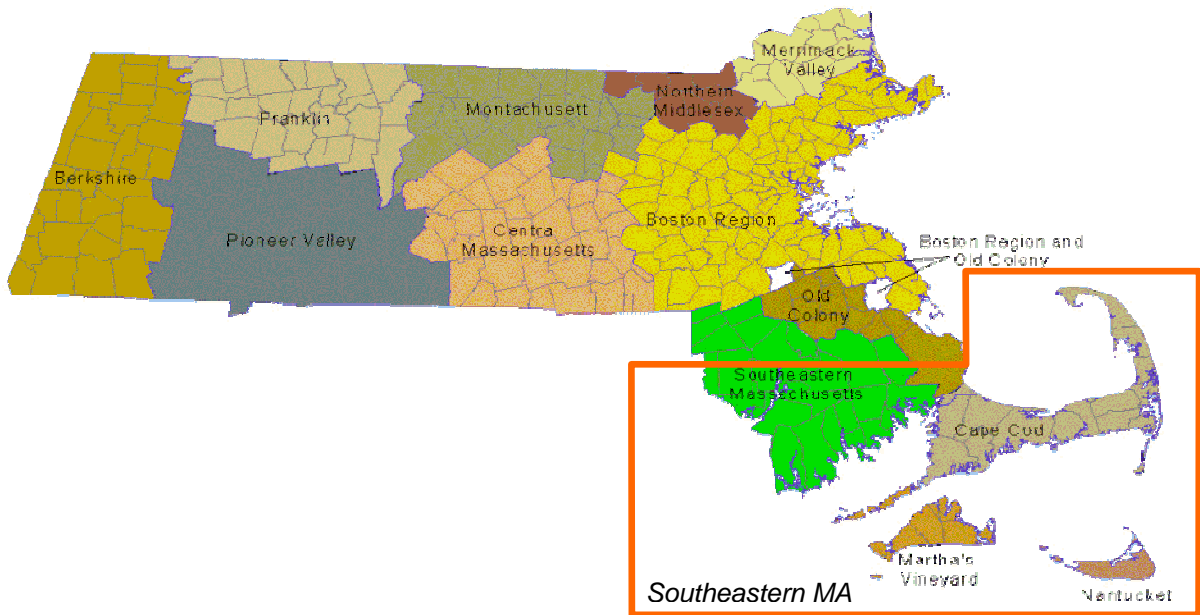


Commonwealth of Massachusetts



## REGIONAL ITS ARCHITECTURE FOR SOUTHEASTERN MASSACHUSETTS

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**Mitt Romney**  
*Governor*

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*Lieutenant Governor*

OPERATIONAL CONCEPT

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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. Successful ITS deployment requires 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 an architecture that guides the coordination and integration of individual ITS deployment projects. This ITS architecture is a framework that defines the component systems and their interconnections, and that provides a tool for facilitating institutional relationships within a region.

The Commonwealth of Massachusetts, through the Executive Office of Transportation (EOT), has undertaken the development of a Regional ITS Architecture for Southeastern Massachusetts. The Office of Transportation Planning has led this effort on behalf of EOT, with input and participation from key transportation agencies and organizations in the region.

Extensive stakeholder interviews, workshops, and working sessions have identified the technical components of the architecture. This process has developed an architecture that defines the existing and planned component systems, as well as the interfaces among them. The architecture provides a vision of an integrated transportation system that involves numerous operating agencies. It is imperative, therefore, to address the numerous interagency relationships needed to plan, operate, and maintain those systems. For this reason, the architecture development process includes the creation of an operational concept.

The operational concept focuses on the institutional aspects of the Regional ITS Architecture. It defines the relationships among the organizations in the region required for the deployment and operation of an integrated transportation system. The purpose of the operational concept is to define the roles and responsibilities of the stakeholders in the implementation and operation of the systems that make up the architecture.

The remainder of this report is structured as follows:

- Section 2, *Operational Coordination*, discusses the different levels of interaction and types of information exchange that may be required for operation of interagency interfaces.
- Section 3, *Interagency Interfaces*, presents a detailed operational concept for each of the interagency interfaces that the architecture identifies.
- Finally, Section 4, *Institutional Coordination*, covers the key institutional issues, including potential interagency agreements for operational coordination.

## 2. OPERATIONAL COORDINATION

ITS initiatives that involve cross-jurisdictional relationships will require a detailed operational concept. In some cases, multiple agencies will need to form relationships with each other to define specific roles and responsibilities for the deployment of the system.

Relationships between agencies are defined by two main components: 1) the roles/responsibilities of each agency in the relationship, and 2) the types of information that each agency shares. Exhibit 2-1 identifies seven types of agency-to-agency relationships, spanning the range of potential institutional interactions that might occur between two organizations in the operation and maintenance of an ITS application. The table lists the relationships from lowest to highest level of interaction and provides definitions and examples for each of the identified relationships.

**Exhibit 2-1: Agency-to-Agency Relationships**

Relationship	Definition	Example
Consultation	One party confers with another party, in accordance with an established process, about an anticipated action and then keeps that party informed about the actions taken. Information is exchanged through traditional means of communication, such as phone or face-to-face meetings.	Agency A provides information on activities to Agency B.
Cooperation	The parties involved in carrying out the planning, project development and operations processes work together to achieve common goals or objectives. Information is exchanged through traditional means of communication.	Both agencies cooperate in the development and execution of common plans, projects, and operational procedures.
Information Sharing	The electronic exchange of data and device status information between parties for the purposes of coordinated operations, planning, and analysis.	Agency A will provide status, data, and/or video information from Agency A's field devices (e.g. detectors) to Agency B.
Control Sharing	The ability, through operational agreements, to allow for one party to control another party's field devices to properly respond to incident, event, weather, or traffic conditions.	Agency A is allowed by Agency B to control the Agency B's field devices (e.g. VMS, select signal timing patterns) for specified defined occurrences.
Operational Responsibility Shifted	One party operates the field equipment of a second party on a full time basis.	Agency A will operate the field devices of Agency B (e.g. County operates a City's traffic signals but the City is responsible for maintenance and repairs.)
Maintenance Responsibility Shifted	One party maintains the field equipment of a second party.	Agency A maintains the field devices of Agency B, but the Agency B is responsible for operations.
Full Responsibility Shifted	One party has full responsibility for the field equipment of a second party including operations and preventative and emergency maintenance.	Agency A operates and maintains the field devices of Agency B.

Along with these relationships are associated information types that are typical for agency-to-agency exchange. Six types of information exchanges are identified. Exhibit 2-2 provides definitions and examples for these information flows.

As these tables illustrate, the extent of interaction and information exchange between agencies can vary greatly. Relationships can vary from consultation and cooperation, where electronic information is not exchanged, to full transfer of operational responsibility. The extent of the interaction will depend on many factors, including the nature of the information being exchanged, the technical capabilities of the agencies, and the institutional relationships already in place. A different relationship may therefore be appropriate for each particular interagency interface. The next section discusses all of the interagency interfaces in the architecture and proposes an operational concept for each, based on the relationships and information flows identified by the participants.

**Exhibit 2-2: Information Flow Definitions**

Information Flow	Definition	Example
Data	The dissemination of raw data gathered from one party's field devices to another party. Data can include, but is not limited to, traffic, weather, parking, transit data, etc. Video images are not included in this information flow.	Agency A sends data from its field devices to Agency B.
Video	The dissemination of live video and still images from one party's field camera's to another party	Agency A sends live video and still images to Agency B.
Event Information	The dissemination of event/incident information (or other processed data) from one party to another party.	Agency A sends processed data to Agency B.
Device Status	The ability for one party to monitor another party's field devices, and to receive such information as current signal timing/response plan, current message sets, etc.	Agency A sends status information on its devices to Agency B.
Request	The ability for one party to solicit either information or a command change, such as Variable Message Sign (VMS) or signal timing changes, from another party.	Agency A requests information or action from Agency B.
Control	The ability for one party to control another party's field devices. Control can include but is not limited to, changing VMS messages, changing traffic signal timings, camera control, etc.	Agency A issues control instruction to Agency B's field devices.

### 3. INTERAGENCY INTERFACES

Of the hundreds of interfaces included in the architecture, the ones considered in the Operational Concept are only those that cut across jurisdictional boundaries. The interagency interfaces called for in the Regional ITS Architecture are identified and defined in this section. The interfaces are addressed within the following categories:

- Roadway Management
- Transit Management
- Emergency Management
- Data Archives
- Electronic Fare Payment

It should be noted that these categories are not the same as the functional areas used in the "Market Packages by Functional Area" section of the website (and as defined by the National ITS Architecture). Instead, these categories have been defined in order to help in the discussion of the large number of interfaces. They do not directly correspond to the market package functional areas because the interfaces of interest do not necessarily fall under a single market package or even a single functional area. For example, the interface supporting the provision of traffic information from a traffic management center to a bus control center falls under both the "Traffic Information Dissemination" and "Transit Fixed-Route Operations" market packages. The interface might also support the provision of traffic signal priority for buses, which would fall under both the "Transit Fixed-Route Operations" market package and the "Regional Traffic Control" market package.

To reduce this overlap, the following subsections group the interfaces under the more basic categories defined above. Within each category, operational concepts have been defined for either individual interfaces or groups of similar interfaces. The intent of the discussion of each interface is to outline how the interface will be operated by the two agencies, including what information will be exchanged and how this exchange will occur. Defining these interfaces serves as the initial step in the development of agreements between the interfacing agencies, as it determines the issues that must be addressed in the interagency agreements. Moreover, the interface definitions also lead to the development of the Implementation Plan, which addresses the system components required to support the defined operational concept.

3.1.1 ROADWAY MANAGEMENT

Exhibit 3-1 illustrates the interagency interfaces required to support regional roadway management functions. Most interfaces are those between the various traffic management centers in the region. An additional set of interfaces exists between each of the traffic management centers and private traveler information service providers to support traveler information functions.

**Exhibit 3-1: Interagency Interfaces – Roadway Management**

	MassHighway	Town of Barnstable	City of Brockton	Town of Plymouth	Local Cities/Towns	Private Traveler Information Service Providers
MassHighway		✓	✓	✓	✓	✓
Town of Barnstable					✓	✓
City of Brockton					✓	✓
Town of Plymouth					✓	✓
Local Cities/Towns						✓

Each of these interfaces is addressed by an operational concept. The following operational concepts are defined for Roadway Management:

- Center-to-Center
- Traffic Signal Operation:
- Private Traveler Information:

The following tables present these operational concepts.



**Exhibit 3-2: Operational Concept: Roadway Management – Center-to-Center**

Operational Concept:	<b>Center-to-Center</b>
Functional Area:	Roadway Management
<p>This operational concept covers interfaces between centers with traffic management functions. These centers include major traffic control centers such as the MassHighway TOC, as well as smaller dispatch/operation centers such as those of local cities/towns.</p>	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Town of Barnstable and MassHighway</li> <li>▪ Town of Barnstable and other Local Cities/Towns</li> <li>▪ City of Brockton and MassHighway</li> <li>▪ City of Brockton and other Local Cities/Towns</li> <li>▪ Town of Plymouth and MassHighway</li> <li>▪ Town of Plymouth and other Local Cities/Towns</li> <li>▪ Local Cities/Towns and other Local Cities/Towns</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<i>Information Sharing:</i> If one or both of the control centers has capability for video, video images will be exchanged between the two control centers to allow operator viewing of select CCTV cameras from the other agency. Pan/tilt/zoom control of the camera will remain in the control of the agency owning the camera, but requests for camera repositioning may be made via voice communications (e.g. phone or radio).
<i>Event Information:</i>	<i>Information Sharing:</i> Event information, such as accident, delay, and construction information, will be exchanged between the two centers through a shared connection to a centralized database. Each agency will enter event information into the database for roadways within its jurisdiction. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the central software (if applicable). Similarly, event information will be received by each traffic management center either through operator monitoring of a web-based interface or through an automated link with the central software.
<i>Device Status:</i>	<i>Consultation:</i> Exchange of device status information, including incident response measures such as VMS messages, will occur via voice communications. Coordination via phone or radio will be essential when incident response on one agency’s roadways will affect operations on the other agency’s roadways. Automated exchange of device status information, such as the ability to monitor messages displayed on the other agency’s VMSs, is recommended for future implementation.
<i>Request:</i>	<i>Coordination:</i> Requests for CCTV camera repositioning, as discussed above, will be made via voice communications. All other requests, such as placement of messages on the other agency’s VMSs, will also be made via voice communications.
<i>Control:</i>	<i>Independent:</i> Direct control of the other agency’s field equipment will not be permitted. All control will remain with the agency that owns the equipment. Indirect control is possible via requests to the other agency, as discussed above.

**Exhibit 3-3: Operational Concept: Roadway Management – Center-to-Center and Traffic Signal Operation**

Operational Concept:	<b>Center-to-Center and Traffic Signal Operation</b>
Functional Area:	Roadway Management
<p>This operational concept applies to the interface between MassHighway and Local City/Towns. It includes the center-to-center information flows, as well as the operation of local city/town signals by MassHighway where applicable. This signal interface applies to cases where city/town signals are tied into closed-loop systems operated by MassHighway.</p>	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Local Cities/Towns and MassHighway</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<i>Information Sharing:</i> If one or both of the control centers has capability for video, video images will be exchanged between the two control centers to allow operator viewing of select CCTV cameras from the other agency. Pan/tilt/zoom control of the camera will remain in the control of the agency owning the camera, but requests for camera repositioning may be made via voice communications (e.g. phone or radio).
<i>Event Information:</i>	<i>Information Sharing:</i> Event information, such as accident, delay, and construction information, will be exchanged between the two centers through a shared connection to a centralized database. Each agency will enter event information into the database for roadways within its jurisdiction. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the central software (if applicable). Similarly, event information will be received by each traffic management center either through operator monitoring of a web-based interface or through an automated link with the central software.
<i>Device Status:</i>	<i>Consultation:</i> Exchange of device status information, including incident response measures such as VMS messages, will occur via voice communications. Coordination via phone or radio will be essential when incident response on one agency’s roadways will affect operations on the other agency’s roadways. Automated exchange of device status information, such as the ability to monitor messages displayed on the other agency’s VMSs, is recommended for future implementation.
<i>Request:</i>	<i>Coordination:</i> Requests for CCTV camera repositioning, as discussed above, will be made via voice communications. All other requests, such as placement of messages on the other agency’s VMSs, will also be made via voice communications.
<i>Control:</i>	<i>Operational Responsibility Shifted:</i> Traffic signals and signal controllers owned by the city/town will be monitored and operated by MassHighway as part of a MassHighway closed loop system. The city/town will be responsible for maintenance field equipment, but MassHighway will have full operational control.

**Exhibit 3-4: Operational Concept: Roadway Management – Private Traveler Information**

Operational Concept:	<b>Private Traveler Information</b>
Functional Area:	Roadway Management
This operational concept applies to the interfaces between Private Traveler Information Service Providers' control centers and traffic management agency control centers.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Private Traveler Information Service Providers and MassHighway</li> <li>▪ Private Traveler Information Service Providers and Town of Barnstable</li> <li>▪ Private Traveler Information Service Providers and City of Brockton</li> <li>▪ Private Traveler Information Service Providers and Town of Plymouth</li> <li>▪ Private Traveler Information Service Providers and Local Cities/Towns</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<i>Information Sharing:</i> Video images will be exchanged between the two control centers to allow operator viewing of select CCTV cameras from the other agency. Pan/tilt/zoom control of the camera will remain in the control of the agency owning the camera, but requests for camera repositioning may be made via voice communications (e.g. phone or radio).
<i>Event Information:</i>	<i>Information Sharing:</i> Event information, such as accident, delay, and construction information, will be exchanged between the two control centers through a shared connection to a centralized database. Each agency will enter event information for roadways within its jurisdiction or coverage area into the database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the central software at each control center. Similarly, event information will be received by each control center either through an automated link with the central software or through operator monitoring of a web-based interface.
<i>Device Status:</i>	<i>Independent:</i> No exchange of device status information is planned. However, automated exchange of device status information, such as VMS states, is recommended for future implementation, so that information provided by the private service provider is consistent with agency messages.
<i>Request:</i>	<i>Coordination:</i> Requests for CCTV camera repositioning, as discussed above, will be made via voice communications.
<i>Control:</i>	<i>Independent:</i> Direct control of the other agency's field equipment will not be permitted. All control will remain with the agency that owns the equipment. Indirect control is possible via requests to the other agency, as discussed above.

3.1.2 TRANSIT MANAGEMENT

Exhibit 3-5 illustrates the interagency interfaces required to support regional transit management functions. These interfaces include center-to-center interfaces among transit control centers, interfaces between transit control centers and traffic control centers, and interfaces with private travel information service providers.

**Exhibit 3-5: Interagency Interfaces – Transit Management**

	Transit Management													Traffic Management								
	BAT	CORCA	GATRA	MBTA	NRTA	SRTA	VTA	Local Transit	Private Ground Transportation Providers	Local/Regional School Districts	Steamship Authority	Private Ferry Operators	New Bedford Harbor	Rail Operators	MassHighway	Town of Barnstable	City of Brockton	Town of Plymouth	Local Cities/Towns	National Park Service	Private Traveler Information Service Providers	
BAT									✓						✓							✓
CCRTA									✓			✓			✓							✓
GATRA				✓					✓						✓							✓
MBTA															✓							✓
NRTA											✓	✓			✓							✓
SRTA															✓							✓
VTA											✓	✓			✓							✓
Local Transit															✓	✓		✓	✓			✓
Private Ground Transportation Providers															✓	✓	✓	✓	✓			✓
Local/Regional School Districts															✓	✓	✓	✓	✓			✓
Steamship Authority															✓					✓		✓
Private Ferry Operators															✓							✓
New Bedford Harbor															✓							✓
Rail Operators															✓	✓	✓	✓	✓			✓

Each of these interfaces is addressed by one of the following operational concepts:

- Center-to-Center
- Traffic Coordination
- Traffic Coordination and Signal Priority
- Grade Crossings
- Private Traveler Information
- Parking Management

The following tables present these operational concepts.

**Exhibit 3-6: Operational Concept: Transit Management – Center-to-Center**

Operational Concept:	<b>Center-to-Center</b>
Functional Area:	Transit Management
This operational concept applies to the interfaces among the various transit operations control centers.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ BAT and Private Ground Transportation Providers</li> <li>▪ CCRTA and Private Ground Transportation Providers</li> <li>▪ CCRTA and Private Ferry Operations</li> <li>▪ CCRTA and Steamship Authority</li> <li>▪ GATRA and Private Ground Transportation Providers</li> <li>▪ MBTA and GATRA</li> <li>▪ NRTA and Private Ferry Operations</li> <li>▪ NRTA and Steamship Authority</li> <li>▪ VTA and Private Ferry Operations</li> <li>▪ VTA and Steamship Authority</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	<p><i>Information Sharing:</i> Event information such as service updates will be exchanged through a shared connection to a centralized database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the central software at each control center. Event information will be received by each control center either through an automated link with the central software or through operator monitoring of a web-based interface.</p> <p><i>Consultation:</i> Exchange of response status information, including incident response measures such as service modifications, will occur via voice communications. Coordination via phone or radio will be essential when incident response by one agency affects operations by the other.</p>
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	<i>Coordination:</i> Requests, such as those for service modifications such as vehicle holding or rerouting, will be made via voice communications. An automated system and protocol is recommended for situations where requests are frequent.
<i>Control:</i>	Not applicable.

**Exhibit 3-7: Operational Concept: Transit Management – Traffic Coordination**

Operational Concept:	<b>Traffic Coordination</b>
Functional Area:	Transit Management
This operational concept applies to the interfaces between transit operations control centers and traffic management control centers.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Town of Barnstable and Local Transit</li> <li>▪ Town of Barnstable and Local/Regional School Districts</li> <li>▪ Town of Barnstable and Private Ground Transportation Providers</li> <li>▪ City of Brockton and Local/Regional School Districts</li> <li>▪ City of Brockton and Private Ground Transportation Providers</li> <li>▪ Town of Plymouth and GATRA</li> <li>▪ Town of Plymouth and Local Transit</li> <li>▪ Town of Plymouth and Local/Regional School Districts</li> <li>▪ Town of Plymouth and Private Ground Transportation Providers</li> <li>▪ MassHighway and Local Transit</li> <li>▪ MassHighway and Local/Regional School Districts</li> <li>▪ MassHighway and NRTA</li> <li>▪ MassHighway and VTA</li> <li>▪ Local Cities/Towns and Local Transit</li> <li>▪ Local Cities/Towns and Local/Regional School Districts</li> <li>▪ Local Cities/Towns and NRTA</li> <li>▪ Local Cities/Towns and VTA</li> <li>▪ Cape Cod National Seashore and CCRTA</li> <li>▪ Cape Cod National Seashore and Local Transit</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<i>Information Sharing:</i> The transit agency will have access to video feeds from select traffic cameras to support dispatching operations. Pan/tilt/zoom control of the camera will remain in the control of the traffic operations center, but requests for camera repositioning by the transit agency may be made via voice communications (e.g. phone or radio).
<i>Event Information:</i>	<p><i>Information Sharing:</i> Event information from the traffic operations center, such as accident, delay, and construction information, will be provided to the transit agency through a shared connection to a centralized database. The traffic operations center will enter event information for roadways within its jurisdiction into the database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the traffic management software at the control center. The transit agency will receive event information through operator monitoring of a web-based interface.</p> <p><i>Consultation:</i> Exchange of response status information, including incident response measures such as street closures or service modifications, will occur via voice communications. Coordination via phone or radio will be essential when incident response by the traffic operations center affects operations by the transit agency, and vice versa.</p>
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	<i>Consultation:</i> Requests from the transit agency to the traffic operations center for CCTV camera repositioning, as discussed above, will be made via voice communications.
<i>Control:</i>	<i>Independent:</i> Direct control of roadway field equipment will not be permitted, as all control will remain with the traffic operations center. Indirect control by the transit agency is possible via requests to the traffic operations center, as discussed above.

**Exhibit 3-8: Operational Concept: Transit Management – Traffic Coordination and Signal Priority**

Operational Concept:	<b>Traffic Coordination and Signal Priority</b>	
Functional Area:	Transit Management	
<p>As with the “Traffic Coordination” operational concept described above, this operational concept applies to the interfaces between transit operations control centers and traffic management control centers. However, this operational concept also includes the provision of signal priority for transit vehicles.</p>		
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ City of Brockton and BAT</li> <li>▪ Town of Plymouth and BAT</li> <li>▪ Town of Barnstable and CCRTA</li> <li>▪ MassHighway and BAT</li> <li>▪ MassHighway and CCRTA</li> <li>▪ MassHighway and GATRA</li> <li>▪ MassHighway and SRTA</li> </ul>	<ul style="list-style-type: none"> <li>▪ MassHighway and Private Ground Transportation Providers</li> <li>▪ Local Cities/Towns and BAT</li> <li>▪ Local Cities/Towns and CCRTA</li> <li>▪ Local Cities/Towns and GATRA</li> <li>▪ Local Cities/Towns and SRTA</li> <li>▪ Local Cities/Towns and Private Ground Transportation Providers</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<p><i>Information Sharing:</i> The transit agency will have access to video feeds from select traffic cameras to support dispatching operations. Pan/tilt/zoom control of the camera will remain in the control of the traffic operations center, but requests for camera repositioning by the transit agency may be made via voice communications (e.g. phone or radio).</p>
<i>Event Information:</i>	<p><i>Information Sharing:</i> Event information from the traffic operations center, such as accident, delay, and construction information, will be provided to the transit agency through a shared connection to a centralized database. The traffic operations center will enter event information for roadways within its jurisdiction into the database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the traffic management software at each control center. The transit agency will receive event information through operator monitoring of a web-based interface.</p> <p><i>Consultation:</i> Exchange of response status information, including incident response measures such as street closures or service modifications, will occur via voice communications. Coordination via phone or radio will be essential when incident response by the traffic operations center affects operations by the transit agency, and vice versa.</p>
<i>Device Status:</i>	<p><i>Information Sharing:</i> Relevant status information for field devices will include traffic signal status and information about transit priority calls. Field device status will be reported to the transit authority from the traffic management center by means of a direct connection between the central systems.</p>
<i>Request:</i>	<p><i>Information Sharing:</i> Requests for traffic signal priority for buses or light rail vehicles will be made to the traffic signal system controlled by the traffic operations center. This may occur locally at the signal controller or through a request to the central system. If the request is to the central system, the traffic operations center will make the determination of whether or not to grant priority.</p> <p><i>Consultation:</i> Requests from the transit agency to the traffic operations center for CCTV camera repositioning, as mentioned above, will be made via voice communications.</p>
<i>Control:</i>	<p><i>Independent:</i> Direct control of roadway field equipment will not be permitted, as all control will remain with the traffic operations center. Indirect control by the transit agency is possible via requests to the traffic operations center, as discussed above.</p>

**Exhibit 3-9: Operational Concept: Transit Management – Grade Crossings**

Operational Concept:	<b>Grade Crossings</b>
Functional Area:	Transit Management
<p>This operational concept applies to the interfaces between rail operations control centers and traffic management control centers, specifically for coordination of activity at at-grade rail crossings.</p>	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ City of Brockton and Rail Operators</li> <li>▪ Local Cities/Towns and Rail Operators</li> <li>▪ MassHighway and Rail Operators</li> <li>▪ Town of Barnstable and Rail Operators</li> <li>▪ Town of Plymouth and Rail Operators</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	<p><i>Information Sharing:</i> Event information, such as construction activity affecting a grade crossing or rail schedule information, will be exchanged between the two control centers through a shared connection to a centralized database. Each agency will enter event information into the database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the software at each control center. Similarly, event information will be received by each control center either through an automated link with the central software or through operator monitoring of a web-based interface.</p>
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	Not applicable.
<i>Control:</i>	Not applicable.



**Exhibit 3-10: Operational Concept: Transit Management – Private Traveler Information**

Operational Concept:	<b>Private Traveler Information</b>
Functional Area:	Transit Management
This operational concept applies to the interfaces between transit agency control centers and control centers of Private Traveler Information Service Providers.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Private Traveler Information Service Providers and BAT</li> <li>▪ Private Traveler Information Service Providers and CCRTA</li> <li>▪ Private Traveler Information Service Providers and GATRA</li> <li>▪ Private Traveler Information Service Providers and Local Transit</li> <li>▪ Private Traveler Information Service Providers and MBTA</li> <li>▪ Private Traveler Information Service Providers and NRTA</li> <li>▪ Private Traveler Information Service Providers and Private Ground Transportation Providers</li> <li>▪ Private Traveler Information Service Providers and SRTA</li> <li>▪ Private Traveler Information Service Providers and VTA</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	<p><i>Information Sharing:</i> Service updates from the transit operations center will be provided to the private service provider through a shared connection to a centralized database. The transit operations center will enter event information into the database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the software at the control center. The private service provider will receive event information through operator monitoring of a web-based interface.</p> <p><i>Information Sharing:</i> Exchange of response status information, including incident response measures such as service modifications, will occur through a shared connection to a centralized database or by via voice communications in urgent situations.</p>
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	Not applicable.
<i>Control:</i>	Not applicable.

**Exhibit 3-11: Operational Concept: Transit Management – Parking Management**

Operational Concept:	<b>Parking Management</b>
Functional Area:	Transit Management
<p>This operational concept applies to the interfaces between agencies operating parking facilities (ferry parking) and agencies/organizations that provide parking information to travelers. These information providers include traffic control centers managing the roadways leading to the facilities as well as 511 and private services.</p>	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ New Bedford Harbor Development Commission and MassHighway</li> <li>▪ New Bedford Harbor Development Commission and Local Cities/Towns</li> <li>▪ New Bedford Harbor Development Commission and Private Traveler Information Service Providers</li> <li>▪ Steamship Authority and MassHighway</li> <li>▪ Steamship Authority and Local Cities/Towns</li> <li>▪ Steamship Authority and Private Traveler Information Service Providers</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	<i>Information Sharing:</i> Parking status information, such as information on space availability or recommended lots, will be provided to the traffic operations center through an automated link. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the parking management system software (if applicable). Similarly, event information will be received by each traffic management center either through operator monitoring of a web-based interface or through an automated link with the central software.
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	<i>Coordination:</i> Dissemination of the parking status information provided to the information provider agency will be made at the discretion of that agency. Requests for provision of information other than the status information provided through the automated link will be made via voice communications.
<i>Control:</i>	<i>Independent:</i> Direct control of the information provider agency's field equipment will not be permitted. All control will remain with the agency that owns the equipment. Indirect control is possible via requests to the information provider agency, as discussed above.

3.1.3 EMERGENCY MANAGEMENT

Exhibit 3-12 illustrates the interagency interfaces required to support regional emergency management functions. These interfaces include center-to-center interfaces among the emergency management centers, as well as interfaces between emergency management centers and traffic control centers.

**Exhibit 3-12: Interagency Interfaces – Emergency Management**

	Emergency Management					Traffic Management				Transit Management											
	Army Corps	Coast Guard	Local Cities/Towns	MEMA	National Park Service	State Police	MassHighway	Town of Barnstable	City of Brockton	Town of Plymouth	BAT	CCRTA	GATRA	MBTA	NRTA	SRTA	VTA	Local Transit	Private Ground Transportation Providers	Local/Regional School Districts	Steamship Authority
Army Corps	✓																				
Coast Guard		✓																			
Local Cities/Towns			✓																		
MEMA				✓																	
National Park Service					✓																
State Police						✓															

Each of these interfaces is addressed by one of the following operational concepts:

- Center-to-Center
- Traffic Coordination
- Traffic Coordination and Signal Priority
- Traffic Coordination (MassHighway/MEMA)
- Transit Coordination

The following tables present these operational concepts.

**Exhibit 3-13: Operational Concept: Emergency Management – Center-to-Center**

Operational Concept:	<b>Center-to-Center</b>	
Functional Area:	Emergency Management	
This operational concept applies to the interfaces among the various emergency management control centers.		
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ State Police and Army Corps</li> <li>▪ State Police and Coast Guard</li> <li>▪ State Police and Local Cities/Towns</li> <li>▪ State Police and MEMA</li> <li>▪ State Police and National Park Service</li> <li>▪ MEMA and Army Corps</li> <li>▪ MEMA and Coast Guard</li> <li>▪ MEMA and Local Cities/Towns</li> <li>▪ MEMA and National Park Service</li> </ul>	<ul style="list-style-type: none"> <li>▪ Local Cities/Towns and Army Corps</li> <li>▪ Local Cities/Towns and Coast Guard</li> <li>▪ Local Cities/Towns and National Park Service</li> <li>▪ Coast Guard and Army Corps</li> <li>▪ Coast Guard and National Park Service</li> <li>▪ Army Corps and National Park Service</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	No video exchange will be made between the two agencies.
<i>Event Information:</i>	<p><i>Cooperation:</i> Emergency event information, such as reports of accidents and other major incidents, will be exchanged by voice communication (phone or radio). The critical nature of such communication requires this direct person-to-person interface.</p> <p><i>Information Sharing:</i> Non-emergency event information will be exchanged through a shared connection to a centralized database. Entering and viewing of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the control center software.</p>
<i>Device Status:</i>	<i>Consultation:</i> Exchange of device status information, including incident response measures, will occur via voice communications. Automated exchange of device status information, such as the ability for one agency to monitor information being disseminated by another, is recommended for future implementation.
<i>Request:</i>	<i>Cooperation:</i> All requests, such as emergency operations procedures or dissemination of information via the other agency's equipment, will be made via voice communications.
<i>Control:</i>	Not applicable.

**Exhibit 3-14: Operational Concept: Emergency Management – Traffic Coordination**

Operational Concept:	<b>Traffic Coordination</b>
Functional Area:	Emergency Management
This operational concept applies to the interfaces between local or regional emergency management control centers and traffic management centers.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ MassHighway and Local Cities/Towns</li> <li>▪ MassHighway and State Police</li> <li>▪ Town of Barnstable and State Police</li> <li>▪ City of Brockton and State Police</li> <li>▪ Town of Plymouth and State Police</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<i>Information Sharing:</i> The emergency operations center will have access to video feeds from select traffic cameras to support incident management operations. Pan/tilt/zoom control of the camera will remain in the control of the traffic management center, but requests for camera repositioning by the emergency operations center may be made via voice communications (e.g. phone or radio).
<i>Event Information:</i>	<p><i>Cooperation:</i> Emergency event information, such as reports of accidents and other major incidents, will be exchanged by voice communication (phone or radio). The critical nature of such communication requires this direct person-to-person interface.</p> <p><i>Information Sharing:</i> Non-emergency event information from the traffic management center, such as traffic and construction information, will be provided to the emergency operations center through a shared connection to a centralized database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the traffic management center software. The emergency operations center will receive event information through operator monitoring of a web-based interface.</p>
<i>Device Status:</i>	<i>Consultation:</i> Exchange of device status information, including incident response measures such as road closures and detours, will occur via voice communications. Coordination via phone or radio will be essential when incident response by the emergency operations center affects operations by the traffic management center, and vice versa. Automated exchange of device status information, such as the ability for the emergency operations center to monitor event responses by the traffic management center, is recommended for future implementation.
<i>Request:</i>	<i>Cooperation:</i> Emergency operations center requests for CCTV camera repositioning, as mentioned above, will be made via voice communications. All other requests, such as placement of messages on VMSs controlled by the traffic management center, will also be made via voice communications.
<i>Control:</i>	<i>Independent:</i> Direct control of traffic field equipment will not be permitted, as all control will remain with the traffic management center. Indirect control by the emergency operations center is possible via requests to the traffic management center, as discussed above.

**Exhibit 3-15: Operational Concept: Emergency Management – Traffic Coordination and Signal Priority**

Operational Concept:	<b>Traffic Coordination and Signal Priority</b>
Functional Area:	Emergency Management
As with the “Traffic Coordination” operational concept described above, this operational concept applies to the interfaces between local or regional emergency management control centers and traffic management centers. However, this operational concept also includes the provision of signal priority for emergency vehicles.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Town of Barnstable and Local Cities/Towns</li> <li>▪ City of Brockton and Local Cities/Towns</li> <li>▪ Town of Plymouth and Local Cities/Towns</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<i>Information Sharing:</i> The emergency operations center will have access to video feeds from select traffic cameras to support incident management operations. Pan/tilt/zoom control of the camera will remain in the control of the traffic management center, but requests for camera repositioning by the emergency operations center may be made via voice communications (e.g. phone or radio).
<i>Event Information:</i>	<p><i>Cooperation:</i> Emergency event information, such as reports of accidents and other major incidents, will be exchanged by voice communication (phone or radio). The critical nature of such communication requires this direct person-to-person interface.</p> <p><i>Information Sharing:</i> Non-emergency event information from the traffic management center, such as traffic and construction information, will be provided to the emergency operations center through a shared connection to a centralized database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the traffic management center software. The emergency operations center will receive event information through operator monitoring of a web-based interface.</p>
<i>Device Status:</i>	<p><i>Consultation:</i> Exchange of device status information, including incident response measures such as road closures and detours, will occur via voice communications. Coordination via phone or radio will be essential when incident response by the emergency operations center affects operations by the traffic management center, and vice versa.</p> <p><i>Information Sharing:</i> Relevant status information for field devices will include traffic signal status and information about emergency vehicle priority calls. Field device status will be reported to the emergency management dispatch center from the traffic management center by means of a direct connection between the central systems.</p>
<i>Request:</i>	<p><i>Information Sharing:</i> Requests for traffic signal priority for emergency vehicles will be made to the traffic signal system controlled by the traffic operations center. This may occur locally at the signal controller (e.g. direct signal preemption) or through a request to the central system. If the request is to the central system, the traffic operations center will change the signals in response to the priority request.</p> <p><i>Cooperation:</i> Emergency operations center requests for CCTV camera repositioning, as mentioned above, will be made via voice communications. All other requests, such as placement of messages on VMSs controlled by the traffic management center, will also be made via voice communications.</p>
<i>Control:</i>	<i>Independent:</i> Direct control of traffic field equipment will not be permitted, as all control will remain with the traffic management center. Indirect control by the emergency operations center is possible via requests to the traffic management center, as discussed above.

**Exhibit 3-16: Operational Concept: Emergency Management – Traffic Coordination (MEMA and MassHighway)**

Operational Concept:	<b>Traffic Coordination (MEMA and MassHighway)</b>
Functional Area:	Emergency Management
<p>This operational concept applies to the interface between MEMA and MassHighway. This interface differs from the other “Traffic Coordination” interfaces in that direct control of MassHighway’s central software and field equipment by MEMA will be possible under certain circumstances. The interface will be implemented between the MEMA Operations Center and the MassHighway Traffic Operations Center.</p>	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ MEMA and MassHighway</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	<p><i>Information Sharing:</i> MEMA will have access to video feeds from select MassHighway cameras to support incident management operations. In non-critical conditions, pan/tilt/zoom control of the camera will remain in the control of MassHighway, but requests for camera repositioning by MEMA may be made via voice communications (e.g. phone or radio).</p> <p><i>Control Sharing:</i> A back-up operator workstation for the MassHighway TOC will be located at the MEMA Operations Center. This workstation will have the same functionality as workstations in the TOC, allowing full control of all MassHighway field equipment. In critical circumstances, MEMA will be able to view and control MassHighway cameras via the remote TOC workstation.</p>
<i>Event Information:</i>	<p><i>Cooperation:</i> Emergency event information, such as reports of accidents and other major incidents, will be exchanged by voice communication (phone or radio). The critical nature of such communication requires this direct person-to-person interface.</p> <p><i>Information Sharing:</i> Non-emergency event information from MassHighway, such as traffic and construction information, will be provided to MEMA through a shared connection to a centralized database. The MassHighway central software will automatically send event information to the database. MEMA will receive event information through operator monitoring of a web-based interface.</p>
<i>Device Status:</i>	<p><i>Information Sharing:</i> Automated exchange of MassHighway device status information will be provided through the remote TOC workstation. This will provide MEMA with the ability to monitor response measures, such as messages displayed on MassHighway VMSs.</p>
<i>Request:</i>	<p><i>Cooperation:</i> MEMA requests for CCTV camera repositioning, as mentioned above, will be made via voice communications. All other requests, such as placement of messages on MassHighway VMSs, will also be made via voice communications.</p>
<i>Control:</i>	<p><i>Control Sharing:</i> As mentioned above, MEMA will be able to take direct control of MassHighway field equipment under critical circumstances. The back-up TOC workstation will have the same functionality as workstations in the TOC, allowing full control of all MassHighway field equipment.</p>

**Exhibit 3-17: Operational Concept: Emergency Management – Transit Coordination**

Operational Concept:	<b>Traffic Coordination</b>
Functional Area:	Emergency Management
This operational concept applies to the interfaces between local or regional emergency management control centers and transit management centers.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Local Cities/Towns and BAT</li> <li>▪ Local Cities/Towns and CCRTA</li> <li>▪ Local Cities/Towns and GATRA</li> <li>▪ Local Cities/Towns and MBTA</li> <li>▪ Local Cities/Towns and NRTA</li> <li>▪ Local Cities/Towns and SRTA</li> <li>▪ Local Cities/Towns and VTA</li> <li>▪ Local Cities/Towns and Local Transit</li> <li>▪ Local Cities/Towns and Private Ground Transportation Providers</li> <li>▪ Local Cities/Towns and Local/Regional School Districts</li> <li>▪ State Police and Steamship Authority</li> <li>▪ MEMA and Steamship Authority</li> <li>▪ Coast Guard and Steamship Authority</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	Not applicable.
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	<p><i>Cooperation:</i> Emergency event information, such as reports of major incidents or incident response measures such as service modifications, will be exchanged by voice communication (phone or radio). The critical nature of such communication requires this direct person-to-person interface.</p> <p><i>Information Sharing:</i> Non-emergency event information from the transit management center, such as service updates, will be provided to the emergency operations center through a shared connection to a centralized database. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the central software at the transit management center. The emergency operations center will receive event information through operator monitoring of a web-based interface.</p>
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	<i>Coordination:</i> Requests, such as those for service modifications such as vehicle holding or rerouting, will be made via voice communications. An automated system and protocol is recommended for situations where requests are frequent.
<i>Control:</i>	Not applicable.



3.1.4 DATA ARCHIVES

Exhibit 3-18 illustrates the interagency interfaces required to support regional data archive management functions. These include interfaces with the Office of Transportation Planning (proposed as the hub of an integrated data archive system), as well as an interface between the RMV and State and local police for crash reporting.

**Exhibit 3-18: Interagency Interfaces – Data Archives**

	Cape Cod Commission	Martha's Vineyard Commission	NPEDC	OCPC	SRPEDD	EOT (OTP)	RMV	BAT	CCRTA	GATRA	MBTA	NRTA	SRTA	VTA	Local City/Town Commission	Plymouth Area Chamber of Commerce	State Police	Local City/Town Public Safety
Cape Cod Commission						<												
Martha's Vineyard Commission						<												
NPEDC						<												
OCPC						<												
SRPEDD						<												
EOT (OTP)							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RMV																	✓	✓

Each of these interfaces is addressed by one of the following operational concepts:

- Planning Archives
- Crash Records Database

The following tables present these operational concepts.

**Exhibit 3-19: Operational Concept: Data Archives – Planning Archives**

Operational Concept:	<b>Planning Archives</b>
Functional Area:	Data Archives
<p>The data archive function will reside at the Office of Transportation Planning (OTP) and will serve as the hub of the regional archived data management system. Thus, the interfaces required to support archived data management functions are between the Office of Transportation Planning and the other agencies in the region that access archived data.</p>	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ OTP and Cape Cod Commission</li> <li>▪ OTP and Martha's Vineyard Commission</li> <li>▪ OTP and NPEDC</li> <li>▪ OTP and OCPC</li> <li>▪ OTP and SRPEDD</li> <li>▪ OTP and BAT</li> <li>▪ OTP and CCRTA</li> <li>▪ OTP and GATRA</li> <li>▪ OTP and MBTA</li> <li>▪ OTP and NRTA</li> <li>▪ OTP and SRTA</li> <li>▪ OTP and VTA</li> <li>▪ OTP and Local City/Town Commission</li> <li>▪ OTP and Plymouth Area Chamber of Commerce</li> <li>▪ OTP and RMV</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	<p><i>Information Sharing:</i> As the regional archived data management system hub, the Office of Transportation Planning archive will hold key data collected and reported by other agencies. However, data exchange will also be possible between OTP and each of the other agencies' archives. This will provide OTP Planning with access to data held by the other agencies but not directly reported, and will provide the other agencies with access to data held by OTP.</p> <p>This data exchange will occur over an Internet-based link between the databases at each location. Access to data on the other systems will be initiated by the agency requesting the information.</p>
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	Not applicable.
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	<i>Information Sharing:</i> As noted above, data exchange will occur between the databases following a request by the initiating agency.
<i>Control:</i>	Not applicable.

**Exhibit 3-20: Operational Concept: Data Archives – Crash Records Database**

Operational Concept:	<b>Crash Records Database</b>
Functional Area:	Data Archives
This operational concept applies to the interface between the RMV and State Police, which supports the exchange of information between State Police systems and the RMV Crash Records Database.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ RMV and State Police</li> <li>▪ RMV and Local Cities/Towns</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	<i>Information Sharing:</i> Data exchange will occur over an Internet-based link between the databases at each location. This interface will allow addition of records to the RMV database by state or local police, as well as queries to the RMV database.
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	Not applicable.
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	<i>Information Sharing:</i> Data exchange will occur between the databases following a request by the initiating agency.
<i>Control:</i>	Not applicable.

3.1.5 ELECTRONIC FARE PAYMENT

Exhibit 3-21 illustrates the interagency interfaces required to support regional implementation of electronic fare payment. The plan for EFP in the region is based around a Regional Fare Card that is interoperable among the various transit agencies. As the MBTA is in the process of implementing an electronic fare payment system, it is envisioned that the MBTA fare card will be the basis of this regional fare card. However, for the purposes of the architecture, the regional fare card will be considered as a separate entity.

**Exhibit 3-21: Interagency Interfaces – Electronic Fare Payment**

	BAT	CCRTA	GATRA	NRTA	SRTA	VTA	Local Transit	Private Ground Transportation Providers	Steamship Authority	Regional Fare Card Agency
BAT										✓
CCRTA										✓
GATRA										✓
NRTA										✓
SRTA										✓
VTA										✓
Local Transit										✓
Private Ground Transportation Providers										✓
Steamship Authority										✓
Regional Fare Card Agency										

These interfaces to support electronic fare payment are addressed by a single operational concept, as presented in the following table.

**Exhibit 3-22: Operational Concept: Electronic Fare Payment**

Operational Concept:	<b>Electronic Fare Payment</b>
Functional Area:	Electronic Fare Payment
This operational concept applies to the interagency interfaces required to support regional implementation of electronic fare payment.	
Interfacing Agencies:	<ul style="list-style-type: none"> <li>▪ Regional Fare Card Agency and BAT</li> <li>▪ Regional Fare Card Agency and CCRTA</li> <li>▪ Regional Fare Card Agency and GATRA</li> <li>▪ Regional Fare Card Agency and NRTA</li> <li>▪ Regional Fare Card Agency and SRTA</li> <li>▪ Regional Fare Card Agency and VTA</li> <li>▪ Regional Fare Card Agency and Local Transit</li> <li>▪ Regional Fare Card Agency and Private Ground Transportation Providers</li> <li>▪ Regional Fare Card Agency and Steamship Authority</li> </ul>

<i>Information Flow</i>	<i>Relationship</i>
<i>Data:</i>	<p><i>Information Sharing:</i> The Regional Fare Card Agency will hold all administrative and financial data related to the fare cards. In order for the fare card to be used on services by the transit providers in the region, data exchange is required between the fare collection systems of the transit providers and the Regional Fare Card Agency. Two primary data exchanges are required.</p> <p>The first data exchange occurs when the fare card is used on a transit provider's fare-box. At that time, the fare card information is sent to the Regional Fare Card Agency for validation, ensuring that the balance on the card is adequate and deducting the fare from the balance.</p> <p>The second data exchange occurs when the transit provider's account is reconciled with the Regional Fare Card Agency. This is usually done periodically, e.g. at the end of each service day. At that time, the total value of the transit provider's fares paid by fare cards is transferred from the Regional Fare Card Agency to the transit provider.</p>
<i>Video:</i>	Not applicable.
<i>Event Information:</i>	Not applicable.
<i>Device Status:</i>	Not applicable.
<i>Request:</i>	<p><i>Information Sharing:</i> The data exchange occurring during the validation of the fare card will be performed following a request of the transit provider. This request will be initiated upon the use of the fare card in the transit provider's farebox.</p>
<i>Control:</i>	Not applicable.

## 4. INSTITUTIONAL COORDINATION

The Regional ITS Architecture provides both a technical and institutional framework for the deployment of ITS in the Southeastern Massachusetts region. This involves coordination between various agencies and jurisdictions to achieve seamless operations and/or interoperability. The existing and recommended operational concepts defined in the previous section provide guidance for the functional requirements of inter-jurisdictional interactions. These inter-jurisdictional operational concepts in turn point directly to the types of agreements that may be required between individual agencies in order to define the agency roles and responsibilities for each of these interactions. This section discusses considerations for developing inter-jurisdictional agreements for implementing the operational concepts, achieving the information flows, and operating the systems defined in the regional architecture.

### 4.1.1 EXISTING AGREEMENTS

Interagency coordination already occurs among the operating agencies in the Southeastern Massachusetts region. In some cases, the responsibilities of the coordinating agencies are detailed in interagency agreements or Memoranda of Understanding (MOUs), which provide formal documentation of agency roles, procedures, and responsibilities. In many cases, however, such as where jurisdictions meet or overlap, coordination occurs without formal agreements. In these cases, protocols have been developed at the operating level with no need seen by the cooperating agencies to formalize the arrangements.

This section documents information regarding formal and informal interagency agreements relevant to the Regional ITS Architecture. This information was obtained from the initial architecture input meetings and subsequent contact with stakeholders. Exhibit 4-1 summarizes the existing operational agreements in the region by function. Each of the agreements is discussed in the following subsections.

**Exhibit 4-1: Existing Operational Agreements**

<i>Function</i>	<i>Participants</i>	<i>Agreement</i>	<i>Status</i>
<b>Traffic Control</b>	MassHighway, Local Cities/Towns	Traffic signal operation	Formalized
<b>Incident Management</b>	MassHighway, State Police, et al.	Unified Response Manual for Roadway Traffic Incidents	Formalized (December 1998), Update under development
	MassHighway, State Police	Accident Response/Quick Clearance Agreement	Formalized (August 2003)
<b>Traveler Information</b>	MassHighway, SmarTraveler	Traveler information services	Formalized (MassHighway contract)
	MBTA, SmarTraveler	Traveler information services	Formalized (MBTA contract)
	MBTA, Plymouth & Brockton	Information sharing	Not formalized
<b>Emergency Management</b>	MEMA, State Police, et al.	Massachusetts Amber Alert Plan	Formalized (October 2002)
	MassHighway, State Police	Expansion of Amber Alert Plan (highway VMSS)	Under development

#### 4.1.1.1 Traffic Control

Agreements regarding traffic control in the region are in place between MassHighway and various cities and towns in the region. These agreements cover the linking of city/town signals to closed-loop signal systems operated by MassHighway. In most cases, the signals in question are at intersections within the city/town jurisdiction but adjacent to MassHighway-operated signals. Formal agreements have been established to cover this shifting of operational control.

#### 4.1.1.2 Incident Management

The *Unified Response Manual (URM) for Roadway Traffic Incidents* establishes a statewide traffic management plan for roadway incidents. The scope of the manual is limited to incidents on designated National Highway System (NHS) roadways and other principal arterials. The URM was developed by the Massachusetts Operations Action Group, consisting of representatives from the following agencies:

- Massachusetts Highway Department
- Massachusetts Turnpike Authority
- Massachusetts Department of Public Health
- Federal Highway Administration
- Massachusetts State Police
- Fire Chiefs' Association of Massachusetts
- Massachusetts Department of Environmental Protection
- Statewide Towing Association

The original agreement was approved and signed in December 1998, but is currently being updated. The document includes as an annex the "Accident Response / Quick Clearance Agreement" between MassHighway and the State Police, originally signed in April 1993. This agreement has since been updated, and a revised version was signed in August 2003.

#### 4.1.1.3 Traveler Information

SmartTraveler, a private traveler information service provider, is under contract with MassHighway and the MBTA to provide traveler information services to those agencies. SmartTraveler also has an agreement with Plymouth & Brockton to obtain travel time information from their buses (acting as probe vehicles) in exchange for information on traffic conditions. This agreement is not formalized, however.

#### 4.1.1.4 Emergency Management

The Massachusetts Amber Alert Plan documents the criteria and procedures for issuing public alerts about abducted children and their kidnappers. The initial implementation of the plan in October 2002 was an agreement by and among the Massachusetts Chiefs of Police Association, the Massachusetts State Police, the Massachusetts Emergency Management Agency (MEMA), and local broadcasters for the broadcast of child abduction alert messages via radio, cable and television stations statewide.

Extension of the plan to include posting of messages on highway variable message signs is under development. An Amber Alert MOU between MassHighway and the State Police has been drafted and is under review by the agencies.

#### 4.1.2 ELEMENTS OF AN AGREEMENT

Agreements are established to clearly define responsibilities among the involved parties. The level of formality generally increases as risks escalate and when financial transactions take place. Formality will also increase when the performance or lack of performance on the part of one organization impacts the operations of another. For example, if an agency maintains and operates the traffic signals of another agency, failure to restore a failed traffic signal in a timely fashion could have a significant impact. As different systems are linked together, they will depend upon each other. The clear definition of responsibilities for all parties will help ensure smooth operations.

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. The level of specificity will depend on the nature of the information link.

- Operational Concept (a layperson's introduction to the nature and purpose of the agreement)
- Benefits of the agreement (e.g. operational, economic)
- Duties of Responsible Organizations (a summary of duties and responsibilities)
- Data Sharing (aspects of sharing data to be considered)
  - Provision of Data
  - Data Rights
  - Data Reuse
  - Data Identification
  - Data Availability
  - Data Accuracy
- Control Sharing (aspects of sharing control to be considered with rights and priorities being clearly understood)
  - Provision of Control
  - Control Rights
  - Control Restrictions
  - Control Priority
  - Control Availability
- Connections (defines how the connection is made)
  - Provision of Equipment
  - Physical Access Point
  - Demarcation Point
  - Security
  - Configuration Management
  - Standards and Protocols
- System Documentation
- Operations
  - Contacts
  - Hours of Operations
  - Responsibilities
- Maintenance
  - Contacts
  - Hours of Operations
  - Responsibilities
  - Response Time



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

#### 4.1.3 RECOMMENDATIONS

In general, all interagency interfaces without existing formal agreements are candidates for operational agreements. This includes interfaces under development or proposed in the architecture that have not yet been implemented, as well as interfaces that are currently operational but without a formal agreement.

##### 4.1.3.1 Formalization of Existing Working Arrangements

Although some agencies may be reluctant to formalize an existing informal agreement that is operating without problems, there are a number of considerations that point to the need for adoption of a formal agreement:

- *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 or expanded funding for the interface.

- *Address 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 highly recommended that existing working arrangements be considered for formalization. Especially important are those working arrangements that involve technical coordination and cost considerations, as well as arrangements involving public safety.

4.1.3.2 Agreements for New Interfaces

The other source for new agreements will be the new interfaces proposed in the regional architecture. All of the interagency interfaces in the architecture are identified and categorized in Section 3. Similar agreements can be drafted for the interfaces within each grouping, with customization as needed for special cases. As with the existing informal agreements, all interfaces would benefit from formal agreements. However, the key interfaces to consider initially are those involving technical coordination and those involving emergency management. Exhibit 4-2 presents the interface types recommended for formal agreements.

**Exhibit 4-2: Recommended Agreements for New Interfaces**

<i>Functional Area</i>	<i>Interface Type</i>
<b>Roadway Management</b>	Center-to-Center
<b>Transit Management</b>	Center-to-Center
	Traffic Coordination
	Traffic Coordination and Signal Priority
<b>Emergency Management</b>	Center-to-Center
	Traffic Coordination
	Traffic Coordination and Signal Priority
	Transit Coordination
<b>Data Archives</b>	Planning Archives
<b>Electronic Fare Payment</b>	Regional Fare Card

Each of the interfaces within the identified groups can be based on a framework agreement drafted for the specific interface type. For each interface in the group, this framework can then be customized to address the issues specific to the agencies and systems involved. The intent of this is to facilitate the process of drafting interagency agreements and reducing the barriers to implementation.

4.1.3.3 Sample Interagency Agreement

To illustrate the components of an interagency agreement, the Appendix presents a sample interagency agreement between an RTA and a municipality. This agreement corresponds to the Traffic Coordination and Signal Priority operational concept (see Exhibit 3-8). As recommended, the agreement documents the rationale for the agreement as well as the operational procedures that govern the relevant interfaces.

## APPENDIX

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### **SAMPLE INTERAGENCY AGREEMENT**

## AGREEMENT

This AGREEMENT, dated the \_\_\_ day of, \_\_\_\_\_, is entered into by and between the \_\_\_\_\_ Regional Transit Authority (“\_RTA”) a body politic and corporate and public instrumentality of the Commonwealth, organized and existing under Chapter 161B of the Massachusetts General Laws, as amended and the \_\_\_\_\_ (“\_\_\_”) an agency of the City of \_\_\_\_\_, a municipal corporation of the Commonwealth of Massachusetts, as amended.

### RECITALS

WHEREAS, Chapter 161B, Section 2, of the Massachusetts General Laws (“Chapter 161B”) authorizes the \_RTA to enter into all contracts and agreements and to do all acts and things necessary, convenient or desirable in the performance of its duties and the execution of its powers under Chapter \_\_\_\_; and

WHEREAS, \_RTA operates the \_RTA Operations Control Center and the \_\_\_ operates the \_\_\_ Traffic Management Center in order to, among other things, facilitate intermodal traffic flow, enhance passenger and motorist safety, improve the efficiency of incident management resources and enhance incident response for the \_RTA and the city of \_\_\_\_\_; and

WHEREAS, the parties desire to improve their efforts to facilitate intermodal traffic flow, enhance passenger and motorist safety, improve the efficiency of incident management resources and enhance incident response for the \_RTA and the city of \_\_\_\_\_; and

WHEREAS, the parties desire to set forth in this Agreement the terms and conditions of the interface between the transit operations center and the city traffic management centers described herein.

NOW, THEREFORE, THE \_RTA AND \_\_\_ agree as follows:

1. The term of this Agreement will be for (xx) years, subject to renewal by mutual agreement.
2. \_RTA will have access to video feed from select traffic cameras, identified in “Exhibit A” and attached hereto and made part of this agreement, to support dispatching operations.
3. Pan/tilt/zoom control of the camera will remain in the control of the \_\_\_ traffic operations center, but requests for camera repositioning by the \_RTA may be made via voice communications (e.g. phone or radio).

4. Video will be transmitted by means of a Video Integration System, which will transmit video over a secure Internet connection.
5. Event information from the \_\_\_ traffic operations center, such as accident, delay, and construction information, will be provided to the \_RTA via the Internet-based Event Reporting System (ERS).
6. The \_\_\_ traffic operations center will enter event information for roadways within its jurisdiction into the ERS. Entering of information may be manual, by means of a web-based interface, or automatic, by means of an automated process developed for the traffic management software at each control center. The \_RTA will receive event information through operator monitoring of the ERS interface.
7. Exchange of device status information, including incident response measures such as street closures or service modifications, will occur via voice communications.
8. Coordination via voice or radio will be essential when incident response by the \_\_\_ traffic operations center affects operations by the \_RTA, and vice versa.
9. Relevant status information for field devices will include traffic signal status and information about transit priority calls.
10. Field device status will be reported to the \_RTA from the \_\_\_ traffic management center by means of a direct connection between the central systems.
11. Requests for traffic signal priority for buses or light rail vehicles will be made to the traffic signal system controlled by the \_\_\_ traffic operations center.
12. Direct control of roadway field equipment will not be permitted, as all control will remain with the \_\_\_ traffic operations center.
13. Indirect control by the \_RTA is possible via a voice communications (e.g. phone or radio) request to the \_\_\_ traffic operations center.
14. \_RTA and \_\_\_ agree that there will be no transfer of rights under this Agreement to any party without the written consent of both the \_RTA and \_\_\_.

Whenever notice to one party by the other party is necessary or appropriate under this Agreement, such notice will be in writing and will be sent by first class mail, overnight delivery, hand delivery or facsimile to the following persons, unless otherwise directed by a formal notice:

\_RTA: Executive Director  
\_\_\_\_\_ Regional Transit Authority

Copy to: General Counsel  
\_\_\_\_\_ Regional Transit Authority

“City”:

Copy to: City Solicitor

IN WITNESS WHEREOF, the parties hereto have caused this agreement to be duly exercised as a sealed instrument as of the date first written above.

\_\_\_\_\_ REGIONAL TRANSIT  
AUTHORITY

CITY OF \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Approved as to Form:

Approved as to Form:

\_\_\_\_\_  
General Counsel

\_\_\_\_\_  
City Solicitor