receive transit vehicle signal priority requests and control traffic signals accordingly.		
Requirement:	1	The field element shall respond to signal priority requests from transit vehicles.	Planned
Functional Area:	**Roadway Signal Preemption** Field elements that receive signal preemption requests from approaching emergency vehicles and overrides the current operation of the traffic signals		
Requirement:	1	The field element shall respond to signal preemption requests from emergency vehicles.	Planned
Functional Area:	**Roadway Traffic Information Dissemination** Driver information systems, such as dynamic message signs and Highway Advisory Radio (HAR).		
Requirement:	1	The field element shall include dynamic messages signs for dissemination of traffic and other information to drivers, under center control; the DMS may be either those that display variable text messages, or those that have fixed format display(s) (e.g. vehicle restrictions, or lane open/close).	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Local Field Devices**	
Entity: **Roadway**	
Functional Area: **Roadway Traffic Information Dissemination** Driver information systems, such as dynamic message signs and Highway Advisory Radio (HAR).	
Requirement: 2 The field element shall include driver information systems that communicate directly from a center to the vehicle radio (such as Highway Advisory Radios) for dissemination of traffic and other information to drivers, under center control.	Planned
Requirement: 4 The field element shall provide operational status for the driver information systems equipment (DMS, HAR, etc.) to the center.	Planned
Requirement: 5 The field element shall provide fault data for the driver information systems equipment (DMS, HAR, etc.) to the center for repair.	Planned
Functional Area: **Roadway Equipment Coordination** Field elements that control and send data to other field elements (such as environmental sensors that send data to a DMS or coordination between traffic controllers on adjacent intersections), without center control.	
Requirement: 1 The field element shall include sensors that provide data and status information to other field element devices, without center control.	Planned
Requirement: 2 The field element shall include sensors that receive configuration data from other field element devices, without center control.	Planned
Functional Area: **Roadway Data Collection** Field elements to collect traffic, road, and environmental conditions information for use in transportation planning, research, and other off-line applications. Includes the sensors, supporting roadside infrastructure, and communications equipment.	
Requirement: 1 The field element shall collect traffic, road, and environmental conditions information.	Planned
Requirement: 2 The field element shall include the sensors and supporting roadside devices that sense, collect, and send traffic, road, and environmental conditions information to a center for archival.	Planned
Requirement: 3 The field element shall collect sensor status and sensor faults from roadside equipment and send it along with the recorded data to a center for archival.	Planned
Element: **Local Infrastructure Monitoring Systems**	
Entity: **Roadway**	
Functional Area: **Roadway Infrastructure Monitoring** Sensors that monitor the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts), under maintenance center and maintenance vehicle control.	
Requirement: 1 The field element shall include infrastructure condition monitoring sensors that monitor the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts), under maintenance center control.	Existing

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Local Infrastructure Monitoring Systems**	
Entity: **Roadway**	
Functional Area: **Roadway Infrastructure Monitoring** Sensors that monitor the condition of pavement, bridges, tunnels, associated hardware, and other transportation-related infrastructure (e.g., culverts), under maintenance center and maintenance vehicle control.	
Requirement: 3 The field element shall provide operational status for the infrastructure condition monitoring sensors to the maintenance center.	Existing
Requirement: 5 The field element shall provide fault data for the infrastructure condition monitoring sensors to the maintenance center for repair.	Existing
Entity: **Security Monitoring**	
Functional Area: [Not Defined]	
Element: **Local Maintenance and Construction Vehicles**	
Entity: **Maintenance and Construction Vehicle**	
Functional Area: **MCV Vehicle Location Tracking** On-board systems to track vehicle location and reports the position and timestamp information to the dispatch center.	
Requirement: 1 The maintenance and construction vehicle shall track its current location.	Planned
Requirement: 2 The maintenance and construction vehicle shall send the time stamped vehicle location to the controlling center.	Planned
Functional Area: **MCV Winter Maintenance** On-board systems that support snow plow operations and other roadway treatments (e.g., salt spraying and other material applications). Supports information sharing between snow plows.	
Requirement: 3 The maintenance and construction vehicle shall monitor materials information including remaining quantity and current application rate of materials on the vehicle.	Planned
Requirement: 5 The maintenance and construction vehicle shall send operational data to the center including the operational state of the maintenance equipment (e.g., blade up/down, spreader pattern), types and quantities of materials used for construction and maintenance activities, and a record of the actual work performed.	Planned
Functional Area: **MCV Roadway Maintenance and Construction** On-board systems that support routine non-winter maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of equipment on the roadway.	
Requirement: 4 The maintenance and construction vehicle shall respond to dispatch information from the center, presented to the vehicle operator for acknowledgement and returning status.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Maintenance and Construction Vehicles**		
Entity: **Maintenance and Construction Vehicle**		
Functional Area: **MCV Roadway Maintenance and Construction** On-board systems that support routine non-winter maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of equipment on the roadway.		
Requirement:	5 The maintenance and construction vehicle shall send operational data to the center including the operational state of the maintenance equipment (e.g., blade up/down, spreader pattern), types and quantities of materials used for construction and maintenance activities, and a record of the actual work performed.	Planned
Element: **Local Media**		
Entity: **Media**		
Functional Area: [Not Defined]		
Element: **Local Municipal Websites**		
Entity: **Information Service Provider**		
Functional Area: **Interactive Infrastructure Information** Personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.		
Requirement:	1 The center shall disseminate customized traffic and highway condition information to travelers, including incident information, detours and road closures, recommended routes, and current speeds on specific routes upon request.	Planned
Requirement:	2 The center shall disseminate customized maintenance and construction information to travelers, including scheduled maintenance and construction work activities and work zone activities upon request.	Planned
Requirement:	4 The center shall disseminate customized parking information to travelers, including location, availability, and fees upon request.	Planned
Requirement:	8 The center shall disseminate customized event information to travelers upon request.	Planned
Requirement:	17 The center shall provide the capability for a system operator to control the type and update frequency of traveler information.	Planned
Element: **Local Parking Facility Security - Surveillance Systems**		
Entity: **Parking Management**		
Functional Area: **Parking Management** Monitor vehicles and current parking availability within parking facilities. Use driver information systems (e.g., DMS) to provide parking availability and other parking facility information to drivers. Support local traffic control coordination around the parking facility.		
Requirement:	[Not Defined]	
Entity: **Security Monitoring**		
Functional Area: **Field Secure Area Surveillance**		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Parking Facility Security - Surveillance Systems**		
Entity: **Security Monitoring**		
Functional Area: **Field Secure Area Surveillance** Security surveillance devices (audio/video) that monitor facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, and transit railways or guideways).		
Requirement:	1 The field element shall include video and/or audio surveillance of secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, roadway infrastructure, and transit railways or guideways).	Planned
Requirement:	2 The field element shall be remotely controlled by a center.	Planned
Requirement:	3 The field element shall provide equipment status and fault indication of surveillance equipment to a center.	Planned
Requirement:	4 The field element shall provide raw video or audio data.	Planned
Element: **Local Parking Management Systems**		
Entity: **Parking Management**		
Functional Area: **Parking Management** Monitor vehicles and current parking availability within parking facilities. Use driver information systems (e.g., DMS) to provide parking availability and other parking facility information to drivers. Support local traffic control coordination around the parking facility.		
Requirement:	1 The parking element shall maintain parking lot information including static information such as hours of operation, rates, location, entrance locations, capacity, type, and constraints; as well as dynamic information such as current state of the lot, occupancy, arrival rates, and departure rates.	Planned
Requirement:	4 The parking element shall provide the capability to detect, count, and classify vehicles at entrances, exits, and designated locations within a parking facility.	Planned
Element: **Local Public Safety Centers**		
Entity: **Emergency Management**		
Functional Area: **Emergency Call-Taking** Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.		
Requirement:	1 The center shall support the interface to the Emergency Telecommunications System (e.g. 911 or 7-digit call routing) to receive emergency notification information and provide it to the emergency system operator.	Existing
Requirement:	2 The center shall receive emergency call information from 911 services and present the possible incident information to the emergency system operator.	Existing
Requirement:	5 The center shall receive emergency notification information from other public safety agencies and present the possible incident information to the emergency system operator.	Existing

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Public Safety Centers**		
Entity: **Emergency Management**		
Functional Area: **Emergency Call-Taking** Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.		
Requirement:	6 The center shall receive emergency notification information from public transit systems and present the possible incident information to the emergency system operator.	Planned
Requirement:	9 The center shall forward the verified emergency information to the responding agency based on the location and nature of the emergency.	Existing
Requirement:	10 The center shall update the incident information log once the emergency system operator has verified the incident.	Existing
Requirement:	11 The center shall provide the capability for digitized map data to act as the background to the emergency information presented to the emergency system operator.	Planned
Functional Area: **Emergency Dispatch** Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units.		
Requirement:	1 The center shall dispatch emergency vehicles to respond to verified emergencies under center personnel control.	Existing
Requirement:	2 The center shall store the current status of all emergency vehicles available for dispatch and those that have been dispatched.	Existing
Requirement:	3 The center shall relay location and incident details to the responding vehicles.	Existing
Requirement:	4 The center shall track the location and status of emergency vehicles responding to an emergency based on information from the emergency vehicle.	Planned
Requirement:	5 The center shall store and maintain the emergency service responses in an action log.	Planned
Requirement:	6 The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Requirement:	7 The center shall receive traffic images to support dispatch of emergency vehicles.	Planned
Requirement:	8 The center shall provide the capability to request remote control of traffic surveillance devices	Planned
Requirement:	9 The center shall coordinate response to incidents with other Emergency Management centers to ensure appropriate resources are dispatched and utilized.	Existing
Functional Area: **Emergency Routing** Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Public Safety Centers**		
Entity: **Emergency Management**		
Functional Area: **Emergency Routing** Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.		
Requirement:	2 The center shall receive information on the location and status of traffic control equipment and work zones along potential emergency routes.	Planned
Requirement:	3 The center shall receive status information from care facilities to determine the appropriate facility and its location.	Existing
Requirement:	4 The center shall receive asset restriction information to support the dispatching of appropriate emergency resources.	Planned
Requirement:	9 The center shall provide the capability to request special traffic control measures, such as signal preemption, from the traffic management center to facilitate emergency vehicle progress along the suggested route.	Planned
Requirement:	11 The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Functional Area: **Incident Command** Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.		
Requirement:	1 The center shall provide tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders to support local management of an incident.	Existing
Requirement:	2 The center shall provide incident command communications with public safety, emergency management, transportation, and other allied response agency centers.	Existing
Requirement:	3 The center shall track and maintain resource information and action plans pertaining to the incident command.	Existing
Requirement:	4 The center shall share incident command information with other public safety agencies including resource deployment status, hazardous material information, rail incident information, evacuation advice as well as traffic, road, and weather conditions.	Existing
Requirement:	5 The center shall assess the status of responding emergency vehicles as part of an incident command.	Existing
Functional Area: **Emergency Response Management** Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.		
Requirement:	3 The center shall provide the capability to implement response plans and track progress through the incident by exchanging incident information and response status with allied agencies.	Existing
Requirement:	4 The center shall develop, coordinate with other agencies, and store emergency response plans.	Existing

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Public Safety Centers**		
Entity: **Emergency Management**		
Functional Area: **Emergency Response Management** Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.		
Requirement:	5 The center shall track the availability of resources and coordinate resource sharing with allied agency centers including traffic, maintenance, or other emergency centers.	Planned
Requirement:	6 The center shall allocate the appropriate emergency services, resources, and vehicle (s) to respond to incidents, and shall provide the capability to override the current allocation to suit the special needs of a current incident.	Planned
Requirement:	7 The center shall receive event scheduling information from Event Promoters.	Planned
Requirement:	10 The center shall provide the capability to request transit resource availability from transit centers for use during disaster and evacuation operations.	Planned
Requirement:	12 The center shall provide information to the media concerning the status of an emergency response.	Planned
Requirement:	17 The center shall provide the capability to communicate information about emergency situations to local population through the Emergency Telecommunications System.	Planned
Functional Area: **Emergency Data Collection** Collection and storage of information related to Emergency Management. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect emergency service data, emergency vehicle management data, emergency vehicle data, sensor and surveillance data, threat data, and incident data.	Existing
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the emergency management data or for the data itself.	Planned
Entity: **Enforcement Agency**		
Functional Area: [Not Defined]		
Element: **Local Public Safety Vehicles**		
Entity: **Emergency Vehicle**		
Functional Area: **On-board EV En Route Support** On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.		
Requirement:	1 The emergency vehicle, including roadway service patrols, shall track its current location.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Public Safety Vehicles**		
Entity: **Emergency Vehicle**		
Functional Area: **On-board EV En Route Support** On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.		
Requirement:	2 The emergency vehicle, including roadway service patrols, shall send the vehicle's location and operational data to the center for emergency management and dispatch.	Planned
Requirement:	3 The emergency vehicle, including roadway service patrols, shall receive incident details and a suggested route when dispatched to a scene.	Existing
Requirement:	4 The emergency vehicle shall send the current en route status (including estimated time of arrival) and requests for emergency dispatch updates.	Existing
Requirement:	5 The emergency vehicle shall send requests to traffic signal control equipment at the roadside to preempt the signal.	Existing
Requirement:	6 The emergency vehicle shall provide the personnel on-board with dispatch information, including incident type and location, and forward an acknowledgment from personnel to the center that the vehicle is on its way to the incident scene.	Existing
Functional Area: **On-board EV Incident Management Communication** On-board systems provide communications support to first responders. Incident information is provided to dispatched emergency personnel. Emergency personnel transmit information about the incident and response status.		
Requirement:	1 The emergency vehicle shall receive dispatch instructions sufficient to enable emergency personnel in the field to implement an effective incident response. It includes local traffic, road, and weather conditions, hazardous material information, and the current status of resources that have been allocated to an incident.	Existing
Requirement:	2 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the incident site such as the extent of injuries, identification of vehicles and people involved, hazardous material, etc.	Planned
Requirement:	3 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the current incident response status such as the identification of the resources on site, site management strategies in effect, and current clearance status.	Planned
Element: **Local Road Weather Stations**		
Entity: **Roadway**		
Functional Area: **Roadway Environmental Monitoring** Environmental sensors, surface and sub-surface, that collect weather and road surface information. Weather conditions measured include temperature, wind, humidity, precipitation, and visibility. Sensors measure road surface temperature, moisture, icing, salinity, etc.		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Road Weather Stations**		
Entity: **Roadway**		
Functional Area: **Roadway Environmental Monitoring** Environmental sensors, surface and sub-surface, that collect weather and road surface information. Weather conditions measured include temperature, wind, humidity, precipitation, and visibility. Sensors measure road surface temperature, moisture, icing, salinity, etc.		
Requirement:	1 The field element shall include surface and sub-surface environmental sensors that measure road surface temperature, moisture, icing, salinity, and other measures.	Planned
Requirement:	2 The field element shall include environmental sensors that measure weather conditions including temperature, wind, humidity, precipitation, and visibility.	Planned
Requirement:	3 The field element's environmental sensors shall be remotely controlled by a maintenance center.	Planned
Requirement:	4 The field element's environmental sensors shall be remotely controlled by a traffic management center.	Planned
Requirement:	7 The field element shall provide environmental sensor equipment operational status to the controlling center or maintenance vehicle.	Planned
Requirement:	10 The field element shall provide weather and road surface condition data to centers.	Planned
Element: **Local Traffic Management Systems**		
Entity: **Traffic Management**		
Functional Area: **TMC Signal Control** Remotely controls traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.		
Requirement:	1 The center shall remotely control traffic signal controllers.	Planned
Requirement:	2 The center shall accept notifications of pedestrian calls.	Planned
Requirement:	3 The center shall collect traffic signal controller operational status and compare against the control information sent by the center.	Planned
Requirement:	4 The center shall collect traffic signal controller fault data from the field.	Planned
Requirement:	5 The center shall manage (define, store and modify) control plans to coordinate signalized intersections, to be engaged at the direction of center personnel or according to a daily schedule.	Planned
Functional Area: **TMC Regional Traffic Management** Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.		
Requirement:	1 The center shall exchange traffic information with other traffic management centers including incident information, congestion data, traffic data, signal timing plans, and real-time signal control information.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Local Traffic Management Systems**		
Entity: **Traffic Management**		
Functional Area: **TMC Regional Traffic Management** Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.		
Requirement:	2 The center shall exchange traffic control information with other traffic management centers to support remote monitoring and control of traffic management devices (e.g. signs, sensors, signals, cameras, etc.).	Planned
Functional Area: **Traffic Data Collection** Collection and storage of traffic management data. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect traffic management data such as operational data, event logs, etc.	Planned
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the traffic data or for the data itself.	Planned
Element: **Maine Turnpike 24HR Communications Center**		
Entity: **Other Traffic Management**		
Functional Area: [Not Defined]		
Element: **MaineDOT Radio Room**		
Entity: **Other Traffic Management**		
Functional Area: [Not Defined]		
Element: **MassDOT - Highway Division Highway Operations Center**		
Entity: **Other Traffic Management**		
Functional Area: [Not Defined]		
Element: **Motor Carriers**		
Entity: **Fleet and Freight Management**		
Functional Area: [Not Defined]		
Element: **New Hampshire Commercial Vehicle Administration**		
Entity: **Commercial Vehicle Administration**		
Functional Area: [Not Defined]		
Element: **New Hampshire Division of Emergency Services, Communications, and Management**		
Entity: **Emergency Management**		
Functional Area: [Not Defined]		
Element: **NHDOT Field Devices**		
Entity: **Roadway**		
Functional Area: [Not Defined]		
Element: **NHDOT Maintenance District 3 Headquarters**		
Entity: **Maintenance and Construction Management**		

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **NHDOT Maintenance District 3 Headquarters**	
Entity: **Maintenance and Construction Management**	
Functional Area: [Not Defined]	
Entity: **Other MCM**	
Functional Area: [Not Defined]	
Element: **NHDOT Maintenance District 5 Headquarters**	
Entity: **Maintenance and Construction Management**	
Functional Area: [Not Defined]	
Entity: **Other MCM**	
Functional Area: [Not Defined]	
Element: **NHDOT Maintenance District 6 Headquarters**	
Entity: **Maintenance and Construction Management**	
Functional Area: [Not Defined]	
Entity: **Other MCM**	
Functional Area: [Not Defined]	
Element: **Other Prepaid Stored Value Smart Cards**	
Entity: **Traveler Card**	
Functional Area: [Not Defined]	
Element: **Other State Police**	
Entity: **Other Emergency Management**	
Functional Area: [Not Defined]	
Element: **Other Transit Provider Dispatch**	
Entity: **Transit Management**	
Functional Area: [Not Defined]	
Element: **Other Transit Provider Vehicles**	
Entity: **Transit Vehicle**	
Functional Area: [Not Defined]	
Element: **Parking Facilities (Non-Municipal)**	
Entity: **Parking Management**	
Functional Area: [Not Defined]	
Element: **Pedestrians**	
Entity: **Pedestrians**	
Functional Area: [Not Defined]	
Element: **Personal Devices**	
Entity: **Personal Information Access**	
Functional Area: [Not Defined]	
Element: **Plaistow Dispatch Center**	
Entity: **Emergency Management**	
Functional Area: [Not Defined]	
Element: **Plaistow DPW**	
Entity: **Maintenance and Construction Management**	
Functional Area: [Not Defined]	
Element: **Plaistow Traffic Management System**	
Entity: **Traffic Management**	

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Plaistow Traffic Management System**		
Entity: **Traffic Management**		
Functional Area: [Not Defined]		
Element: **Plaistow Traffic Signals**		
Entity: **Roadway**		
Functional Area: [Not Defined]		
Element: **Port Security System**		
Entity: **Security Monitoring**		
Functional Area: **Field Secure Area Sensor Monitoring** Security sensors monitoring facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, and transit railways or guideways) for environmental threats, intrusion and motion, object detection, and infrastructure integrity.		
Requirement:	1 The field element shall include security sensors that monitor conditions of secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, roadway infrastructure, and transit railways or guideways).	Planned
Requirement:	2 The field element shall be remotely controlled by a center.	Planned
Requirement:	3 The field element shall provide equipment status and fault indication of security sensor equipment to a center.	Planned
Requirement:	6 The field element shall include motion and intrusion detection sensors.	Planned
Functional Area: **Field Secure Area Surveillance** Security surveillance devices (audio/video) that monitor facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, and transit railways or guideways).		
Requirement:	1 The field element shall include video and/or audio surveillance of secure areas including facilities (e.g. transit yards) and transportation infrastructure (e.g. bridges, tunnels, interchanges, roadway infrastructure, and transit railways or guideways).	Planned
Requirement:	2 The field element shall be remotely controlled by a center.	Planned
Requirement:	3 The field element shall provide equipment status and fault indication of surveillance equipment to a center.	Planned
Element: **Portable Thermal Imaging Devices**		
Entity: **Commercial Vehicle Check**		
Functional Area: [Not Defined]		
Element: **Portable Weigh-In-Motion**		
Entity: **Commercial Vehicle Check**		
Functional Area: [Not Defined]		
Element: **Portsmouth Data Repository**		
Entity: **Archived Data Management**		
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.		
Requirement:	1 The center shall collect data to be archived from one or more data sources.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Portsmouth Data Repository**		
Entity: **Archived Data Management**		
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.		
Requirement:	2 The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement:	3 The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned
Requirement:	4 The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement:	5 The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement:	6 The center shall include capabilities for archive to archive coordination.	Planned
Requirement:	10 The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned
Entity: **Other Archives**		
Functional Area: [Not Defined]		
Element: **Portsmouth Dispatch Center**		
Entity: **Emergency Management**		
Functional Area: **Emergency Call-Taking** Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.		
Requirement:	1 The center shall support the interface to the Emergency Telecommunications System (e.g. 911 or 7-digit call routing) to receive emergency notification information and provide it to the emergency system operator.	Existing
Requirement:	2 The center shall receive emergency call information from 911 services and present the possible incident information to the emergency system operator.	Existing
Requirement:	5 The center shall receive emergency notification information from other public safety agencies and present the possible incident information to the emergency system operator.	Existing
Requirement:	6 The center shall receive emergency notification information from public transit systems and present the possible incident information to the emergency system operator.	Planned
Requirement:	8 The center shall send a request for remote control of CCTV systems from a traffic management center in order to verify the reported incident.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Portsmouth Dispatch Center**		
Entity: **Emergency Management**		
Functional Area: **Emergency Call-Taking** Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.		
Requirement:	9 The center shall forward the verified emergency information to the responding agency based on the location and nature of the emergency.	Existing
Requirement:	10 The center shall update the incident information log once the emergency system operator has verified the incident.	Existing
Requirement:	11 The center shall provide the capability for digitized map data to act as the background to the emergency information presented to the emergency system operator.	Planned
Functional Area: **Emergency Dispatch** Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units.		
Requirement:	1 The center shall dispatch emergency vehicles to respond to verified emergencies under center personnel control.	Existing
Requirement:	2 The center shall store the current status of all emergency vehicles available for dispatch and those that have been dispatched.	Existing
Requirement:	3 The center shall relay location and incident details to the responding vehicles.	Existing
Requirement:	4 The center shall track the location and status of emergency vehicles responding to an emergency based on information from the emergency vehicle.	Planned
Requirement:	5 The center shall store and maintain the emergency service responses in an action log.	Planned
Requirement:	6 The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Requirement:	7 The center shall receive traffic images to support dispatch of emergency vehicles.	Planned
Requirement:	8 The center shall provide the capability to request remote control of traffic surveillance devices	Planned
Requirement:	9 The center shall coordinate response to incidents with other Emergency Management centers to ensure appropriate resources are dispatched and utilized.	Planned
Functional Area: **Emergency Routing** Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.		
Requirement:	1 The center shall collect current traffic and road condition information for emergency vehicle route calculation.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Portsmouth Dispatch Center**			
Entity: **Emergency Management**			
Functional Area: **Emergency Routing** Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.			
Requirement:	2	The center shall receive information on the location and status of traffic control equipment and work zones along potential emergency routes.	Planned
Requirement:	9	The center shall provide the capability to request special traffic control measures, such as signal preemption, from the traffic management center to facilitate emergency vehicle progress along the suggested route.	Planned
Requirement:	11	The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Functional Area: **Incident Command** Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.			
Requirement:	1	The center shall provide tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders to support local management of an incident.	Existing
Requirement:	2	The center shall provide incident command communications with public safety, emergency management, transportation, and other allied response agency centers.	Existing
Requirement:	3	The center shall track and maintain resource information and action plans pertaining to the incident command.	Existing
Requirement:	4	The center shall share incident command information with other public safety agencies including resource deployment status, hazardous material information, rail incident information, evacuation advice as well as traffic, road, and weather conditions.	Planned
Requirement:	5	The center shall assess the status of responding emergency vehicles as part of an incident command.	Existing
Functional Area: **Emergency Response Management** Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.			
Requirement:	3	The center shall provide the capability to implement response plans and track progress through the incident by exchanging incident information and response status with allied agencies.	Planned
Requirement:	4	The center shall develop, coordinate with other agencies, and store emergency response plans.	Planned
Requirement:	5	The center shall track the availability of resources and coordinate resource sharing with allied agency centers including traffic, maintenance, or other emergency centers.	Planned
Requirement:	7	The center shall receive event scheduling information from Event Promoters.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Portsmouth Dispatch Center**			
Entity: **Emergency Management**			
Functional Area: **Emergency Response Management** Strategic emergency planning and response capabilities and broad inter-agency interfaces to support large-scale incidents and disasters, commonly associated with Emergency Operations Centers.			
Requirement:	8	The center shall support remote control of field equipment normally under control of the traffic management center including traffic signals, dynamic message signs, gates, and barriers.	Planned
Requirement:	9	The center shall provide the capability to remotely control and monitor CCTV systems normally operated by a traffic management center.	Planned
Requirement:	10	The center shall provide the capability to request transit resource availability from transit centers for use during disaster and evacuation operations.	Planned
Requirement:	13	The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Requirement:	14	The center shall provide the capability for center personnel to provide inputs to the management of incidents, disasters and evacuations.	Planned
Requirement:	17	The center shall provide the capability to communicate information about emergency situations to local population through the Emergency Telecommunications System.	Planned
Functional Area: **Emergency Data Collection** Collection and storage of information related to Emergency Management. For use by operations personnel or data archives in the region.			
Requirement:	1	The center shall collect emergency service data, emergency vehicle management data, emergency vehicle data, sensor and surveillance data, threat data, and incident data.	Planned
Requirement:	2	The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3	The center shall receive and respond to requests from ITS Archives for either a catalog of the emergency management data or for the data itself.	Planned
Element: **Portsmouth DPW**			
Entity: **Maintenance and Construction Management**			
Functional Area: **MCM Incident Management** Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.			
Requirement:	4	The center shall coordinate planning for incidents with emergency management centers - including pre-planning activities for disaster response, evacuation, and recovery operations.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Portsmouth DPW**		
Entity: **Maintenance and Construction Management**		
Functional Area: **MCM Incident Management** Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.		
Requirement:	5 The center shall respond to requests from emergency management to provide maintenance and construction resources to implement response plans, assist in clean up, verify an incident, etc. This may also involve coordination with traffic management centers and other maintenance centers.	Existing
Functional Area: **MCM Winter Maintenance Management** Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.		
Requirement:	1 The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other winter roadway maintenance.	Planned
Requirement:	3 The center shall provide status information about scheduled winter maintenance activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations. The information is provided to other management centers such as traffic, emergency, transit, traveler information providers, other maintenance centers, and the media.	Planned
Requirement:	5 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for the scheduling of winter maintenance activities.	Planned
Requirement:	9 The center shall provide dispatch instructions for vehicle operators based on input parameters from center personnel, specifically for winter conditions. This could include a treatment route, treatment application rates, start and end times, and other treatment instructions.	Planned
Functional Area: **MCM Roadway Maintenance and Construction** Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.		
Requirement:	2 The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other roadway maintenance.	Existing
Requirement:	4 The center shall provide emergency management and traffic management centers with information about scheduled maintenance and construction work activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Portsmouth DPW**		
Entity: **Maintenance and Construction Management**		
Functional Area: **MCM Roadway Maintenance and Construction** Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.		
Requirement:	5 The center shall collect the status and fault data from roadside equipment, such as traffic, infrastructure, and environmental sensors, highway advisory radio and dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, short range communications equipment, security sensors and surveillance equipment, etc., and provide a cohesive view of equipment repair needs.	Planned
Requirement:	8 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for the scheduling of roadway maintenance and construction activities.	Planned
Requirement:	10 The center shall dispatch and route maintenance and construction vehicle drivers and support them with route-specific environmental, incident, advisory, threat, alert, and traffic congestion information.	Planned
Element: **Portsmouth Public Safety Vehicles**		
Entity: **Emergency Vehicle**		
Functional Area: **On-board EV En Route Support** On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.		
Requirement:	1 The emergency vehicle, including roadway service patrols, shall track its current location.	Planned
Requirement:	2 The emergency vehicle, including roadway service patrols, shall send the vehicle's location and operational data to the center for emergency management and dispatch.	Planned
Requirement:	3 The emergency vehicle, including roadway service patrols, shall receive incident details and a suggested route when dispatched to a scene.	Existing
Requirement:	4 The emergency vehicle shall send the current en route status (including estimated time of arrival) and requests for emergency dispatch updates.	Planned
Requirement:	5 The emergency vehicle shall send requests to traffic signal control equipment at the roadside to preempt the signal.	Existing
Requirement:	6 The emergency vehicle shall provide the personnel on-board with dispatch information, including incident type and location, and forward an acknowledgment from personnel to the center that the vehicle is on its way to the incident scene.	Planned
Functional Area: **On-board EV Incident Management Communication**		

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Portsmouth Public Safety Vehicles**	
Entity: **Emergency Vehicle**	
Functional Area: **On-board EV Incident Management Communication** On-board systems provide communications support to first responders. Incident information is provided to dispatched emergency personnel. Emergency personnel transmit information about the incident and response status.	
Requirement: 1 The emergency vehicle shall receive dispatch instructions sufficient to enable emergency personnel in the field to implement an effective incident response. It includes local traffic, road, and weather conditions, hazardous material information, and the current status of resources that have been allocated to an incident.	Existing
Requirement: 2 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the incident site such as the extent of injuries, identification of vehicles and people involved, hazardous material, etc.	Planned
Requirement: 3 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the current incident response status such as the identification of the resources on site, site management strategies in effect, and current clearance status.	Planned
Element: **Portsmouth Traffic Management System**	
Entity: **Traffic Management**	
Functional Area: **TMC Signal Control** Remotely controls traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.	
Requirement: 1 The center shall remotely control traffic signal controllers.	Existing
Requirement: 2 The center shall accept notifications of pedestrian calls.	Existing
Requirement: 3 The center shall collect traffic signal controller operational status and compare against the control information sent by the center.	Existing
Requirement: 4 The center shall collect traffic signal controller fault data from the field.	Existing
Requirement: 5 The center shall manage (define, store and modify) control plans to coordinate signalized intersections, to be engaged at the direction of center personnel or according to a daily schedule.	Existing
Functional Area: **TMC Regional Traffic Management** Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.	
Requirement: 1 The center shall exchange traffic information with other traffic management centers including incident information, congestion data, traffic data, signal timing plans, and real-time signal control information.	Planned
Requirement: 2 The center shall exchange traffic control information with other traffic management centers to support remote monitoring and control of traffic management devices (e.g. signs, sensors, signals, cameras, etc.).	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Portsmouth Traffic Management System**	
Entity: **Traffic Management**	
Functional Area: **Traffic Data Collection** Collection and storage of traffic management data. For use by operations personnel or data archives in the region.	
Requirement: 1 The center shall collect traffic management data such as operational data, event logs, etc.	Existing
Requirement: 2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement: 3 The center shall receive and respond to requests from ITS Archives for either a catalog of the traffic data or for the data itself.	Planned
Element: **Portsmouth Traffic Signals**	
Entity: **Roadway**	
Functional Area: **Roadway Signal Controls** Field elements including traffic signal controllers for use at signalized intersections; also supports pedestrian crossings.	
Requirement: 1 The field element shall control traffic signals under center control.	Existing
Requirement: 4 The field element shall report the current signal control information to the center.	Existing
Requirement: 5 The field element shall report current preemption status to the center.	Existing
Requirement: 6 The field element shall return traffic signal controller operational status to the center.	Existing
Requirement: 7 The field element shall return traffic signal controller fault data to the center.	Existing
Functional Area: **Roadway Signal Priority** Field elements that provide the capability to receive transit vehicle signal priority requests and control traffic signals accordingly.	
Requirement: [Not Defined]	
Functional Area: **Roadway Signal Preemption** Field elements that receive signal preemption requests from approaching emergency vehicles and overrides the current operation of the traffic signals	
Requirement: 1 The field element shall respond to signal preemption requests from emergency vehicles.	Existing
Element: **Private Ground Transportation Services**	
Entity: **Multimodal Transportation Service Provider**	
Functional Area: [Not Defined]	
Element: **Private Tow and Wrecker Dispatch**	
Entity: **Emergency Management**	
Functional Area: [Not Defined]	
Element: **Private Tow and Wrecker Vehicles**	
Entity: **Emergency Vehicle**	

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Private Tow and Wrecker Vehicles**	
Entity: **Emergency Vehicle**	
Functional Area: [Not Defined]	
Element: **Public and Private Utilities Dispatch**	
Entity: **Maintenance and Construction Management**	
Functional Area: [Not Defined]	
Element: **Rail/Airport/Port Non-Public Facilities Safety - Security Monitoring Devices**	
Entity: **Security Monitoring**	
Functional Area: [Not Defined]	
Element: **Rail/Airport/Port Operations**	
Entity: **Intermodal Freight Depot**	
Functional Area: [Not Defined]	
Entity: **Rail Operations**	
Functional Area: [Not Defined]	
Element: **Rail/Airport/Port Public Facilities Safety - Security Monitoring Devices**	
Entity: **Remote Traveler Support**	
Functional Area: [Not Defined]	
Element: **Regional Call/Coordination Center**	
Entity: **Information Service Provider**	
Functional Area: [Not Defined]	
Element: **Regional Event Promoters**	
Entity: **Event Promoters**	
Functional Area: [Not Defined]	
Element: **Regional Fare Card**	
Entity: **Traveler Card**	
Functional Area: [Not Defined]	
Element: **Road Weather Information System**	
Entity: **Roadway**	
Functional Area: [Not Defined]	
Entity: **Other Roadway**	
Functional Area: [Not Defined]	
Element: **Roadside Safety Inspection Station**	
Entity: **Commercial Vehicle Check**	
Functional Area: [Not Defined]	
Element: **Roadway Service Patrol Vehicle**	
Entity: **Emergency Vehicle**	
Functional Area: [Not Defined]	
Element: **RPC Data Warehouse**	
Entity: **Archived Data Management**	
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.	
Requirement: 1 The center shall collect data to be archived from one or more data sources.	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **RPC Data Warehouse**	
Entity: **Archived Data Management**	
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.	
Requirement: 2 The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement: 3 The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned
Requirement: 4 The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement: 5 The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement: 6 The center shall include capabilities for archive to archive coordination.	Planned
Requirement: 10 The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned
Element: **Salem Data Repository**	
Entity: **Archived Data Management**	
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.	
Requirement: 1 The center shall collect data to be archived from one or more data sources.	Planned
Requirement: 2 The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement: 3 The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned
Requirement: 4 The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement: 5 The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement: 6 The center shall include capabilities for archive to archive coordination.	Planned
Requirement: 10 The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned
Entity: **Other Archives**	
Functional Area: [Not Defined]	
Element: **Salem Dispatch Center**	
Entity: **Emergency Management**	

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem Dispatch Center**		
Entity: **Emergency Management**		
Functional Area: **Emergency Call-Taking** Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.		
Requirement:	1 The center shall support the interface to the Emergency Telecommunications System (e.g. 911 or 7-digit call routing) to receive emergency notification information and provide it to the emergency system operator.	Existing
Requirement:	2 The center shall receive emergency call information from 911 services and present the possible incident information to the emergency system operator.	Existing
Requirement:	5 The center shall receive emergency notification information from other public safety agencies and present the possible incident information to the emergency system operator.	Planned
Requirement:	6 The center shall receive emergency notification information from public transit systems and present the possible incident information to the emergency system operator.	Planned
Requirement:	7 The center shall coordinate, correlate, and verify all emergency inputs, including those identified based on external calls and internal analysis of security sensor and surveillance data, and assign each a level of confidence.	Planned
Requirement:	8 The center shall send a request for remote control of CCTV systems from a traffic management center in order to verify the reported incident.	Planned
Requirement:	9 The center shall forward the verified emergency information to the responding agency based on the location and nature of the emergency.	Planned
Requirement:	10 The center shall update the incident information log once the emergency system operator has verified the incident.	Planned
Requirement:	11 The center shall provide the capability for digitized map data to act as the background to the emergency information presented to the emergency system operator.	Planned
Functional Area: **Emergency Dispatch** Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units.		
Requirement:	1 The center shall dispatch emergency vehicles to respond to verified emergencies under center personnel control.	Existing
Requirement:	2 The center shall store the current status of all emergency vehicles available for dispatch and those that have been dispatched.	Planned
Requirement:	3 The center shall relay location and incident details to the responding vehicles.	Existing
Requirement:	4 The center shall track the location and status of emergency vehicles responding to an emergency based on information from the emergency vehicle.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem Dispatch Center**		
Entity: **Emergency Management**		
Functional Area: **Emergency Dispatch** Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units.		
Requirement:	5 The center shall store and maintain the emergency service responses in an action log.	Planned
Requirement:	6 The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Requirement:	7 The center shall receive traffic images to support dispatch of emergency vehicles.	Planned
Requirement:	8 The center shall provide the capability to request remote control of traffic surveillance devices	Planned
Requirement:	9 The center shall coordinate response to incidents with other Emergency Management centers to ensure appropriate resources are dispatched and utilized.	Planned
Functional Area: **Emergency Routing** Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.		
Requirement:	1 The center shall collect current traffic and road condition information for emergency vehicle route calculation.	Planned
Requirement:	7 The center shall calculate emergency vehicle routes, under center personnel control, based on the collected traffic and road conditions information.	Planned
Requirement:	9 The center shall provide the capability to request special traffic control measures, such as signal preemption, from the traffic management center to facilitate emergency vehicle progress along the suggested route.	Existing
Requirement:	10 Once the route is calculated the route shall be provided to the dispatch function.	Planned
Requirement:	11 The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Functional Area: **Incident Command** Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.		
Requirement:	1 The center shall provide tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders to support local management of an incident.	Existing
Requirement:	2 The center shall provide incident command communications with public safety, emergency management, transportation, and other allied response agency centers.	Existing

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem Dispatch Center**		
Entity: **Emergency Management**		
Functional Area: **Incident Command** Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.		
Requirement:	3 The center shall track and maintain resource information and action plans pertaining to the incident command.	Planned
Requirement:	4 The center shall share incident command information with other public safety agencies including resource deployment status, hazardous material information, rail incident information, evacuation advice as well as traffic, road, and weather conditions.	Planned
Requirement:	5 The center shall assess the status of responding emergency vehicles as part of an incident command.	Planned
Functional Area: **Emergency Data Collection** Collection and storage of information related to Emergency Management. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect emergency service data, emergency vehicle management data, emergency vehicle data, sensor and surveillance data, threat data, and incident data.	Planned
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the emergency management data or for the data itself.	Planned
Element: **Salem DPW**		
Entity: **Maintenance and Construction Management**		
Functional Area: **MCM Incident Management** Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.		
Requirement:	3 The center shall exchange incident and threat information with emergency management centers as well as traffic management centers; including notification of existence of incident and expected severity, location, time and nature of incident.	Planned
Requirement:	4 The center shall coordinate planning for incidents with emergency management centers - including pre-planning activities for disaster response, evacuation, and recovery operations.	Planned
Requirement:	5 The center shall respond to requests from emergency management to provide maintenance and construction resources to implement response plans, assist in clean up, verify an incident, etc. This may also involve coordination with traffic management centers and other maintenance centers.	Existing
Functional Area: **MCM Winter Maintenance Management**		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem DPW**		
Entity: **Maintenance and Construction Management**		
Functional Area: **MCM Winter Maintenance Management** Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.		
Requirement:	1 The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other winter roadway maintenance.	Existing
Requirement:	3 The center shall provide status information about scheduled winter maintenance activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations. The information is provided to other management centers such as traffic, emergency, transit, traveler information providers, other maintenance centers, and the media.	Planned
Requirement:	5 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for the scheduling of winter maintenance activities.	Planned
Requirement:	7 The center shall dispatch and route winter maintenance vehicle drivers and support them with route- specific environmental, incident, advisory, threat, alert, and traffic congestion information.	Planned
Requirement:	9 The center shall provide dispatch instructions for vehicle operators based on input parameters from center personnel, specifically for winter conditions. This could include a treatment route, treatment application rates, start and end times, and other treatment instructions.	Planned
Requirement:	11 The center shall assess the current status of all winter maintenance activities, including actual work activities performed, current locations and operational conditions of vehicles, materials and equipment inventories, field equipment status, environmental information, etc.	Planned
Functional Area: **MCM Roadway Maintenance and Construction** Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.		
Requirement:	2 The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other roadway maintenance.	Existing
Requirement:	4 The center shall provide emergency management and traffic management centers with information about scheduled maintenance and construction work activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations.	Planned

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Salem DPW**	
Entity: **Maintenance and Construction Management**	
Functional Area: **MCM Roadway Maintenance and Construction** Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.	
Requirement: 5 The center shall collect the status and fault data from roadside equipment, such as traffic, infrastructure, and environmental sensors, highway advisory radio and dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, short range communications equipment, security sensors and surveillance equipment, etc., and provide a cohesive view of equipment repair needs.	Planned
Requirement: 8 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for the scheduling of roadway maintenance and construction activities.	Planned
Requirement: 10 The center shall dispatch and route maintenance and construction vehicle drivers and support them with route-specific environmental, incident, advisory, threat, alert, and traffic congestion information.	Planned
Requirement: 12 The center shall track the status of roadway maintenance and construction activities by monitoring collected data from the dispatched vehicles and equipment.	Planned
Requirement: 13 The center shall report the status of field equipment maintenance activities to the centers that operate the equipment.	Planned
Element: **Salem Public Safety Vehicles**	
Entity: **Emergency Vehicle**	
Functional Area: **On-board EV En Route Support** On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.	
Requirement: 1 The emergency vehicle, including roadway service patrols, shall track its current location.	Planned
Requirement: 2 The emergency vehicle, including roadway service patrols, shall send the vehicle's location and operational data to the center for emergency management and dispatch.	Planned
Requirement: 3 The emergency vehicle, including roadway service patrols, shall receive incident details and a suggested route when dispatched to a scene.	Existing
Requirement: 4 The emergency vehicle shall send the current en route status (including estimated time of arrival) and requests for emergency dispatch updates.	Existing
Requirement: 5 The emergency vehicle shall send requests to traffic signal control equipment at the roadside to preempt the signal.	Existing

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Salem Public Safety Vehicles**	
Entity: **Emergency Vehicle**	
Functional Area: **On-board EV En Route Support** On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.	
Requirement: 6 The emergency vehicle shall provide the personnel on-board with dispatch information, including incident type and location, and forward an acknowledgment from personnel to the center that the vehicle is on its way to the incident scene.	Planned
Functional Area: **On-board EV Incident Management Communication** On-board systems provide communications support to first responders. Incident information is provided to dispatched emergency personnel. Emergency personnel transmit information about the incident and response status.	
Requirement: 1 The emergency vehicle shall receive dispatch instructions sufficient to enable emergency personnel in the field to implement an effective incident response. It includes local traffic, road, and weather conditions, hazardous material information, and the current status of resources that have been allocated to an incident.	Planned
Requirement: 2 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the incident site such as the extent of injuries, identification of vehicles and people involved, hazardous material, etc.	Planned
Requirement: 3 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the current incident response status such as the identification of the resources on site, site management strategies in effect, and current clearance status.	Planned
Element: **Salem Traffic Management System**	
Entity: **Traffic Management**	
Functional Area: **TMC Signal Control** Remotely controls traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.	
Requirement: 1 The center shall remotely control traffic signal controllers.	Existing
Requirement: 3 The center shall collect traffic signal controller operational status and compare against the control information sent by the center.	Existing
Requirement: 4 The center shall collect traffic signal controller fault data from the field.	Existing
Requirement: 5 The center shall manage (define, store and modify) control plans to coordinate signalized intersections, to be engaged at the direction of center personnel or according to a daily schedule.	Existing
Functional Area: **TMC Traffic Information Dissemination** Controls dissemination of traffic-related data to other centers, the media, and travelers via the driver information systems (DMS, HAR) that it operates.	

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem Traffic Management System**		
Entity: **Traffic Management**		
Functional Area: **TMC Traffic Information Dissemination** Controls dissemination of traffic-related data to other centers, the media, and travelers via the driver information systems (DMS, HAR) that it operates.		
Requirement:	6 The center shall distribute traffic data to maintenance and construction centers, transit centers, emergency management centers, and traveler information providers.	Planned
Requirement:	8 The center shall provide the capability for center personnel to control the nature of the data that is available to non-traffic operations centers and the media.	Planned
Functional Area: **TMC Regional Traffic Management** Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.		
Requirement:	1 The center shall exchange traffic information with other traffic management centers including incident information, congestion data, traffic data, signal timing plans, and real-time signal control information.	Planned
Requirement:	2 The center shall exchange traffic control information with other traffic management centers to support remote monitoring and control of traffic management devices (e.g. signs, sensors, signals, cameras, etc.).	Planned
Functional Area: **TMC Incident Detection** Remotely monitors traffic sensor and surveillance systems to detect and verify incidents. Also monitors external advisory and incident reporting systems, intermodal freight depots, and border crossings for additional incident information. Identified incidents are reported to operations personnel and other centers.		
Requirement:	3 The center shall receive inputs concerning upcoming events that would effect the traffic network from event promoters and traveler information service providers.	Planned
Requirement:	4 The center shall exchange incident and threat information with emergency management centers as well as maintenance and construction centers; including notification of existence of incident and expected severity, location, time and nature of incident.	Planned
Requirement:	5 The center shall support requests from emergency management centers and border inspection systems to remotely control sensor and surveillance equipment located in the field.	Planned
Requirement:	6 The center shall provide road network conditions and traffic images to emergency management centers to support the detection, verification, and classification of incidents.	Planned
Requirement:	7 The center shall provide video and traffic sensor control commands to the field equipment to detect and verify incidents.	Existing
Requirement:	8 [User Defined] The center shall collect traffic flow and image data from the field equipment to detect and verify incidents.	Existing
Functional Area: **TMC Incident Dispatch Coordination/Communication**		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem Traffic Management System**		
Entity: **Traffic Management**		
Functional Area: **TMC Incident Dispatch Coordination/Communication** Formulates an incident response that takes into account the incident potential, incident impacts, and/or resources required for incident management. Facilitates the dispatch of emergency response and service vehicles and coordinates the response with cooperating agencies.		
Requirement:	2 The center shall coordinate planning for incidents with emergency management centers - including pre-planning activities for disaster response, evacuation, and recovery operations.	Planned
Requirement:	3 The center shall support requests from emergency management centers to remotely control sensor and surveillance equipment located in the field, provide special routing for emergency vehicles, and to provide responding emergency vehicles with signal preemption.	Planned
Requirement:	4 The center shall exchange incident information with emergency management centers, maintenance and construction centers, transit centers, information service providers, and the media including description, location, traffic impact, status, expected duration, and response information.	Planned
Requirement:	5 The center shall share resources with allied agency centers to implement special traffic control measures, assist in clean up, verify an incident, etc. This may also involve coordination with maintenance centers.	Planned
Requirement:	6 The center shall receive inputs concerning upcoming events that would effect the traffic network from event promoters, traveler information service providers, media, border crossings, and rail operations centers.	Planned
Requirement:	10 The center shall coordinate information and controls with other traffic management centers.	Planned
Requirement:	12 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for traffic incident management.	Planned
Functional Area: **TMC Traffic Network Performance Evaluation** Measures performance and predicts travel demand patterns to support traffic flow optimization, demand management, and incident management. Collects data from surveillance equipment as well as input from other management centers including emissions, event promoters, and other TMCs.		
Requirement:	1 The center shall monitor, analyze, and store traffic sensor data (speed, volume, occupancy) collected from field elements under remote control of the center to support overall network performance evaluations.	Planned
Requirement:	6 The center shall exchange traffic information with other traffic management centers, including incidents, congestion data, traffic data, signal timing plans, and real-time signal control information to support overall network performance evaluations.	Planned
Requirement:	7 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for network performance evaluations.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem Traffic Management System**		
Entity: **Traffic Management**		
Functional Area: **TMC Traffic Network Performance Evaluation** Measures performance and predicts travel demand patterns to support traffic flow optimization, demand management, and incident management. Collects data from surveillance equipment as well as input from other management centers including emissions, event promoters, and other TMCs.		
Requirement:	8 The center shall provide an interface to the archive data repository to enable the operator to retrieve historical operating data for use in planning to predict future traffic patterns and conditions.	Planned
Functional Area: **TMC Multimodal Coordination** Provides traffic signal priority for transit vehicles based on center-to-center communications with the transit management center; also exchange traffic and transit information.		
Requirement:	2 The center shall exchange information with transit management centers including details current transit routes, the level of service on each route, and the progress of individual vehicles along their routes.	Planned
Functional Area: **Traffic Data Collection** Collection and storage of traffic management data. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect traffic management data such as operational data, event logs, etc.	Planned
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the traffic data or for the data itself.	Planned
Element: **Salem Traffic Monitoring Devices**		
Entity: **Roadway**		
Functional Area: **Roadway Basic Surveillance** Field elements that monitor traffic conditions using loop detectors and CCTV cameras.		
Requirement:	1 The field element shall collect, process, digitize, and send traffic sensor data (speed, volume, and occupancy) to the center for further analysis and storage, under center control.	Existing
Requirement:	2 The field element shall collect, process, and send traffic images to the center for further analysis and distribution.	Existing
Requirement:	4 The field element shall return sensor and CCTV system operational status to the controlling center.	Existing
Requirement:	5 The field element shall return sensor and CCTV system fault data to the controlling center for repair.	Existing
Element: **Salem Traffic Signals**		
Entity: **Roadway**		
Functional Area: **Roadway Signal Controls**		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Salem Traffic Signals**		
Entity: **Roadway**		
Functional Area: **Roadway Signal Controls** Field elements including traffic signal controllers for use at signalized intersections; also supports pedestrian crossings.		
Requirement:	1 The field element shall control traffic signals under center control.	Existing
Requirement:	4 The field element shall report the current signal control information to the center.	Existing
Requirement:	5 The field element shall report current preemption status to the center.	Existing
Requirement:	6 The field element shall return traffic signal controller operational status to the center.	Existing
Requirement:	7 The field element shall return traffic signal controller fault data to the center.	Existing
Functional Area: **Roadway Signal Priority** Field elements that provide the capability to receive transit vehicle signal priority requests and control traffic signals accordingly.		
Requirement:	1 The field element shall respond to signal priority requests from transit vehicles.	Existing
Functional Area: **Roadway Signal Preemption** Field elements that receive signal preemption requests from approaching emergency vehicles and overrides the current operation of the traffic signals		
Requirement:	1 The field element shall respond to signal preemption requests from emergency vehicles.	Existing
Element: **Seabrook Station Alerting Systems**		
Entity: **Alerting and Advisory Systems**		
Functional Area: [Not Defined]		
Element: **Service Agency Cards**		
Entity: **Traveler Card**		
Functional Area: [Not Defined]		
Element: **Somersworth Data Repository**		
Entity: **Archived Data Management**		
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.		
Requirement:	1 The center shall collect data to be archived from one or more data sources.	Planned
Requirement:	2 The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement:	3 The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Somersworth Data Repository**			
Entity: **Archived Data Management**			
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.			
Requirement:	4	The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement:	5	The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement:	6	The center shall include capabilities for archive to archive coordination.	Planned
Requirement:	10	The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned
Entity: **Other Archives**			
Functional Area: [Not Defined]			
Element: **Somersworth Dispatch Center**			
Entity: **Emergency Management**			
Functional Area: **Emergency Call-Taking** Provides interface to the emergency call-taking systems such as the Emergency Telecommunications System (e.g., 911) that correlate call information with emergencies reported by transit agencies, commercial vehicle operators, or other public safety agencies. Allows the operator to verify the incident and forward the information to the responding agencies.			
Requirement:	1	The center shall support the interface to the Emergency Telecommunications System (e.g. 911 or 7-digit call routing) to receive emergency notification information and provide it to the emergency system operator.	Existing
Requirement:	2	The center shall receive emergency call information from 911 services and present the possible incident information to the emergency system operator.	Existing
Requirement:	5	The center shall receive emergency notification information from other public safety agencies and present the possible incident information to the emergency system operator.	Existing
Requirement:	6	The center shall receive emergency notification information from public transit systems and present the possible incident information to the emergency system operator.	Planned
Requirement:	9	The center shall forward the verified emergency information to the responding agency based on the location and nature of the emergency.	Existing
Requirement:	10	The center shall update the incident information log once the emergency system operator has verified the incident.	Planned
Requirement:	11	The center shall provide the capability for digitized map data to act as the background to the emergency information presented to the emergency system operator.	Planned
Functional Area: **Emergency Dispatch** Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units.			

Architecture			Status
Strafford-Rockingham Region ITS Architecture (Region)			(Region)
Element: **Somersworth Dispatch Center**			
Entity: **Emergency Management**			
Functional Area: **Emergency Dispatch** Dispatch emergency vehicles to incidents, tracking their location and status. Pertinent incident information is gathered and relayed to the responding units.			
Requirement:	1	The center shall dispatch emergency vehicles to respond to verified emergencies under center personnel control.	Existing
Requirement:	2	The center shall store the current status of all emergency vehicles available for dispatch and those that have been dispatched.	Existing
Requirement:	3	The center shall relay location and incident details to the responding vehicles.	Existing
Requirement:	4	The center shall track the location and status of emergency vehicles responding to an emergency based on information from the emergency vehicle.	Planned
Requirement:	5	The center shall store and maintain the emergency service responses in an action log.	Planned
Requirement:	6	The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Requirement:	9	The center shall coordinate response to incidents with other Emergency Management centers to ensure appropriate resources are dispatched and utilized.	Planned
Functional Area: **Emergency Routing** Routing of emergency vehicles to facilitate the quickest/safest arrival. Routes may be determined based on real-time traffic information and road conditions or routes may be provided by Traffic Management on request.			
Requirement:	2	The center shall receive information on the location and status of traffic control equipment and work zones along potential emergency routes.	Planned
Requirement:	7	The center shall calculate emergency vehicle routes, under center personnel control, based on the collected traffic and road conditions information.	Planned
Requirement:	9	The center shall provide the capability to request special traffic control measures, such as signal preemption, from the traffic management center to facilitate emergency vehicle progress along the suggested route.	Existing
Requirement:	10	Once the route is calculated the route shall be provided to the dispatch function.	Planned
Requirement:	11	The center shall provide the capability for digitized map data to act as the background to the information presented to the emergency system operator.	Planned
Functional Area: **Incident Command** Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.			

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Somersworth Dispatch Center**		
Entity: **Emergency Management**		
Functional Area: **Incident Command** Tactical decision support, resource coordination, and communications integration among emergency management agencies for Incident Commands that are established by first responders to support local management of an incident.		
Requirement:	1 The center shall provide tactical decision support, resource coordination, and communications integration for Incident Commands that are established by first responders to support local management of an incident.	Existing
Requirement:	2 The center shall provide incident command communications with public safety, emergency management, transportation, and other allied response agency centers.	Existing
Requirement:	3 The center shall track and maintain resource information and action plans pertaining to the incident command.	Existing
Requirement:	4 The center shall share incident command information with other public safety agencies including resource deployment status, hazardous material information, rail incident information, evacuation advice as well as traffic, road, and weather conditions.	Existing
Requirement:	5 The center shall assess the status of responding emergency vehicles as part of an incident command.	Existing
Element: **Somersworth DPW**		
Entity: **Maintenance and Construction Management**		
Functional Area: **MCM Incident Management** Supports coordinated response to incidents - share incident notifications, manage incident response resources, and coordinate overall incident situation and response among allied response organizations.		
Requirement:	3 The center shall exchange incident and threat information with emergency management centers as well as traffic management centers; including notification of existence of incident and expected severity, location, time and nature of incident.	Planned
Requirement:	4 The center shall coordinate planning for incidents with emergency management centers - including pre-planning activities for disaster response, evacuation, and recovery operations.	Planned
Requirement:	5 The center shall respond to requests from emergency management to provide maintenance and construction resources to implement response plans, assist in clean up, verify an incident, etc. This may also involve coordination with traffic management centers and other maintenance centers.	Existing
Requirement:	7 The center shall provide work zone activities affecting the road network including the nature of the maintenance or construction activity, location, impact to the roadway, expected time(s) and duration of impact, anticipated delays, alternate routes, and suggested speed limits. This information may be augmented with images that provide a visual indication of current work zone status and traffic impacts.	Planned
Functional Area: **MCM Winter Maintenance Management**		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Somersworth DPW**		
Entity: **Maintenance and Construction Management**		
Functional Area: **MCM Winter Maintenance Management** Manages winter road maintenance, tracking and controlling snow plow operations, roadway treatment (e.g., salt spraying and other material applications) based on weather information.		
Requirement:	1 The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other winter roadway maintenance.	Planned
Requirement:	3 The center shall provide status information about scheduled winter maintenance activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations. The information is provided to other management centers such as traffic, emergency, transit, traveler information providers, other maintenance centers, and the media.	Planned
Requirement:	5 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for the scheduling of winter maintenance activities.	Planned
Requirement:	7 The center shall dispatch and route winter maintenance vehicle drivers and support them with route- specific environmental, incident, advisory, threat, alert, and traffic congestion information.	Planned
Requirement:	9 The center shall provide dispatch instructions for vehicle operators based on input parameters from center personnel, specifically for winter conditions. This could include a treatment route, treatment application rates, start and end times, and other treatment instructions.	Planned
Requirement:	10 The center shall support remote control of on-board maintenance and construction vehicle systems and field equipment that is remotely controlled by the vehicle such as adjusting material application rates and spread patterns.	Planned
Requirement:	11 The center shall assess the current status of all winter maintenance activities, including actual work activities performed, current locations and operational conditions of vehicles, materials and equipment inventories, field equipment status, environmental information, etc.	Planned
Functional Area: **MCM Roadway Maintenance and Construction** Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.		
Requirement:	2 The center shall respond to requests from emergency management and traffic management centers for hazard removal, field equipment repair, and other roadway maintenance.	Planned
Requirement:	4 The center shall provide emergency management and traffic management centers with information about scheduled maintenance and construction work activities including anticipated closures and impact to the roadway, alternate routes, anticipated delays, closure times, and durations.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Somersworth DPW**		
Entity: **Maintenance and Construction Management**		
Functional Area: **MCM Roadway Maintenance and Construction** Overall management and support for routine maintenance on the roadway or right-of-way. Includes landscape maintenance, hazard removal (roadway debris, dead animals), routine maintenance activities (roadway cleaning, grass cutting), and repair and maintenance of both ITS and non-ITS equipment.		
Requirement:	5 The center shall collect the status and fault data from roadside equipment, such as traffic, infrastructure, and environmental sensors, highway advisory radio and dynamic message signs, automated roadway treatment systems, barrier and safeguard systems, cameras, traffic signals and override equipment, ramp meters, short range communications equipment, security sensors and surveillance equipment, etc., and provide a cohesive view of equipment repair needs.	Planned
Requirement:	8 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for the scheduling of roadway maintenance and construction activities.	Planned
Requirement:	10 The center shall dispatch and route maintenance and construction vehicle drivers and support them with route-specific environmental, incident, advisory, threat, alert, and traffic congestion information.	Existing
Requirement:	12 The center shall track the status of roadway maintenance and construction activities by monitoring collected data from the dispatched vehicles and equipment.	Planned
Requirement:	13 The center shall report the status of field equipment maintenance activities to the centers that operate the equipment.	Planned
Element: **Somersworth Public Safety Vehicles**		
Entity: **Emergency Vehicle**		
Functional Area: **On-board EV En Route Support** On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.		
Requirement:	1 The emergency vehicle, including roadway service patrols, shall track its current location.	Planned
Requirement:	2 The emergency vehicle, including roadway service patrols, shall send the vehicle's location and operational data to the center for emergency management and dispatch.	Planned
Requirement:	3 The emergency vehicle, including roadway service patrols, shall receive incident details and a suggested route when dispatched to a scene.	Existing
Requirement:	4 The emergency vehicle shall send the current en route status (including estimated time of arrival) and requests for emergency dispatch updates.	Existing
Requirement:	5 The emergency vehicle shall send requests to traffic signal control equipment at the roadside to preempt the signal.	Existing

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Somersworth Public Safety Vehicles**		
Entity: **Emergency Vehicle**		
Functional Area: **On-board EV En Route Support** On-board systems for gathering of dispatch and routing information for emergency vehicle personnel, vehicle tracking, communications with care facilities, and signal preemption via short range communication directly with traffic control equipment at the roadside.		
Requirement:	6 The emergency vehicle shall provide the personnel on-board with dispatch information, including incident type and location, and forward an acknowledgment from personnel to the center that the vehicle is on its way to the incident scene.	Planned
Functional Area: **On-board EV Incident Management Communication** On-board systems provide communications support to first responders. Incident information is provided to dispatched emergency personnel. Emergency personnel transmit information about the incident and response status.		
Requirement:	1 The emergency vehicle shall receive dispatch instructions sufficient to enable emergency personnel in the field to implement an effective incident response. It includes local traffic, road, and weather conditions, hazardous material information, and the current status of resources that have been allocated to an incident.	Planned
Requirement:	2 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the incident site such as the extent of injuries, identification of vehicles and people involved, hazardous material, etc.	Planned
Requirement:	3 The emergency vehicle shall provide an interface to the center for emergency personnel to transmit information about the current incident response status such as the identification of the resources on site, site management strategies in effect, and current clearance status.	Planned
Element: **Somersworth Traffic Management System**		
Entity: **Traffic Management**		
Functional Area: **TMC Signal Control** Remotely controls traffic signal controllers to implement traffic management strategies at signalized intersections based on traffic conditions, incidents, emergency vehicle preemptions, pedestrian crossings, etc.		
Requirement:	1 The center shall remotely control traffic signal controllers.	Existing
Requirement:	3 The center shall collect traffic signal controller operational status and compare against the control information sent by the center.	Existing
Requirement:	4 The center shall collect traffic signal controller fault data from the field.	Existing
Requirement:	5 The center shall manage (define, store and modify) control plans to coordinate signalized intersections, to be engaged at the direction of center personnel or according to a daily schedule.	Existing
Functional Area: **TMC Regional Traffic Management** Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Somersworth Traffic Management System**		
Entity: **Traffic Management**		
Functional Area: **TMC Regional Traffic Management** Coordination between traffic management centers in order to share traffic information between centers as well as control of traffic management field equipment. This may be used during incidents and special events and during day-to-day operations.		
Requirement:	1 The center shall exchange traffic information with other traffic management centers including incident information, congestion data, traffic data, signal timing plans, and real-time signal control information.	Planned
Requirement:	2 The center shall exchange traffic control information with other traffic management centers to support remote monitoring and control of traffic management devices (e.g. signs, sensors, signals, cameras, etc.).	Planned
Functional Area: **Traffic Data Collection** Collection and storage of traffic management data. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect traffic management data such as operational data, event logs, etc.	Planned
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the traffic data or for the data itself.	Planned
Element: **Somersworth Traffic Signals**		
Entity: **Roadway**		
Functional Area: **Roadway Signal Controls** Field elements including traffic signal controllers for use at signalized intersections; also supports pedestrian crossings.		
Requirement:	1 The field element shall control traffic signals under center control.	Existing
Requirement:	2 The field element shall respond to pedestrian crossing requests by accommodating the pedestrian crossing.	Existing
Requirement:	3 The field element shall provide the capability to notify the traffic management center of pedestrian calls and pedestrian accommodations.	Existing
Requirement:	4 The field element shall report the current signal control information to the center.	Existing
Requirement:	5 The field element shall report current preemption status to the center.	Existing
Requirement:	6 The field element shall return traffic signal controller operational status to the center.	Existing
Requirement:	7 The field element shall return traffic signal controller fault data to the center.	Planned
Functional Area: **Roadway Signal Priority**		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **Somersworth Traffic Signals**		
Entity: **Roadway**		
Functional Area: **Roadway Signal Priority** Field elements that provide the capability to receive transit vehicle signal priority requests and control traffic signals accordingly.		
Requirement:	1 The field element shall respond to signal priority requests from transit vehicles.	Planned
Functional Area: **Roadway Signal Preemption** Field elements that receive signal preemption requests from approaching emergency vehicles and overrides the current operation of the traffic signals		
Requirement:	1 The field element shall respond to signal preemption requests from emergency vehicles.	Existing
Element: **SRPC Data Warehouse**		
Entity: **Archived Data Management**		
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.		
Requirement:	1 The center shall collect data to be archived from one or more data sources.	Planned
Requirement:	2 The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement:	3 The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned
Requirement:	4 The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement:	5 The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement:	6 The center shall include capabilities for archive to archive coordination.	Planned
Requirement:	10 The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned
Element: **State Maintenance and Construction Vehicle**		
Entity: **Maintenance and Construction Vehicle**		
Functional Area: [Not Defined]		
Element: **State Police Dispatch**		
Entity: **Emergency Management**		
Functional Area: [Not Defined]		
Entity: **Enforcement Agency**		
Functional Area: [Not Defined]		
Entity: **Other Emergency Management**		
Functional Area: [Not Defined]		
Element: **Statewide Emergency Operations Center**		

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **Statewide Emergency Operations Center**	
Entity: **Commercial Vehicle Administration**	
Functional Area: [Not Defined]	
Entity: **Emergency Management**	
Functional Area: [Not Defined]	
Element: **Statewide Transportation Management Center**	
Entity: **Commercial Vehicle Administration**	
Functional Area: [Not Defined]	
Entity: **Maintenance and Construction Management**	
Functional Area: [Not Defined]	
Entity: **Traffic Management**	
Functional Area: [Not Defined]	
Entity: **Enforcement Agency**	
Functional Area: [Not Defined]	
Element: **Surface Transportation Weather Service**	
Entity: **Surface Transportation Weather Service**	
Functional Area: [Not Defined]	
Element: **Toll Administration Center**	
Entity: **Payment Administration**	
Functional Area: [Not Defined]	
Element: **Toll Plaza**	
Entity: **Roadway Payment**	
Functional Area: [Not Defined]	
Element: **Traveler**	
Entity: **Driver**	
Functional Area: [Not Defined]	
Entity: **Traveler**	
Functional Area: [Not Defined]	
Element: **Traveler Card Update Devices**	
Entity: **Remote Traveler Support**	
Functional Area: **Remote Transit Fare Management** Public traveler interface, such as a kiosk, that provides the capability for the traveler to use a common fare medium for transit fares, tolls, and/or parking lot charges, to calculate the amount due and identify payment problems.	
Requirement: 1 The public interface for travelers shall accept and process current transit passenger fare collection information.	Planned
Requirement: 3 The public interface for travelers shall provide an interface to a transit user traveler card in support of payment for transit fares, tolls, and/or parking lot charges. The stored credit value data from the card shall be collected and updated based on the fare or other charges, or the credit identity shall be collected.	Planned
Requirement: 4 The public interface for travelers shall provide information to the center for financial authorization and transaction processing.	Planned
Requirement: 8 The public interface for travelers shall present information to the traveler in a form suitable for travelers with physical disabilities.	Planned
Element: **TRIO ISP**	

Architecture	Status
Strafford-Rockingham Region ITS Architecture (Region)	(Region)
Element: **TRIO ISP**	
Entity: **Information Service Provider**	
Functional Area: [Not Defined]	
Entity: **Event Promoters**	
Functional Area: [Not Defined]	
Entity: **Map Update Provider**	
Functional Area: [Not Defined]	
Entity: **Media**	
Functional Area: [Not Defined]	
Entity: **Other Emergency Management**	
Functional Area: [Not Defined]	
Entity: **Other Traffic Management**	
Functional Area: [Not Defined]	
Entity: **Rail Operations**	
Functional Area: [Not Defined]	
Entity: **Travel Services Provider**	
Functional Area: [Not Defined]	
Element: **U.S. Coast Guard**	
Entity: **Emergency Management**	
Functional Area: [Not Defined]	
Entity: **Enforcement Agency**	
Functional Area: [Not Defined]	
Element: **UNH Bus Stops and Transfer Points**	
Entity: **Remote Traveler Support**	
Functional Area: **Traveler Secure Area Surveillance** Security surveillance devices that monitor traveler-frequented areas such as transit stops and rest stops.	
Requirement: 1 The field element shall include video and/or audio surveillance of traveler secure areas including transit stations, transit stops, rest areas, park and ride lots, and other fixed sites along travel routes (e.g., emergency pull-off areas and traveler information centers).	Planned
Requirement: 2 The field element shall be remotely controlled by a center.	Planned
Requirement: 3 The field element shall provide equipment status and fault indication of surveillance equipment to a center.	Planned
Functional Area: **Remote Transit Information Services** Public traveler interface that provides real-time travel-related information at transit stops and multi-modal transfer points, including general annunciation, display of imminent arrival information, the latest available information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence.	
Requirement: 1 The public interface for travelers shall collect and provide real-time travel-related information at transit stops, multi-modal transfer points, and other public transportation areas.	Planned
Requirement: 2 The public interface for travelers shall collect and present to the transit traveler information on transit routes, schedules, and real-time schedule adherence.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Bus Stops and Transfer Points**		
Entity: **Remote Traveler Support**		
Functional Area: **Remote Transit Information Services** Public traveler interface that provides real-time travel-related information at transit stops and multi-modal transfer points, including general annunciation, display of imminent arrival information, the latest available information on transit routes, schedules, transfer options, available services, fares, and real-time schedule adherence.		
Requirement:	3 The public interface for travelers shall provide support for general annunciation and/or display of imminent arrival information and other information of general interest to transit users.	Planned
Requirement:	4 The public interface for travelers shall present information to the traveler in a form suitable for travelers with physical disabilities.	Planned
Element: **UNH Data Repository**		
Entity: **Archived Data Management**		
Functional Area: **ITS Data Repository** Collect and maintain data and data catalogs from one or more data sources. May include quality checks, error notification, and archive coordination.		
Requirement:	1 The center shall collect data to be archived from one or more data sources.	Planned
Requirement:	2 The center shall collect data catalogs from one or more data sources. A catalog describes the data contained in the collection of archived data and may include descriptions of the schema or structure of the data, a description of the contents of the data; e.g., time range of entries, number of entries; or a sample of the data (e. g. a thumbnail).	Planned
Requirement:	3 The center shall store the archived data in a focused repository that is suited to a particular set of ITS data users.	Planned
Requirement:	4 The center shall include capabilities for performing quality checks on the incoming archived data.	Planned
Requirement:	5 The center shall include capabilities for error notification on the incoming archived data.	Planned
Requirement:	6 The center shall include capabilities for archive to archive coordination.	Planned
Requirement:	10 The center shall respond to requests from the administrator interface function to maintain the archive data.	Planned
Entity: **Other Archives**		
Functional Area: [Not Defined]		
Element: **UNH Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.		
Requirement:	1 The center shall monitor the locations of all transit vehicles within its network.	Planned
Requirement:	2 The center shall determine adherence of transit vehicles to their assigned schedule.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Vehicle Tracking** Monitoring transit vehicle locations via interactions with on-board systems. Furnish users with real-time transit schedule information and maintain interface with digital map providers.		
Requirement:	3 The center shall support an interface with a map update provider, or other appropriate data sources, through which updates of digitized map data can be obtained and used as a background for transit tracking and dispatch.	Planned
Requirement:	4 The center shall provide transit operational data to traveler information service providers.	Planned
Functional Area: **Transit Center Fixed-Route Operations** Management of fixed route transit operations. Planning, scheduling, and dispatch associated with fixed and flexible route transit services. Updates customer service operator systems, and provides current vehicle schedule adherence and optimum scenarios for schedule adjustment.		
Requirement:	1 The center shall generate transit routes and schedules based on such factors as parameters input by the system operator, road network conditions, incident information, operational data on current routes and schedules, and digitized map data.	Planned
Requirement:	2 The center shall provide the interface to the system operator to control the generation of new routes and schedules (transit services) including the ability to review and update the parameters used by the routes and schedules generation processes and to initiate these processes	Planned
Requirement:	3 The center shall be able to generate special routes and schedules to support an incident, disaster, evacuation, or other emergency.	Planned
Requirement:	4 The center shall dispatch fixed route or flexible route transit vehicles	Existing
Requirement:	5 The center shall collect transit operational data for use in the generation of routes and schedules.	Existing
Requirement:	6 The center shall provide instructions or corrective actions to the transit vehicle operators based upon operational needs.	Existing
Requirement:	7 The center shall manage large deviations of individual transit vehicles, deviations in rural areas, and deviations of large numbers of vehicles.	Planned
Requirement:	8 The center shall generate the necessary corrective actions which may involve more than the vehicles concerned and more far reaching action, such as, the introduction of extra vehicles, wide area signal priority by traffic management, the premature termination of some services, etc.	Planned
Requirement:	9 The center shall exchange information with Maintenance and Construction Operations concerning work zones, roadway conditions, asset restrictions, work plans, etc.	Planned
Requirement:	10 The center shall disseminate up-to-date schedules and route information to other centers for fixed and flexible route services.	Planned
Requirement:	11 The center shall provide an interface to the archive data repository to enable the operator to retrieve historical operating data for use in planning transit routes and schedules.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Fare Management** Management of fare collection at the center - includes setting and distributing fare information, central processing of fares for transit as well as other ITS services, links to financial institutions and enforcement agencies.		
Requirement:	1 The center shall manage the actual value of transit fares for each segment of each regular transit route, including the transmission of the information to transit vehicles and transit stops or stations.	Planned
Requirement:	2 The center shall provide the capability for a system operator to manage the transit fares and control the exchange of transit fare information.	Planned
Requirement:	4 The center shall support the payment of transit fare transactions using data provided by the traveler cards / payment instruments.	Planned
Requirement:	6 The center shall process requests for transit fares to be paid in advance.	Planned
Requirement:	9 The center shall maintain a list of invalid traveler credit identities or bad tag lists that can be forwarded to transit vehicles and transit stops or stations.	Planned
Requirement:	10 The center shall collect fare statistics data to implement variable and flexible fare structures.	Planned
Requirement:	11 The center shall exchange fare and load information with other transit management centers, including potential Centralized Payments facilities.	Planned
Requirement:	12 The center shall provide transit fare information to other centers, including traveler information providers upon request.	Planned
Functional Area: **Transit Center Passenger Counting** Receives and processes transit vehicle loading data using two-way communications from equipped transit vehicles.		
Requirement:	1 The center shall collect passenger count information from each transit vehicle.	Planned
Requirement:	2 The center shall calculate transit ridership data by route, route segment, transit stop, time of day, and day of week based on the collected passenger count information.	Planned
Requirement:	3 The center shall make the compiled ridership data available to the system operator and other applications.	Planned
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.		
Requirement:	1 The center shall analyze transit vehicle schedule performance to determine the need for priority along certain routes or at certain intersections.	Planned
Requirement:	2 The center shall send requests for priority along routes or at intersections to traffic management.	Planned
Requirement:	3 The center shall define business rules that govern use of transit vehicle signal priority, communicate these rules to the transit vehicle, and monitor transit vehicle requests for priority at signalized intersections.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Signal Priority** Manage transit signal priority, monitoring schedule performance and generating requests for transit priority on routes and at certain intersections.		
Requirement:	4 The center shall provide transit operations personnel with the capability to control and monitor transit signal priority operations.	Planned
Functional Area: **Transit Center Security** Monitor transit vehicle operator or traveler activated alarms; authenticate transit vehicle operators; remotely disable a transit vehicle; alert operators, travelers, and police to potential incidents identified by these security features.		
Requirement:	1 The center shall monitor transit vehicle operational data to determine if the transit vehicle is off-route and assess whether a security incident is occurring.	Planned
Requirement:	2 The center shall receive reports of emergencies on-board transit vehicles entered directly be the transit vehicle operator or from a traveler through interfaces such as panic buttons or alarm switches.	Planned
Requirement:	4 The center shall exchange transit incident information along with other service data with other transit agencies.	Planned
Requirement:	5 The center shall receive information pertaining to a wide-area alert such as weather alerts, disaster situations, or child abductions. This information may come from Emergency Management or from other Alerting and Advisory Systems.	Planned
Requirement:	7 The center shall coordinate the response to security incidents involving transit with other agencies including Emergency Management, other transit agencies, media, traffic management, and traveler information service providers.	Planned
Requirement:	8 The center shall receive threat information and status on the integrity of the transit infrastructure.	Planned
Functional Area: **Transit Vehicle Operator Assignment** Assignment of transit operators to runs in a fair manner while minimizing labor and overtime services, considering operator preferences, qualifications, accumulated work hours, and other information about each operator.		
Requirement:	1 The center shall maintain records of a transit vehicle operator's performance. This may be done utilizing standardized performance evaluation criteria set forth by governmental regulations and transit operating company policies, assessing the transit vehicle operator's driving history, and assessing comments from the transit vehicle operator's supervisor(s) as well as noting any moving violations or accidents, supervisor comments, government regulations, and company policies.	Existing
Requirement:	2 The center shall assess the transit vehicle operator's availability based on previous work assignments, accumulated hours, plus health and vacation commitments.	Planned
Requirement:	3 The center shall assign transit vehicle operators to transit schedules based on their eligibility, route preferences, seniority, and transit vehicle availability.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Vehicle Operator Assignment** Assignment of transit operators to runs in a fair manner while minimizing labor and overtime services, considering operator preferences, qualifications, accumulated work hours, and other information about each operator.		
Requirement:	4 The center shall provide an interface through which the transit vehicle operator information can be maintained - either from the transit vehicle operator, center personnel, or other functions.	Planned
Requirement:	5 The center shall generate supplemental vehicle operator assignments as required due to change events that occur during the operating day.	Planned
Functional Area: **Transit Vehicle Assignment** Assigns individual transit vehicles to vehicle blocks and downloads this information to the transit vehicle, updating assignments as necessitated by changes. It also provides an inventory management function that stores attributes about each of the transit vehicles.		
Requirement:	1 The center shall assign individual transit vehicles to transit blocks.	Existing
Requirement:	2 The center shall download vehicle assignments to the transit vehicle prior to the start of the day's operations.	Existing
Requirement:	3 The center shall provide an exception handling process for the vehicle assignment function. This process shall generate new supplemental vehicle assignments as required due to change events which occur during the operating day.	Planned
Requirement:	4 The center shall provide an inventory management function for the transit facility that stores functional attributes about each vehicle owned by the transit operator. The functional attributes permit the planning and assignment functions to match vehicles with routes based on suitability for the types of service required by the particular routes.	Planned
Requirement:	6 The center shall provide transit operations personnel with the capability to update transit vehicle assignments and receive reports on transit vehicle inventory status.	Planned
Functional Area: **Transit Center Information Services** Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.		
Requirement:	1 The center shall provide travelers using public transportation with traffic and advisory information upon request. Such information may include transit routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, and special events.	Planned
Requirement:	2 The center shall provide transit information to the media including details of deviations from schedule of regular transit services.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Center Information Services** Provide interactive traveler information to travelers (on-board transit vehicles, at stops/stations, using personal devices), traveler information service providers, media, and other transit organizations. Includes routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, yellow pages, and special events.		
Requirement:	3 The center shall exchange transit schedules, real-time arrival information, fare schedules, and general transit service information with other transit organizations to support transit traveler information systems.	Planned
Requirement:	4 The center shall provide transit service information to traveler information service providers including routes, schedules, schedule adherence, and fare information as well as transit service information during evacuation.	Planned
Functional Area: **Transit Center Multi-Modal Coordination** Coordinate schedules with other agencies and modes, including transit transfer cluster and transfer point information.		
Requirement:	1 The center shall coordinate schedules and services between transit agencies, traffic management, maintenance and construction operations, parking management, and other surface or air transportation modes.	Planned
Requirement:	2 The center shall share transfer cluster and transfer point information with multimodal transportation service providers, other transit agencies, and traveler information service providers. A transfer cluster is a collection of stop points, stations, or terminals where transfers can be made conveniently.	Planned
Requirement:	5 The center shall provide transit operations personnel with the capability to control and monitor transit service coordination activities.	Planned
Functional Area: **Transit Evacuation Support** Support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency. Coordinate regional evacuation plans and resources including transit and school bus fleets.		
Requirement:	1 The center shall manage the use of transit resources to support evacuation and subsequent reentry of a population in the vicinity of a disaster or other emergency.	Planned
Requirement:	2 The center shall coordinate regional evacuation plans with Emergency Management - identifying the transit role in an evacuation and the transit resources that would be used.	Planned
Requirement:	3 The center shall coordinate the use of transit and school bus fleets during an evacuation, supporting evacuation of those with special needs and the general population.	Planned
Requirement:	4 The center shall adjust and update transit service and fare schedules and provide that information to other agencies as they coordinate evacuations.	Planned
Functional Area: **Transit Data Collection** Collection and storage of transit management data. For use by operations personnel or data archives in the region.		

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Dispatch**		
Entity: **Transit Management**		
Functional Area: **Transit Data Collection** Collection and storage of transit management data. For use by operations personnel or data archives in the region.		
Requirement:	1 The center shall collect transit management data such as transit fares and passenger use, transit services, paratransit operations, transit vehicle maintenance data, etc.	Planned
Requirement:	2 The center shall assign quality control metrics and meta-data to be stored along with the data. Meta-data may include attributes that describe the source and quality of the data and the conditions surrounding the collection of the data.	Planned
Requirement:	3 The center shall receive and respond to requests from ITS Archives for either a catalog of the transit data or for the data itself.	Planned
Functional Area: **Transit Transportation Operations Data Collection** Collects real-time information on the state of the regional transportation system for operational use by the center. It establishes communications with a regional repository, requests or subscribes to information relevant to the center, and distributes the received information for use.		
Requirement:	1 The center shall collect real-time information on the state of the regional transportation system including current traffic and road conditions, weather conditions, special event and incident information.	Planned
Element: **UNH Fixed Route Transit Vehicles**		
Entity: **Transit Vehicle**		
Functional Area: **On-board Transit Trip Monitoring** Support fleet management with automatic vehicle location (AVL) and automated mileage and fuel reporting and auditing.		
Requirement:	1 The transit vehicle shall track the current location of the transit vehicle.	Planned
Requirement:	2 The transit vehicle shall support the computation of the location of a transit vehicle using on-board sensors to augment the location determination function. This may include proximity to the transit stops or other known reference points as well as recording trip length.	Planned
Requirement:	4 The transit vehicle shall record transit trip monitoring data including operational status information such as doors open/closed, running times, etc.	Planned
Requirement:	5 The transit vehicle shall send the transit vehicle trip monitoring data to center-based trip monitoring functions.	Planned
Functional Area: **On-board Transit Fare Management** On-board systems provide fare collection using a travelers non-monetary fare medium. Collected fare data are made available to the center.		
Requirement:	1 The transit vehicle shall read data from the traveler card / payment instrument presented by boarding passengers.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Transit Vehicles**		
Entity: **Transit Vehicle**		
Functional Area: **On-board Transit Fare Management** On-board systems provide fare collection using a travelers non-monetary fare medium. Collected fare data are made available to the center.		
Requirement:	4 The transit vehicle shall calculate the traveler's fare based on the origin and destination provided by the traveler as well as factors such as the transit routing, transit fare category, traveler history, and route-specific information.	Planned
Requirement:	6 The transit vehicle shall provide a transit fare payment interface that is suitable for travelers with physical disabilities.	Planned
Requirement:	10 The transit vehicle shall provide fare statistics data to the center.	Planned
Functional Area: **On-board Passenger Counting** On-board systems collect transit vehicle loading data and make it available to the center.		
Requirement:	1 The transit vehicle shall count passengers boarding and alighting.	Planned
Requirement:	2 The passenger counts shall be related to location to support association of passenger counts with routes, route segments, or bus stops.	Planned
Requirement:	3 The passenger counts shall be timestamped so that ridership can be measured by time of day and day of week.	Planned
Requirement:	4 The transit vehicle shall send the collected passenger count information to the transit center.	Planned
Functional Area: **On-board Transit Security** On-board video/audio surveillance systems, threat sensors, and object detection sensors to enhance security and safety on-board a transit vehicles. Also includes silent alarms activated by transit user or vehicle operator, operator authentication, and remote vehicle disabling.		
Requirement:	1 The transit vehicle shall perform video and audio surveillance inside of transit vehicles and output raw video or audio data for either local monitoring (for processing or direct output to the transit vehicle operator), remote monitoring or for local storage (e.g., in an event recorder).	Planned
Requirement:	6 The transit vehicle shall output an indication of potential incidents or threats and the processed sensor information to the center along with the vehicle's current location.	Planned
Requirement:	8 The transit vehicle shall monitor and output surveillance and sensor equipment status and fault indications.	Planned
Requirement:	9 The transit vehicle shall accept emergency inputs from either the transit vehicle operator or a traveler through such interfaces as panic buttons, silent or audible alarms, etc.	Planned
Requirement:	10 The transit vehicle shall output reported emergencies to the center.	Planned
Functional Area: **On-board Transit Signal Priority** On-board systems request signal priority through short range communication directly with traffic control equipment at the roadside (intersections, ramps, interchanges, etc.).		
Requirement:	1 The transit vehicle shall determine the schedule deviation and estimated times of arrival (ETA) at transit stops.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Fixed Route Transit Vehicles**		
Entity: **Transit Vehicle**		
Functional Area: **On-board Transit Signal Priority** On-board systems request signal priority through short range communication directly with traffic control equipment at the roadside (intersections, ramps, interchanges, etc.).		
Requirement:	2 The transit vehicle shall send priority requests to traffic signal controllers at intersections, pedestrian crossings, and multimodal crossings on the roads (surface streets) and freeway (ramp controls) network that enable a transit vehicle schedule deviation to be corrected.	Planned
Requirement:	3 The transit vehicle shall send the schedule deviation data and status of priority requests to the transit vehicle operator and provide the capability for the transit vehicle operator to control the priority system.	Planned
Functional Area: **On-board Transit Information Services** On-board systems to furnish next-stop annunciation as well as interactive travel-related information, including routes, schedules, transfer options, fares, real-time schedule adherence, current incidents, weather conditions, non-motorized transportation services, and special events.		
Requirement:	3 The transit vehicle shall broadcast advisories about the imminent arrival of the transit vehicle at the next stop via an on-board automated annunciation system.	Planned
Requirement:	4 The transit vehicle shall support input and output forms that are suitable for travelers with physical disabilities.	Planned
Element: **UNH System Operator**		
Entity: **Transit Operations Personnel**		
Functional Area: [Not Defined]		
Element: **UNH Transit Vehicle Operator**		
Entity: **Transit Vehicle Operator**		
Functional Area: [Not Defined]		
Element: **UNH Website**		
Entity: **Information Service Provider**		
Functional Area: **Interactive Infrastructure Information** Personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.		
Requirement:	3 The center shall disseminate customized transit routes and schedules, transit transfer options, transit fares, and real-time schedule adherence information to travelers upon request.	Planned
Requirement:	7 The center shall disseminate customized multimodal transportation service information (for example, from ferry and airline operators), including transfer points and other information, to travelers upon request.	Planned
Requirement:	8 The center shall disseminate customized event information to travelers upon request.	Planned

Architecture		Status
Strafford-Rockingham Region ITS Architecture (Region)		(Region)
Element: **UNH Website**		
Entity: **Information Service Provider**		
Functional Area: **Interactive Infrastructure Information** Personalized dissemination of traffic, transit, maintenance and construction, multimodal, event, and weather information to traveler interface systems and vehicles, upon request.		
Requirement:	12 The center shall manage payment for services, such as tolls, transit fares, parking lot charges, map updates, and advanced payment for tolls, and provide transaction success or failure details.	Planned
Requirement:	15 The center shall manage updates of digitized map data and provide updates to traveler interface systems upon request.	Planned
Requirement:	17 The center shall provide the capability for a system operator to control the type and update frequency of traveler information.	Planned
Element: **Vehicles**		
Entity: **Vehicle**		
Functional Area: [Not Defined]		
Element: **Wayside Equipment**		
Entity: **Wayside Equipment**		
Functional Area: [Not Defined]		

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