

Tracking the Deployment of the Integrated Metropolitan ITS Infrastructure in Boston, Lawrence, Salem

FY99 Results

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Part 1 - Background and Purpose

In January 1996, Secretary Peña set a goal of deploying the integrated metropolitan Intelligent Transportation System (ITS) infrastructure in 75¹ of the nation's largest metropolitan areas by 2006:

*"I'm setting a national goal: to build an intelligent transportation infrastructure across the United States to save time and lives, and improve the quality of life for Americans. I believe that what we do, we must measure . . . Let us set a very tangible target that will focus our attention . . . I want 75 of our largest metropolitan areas outfitted with a complete intelligent transportation infrastructure in 10 years."*²

-- Secretary Peña, 1996

In 1997, the U.S. Department of Transportation initiated an effort to track progress toward fulfillment of this goal by conducting a survey of deployment in the nation's largest metropolitan areas. Traditionally, the product of a transportation infrastructure investment consists of a fixed asset such as a highway, bridge, or public transportation vehicle developed, constructed, or purchased by a single agency. Tracking the level of deployment for such traditional fixed assets can be accomplished by simply counting the number of such assets deployed. Measuring the deployment of the metropolitan ITS infrastructure is more complex because it consists of a set of systems, often deployed by multiple agencies, and integrated through a combination of complex institutional and technical arrangements. In brief, it is often difficult to simply count the number of systems deployed without first devising a measurement approach that captures the essential features of such systems in a consistent fashion across many deployment environments.

In order to track progress toward fulfillment of the Secretary's goal for deployment, the U.S. Department of Transportation ITS Joint Program Office developed the metropolitan ITS deployment tracking methodology. This methodology tracks deployment of the nine components that make up the Metropolitan ITS infrastructure: Freeway Management; Incident Management; Arterial Management; Emergency Management; Transit Management; Electronic Toll Collection; Electronic Fare Payment; Highway-Rail Intersections; and Regional Multimodal Traveler Information. Through a set of indicators tied to the major functions of each component, the level of deployment is tracked for the nation's largest metropolitan areas. In addition, the integration links between agencies operating the infrastructure are also tracked. The details of

¹ Since Secretary Peña's speech, the number of metropolitan areas that DOT will measure has been increased from 75 to 78. However, to maintain reporting consistency across the 10-year goal period, this report considers only the original 75 metropolitan areas.

² Excerpt of a speech delivered by Secretary of Transportation Peña at the Transportation Research Board in Washington, DC on January 10, 1996.

the methodology are explained elsewhere.³

During the summer and fall of 1999, the U.S. DOT undertook a new data collection effort for the purpose of examining ITS deployment progress in the nation's largest metropolitan areas. The Boston, Lawrence, Salem metropolitan area was among the areas surveyed in 1997 and again in 1999. This report presents the results of the 1999 survey efforts and compares the results of the 1997 survey against those observed in 1999. The overall response rate for the surveys administered in the Boston, Lawrence, Salem region was 80% in 1997 and 67% in 1999.

Part 2 contains a summary of the 1999 survey results, and Part 3 provides a comparison of 1999 survey results and the 1997 survey results.

The report also contains a set of appendices containing a map of the survey area, the list of local contacts surveyed along with a status of their response to the survey and a summary of the data collected from the surveys.

Agencies are encouraged to review the data presented in this report for completeness and accuracy and to direct any comments or corrections to the data provided to the contacts listed below:

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³ Additional Resources: "Measuring ITS Deployment and Integration" (Electronic Document Number: 4372). U.S. Department of Transportation, Joint Program Office for Intelligent Transportation Systems, 400 Seventh St., SW (HVV-1), Washington, DC 20590, Phone: 202-366-9536, Fax: 202-366-3302, Web: <http://www.its.dot.gov>.

Part 2 - Summary 1999 Survey Results

Deployment indicators have been developed for two broad areas of interest: (1) the individual components, including their basic functions and characteristics and (2) integration of components, including how these components work together to provide coordinated regional service. As mentioned earlier, these indicators are expressed as percentages of the possible deployment opportunity and not necessarily what should be deployed based on local needs. Requirements for deployment and integration between each component will vary based on local conditions and cannot be assigned without extensive coordination with individual metropolitan areas.

The following two figures portray the surrogate indicators for each of the nine components in Boston, Lawrence, Salem and the same indicators at the national level. These are judged to be the single best representative of a component and are being used as summary indicator for component. The summary indicators are expressed as a percentage; however, because deployment goals have yet to be established, these indicators should not be read as a comparison of what is deployed versus eventual deployment goals. Instead, they only reflect what is deployed compared to full market saturation (i.e., opportunity for deployment).

Each component indicator was selected to reflect a critical function of the individual components. For example, in the case of Freeway Management, three basic functions were defined: surveillance, traffic control, and information display. The three indicators developed to reflect these functions are: percentage of freeway centerline miles under electronic surveillance (surveillance function), percentage of freeway entrance ramps managed by ramp meters (traffic control function), and percentage of freeway centerline miles covered by permanent VMS, HAR, or in-vehicle signing (information display function). The indicators are surrogates that do not necessarily reflect the full breadth of metropolitan ITS deployment activity.

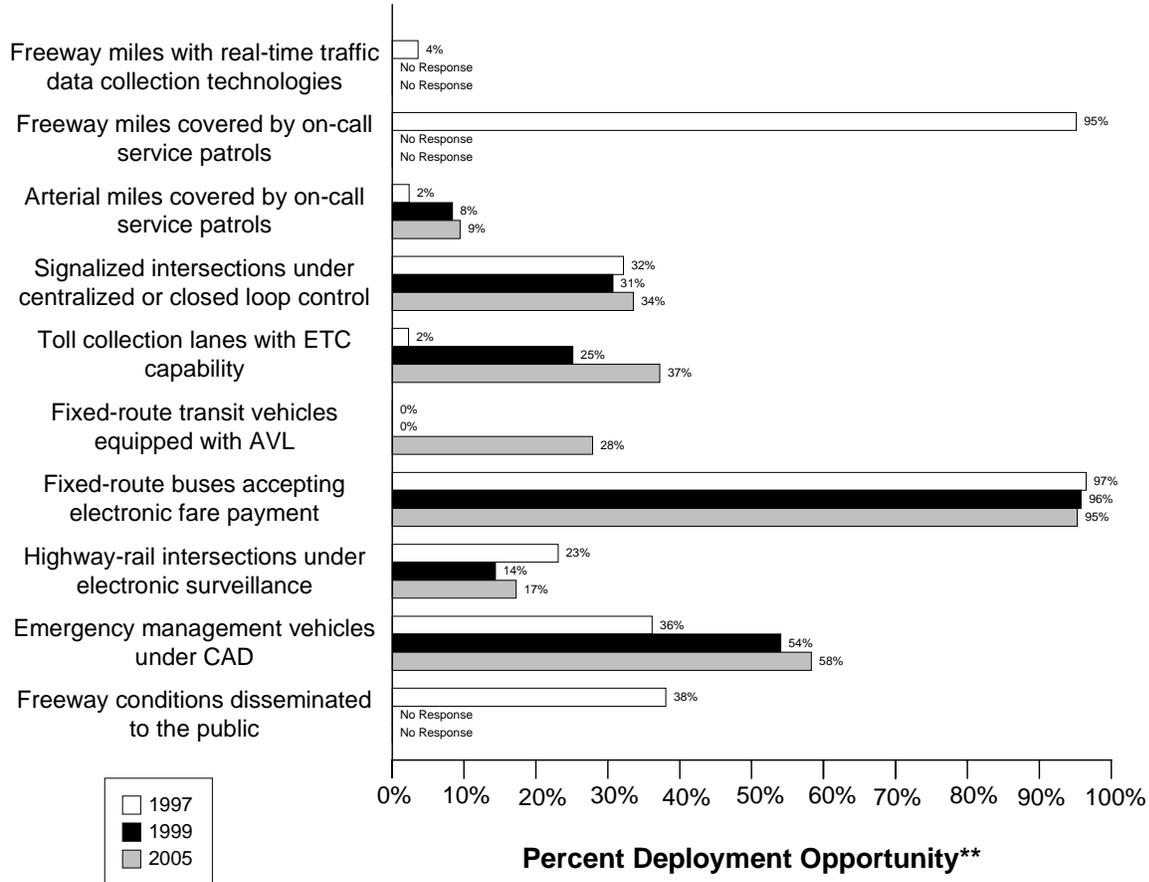
A critical aspect of ITS that provides much of its capability is the integration of individual components to form a unified regional traffic control system. Individual ITS components routinely collect information that is used for purposes internal to that component. For example, the Arterial Management component monitors arterial conditions to revise signal timing and to convey these conditions to travelers through such technologies as variable message signs and highway advisory radio. Other ITS components can make use of this information in formulating their control strategies. For example, Transit Management may alter routes and schedules based on real-time information on arterial traffic conditions, and Freeway Management may alter ramp metering or diversion recommendations based on the same information.

As with the component indicators, definitions for inter- and intra-component integration were developed for each component, and indicators, derived from these definitions, were produced for each component. A total of 34 individual integration indicators was specified and is portrayed in the third figure which follows. Each integration indicator has been assigned a number and an origin/destination path from one ITS infrastructure component to another. For example, the

integration of information from the Freeway Management component to the Regional Multimodal Traveler Information component is identified by the number “10.”

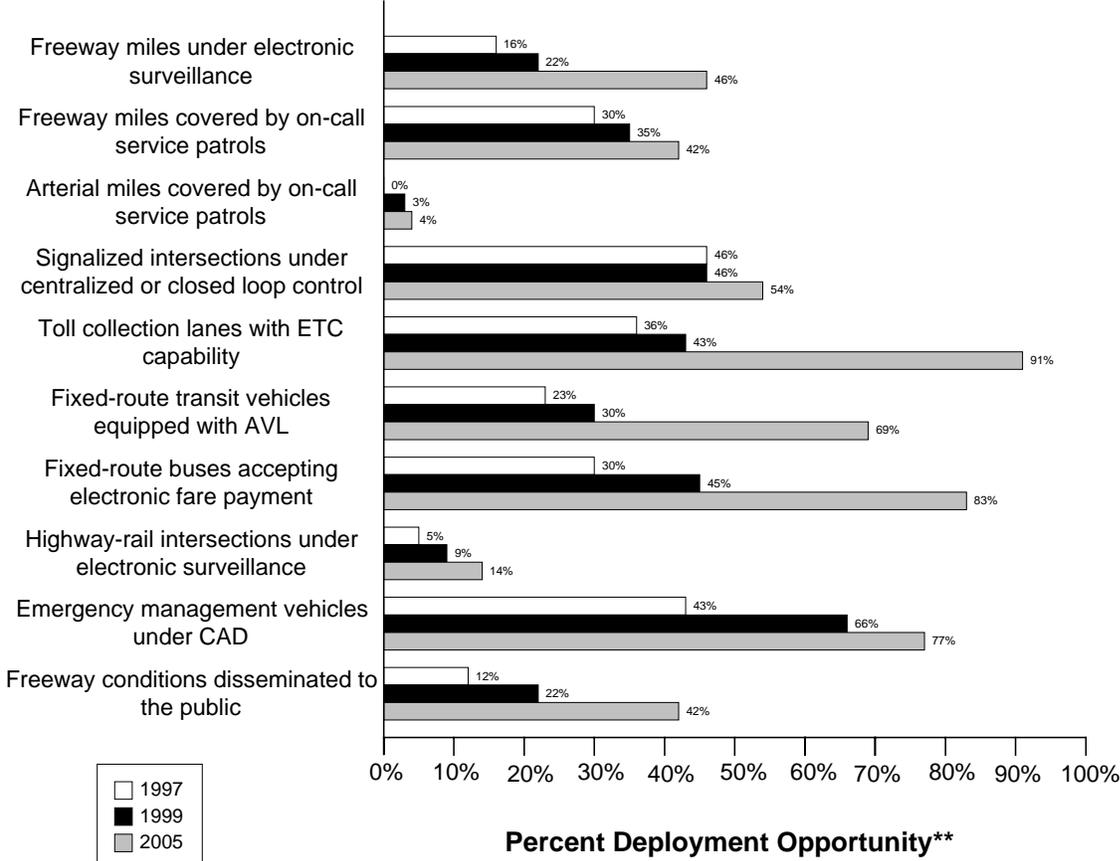
Data as of 5/1/00

Boston, Lawrence, Salem Summary Indicators*



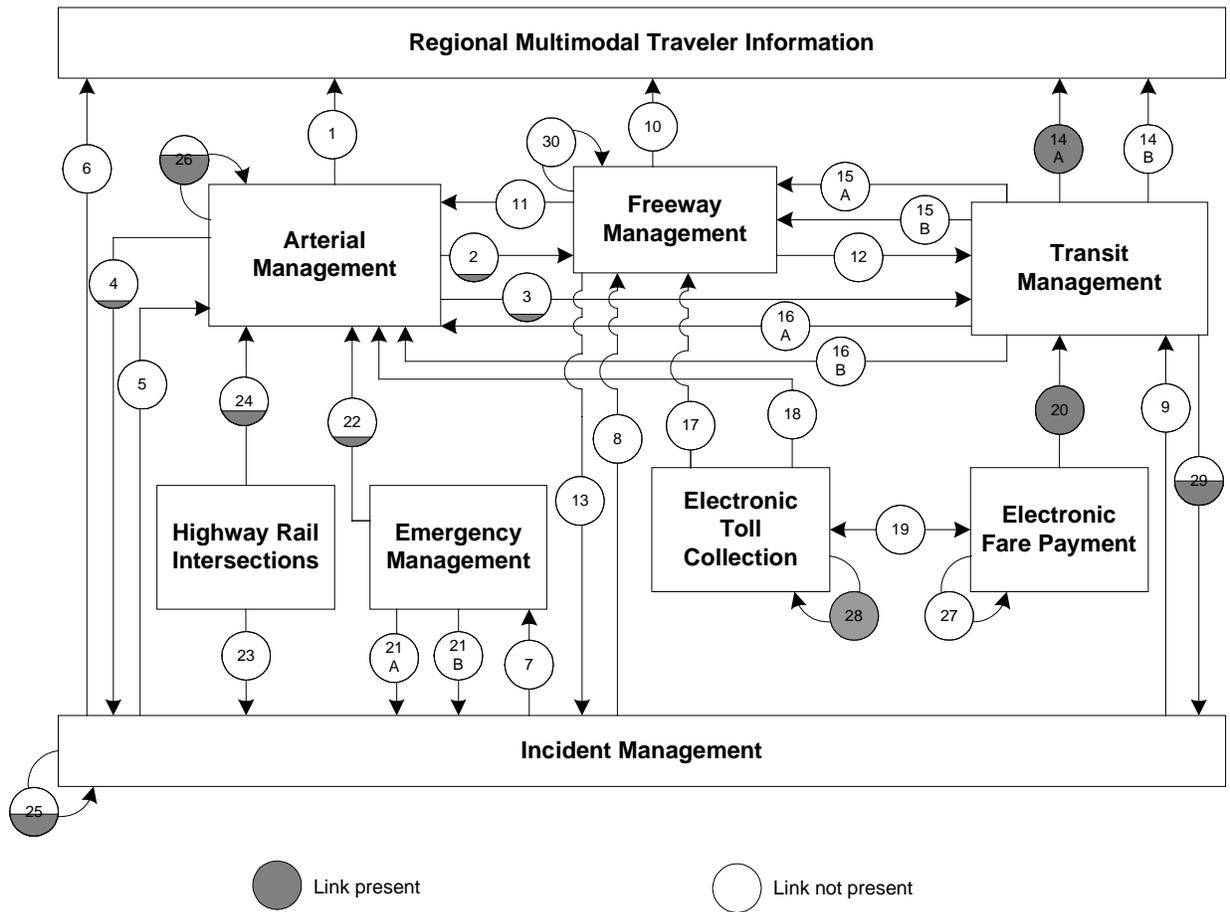
* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
 ** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

National Summary Indicators*



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Boston, Lawrence, Salem Integration Links



Note: Shading indicates the value of the link. For example a circle half shaded equals 50%

Link	Description	Link	Description
1	Arterial Management to Regional Multimodal Traveler Information	2	Arterial Management to Freeway Management
3	Arterial Management to Transit Management	4	Arterial Management to Incident Management
5	Incident Management to Arterial Management	6	Incident Management to Regional Multimodal Traveler Information
7	Incident Management to Emergency Management.	8	Incident Management to Freeway Management
9	Incident Management to Transit Management	10	Freeway Management to Regional Multimodal Traveler Information
11	Freeway Management to Arterial Management	12	Freeway Management to Transit Management

Link	Description	Link	Description
13	Freeway Management to Incident Management	14a	Transit Management to Regional Multimodal Traveler Information (static route information)
		14b	Transit Management to Regional Multimodal Traveler Information (schedule adherence information)
15a	Transit Management to Freeway Management	16a	Transit Management to Arterial Management
15b	Transit Management to Freeway Management (transit vehicle probes)	16b	Transit Management to Arterial Management (transit vehicle probes)
17	Electronic Toll Collection to Freeway Management (ETC equipped probes)	18	Electronic Toll Collection to Arterial Management (ETC equipped probes)
19	Electronic Fare Payment and Electronic Toll Collection	20	Electronic Fare Payment to Transit Management
21a	Emergency Management to Incident Management (incident notification)	22	Emergency Management to Arterial Management
21b	Emergency Management to Incident Management (incident clearance)		
23	Highway-rail intersections to Incident Management (crossing status)	24	Highway-rail intersections to Arterial Management (crossing status)
25	Incident Management intra component	26	Arterial Management intra component
27	Electronic Fare Payment intra component.	28	Electronic Toll Collection intra component
29	Transit Management to Incident Management (incident reporting)	30	Freeway Management intra component

Part 3 - Detailed 1999 Survey Results

The following figures and tables summarize the complete set of component and integration indicators developed for the Boston, Lawrence, Salem metropolitan area. The figures summarizing the component indicators consist of a bar chart portraying the deployment levels for 1997, 1999, and 2005 accompanied by detailed tables of the data used to calculate each component indicator value (*Num* stands for numerator and *Den* stands for denominator; blank space indicates that no response was received.)

Example: Calculating Component Indicators for Freeway Management

Consider a metropolitan area with 100 miles of freeway and 25 freeway entrance ramps. The area has no ramp meters, 10 freeway miles for which traffic data are collected electronically, and 5 freeway miles, which are covered by highway advisory radio.

The component indicator for electronic surveillance is calculated as $(10/100)$ or 10%.

The component indicator for ramp meter control is calculated as $(0/25)$ or 0%.

The component indicator for HAR coverage is calculated as $(5/100)$ or 5%.

The summary indicator for the metropolitan area is calculated as $(10\%+0\%+5\%)/3 = 5\%$.

The figures summarizing the integration indicators consist of a diagram for each of the nine metropolitan ITS components portraying the integration level for 1999 (*italic*) and 2005 (**bold**), accompanied by tables providing an explanation of the data and calculations performed to develop each integration indicator value for 1999 and 2005. Each diagram portrays the proportion of agencies providing information to a component (e.g., the flow of incident information from Incident Management to Freeway Management) and the proportion of agencies providing information from one component to other components (e.g., the flow of freeway travel condition information from Freeway Management to Arterial Management).

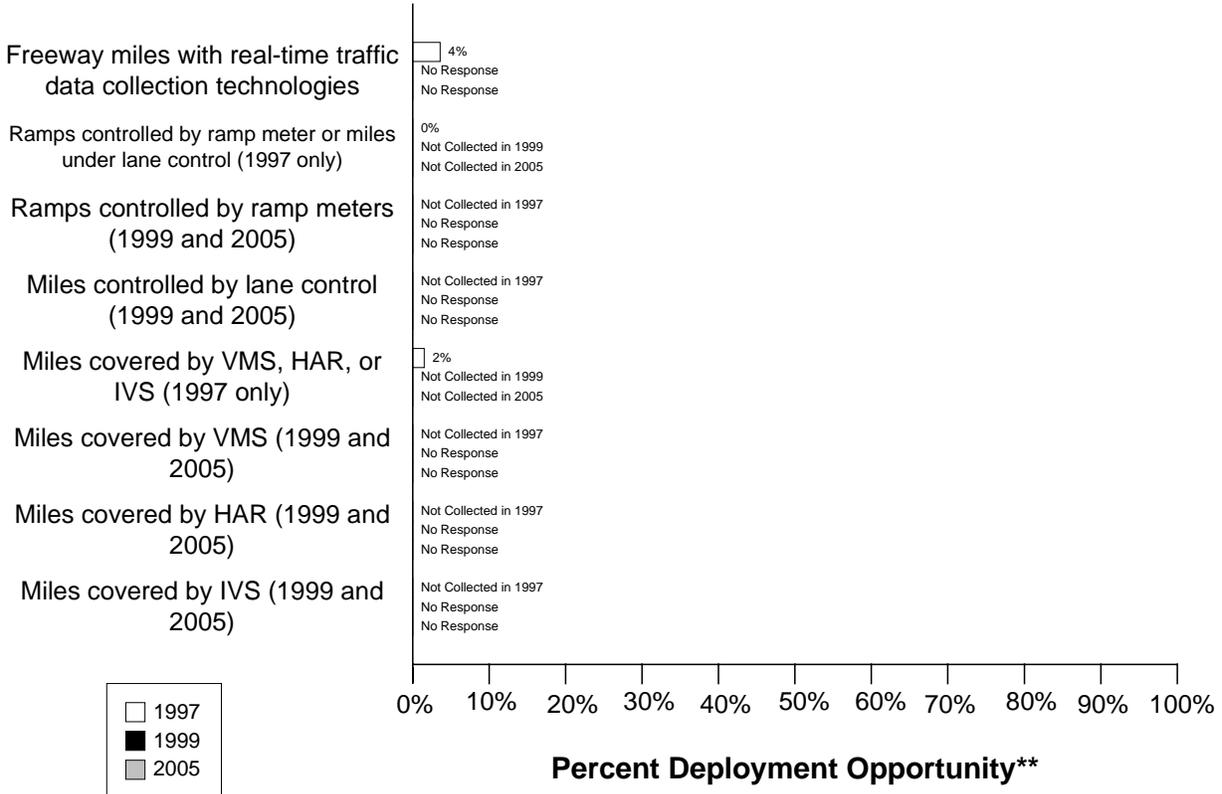
Example: Calculating Integration between Arterial Management and Regional Multimodal Traveler Information

Consider a metropolitan area with three arterial management agencies. One out of three provides information to the public using a Regional Multimodal Traveler Information Media (e.g., internet, kiosk, pager, etc...). The integration indicator is $1/3$ or 33%.

Freeway Management Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Freeway Management*



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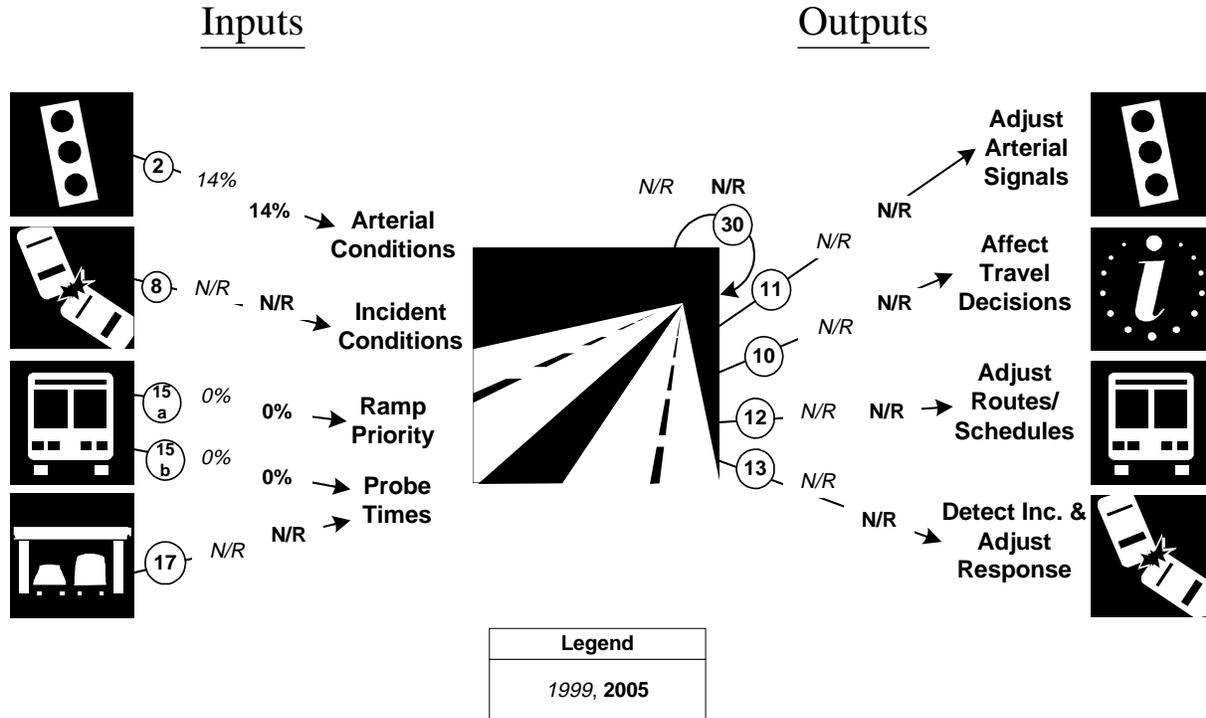
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway centerline miles are under electronic surveillance for monitoring traffic flow	14.2	394	4%						
Freeway entrance ramps are controlled by ramp meters or miles under lane control	0	394	0%						

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway entrance ramps are controlled by ramp meters									
Freeway centerline miles will be controlled by lane control									
Freeway miles are covered by VMS, HAR, or IVS	6	394	2%						
Freeway miles are covered by VMS									
Freeway miles are covered by HAR									
Freeway miles are covered by IVS									

Freeway Management Integration Indicators

Boston, Lawrence, Salem

Freeway Management Integration*



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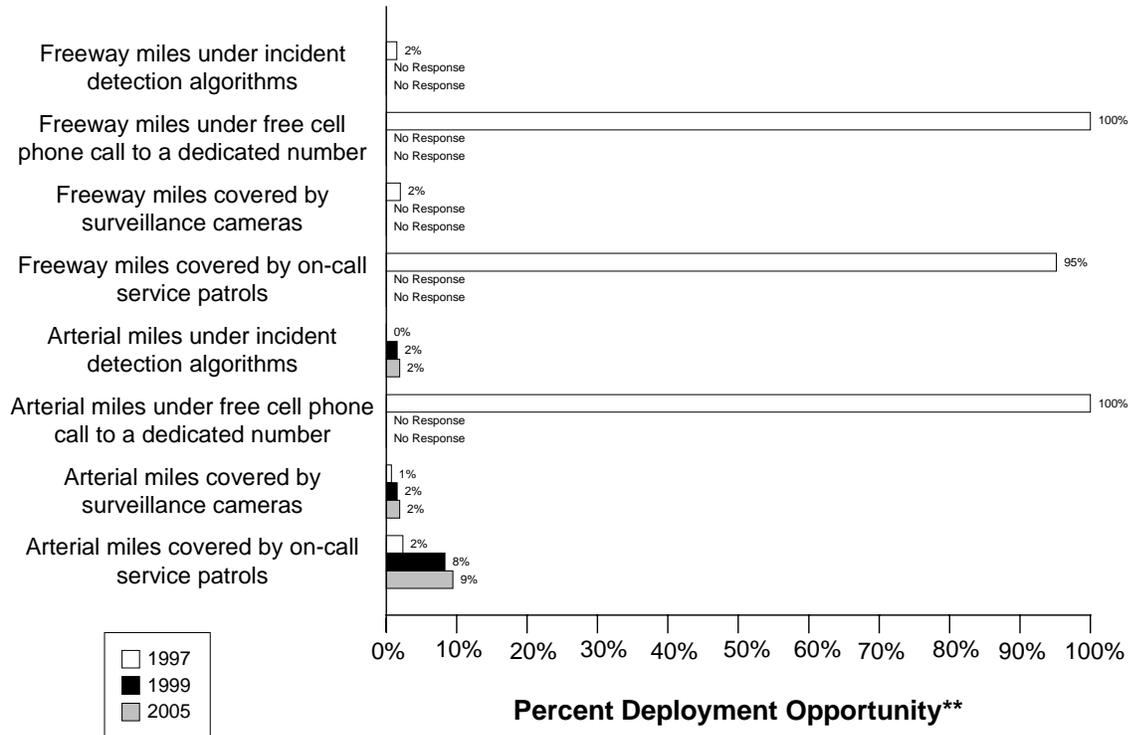
Link Description	1999	2005
2. Arterial Management agencies sending information to Freeway Management	(1 / 7) 14%	(1 / 7) 14%
8. Incident Management agencies sending information to Freeway Management	(0 /)	(0 /)
15a. Transit management agencies with vehicles equipped with ramp meter priority	(0 / 2) 0%	(0 / 2) 0%
15b. Transit Management agencies with vehicles equipped as probes	(0 / 2) 0%	(0 / 2) 0%
17. Freeway Management agencies receiving freeway conditions from vehicle probes	(0 /)	(0 /)
30. Freeway Management agencies sending information to another Freeway Management agency	(0 /)	(0 /)
11. Freeway Management agencies sending information to Arterial Management	(0 /)	(0 /)

Link Description	1999	2005
10. Freeway Management agencies disseminating freeway conditions to the public	(0/)	(0/)
12. Freeway Management agencies sending freeway conditions to Transit Management	(0/)	(0/)
13. Freeway Management agencies sending freeway conditions to Incident Management	(0/)	(0/)

Incident Management Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Freeway and Arterial Incident Management*



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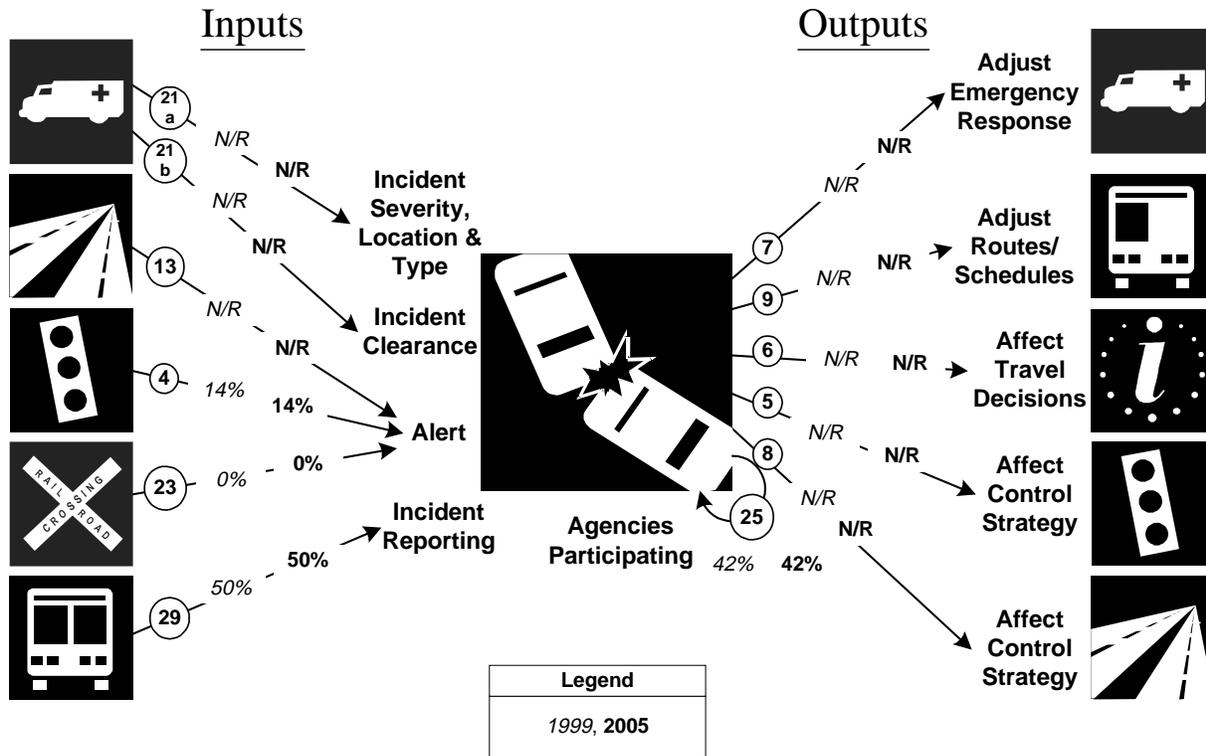
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway miles are covered by incident detection algorithms	6	394	2%						
Freeway miles are covered by free cellular phone calls to a dedicated number	394	394	100%						
Freeway miles are covered by surveillance cameras.	8	394	2%						

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway miles are covered by on-call publicly-sponsored service patrol or towing services.	375	394	95%						
Arterial miles are covered by incident detection algorithms	0	3174	0%	50	3174	2%	60	3174	2%
Arterial miles are covered by free cellular phone calls to a dedicated number	3174	3174	100%		3174			3174	
Arterial miles are covered by surveillance cameras	23	3174	1%	50	3174	2%	60	3174	2%
Arterial miles are covered by on-call publicly-sponsored service patrol or towing services	75	3174	2%	265	3174	8%	300	3174	9%

Incident Management Integration Indicators

Boston, Lawrence, Salem

Incident Management Integration*



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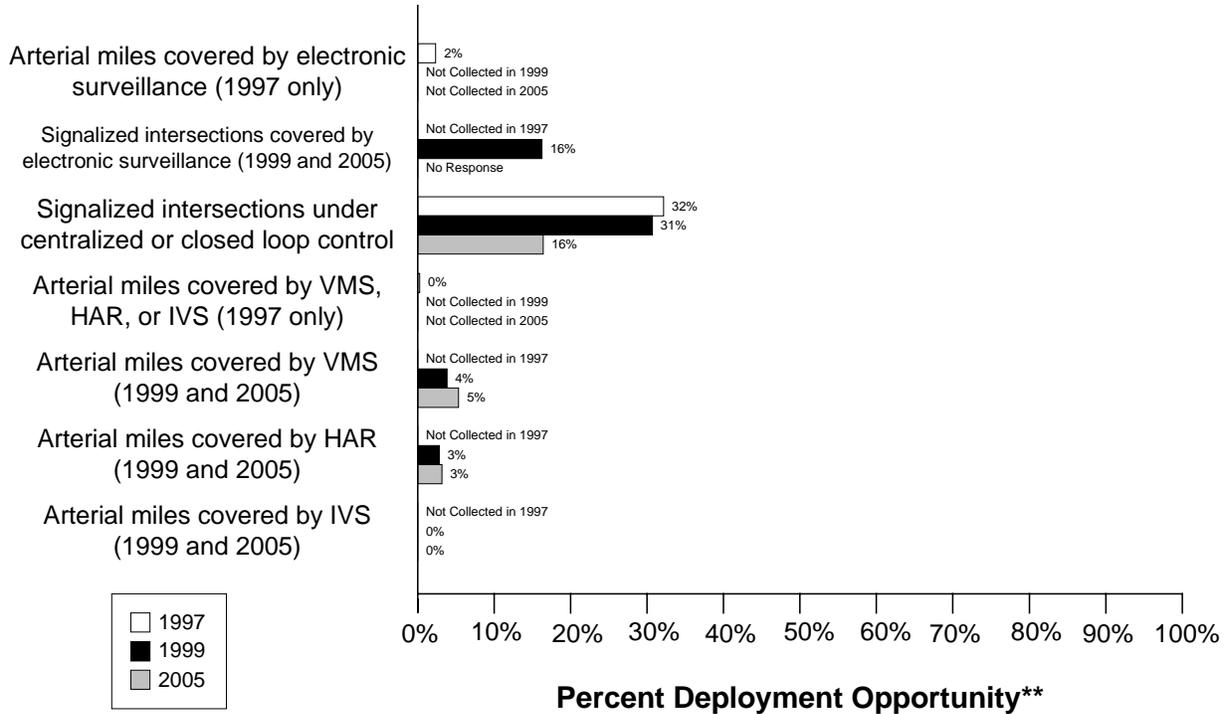
Link Description	1999	2005
21a. Incident management agencies receiving incident severity from Emergency Management	(0 /)	(0 /)
21b. Incident management agencies receiving incident clearance activities from Emergency Management	(0 /)	(0 /)
13. Freeway Management agencies sending freeway conditions to Incident Management	(0 /)	(0 /)
4. Arterial Management agencies sending arterial conditions to Incident Management	(1 / 7) 14%	(1 / 7) 14%
23. Arterial Management agencies receive information on highway-rail intersection crossing blockages for the purpose of managing incident response	(0 / 7) 0%	(0 / 7) 0%
29. Transit Management agencies report traffic incidents as part of an organized regional incident management program	(1 / 2) 50%	(1 / 2) 50%

Link Description	1999	2005
7. Incident management agencies transfer information describing incident severity, location, and type to Emergency Management agencies	(0/)	(0/)
9. Incident Management agencies transfer information describing incident severity, location, and type to Transit Management agencies	(0/)	(0/)
6. Incident Management agencies disseminate information describing incident severity, location, and type to the public	(0/)	(0/)
5. Incident Management agencies transfer information describing incident severity, location, and type to Arterial Management agencies	(0/)	(0/)
8. Incident Management agencies transfer information describing incident severity, location, and type to Freeway Management agencies	(0/)	(0/)
25. Police, fire, and EMS agencies participating in a formal incident management plan/team	(11/ 26) 42%	(11/ 26) 42%

Arterial Management Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Arterial Management*



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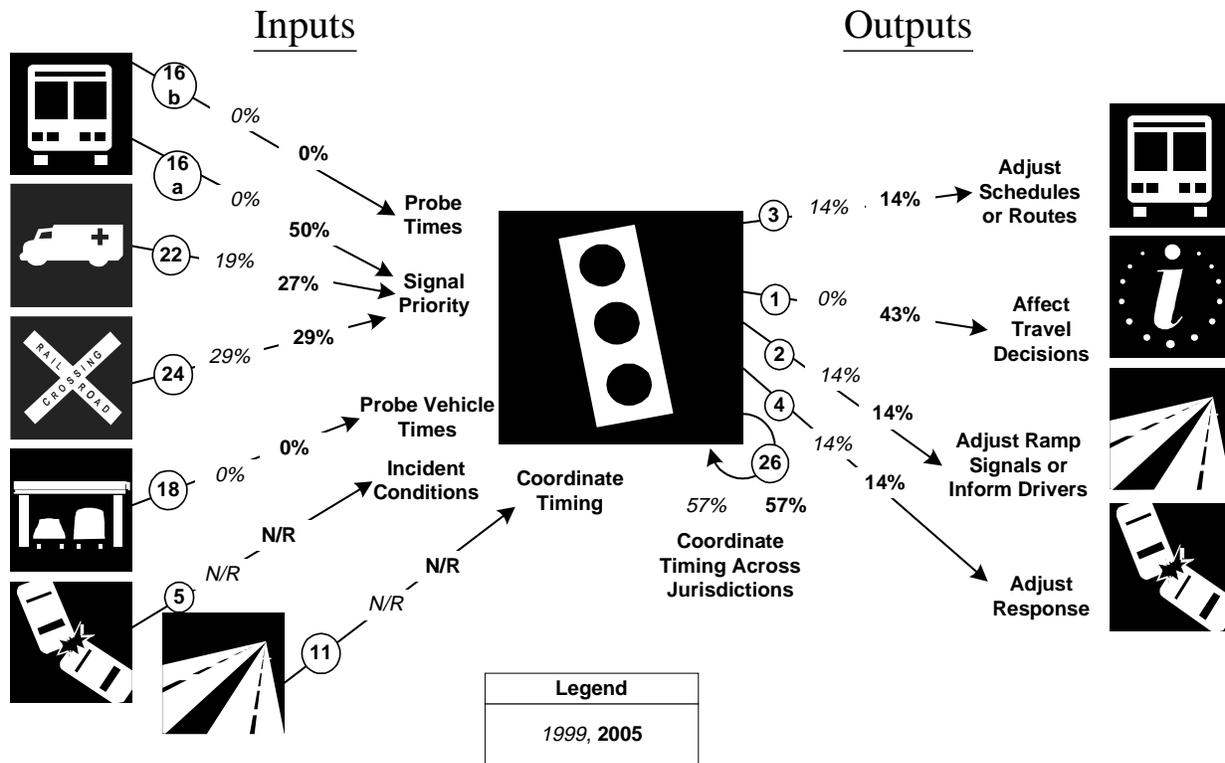
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Arterial miles covered by electronic surveillance	75	3174	2%						
Signalized intersections are covered by electronic surveillance for monitoring traffic flow				375	2306	16%		1346	
Signalized intersections are under centralized or closed loop control	650	2021	32%	708	2306	31%	221	1346	16%

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Arterial miles are covered by VMS, HAR, or IVS	8	3174	0%						
Arterial miles are covered by VMS				122	3174	4%	170	3174	5%
Arterial miles are covered by HAR				90	3174	3%	100	3174	3%
Arterial miles are covered by IVS				0	3174	0%	0	3174	0%

Arterial Management Integration Indicators

Boston, Lawrence, Salem

Arterial Management Integration*



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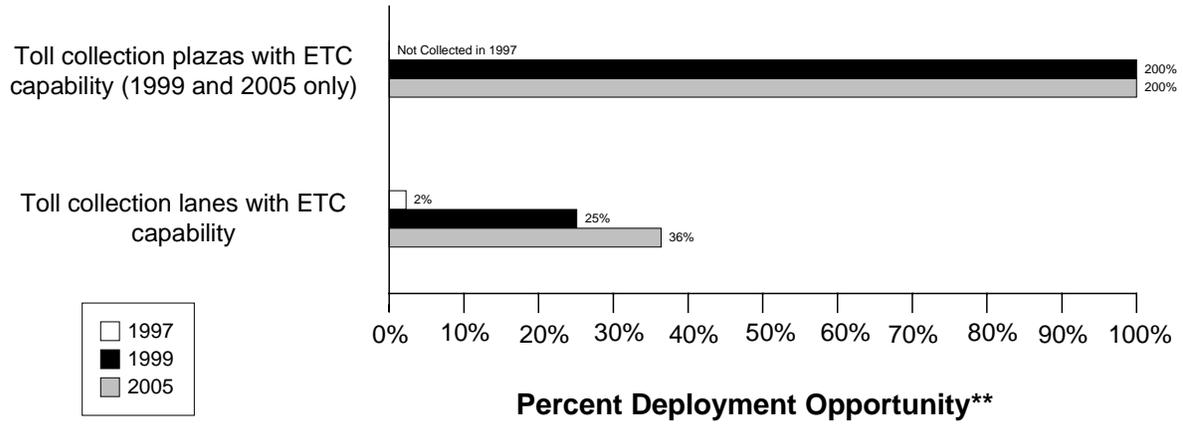
Link Description	1999	2005
16a. Transit management agencies with vehicles equipped with traffic signal priority	(0 / 2) 0%	(1 / 2) 50%
16b. Transit Management agencies have vehicles equipped as probes on arterials	(0 / 2) 0%	(0 / 2) 0%
22. Emergency Management agencies have vehicles equipped with traffic signal preemption capability	(5 / 26) 19%	(7 / 26) 27%
24. Arterial Management agencies have traffic signals within 200 feet of a highway rail intersection with the capability of having their signal timing adjusted in response to a train crossing	(2 / 7) 29%	(2 / 7) 29%
18. Number of Arterial Management agencies receiving information from vehicle probes	(0 / 7) 0%	(0 / 7) 0%
5. Incident Management agencies transfer information describing incident severity, location, and type to Arterial Management	(0 /)	(0 /)
11. Freeway Management agencies transfer freeway travel times, speeds, and conditions to Arterial Management agencies	(0 /)	(0 /)

Link Description	1999	2005
3. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Transit Management	(1/ 7) 14%	(1/ 7) 14%
1. Arterial Management agencies disseminate arterial travel times, speeds, and conditions to the public	(0/ 7) 0%	(3/ 7) 43%
2. Arterial Management agencies send traffic condition information to Freeway Management	(1/ 7) 14%	(1/ 7) 14%
4. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Incident Management	(1/ 7) 14%	(1/ 7) 14%
26. Arterial Management agencies under cooperative agreement to share traffic signal timing for coordinated response	(4/ 7) 57%	(4/ 7) 57%

Electronic Toll Collection Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Electronic Toll Collection*



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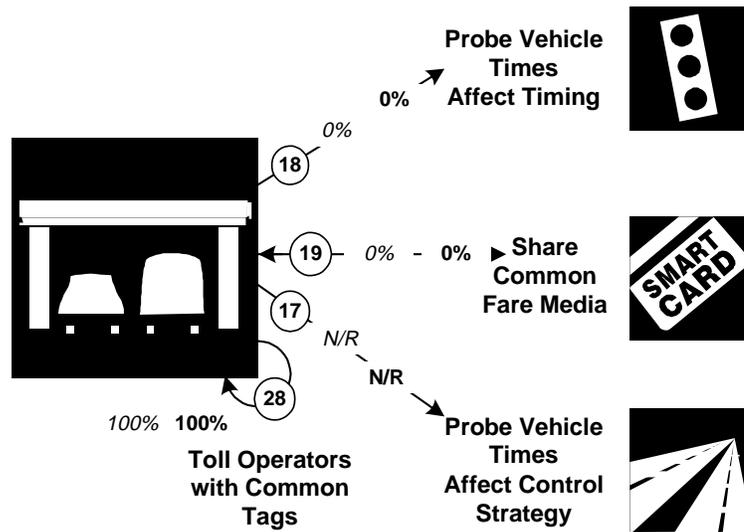
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Toll collection plazas with ETC capability				23	23	100%	24	24	100%
Toll collection lanes with ETC capability	4	178	2%	57	227	25%	84	231	36%

Electronic Toll Collection Integration Indicators

Boston, Lawrence, Salem Electronic Toll Collection Integration*

Inputs

Outputs



Legend
1999, 2005

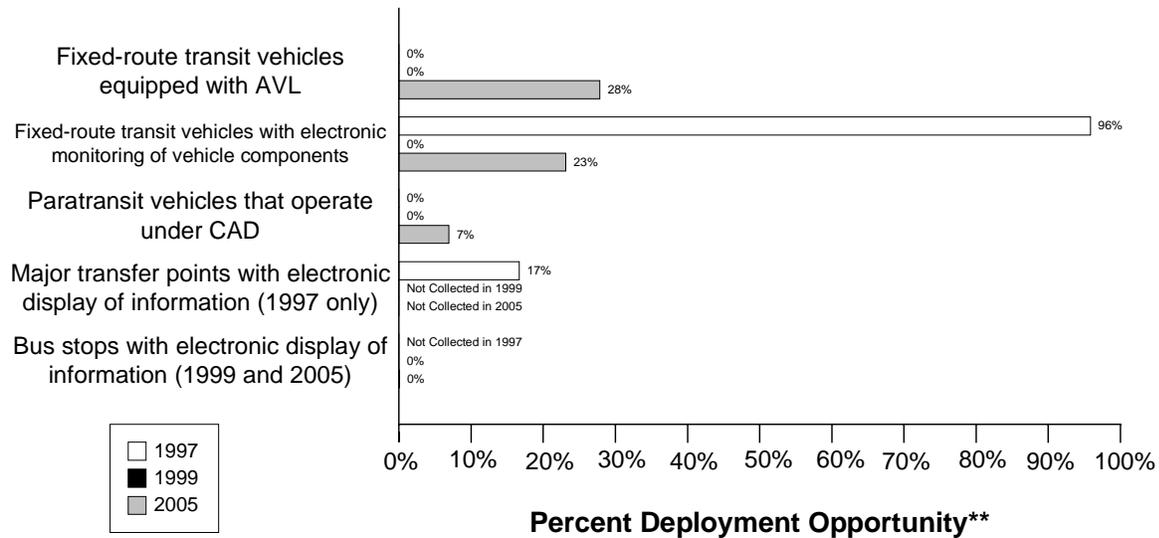
* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
18. Number of Arterial Management agencies receiving information from vehicle probes	(0/ 7) 0%	(0/ 7) 0%
19. Transit agencies that accept electronic payment through the use of electronic toll collection media	(0/ 2) 0%	(0/ 2) 0%
17. Freeway Management agencies receiving information from vehicle probes	(0/)	(0/)
28. Toll operators using common toll tag technology	(4/ 4) 100%	(4/ 4) 100%

Transit Management Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Transit Management*

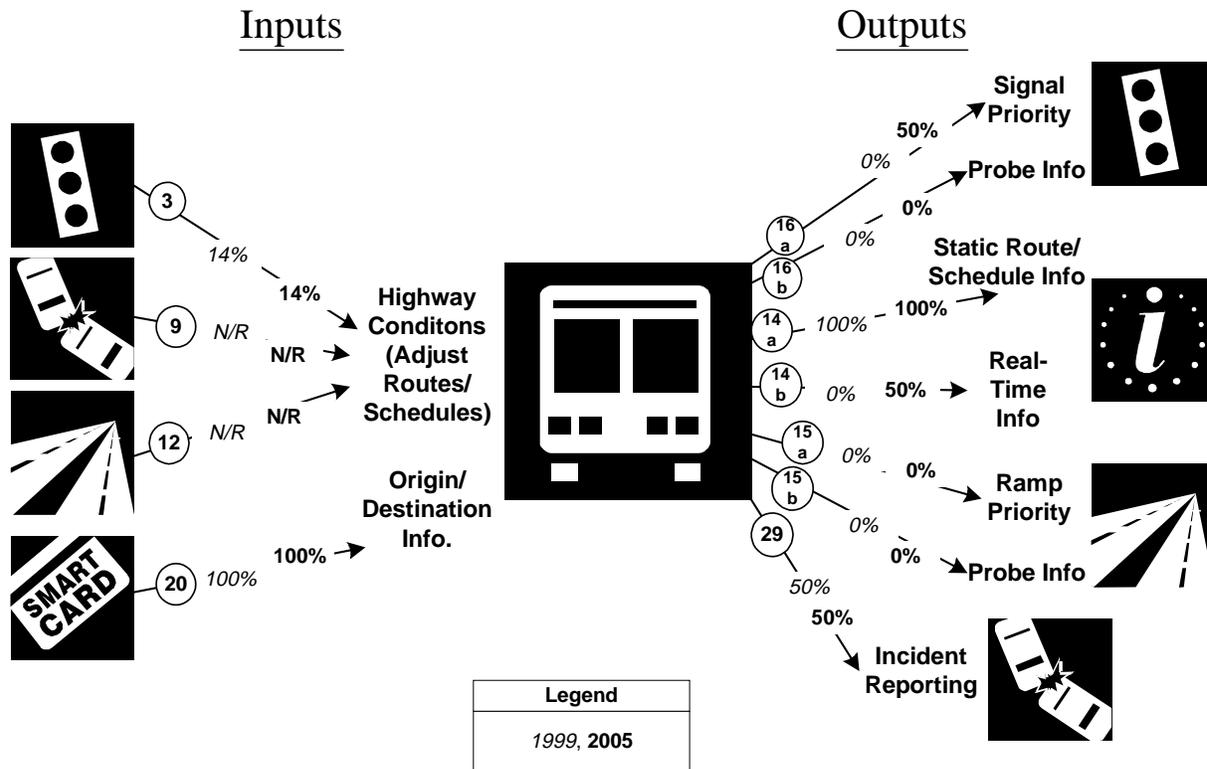


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Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Fixed-route transit vehicles are equipped with AVL	0	1291	0%	0	1075	0%	301	1081	28%
Fixed-route transit vehicles are equipped with electronic monitoring of vehicle component	1030	1075	96%	0	1075	0%	250	1081	23%
Paratransit vehicles operate under computer-aided dispatch	0	430	0%	0	415	0%	30	435	7%
Percent fixed-route transfer locations with electronic display of information	4	24	17%						
Bus stops display information to the public				2	8500	0%	3	8450	0%

Transit Management Integration Indicators

Boston, Lawrence, Salem Transit Management Integration*



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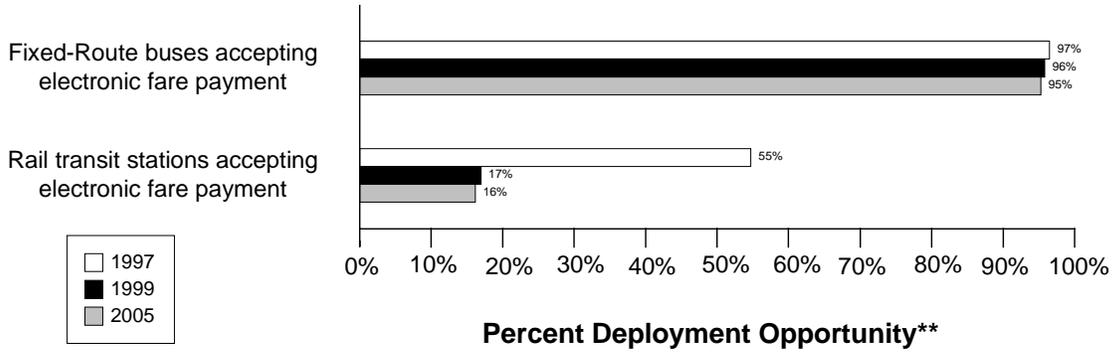
Link Description	1999	2005
3. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Transit Management	(1 / 7) 14%	(1 / 7) 14%
9. Incident management agencies transfer information describing incident severity, location, and type to Transit Management	(0 /)	(0 /)
12. Freeway Management agencies transfer freeway travel times, speeds, and conditions to Transit Management	(0 /)	(0 /)
20. Transit Management agencies using Electronic Fare Payment data in transit service planning	(2 / 2) 100%	(2 / 2) 100%
16a. Transit Management agencies have vehicles equipped with traffic signal priority capability	(0 / 2) 0%	(1 / 2) 50%
16b. Transit Management agencies have vehicles equipped as probes on arterials	(0 / 2) 0%	(0 / 2) 0%
14a. Transit Management agencies disseminate information describing transit routes, schedules, and fares to travelers	(2 / 2) 100%	(2 / 2) 100%

Link Description	1999	2005
14b. Transit Management agencies disseminate information describing schedule/route adherence to travelers	(0/ 2) 0%	(1/ 2) 50%
15a. Transit Management agencies have vehicles equipped with ramp meter priority capability	(0/ 2) 0%	(0/ 2) 0%
15b. Transit Management agencies have vehicles equipped as probes on freeways	(0/ 2) 0%	(0/ 2) 0%
29. Transit Management agencies that report traffic incidents as part of an organized regional Incident Management program	(1/ 2) 50%	(1/ 2) 50%

Electronic Fare Payment Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Electronic Fare Payment*



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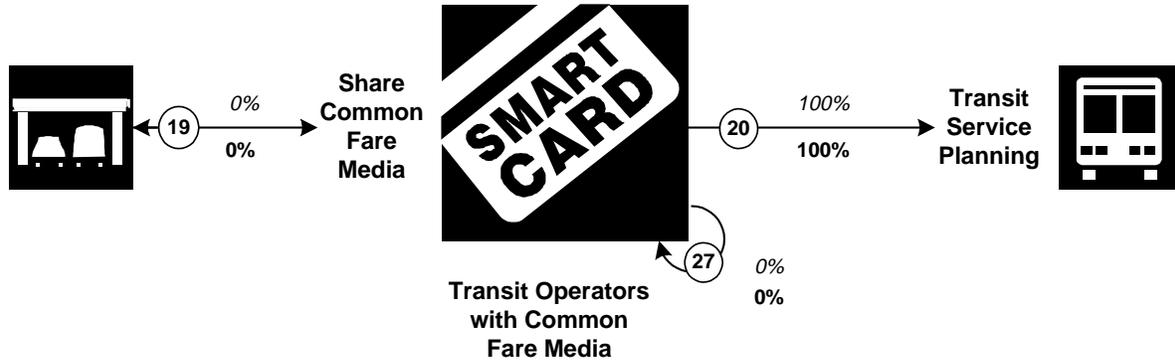
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Fixed-route transit vehicles that accept electronic payment	1246	1291	97%	1030	1075	96%	1030	1081	95%
Rail transit stations that accept electronic payment	29	53	55%	40	236	17%	40	247	16%

Electronic Fare Payment Integration Indicators

**Boston, Lawrence, Salem
Electronic Fare Payment Integration***

Inputs

Outputs



Legend
1999
2005

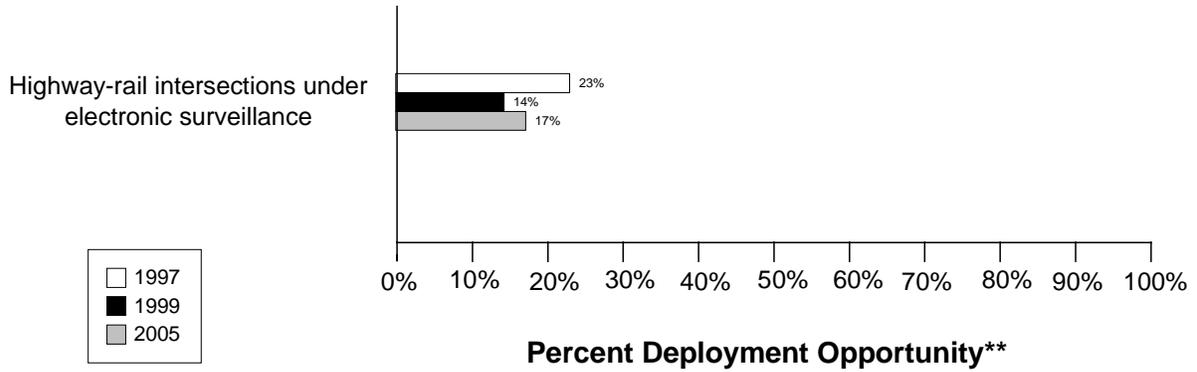
* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
19. Transit agencies that accept electronic payment through the use of electronic toll collection media	(0/ 2) 0%	(0/ 2) 0%
20. Transit Management agencies use Electronic Fare Payment data in transit service planning	(2/ 2) 100%	(2/ 2) 100%
27. Transit Management agencies that use the same electronic payment system	(0/ 2) 0%	(0/ 2) 0%

Highway Rail Intersection Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Highway-Rail Intersections*



* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Highway-rail intersections are under electronic surveillance	3	13	23%	50	348	14%	60	348	17%

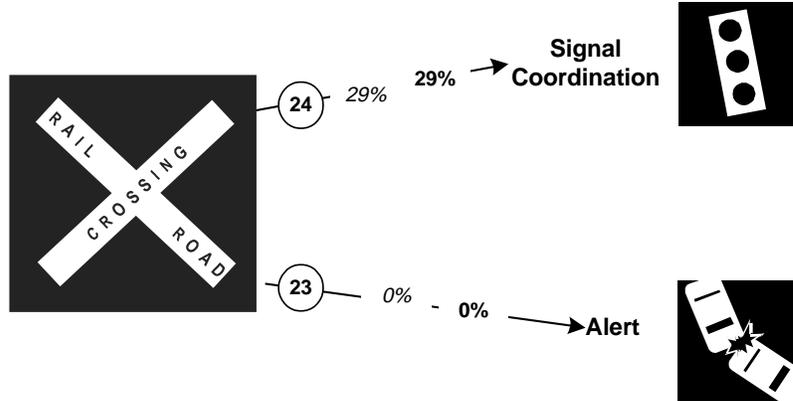
Highway Rail Intersection Integration Indicators

Boston, Lawrence, Salem

Highway Rail Intersections Integration*

Inputs

Outputs



Legend
1999, 2005

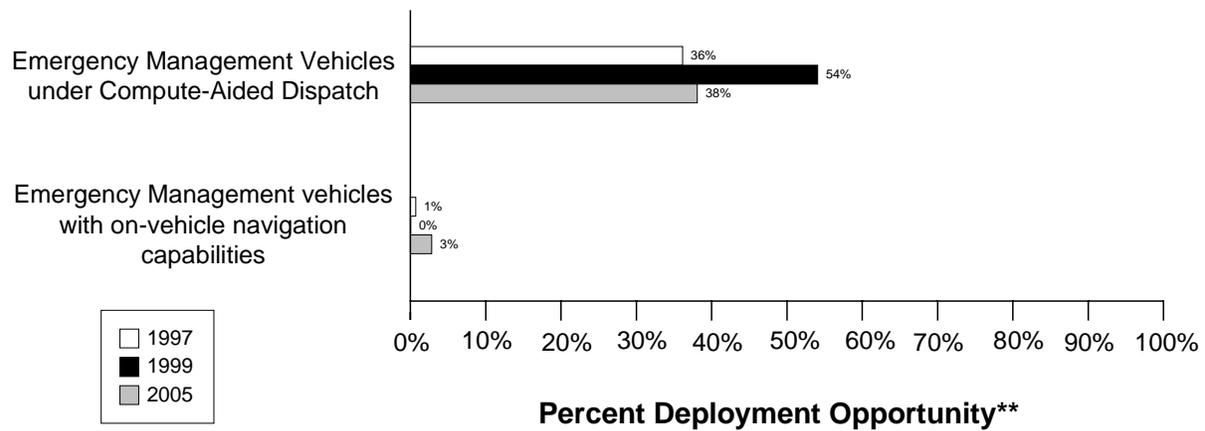
* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
24. Arterial Management agencies with traffic signals within 200 feet of a highway rail intersection with the capability of having their signal timing adjusted in response to a train crossing	(2/ 7) 29%	(2/ 7) 29%
23. Arterial Management agencies receive information on highway-rail intersection crossing blockages for the purpose of managing incident response	(0/ 7) 0%	(0/ 7) 0%

Emergency Management Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Emergency Management*



* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.

** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

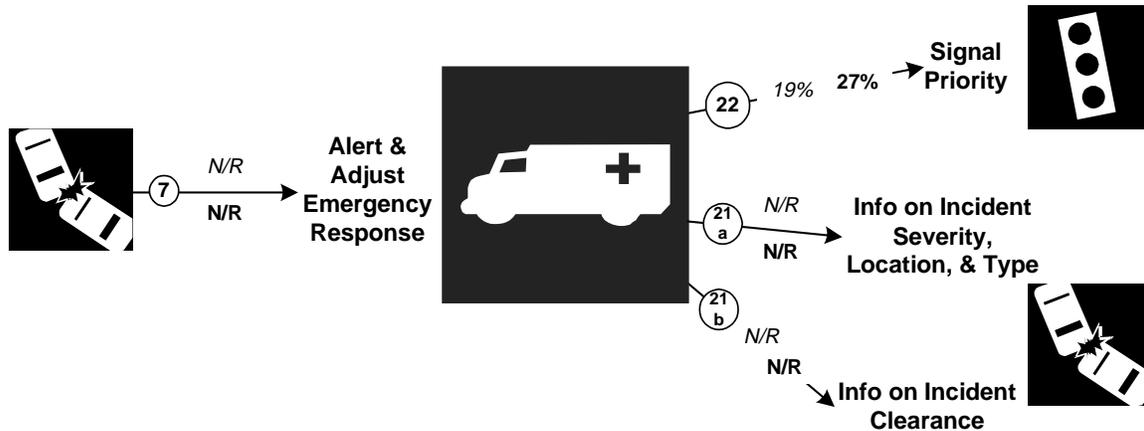
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Public sector emergency vehicles that operate under computer-aided dispatch	751	2078	36%	1051	1944	54%	227	596	38%
Public sector emergency vehicles that have in-vehicle route guidance capability	15	2078	1%	1	1944	0%	17	596	3%

Emergency Management Integration Indicators

Boston, Lawrence, Salem Emergency Management Integration*

Inputs

Outputs



Legend
1999, 2005

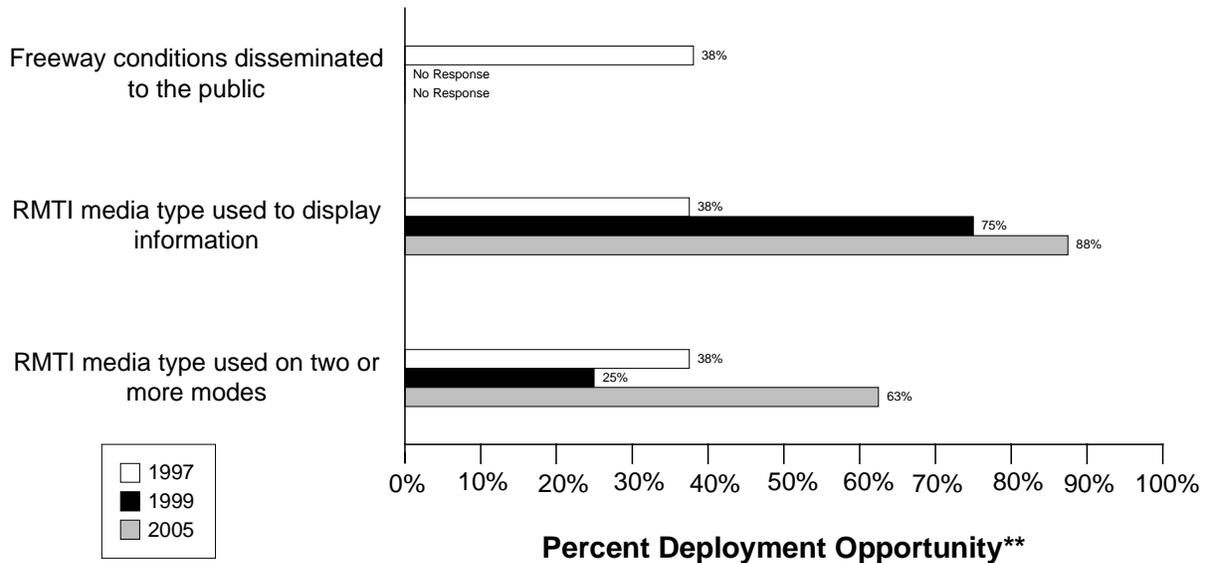
* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
7. Freeway Management agencies transfer information describing incident severity, location, and type to Emergency Management agencies	(0/)	(0/)
22. Emergency Management agencies have vehicles equipped with traffic signal preemption capability	(5/ 26) 19%	(7/ 26) 27%
21a. Freeway Management agencies receive incident severity, location, and type data from Emergency Management agencies	(0/)	(0/)
21b. Freeway Management agencies receive incident clearance activities information from Emergency Management agencies	(0/)	(0/)

Regional Multimodal Traveler Information Component Indicators

Data as of 5/1/00

Boston, Lawrence, Salem Regional Multimodal Traveler Information*

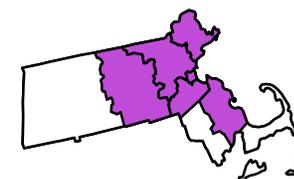
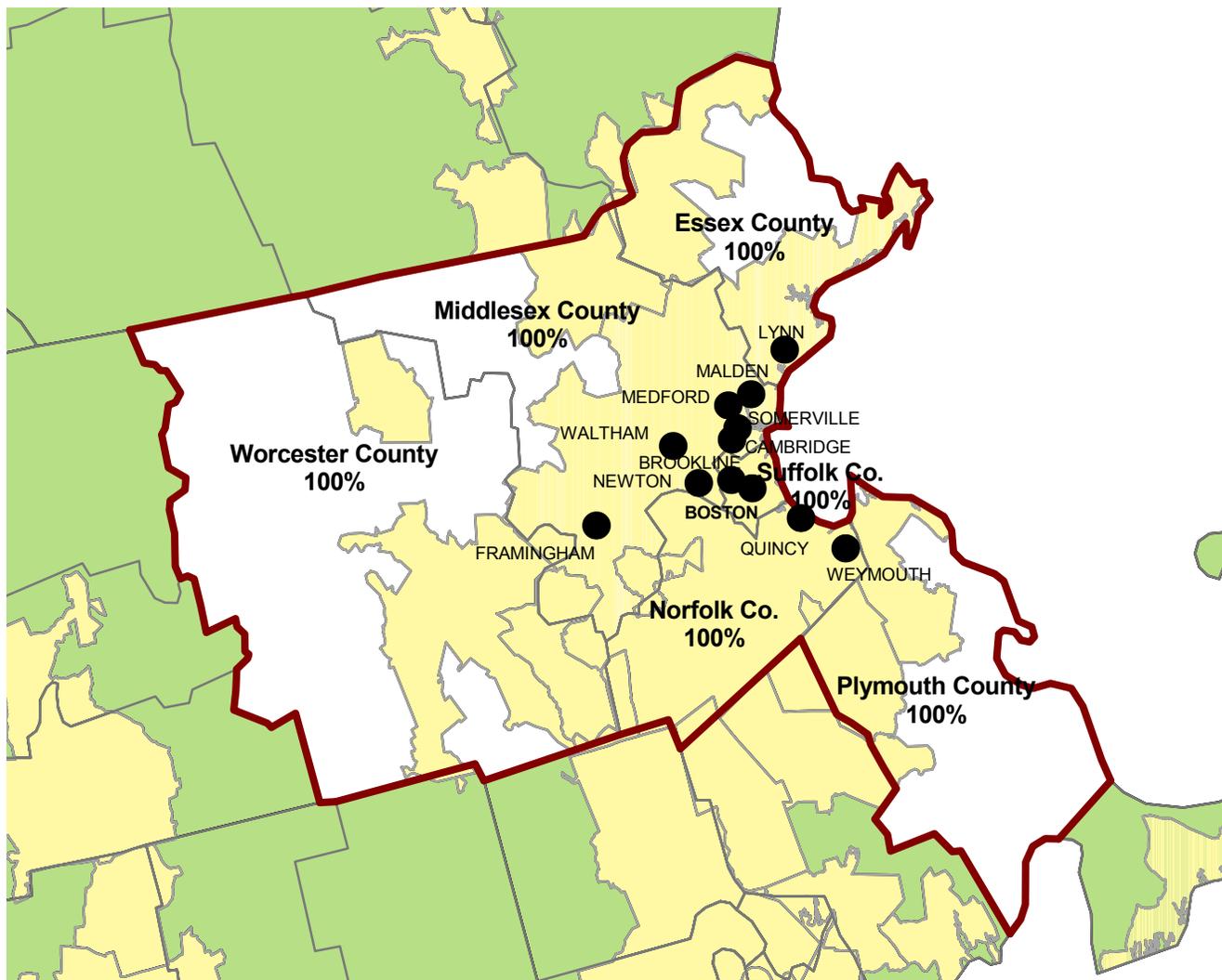


* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.
 ** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway conditions disseminated to travelers	150	394	38%				0		
Possible RMTI media types are used to display information to travelers	3	8	38%	6	8	75%	7	8	88%
Possible RMTI media are used to display information on <i>two or more modes</i> to travelers	3	8	38%	2	8	25%	5	8	63%

Appendix A
Survey Coverage Area

BOSTON METROPOLITAN PLANNING ORGANIZATION, MA



- City Included in Surveys
 - Metropolitan Planning Area Boundary
 - County Boundary
 - Urbanized Area
 - Outside Survey Area
- Percentage on the Map Represents Percentage of County Population Included within MPO Boundary

Appendix B
Surveyed Agencies

Surveyed Agencies

Agency Name	Phone	Fax	1999		1997	
			Out	In	Out	In
BOSTON, LAWRENCE, SALEM						
Arterial Management						
Brookline Town	(617) 730-2177	(617) 730-2258	7/30/1999	11/23/1999	08/14/1997	11/28/1997
Quincy City	(617) 376-1948	(617) 376-1259	7/30/1999		08/14/1997	
Newton City	(617) 552-7192	(617) 552-7983	7/30/1999	12/6/1999	08/14/1997	
Medford City	(781) 393-2417	(781) 395-5177	7/30/1999		08/14/1997	
Massachusetts Highway Department	(617) 973-7315	(617) 973-8861	7/30/1999	11/3/1999	08/15/1997	09/26/1997
Somerville City	(617) 625-6600	(617) 628-6675	7/30/1999	10/12/1999	08/15/1997	
Lynn City	(781) 598-4000	(781) 477-7074	7/30/1999	10/26/1999	08/15/1997	
Waltham City	(781) 893-4040	(781) 893-2430	7/30/1999		08/14/1997	10/10/1997
Framingham Town	(508) 620-4880	(508) 872-5616	7/30/1999		08/14/1997	09/15/1997
Lawrence City	(978) 794-1208	(978) 794-5760	7/30/1999		09/12/1997	
Cambridge City	(617) 349-4712	(617) 349-4747	7/29/1999	11/29/1999	08/14/1997	
Weymouth Town	781-337-5100	781-337-6940	7/30/1999		08/14/1997	
Boston City	(617) 635-4680	(617) 635-4295	7/29/1999	8/23/1999	08/14/1997	08/26/1997
Malden City	(781) 397-7040	(781) 397-7023	7/30/1999		08/15/1997	
Electronic Toll Collection						
Massachusetts Port Authority	(617) 242-7979	(617) 242-7995	12/9/1999		08/15/1997	08/20/1997
Massachusetts Turnpike Authority/Callahan &	(781) 431-5046	(781) 237-3348	6/30/1999	9/8/1999	08/15/1997	11/12/1997
Massachusetts Turnpike Authority/Ted Williams	(781) 431-5046	(781) 237-3348	6/30/1999	9/8/1999	08/15/1997	11/12/1997
Massachusetts Turnpike	(781) 431-5046	(781) 237-3348	6/30/1999	9/8/1999	08/15/1997	11/12/1997
Massachusetts Turnpike	(781) 431-5046	(781) 237-3348	6/30/1999	9/8/1999	08/15/1997	11/12/1997
Emergency Management						
Cambridge City Fire & EMS Department	617-349-4974	617-349-4912	6/22/1999	8/26/1999	08/14/1997	09/17/1997
Boston City Fire Department	(617) 343-2880	(617) 353-0884	6/22/1999	8/9/1999	07/08/1998	07/14/1998
Framingham Town Police Department	(508) 872-1212	(508) 620-4904	6/22/1999	6/23/1999	07/10/1998	07/10/1998
Framingham Town Fire Department	508-620-4942	508-620-4946	6/22/1999	9/8/1999	08/14/1997	09/15/1997
Boston City Police Department	(617) 343-4610	(617) 343-5345	6/22/1999	8/5/1999	07/08/1998	07/08/1998
Waltham City Police Department	781-893-3702	781-891-6428	6/22/1999	8/11/1999	08/14/1997	10/10/1997
Brookline City Fire Department	(617) 730-2260	(617) 264-6488	6/22/1999	6/25/1999	07/14/1998	07/14/1998
Lawrence City Fire Department	(978) 794-1223	(978) 691-5760	6/22/1999	8/17/1999	09/02/1997	07/14/1998
Lawrence City Police Department	(978) 794-5900	(978) 794-5913	6/22/1999	6/28/1999	07/15/1998	07/15/1998
Waltham City Fire Department	781-893-4105	781-647-0892	6/22/1999	8/24/1999	08/14/1997	10/10/1997
Somerville City Fire Department	(617) 623-1700	(617) 625-8101	6/22/1999	6/23/1999	07/08/1998	07/08/1998

Agency Name	Phone	Fax	1999		1997	
			Out	In	Out	In
Framingham Town Emergency Medical Services	508-620-4942	508-620-4946	6/22/1999	9/8/1999	08/14/1997	09/15/1997
Somerville City Police Department	(617) 625-1600	(617) 776-9234	6/22/1999	6/24/1999	07/14/1998	07/14/1998
Lynn City Fire & EMS Department	781-593-1234	781-596-1480	8/24/1999	9/29/1999	08/15/1997	01/13/1998
Quincy City Police Department	(617) 479-1212	(617) 328-9360	6/22/1999	8/25/1999	07/16/1998	07/16/1998
Cambridge City Police Department	617-349-6911	617-349-6918	6/22/1999	9/9/1999	08/14/1997	09/17/1997
Newton City Fire Department	(617) 552-7272	(617) 552-7305	6/22/1999	6/23/1999	07/08/1998	07/08/1998
Medford City Fire Department	(781) 396-9400	(781) 396-4377	6/22/1999	7/7/1999	07/15/1998	07/15/1998
Malden City Fire Department	781-397-7383	781-397-7390	6/22/1999	6/23/1999	07/08/1998	07/08/1998
Malden City Police Department	(781) 397-7171	(781) 397-0296	6/22/1999	8/24/1999	07/08/1998	07/08/1998
Weymouth City Police Department	781-682-6100	781-682-6102	6/22/1999	7/28/1999	07/09/1998	07/09/1998
Weymouth City Fire Department	781-337-5151	781-340-5024	6/22/1999	6/28/1999	07/15/1998	07/15/1998
Medford City Police Department	781-391-6409	781-395-5177	6/22/1999		07/14/1998	07/14/1998
Newton City Police Department	(617) 552-7240	(617) 552-7212	6/22/1999	6/30/1999	07/10/1998	07/10/1998
Brookline City Police Department	(617) 730-2254	(617) 730-8454	6/22/1999	7/6/1999	07/08/1998	07/08/1998
Quincy City Fire Department	(617) 376-1040	(617) 376-1027	6/22/1999	9/3/1999	07/08/1998	07/08/1998
Lynn City Police Department	(781) 598-4000	(781) 477-7074	6/22/1999	7/28/1999	08/15/1997	01/13/1998
Freeway Management						
Massachusetts Turnpike Authority	(781) 431-5199	(781) 237-3348	7/29/1999		08/15/1997	
Massachusetts Highway Department	(617) 973-7787	(617) 973-8037	7/29/1999		08/15/1997	09/03/1997
MPO						
Executive Office of Transportation &	(617) 973-7837	(617) 973-8031	7/15/1999			
Transit Management						
Massachusetts Bay Transportation Authority	(617) 222-1626	(617) 222-3776	8/9/1999	11/9/1999	08/14/1997	09/05/1997
Merrimack Valley Regional Transit	(978) 469-1251	(978) 373-1185	8/9/1999	9/13/1999	08/14/1997	08/18/1997

Appendix C
Freeway Management Components

Appendix D
Freeway Management Integration

Appendix E
Freeway Management Information Collection and Dissemination

Appendix F
Arterial Management Components

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Boston City		Brookline Town		Cambridge City		Lynn City	
	1999	2005	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes		Yes	
ARTERIAL MANAGEMENT SECTION								
Number of arterial miles that agency owns or maintains	NR		NR		NR		NR	
Number of arterial miles that is used for planning	NR		NR		NR		NR	
Number of highway-rail intersections that agency maintains	NR		NR		4		NR	
Number of highway-rail intersections that is used for planning	NR		NR		NR		NR	
Type of facilities used to conduct arterial management activities								
Activities housed in a free-standing dedicated building?	No		No		No		No	
Activities housed in a building shared with other activities?	Yes		No		No		No	
Activities conducted in a dedicated control room?	Yes		No		No		No	
Control room contains operator console(s)?	Yes		No		No		No	
Control room contains electronic wall map?	Yes		No		No		No	
Control room contains CCTV display(s)?	Yes		No		No		No	
Activities conducted in a room containing workstations or PCs that manage traffic?	No		No		No		No	
Facilities are electronically linked to other transportation mgt facilities?	No		No		No		No	
Staffing and hours of operation of arterial management activities								
Number of full-time agency staff members	2		NR		NR		NR	
Number of full time contractor staff members	NR		NR		NR		NR	
Number of part-time agency staff members	NR		NR		NR		NR	
Number of part-time contractor staff members	NR		NR		NR		NR	
Staffed 24 hours day by agency staff or by others	NR		NR		NR		NR	
Staffed during peak hours only by agency staff or by others	NR		NR		NR		NR	
Staffed by others during off-peak hours	No		No		No		No	
Agency staff perform transportation management as an ancillary duty	No		No		No		No	
Agency staff dedicated to transportation management duty	No		No		No		No	
Types of operations conducted for arterial management								
Incident detection and management?	Yes		No		No		No	
This metropolitan area?	No		No		No		No	
Other metropolitan area?	No		No		No		No	
Monitoring and troubleshooting status of system components?	Yes		No		No		No	
Radio communications with other agencies?	No		No		No		No	
Exchange of electronic data with other agencies such as computer aided dispatch?	No		No		No		No	
Manual override of traffic signal timing plans	Yes		No		No		No	
Operating transportation mgt roadside devices (e.g., VMS, CCTV, etc.)	Yes		No		No		No	

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Boston City		Brookline Town		Cambridge City		Lynn City	
	1999	2005	1999	2005	1999	2005	1999	2005
Describe agency's role in traffic signal control	operate all traffic signals in city of Boston and some MDC signals in Boston		NR		NR		NR	
Traffic Signals Operated by Agency								
Number of signalized intersections operated and owned by agency	740	NR	NR	NR	NR	NR	NR	NR
Number of signalized intersections operated by agency but owned by another	20	NR	NR	NR	NR	NR	NR	NR
Total number of signalized intersections operated by agency	760	NR	60	67	137	NR	130	NR
<u>Characteristics of signalized intersections that agency operates</u>								
Under closed loop or central system control	515	NR	0	4	27	58	60	NR
Under real-time traffic adaptive control using advanced software	0	NR	0	0	0	NR	0	NR
Using SCOOT	No		No		No		No	
Using SCATS	No		No		No		No	
Name of software	NR		NR		NR		NR	
Allow signal preemption for emergency vehicles	35	NR	4	21	7	NR	0	NR
Allow signal priority for transit vehicles	20	NR	0	18	0	NR	0	NR
Within 200 feet of a highway-rail intersection	NR	NR	0	0	4	NR	0	NR
Within 200 feet of a highway-rail intersection that adjust signal timing	NR	NR	0	0	1	NR	0	NR
Software used to control the signals agency operates								
Date of last upgrade to traffic signal control system software?	upgrade start fall 1999		NR		NR		NR	
How often do you update signal timing?	observe system sensor data		NR		NR		NR	
Software used and number of signalized intersections under control (1999, 2005)	UTCS, 375, NR		NR		NR		NR	
Controllers used to control signals								
NEMA	660	NR	0	0	0	0	0	0
170/179	0	0	0	0	0	0	0	0
2070 controller	0	0	0	0	0	0	0	0
Other	100	50	0	0	0	0	0	0
Technologies Associated with Highway-Rail Intersections								
Total number of highway-rail intersections under electronic surveillance	NR	NR	NR	NR	NR	NR	NR	NR
<u>Highway-Rail intersection capabilities</u>								
Video surveillance	0	0	0	0	0	0	0	0
Electronic surveillance other than video	0	0	0	0	0	0	0	0
Ability to predict train arrival electronically	0	0	0	0	0	0	0	0
Equipped with electronic traffic violator devices	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Boston City		Brookline Town		Cambridge City		Lynn City	
	1999	2005	1999	2005	1999	2005	1999	2005
Real-Time Electronic Traffic Data Collection Technologies								
Total number of signalized intersections covered by electronic surveillance	375	NR	NR	NR	NR	NR	NR	NR
<i>Number of signalized intersections with data collection technologies</i>								
Loop detectors	700	NR	0	0	0	0	0	0
Video detection cameras	3	NR	0	0	0	0	0	0
Probe readers reading toll tags	0	0	0	0	0	0	0	0
Probe readers reading license plates	0	0	0	0	0	0	0	0
Other	20	0	0	0	0	0	0	0
Roadside Technologies used to Distribute Traveler Information								
<i>Number deployed</i>								
Highway Advisory Radio	NR	NR	NR	NR	NR	NR	NR	NR
In-Vehicle Signing (IVS)	NR	NR	NR	NR	NR	NR	NR	NR
VMS controlling parking access	NR	NR	NR	NR	NR	NR	NR	NR
<i>Miles covered</i>								
Highway Advisory Radio	NR	NR	NR	NR	NR	NR	NR	NR
In-Vehicle Signing (IVS)	NR	NR	NR	NR	NR	NR	NR	NR
Variable Message Signs (VMS) on Arterials								
Candidate locations for deployment of VMS where VMS has been deployed	NR	NR	NR	NR	NR	NR	NR	NR
Candidate locations for deployment of VMS	NR	NR	NR	NR	NR	NR	NR	NR
Communication Technologies								
<i>Signalized intersections communicated with by each type of communication</i>								
Twisted pair cable	375	NR	0	0	0	0	0	0
Coaxial cable	0	0	0	0	0	0	0	0
Fiber-optic cable	0	0	0	0	0	0	0	0
Other (e.g., wireless, dial-up modems, leased lines, etc.)	152	0	0	0	0	0	0	0
Does agency convey information on highway-rail intersection crossing status to travelers via roadside media such as VMS or HAR?								
	No		No		No		No	
ITS Standards Used Related to Traffic Signal Control								
Advanced Transportation Controller (ATC) Software Application Interface (ITE 9603-1)	No		No		No		No	
ATC Physical Cabinet Functional Design (ITE-9603-2)	No		No		No		No	
ATC Functionality and Interface Definitions (ITE-9603-3)	No		No		No		No	
Natl. Trans. Communications for ITS Protocol (NTCIP) Class B Profile (AASHTO TS 3.3)	No		No		No		No	
NTCIP Data Collection and Monitoring Devices (AASHTO TS 3.DCM)	No		No		No		No	
NTCIP Object Definitions for Video Camera Control (AASHTO TS 3.VCC)	No		No		No		No	
NTCIP Object Definitions for Actuated Traffic Signal Controller Units (AASHTO TS 3.5)	No		No		No		No	
Would agency be willing to participate in testing of ITS Standards?	Yes		NR		NR		NR	
Have agreements in place with other agencies to use similar hardware and software to aid maintenance and interoperability?								
	Yes		NR		NR		NR	

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Boston City		Brookline Town		Cambridge City		Lynn City	
	1999	2005	1999	2005	1999	2005	1999	2005
INCIDENT MANAGEMENT ON ARTERIAL STREETS								
Receive information on highway-rail intersection crossing blockages for the purpose of managing incident response?	No		No		No		No	
Use of Service Patrols to Assist in Detection and Response to Incidents								
Publicly operated service patrol vehicles	No		No		No		No	
Privately operated service patrol vehicles operated under public contract	No		No		No		No	
Total number of arterial miles patrolled by these services	NR	NR	NR	NR	NR	NR	NR	NR
Miles Covered by Methods to Detect and Verify Incidents								
Free cellular phone call to a dedicated phone number other than 911	0	0	0	0	0	0	0	0
Free cellular phone call to an area radio station	0	0	0	0	0	0	0	0
Police patrols	0	0	0	0	0	0	0	0
Computer algorithms linked to traffic surveillance equipment	0	0	0	0	0	0	0	0
CCTV	0	0	0	0	0	0	0	0
Private sector sources (e.g., Shadow Traffic, Smart Routes)	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
Procedures in place for Arterial Incident Response?								
Working agreement(s)/arrangement(s) with other agencies	No		No		No		No	
Inter-agency incident management admin. team that meets regularly	No		No		No		No	
Major incident response team that responds to major incidents	No		No		No		No	
Set of goals/objectives for incident mgt that has been adopted by agencies in region	No		No		No		No	
Methods of Communication Used On-Site at an Incident								
<u>Police</u>								
Two-way radio	No		No		No		No	
800 MHz trunked radio	No		No		No		No	
Cellular telephone	No		No		No		No	
Hand-held (i.e., walkie-talkie)	No		No		No		No	
Automated data systems (i.e., CAD)	No		No		No		No	
Other	No		No		No		No	
<u>Fire</u>								
Two-way radio	No		No		No		No	
800 MHz trunked radio	No		No		No		No	
Cellular telephone	No		No		No		No	
Hand-held (i.e., walkie-talkie)	No		No		No		No	
Automated data systems (i.e., CAD)	No		No		No		No	
Other	No		No		No		No	
<u>DOT</u>								
Two-way radio	No		No		No		No	
800 MHz trunked radio	No		No		No		No	
Cellular telephone	No		No		No		No	
Hand-held (i.e., walkie-talkie)	No		No		No		No	

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Boston City		Brookline Town		Cambridge City		Lynn City	
	1999	2005	1999	2005	1999	2005	1999	2005
Automated data systems (i.e., CAD)	No		No		No		No	
Other	No		No		No		No	
<u>Towing</u>								
Two-way radio	No		No		No		No	
800 MHz trunked radio	No		No		No		No	
Cellular telephone	No		No		No		No	
Hand-held (i.e., walkie-talkie)	No		No		No		No	
Automated data systems (i.e., CAD)	No		No		No		No	
Other	No		No		No		No	
Which police agencies typically respond to incidents on arterials?								
State Police	No		No		No		No	
County Police or Sheriff	No		No		No		No	
City Police	No		No		No		No	
Who provides on-site emergency medical response?								
Fire	No		No		No		No	
Emergency Management Service Agency	No		No		No		No	
Private hospital	No		No		No		No	
Has a multi-agency contact list been developed in area containing the names, phone numbers, etc. for the appropriate response personnel?	NR		NR		NR		NR	
Is the Incident Command System used to manage incident scenes?	NR		NR		NR		NR	
Is there a legal specification by state law or formal agreement as to who is "in charge" at the incident scene?								
Specified by state law?	No		No		No		No	
Formal agreement?	No		No		No		No	
Not specified or don't know?	No		No		No		No	
On-scene command post used to manage activities of responding agencies?	NR		NR		NR		NR	
Are there communication linkages to a communications traffic/freeway mgt center?	NR		NR		NR		NR	
Plan developed and adopted by responding agencies for staging and parking response vehicles and equip. at incident site that minimizes lane blockage and facilitates the re-opening of lanes?	NR		NR		NR		NR	
Respondents protected through law or court opinion for liability claims for damages to vehicles or cargoes during clearance activities?	NR		NR		NR		NR	
Are overturned tank trucks, which are intact and not leaking, uprighted without first off-loading?	NR		NR		NR		NR	
Does your state or local jurisdiction have a law that requires drivers involved in property-damage-only accidents to move the vehicles from travel lanes to a safe location to exchange info and wait for police?	NR		NR		NR		NR	
Have laws or policies regarding the removal of stalled/abandoned vehicles from freeway shoulders?	NR		NR		NR		NR	
Hours abandoned vehicles are allowed to remain on a freeway shoulder?	NR		NR		NR		NR	
Have policies or procedures for quick removal of vehicles?	NR		NR		NR		NR	

Arterial Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Boston City		Brookline Town		Cambridge City		Lynn City	
	1999	2005	1999	2005	1999	2005	1999	2005
Is Total Station equipment used to investigate major incidents?	NR		NR		NR		NR	
Handling of Towing Responses to Incidents								
Formal contract based on qualifications?	No		No		No		No	
Rotation with companies under contract?	No		No		No		No	
Separate lists kept for light and heavy response and for specialty recovery?	NR		NR		NR		NR	
Rotation list with minimal qualifications?	No		No		No		No	
In towing qualifications, do you require towers to be certified under the								
Towing and Recovery Ass. of America's National Drivers Cert. Program?	NR		NR		NR		NR	
DK: Don't know								
NR: No Response								
Leg: Legislation or action being planned								

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Highway Department		Newton City		Somerville City		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes		7	
ARTERIAL MANAGEMENT SECTION								
Number of arterial miles that agency owns or maintains	NR		NR		NR		0	
Number of arterial miles that is used for planning	NR		NR		NR		0	
Number of highway-rail intersections that agency maintains	342		NR		2		348	
Number of highway-rail intersections that is used for planning	NR		NR		NR		0	
Type of facilities used to conduct arterial management activities								
Activities housed in a free-standing dedicated building?	No		No		No		0	
Activities housed in a building shared with other activities?	No		No		No		1	
Activities conducted in a dedicated control room?	No		No		No		1	
Control room contains operator console(s)?	No		No		No		1	
Control room contains electronic wall map?	No		No		No		1	
Control room contains CCTV display(s)?	No		No		No		1	
Activities conducted in a room containing workstations or PCs that manage traffic?	No		No		No		0	
Facilities are electronically linked to other transportation mgt facilities?	No		No		No		0	
Staffing and hours of operation of arterial management activities								
Number of full-time agency staff members	NR		NR		NR		0	
Number of full time contractor staff members	NR		NR		NR		0	
Number of part-time agency staff members	NR		NR		NR		0	
Number of part-time contractor staff members	NR		NR		NR		0	
Staffed 24 hours day by agency staff or by others	NR		NR		NR		0	
Staffed during peak hours only by agency staff or by others	NR		NR		NR		0	
Staffed by others during off-peak hours	No		No		No		0	
Agency staff perform transportation management as an ancillary duty	No		No		No		0	
Agency staff dedicated to transportation management duty	No		No		No		0	
Types of operations conducted for arterial management								
Incident detection and management?	No		No		No		1	
This metropolitan area?	No		No		No		0	
Other metropolitan area?	No		No		No		0	
Monitoring and troubleshooting status of system components?	No		No		No		1	
Radio communications with other agencies?	No		No		No		0	
Exchange of electronic data with other agencies such as computer aided dispatch?	No		No		No		0	
Manual override of traffic signal timing plans	No		No		No		1	
Operating transportation mgt roadside devices (e.g., VMS, CCTV, etc.)	No		No		No		1	

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Highway Department		Newton City		Somerville City		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Describe agency's role in traffic signal control	NR		NR		NR			
Traffic Signals Operated by Agency								
Number of signalized intersections operated and owned by agency	NR	NR	NR	NR	NR	NR	740	0
Number of signalized intersections operated by agency but owned by another	NR	NR	NR	NR	NR	NR	20	0
Total number of signalized intersections operated by agency	1,054	1,100	98	103	67	76	2306	1346
<u>Characteristics of signalized intersections that agency operates</u>								
Under closed loop or central system control	100	120	6	13	0	26	708	221
Under real-time traffic adaptive control using advanced software	0	0	0	0	0	26	0	26
Using SCOOT	No		No		No		0	
Using SCATS	No		No		No		0	
Name of software	NR		NR		NR			
Allow signal preemption for emergency vehicles	0	0	0	0	15	45	61	66
Allow signal priority for transit vehicles	0	0	0	0	0	0	20	18
Within 200 feet of a highway-rail intersection	102	10	0	0	0	0	106	10
Within 200 feet of a highway-rail intersection that adjust signal timing	7	7	0	0	0	0	8	7
Software used to control the signals agency operates								
Date of last upgrade to traffic signal control system software?	NR		NR		NR			
How often do you update signal timing?	NR		NR		NR			
Software used and number of signalized intersections under control (1999, 2005)	NR		NR		NR			
Controllers used to control signals								
NEMA	0	0	0	0	0	0	660	0
170/179	0	0	0	0	0	0	0	0
2070 controller	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	100	50
Technologies Associated with Highway-Rail Intersections								
Total number of highway-rail intersections under electronic surveillance	50	60	NR	NR	NR	NR	50	60
<u>Highway-Rail intersection capabilities</u>								
Video surveillance	0	0	0	0	0	0	0	0
Electronic surveillance other than video	0	0	0	0	0	0	0	0
Ability to predict train arrival electronically	0	0	0	0	0	0	0	0
Equipped with electronic traffic violator devices	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Highway Department		Newton City		Somerville City		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Real-Time Electronic Traffic Data Collection Technologies								
Total number of signalized intersections covered by electronic surveillance	NR	NR	NR	NR	NR	NR	375	0
<i>Number of signalized intersections with data collection technologies</i>								
Loop detectors	0	0	0	0	0	0	700	0
Video detection cameras	0	0	0	0	0	0	3	0
Probe readers reading toll tags	0	0	0	0	0	0	0	0
Probe readers reading license plates	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	20	0
Roadside Technologies used to Distribute Traveler Information								
<i>Number deployed</i>								
Highway Advisory Radio	NR	NR	NR	NR	NR	NR	0	0
In-Vehicle Signing (IVS)	NR	NR	NR	NR	NR	NR	0	0
VMS controlling parking access	NR	NR	NR	NR	NR	NR	0	0
<i>Miles covered</i>								
Highway Advisory Radio	90	100	NR	NR	NR	NR	90	100
In-Vehicle Signing (IVS)	0	0	NR	NR	NR	NR	0	0
Variable Message Signs (VMS) on Arterials								
Candidate locations for deployment of VMS where VMS has been deployed	49	60	0	3	0	5	49	68
Candidate locations for deployment of VMS	49	60	0	3	0	5	49	68
Communication Technologies								
<i>Signalized intersections communicated with by each type of communication</i>								
Twisted pair cable	0	0	0	0	0	0	375	0
Coaxial cable	0	0	0	0	0	0	0	0
Fiber-optic cable	0	0	0	0	0	0	0	0
Other (e.g., wireless, dial-up modems, leased lines, etc.)	0	0	0	0	0	0	152	0
Does agency convey information on highway-rail intersection crossing status to travelers via roadside media such as VMS or HAR?								
	No		No		No		0	
ITS Standards Used Related to Traffic Signal Control								
Advanced Transportation Controller (ATC) Software Application Interface (ITE 9603-1)	No		No		No		0	
ATC Physical Cabinet Functional Design (ITE-9603-2)	No		No		No		0	
ATC Functionality and Interface Definitions (ITE-9603-3)	No		No		No		0	
Natl. Trans. Communications for ITS Protocol (NTCIP) Class B Profile (AASHTO TS 3.3)	No		No		No		0	
NTCIP Data Collection and Monitoring Devices (AASHTO TS 3.DCM)	No		No		No		0	
NTCIP Object Definitions for Video Camera Control (AASHTO TS 3.VCC)	No		No		No		0	
NTCIP Object Definitions for Actuated Traffic Signal Controller Units (AASHTO TS 3.5)	No		No		No		0	
Would agency be willing to participate in testing of ITS Standards?	NR		NR		NR		1	
Have agreements in place with other agencies to use similar hardware and software to aid maintenance and interoperability?								
	NR		NR		NR		1	

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Highway Department		Newton City		Somerville City		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
INCIDENT MANAGEMENT ON ARTERIAL STREETS								
Receive information on highway-rail intersection crossing blockages for the purpose of managing incident response?	No		No		No		0	
Use of Service Patrols to Assist in Detection and Response to Incidents								
Publicly operated service patrol vehicles	Yes		No		No		1	
Privately operated service patrol vehicles operated under public contract	No		No		No		0	
Total number of arterial miles patrolled by these services	265	300	NR	NR	NR	NR	265	300
Miles Covered by Methods to Detect and Verify Incidents								
Free cellular phone call to a dedicated phone number other than 911	0	0	0	0	0	0	0	0
Free cellular phone call to an area radio station	0	0	0	0	0	0	0	0
Police patrols	0	0	0	0	0	0	0	0
Computer algorithms linked to traffic surveillance equipment	50	60	0	0	0	0	50	60
CCTV	50	60	0	0	0	0	50	60
Private sector sources (e.g., Shadow Traffic, Smart Routes)	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
Procedures in place for Arterial Incident Response?								
Working agreement(s)/arrangement(s) with other agencies	No		No		No		0	
Inter-agency incident management admin. team that meets regularly	No		No		No		0	
Major incident response team that responds to major incidents	No		No		No		0	
Set of goals/objectives for incident mgt that has been adopted by agencies in region	No		No		No		0	
Methods of Communication Used On-Site at an Incident								
<u>Police</u>								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		No		No		0	
Hand-held (i.e., walkie-talkie)	No		No		No		0	
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
<u>Fire</u>								
Two-way radio	No		Yes		No		1	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		Yes		No		1	
Hand-held (i.e., walkie-talkie)	No		Yes		No		1	
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
<u>DOT</u>								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		No		No		0	
Hand-held (i.e., walkie-talkie)	No		No		No		0	

Arterial Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Highway Department		Newton City		Somerville City		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
<u>Towing</u>								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		No		No		0	
Hand-held (i.e., walkie-talkie)	No		No		No		0	
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
Which police agencies typically respond to incidents on arterials?								
State Police	No		Yes		No		1	
County Police or Sheriff	No		No		No		0	
City Police	No		Yes		No		1	
Who provides on-site emergency medical response?								
Fire	No		Yes		No		1	
Emergency Management Service Agency	No		Yes		No		1	
Private hospital	No		No		No		0	
Has a multi-agency contact list been developed in area containing the names, phone numbers, etc. for the appropriate response personnel?	NR		NR		NR		0	
Is the Incident Command System used to manage incident scenes?	NR		NR		NR		0	
Is there a legal specification by state law or formal agreement as to who is "in charge" at the incident scene?								
Specified by state law?	No		Yes		No		1	
Formal agreement?	No		No		No		0	
Not specified or don't know?	No		No		No		0	
On-scene command post used to manage activities of responding agencies?	NR		Yes		NR		1	
Are there communication linkages to a communications traffic/freeway mgt center?	NR		NR		NR		0	
Plan developed and adopted by responding agencies for staging and parking response vehicles and equip. at incident site that minimizes lane blockage and facilitates the re-opening of lanes?	NR		NR		NR		0	
Respondents protected through law or court opinion for liability claims for damages to vehicles or cargoes during clearance activities?	NR		NR		NR		0	
Are overturned tank trucks, which are intact and not leaking, uprighted without first off-loading?	NR		NR		NR		0	
Does your state or local jurisdiction have a law that requires drivers involved in property-damage-only accidents to move the vehicles from travel lanes to a safe location to exchange info and wait for police?	NR		NR		NR		0	
Have laws or policies regarding the removal of stalled/abandoned vehicles from freeway shoulders?	NR		NR		NR		0	
Hours abandoned vehicles are allowed to remain on a freeway shoulder?	NR		NR		NR		0	
Have policies or procedures for quick removal of vehicles?	NR		NR		NR		0	

Arterial Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Highway Department		Newton City		Somerville City		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Is Total Station equipment used to investigate major incidents?	NR		NR		NR		0	
Handling of Towing Responses to Incidents								
Formal contract based on qualifications?	No		No		No		0	
Rotation with companies under contract?	No		No		No		0	
Separate lists kept for light and heavy response and for specialty recovery?	NR		NR		NR		0	
Rotation list with minimal qualifications?	No		No		No		0	
In towing qualifications, do you require towers to be certified under the								
Towing and Recovery Ass. of America's National Drivers Cert. Program?	NR		NR		NR		0	
DK: Don't know								
NR: No Response								
Leg: Legislation or action being planned								

Appendix G
Arterial Management Integration

Arterial Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Boston City		Brookline Town	
	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes	
Arterial Management Section				
<u>Arterial Mgt. agencies in metropolitan area with which you share info.</u>				
Share Timing Plans Information	Massachusetts Highway Department, Brookline Town Transportation Department, MDC with 15 locations, Mass Port, Mass Turnpike Authority	Mass Turnpike Authority	short survey	None listed
Coordinate Changes to Timing Plans	Brookline Town Transportation Department, MDC with 15 locations	Brookline Town Transportation Department, MDC with 15 locations	short survey	None listed
Turn over Control of Signals	None listed	None listed	None listed	None listed
Agencies your agency provides arterial travel times, speeds, and conditions information, share infrastructure or coordinates operation				
<i>Freeway Management Agencies</i>				
Provide Information	Massachusetts Turnpike Authority	Massachusetts Turnpike Authority	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Incident Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Public Transit Operators Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Arterial Management Agencies</i>				
Provide Information	Massachusetts Highway Department, Metropolitan Dist. Comm.	Massachusetts Highway Department, Metropolitan Dist. Comm.	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed

Arterial Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Boston City		Brookline Town	
	1999	2005	1999	2005
<u>Receiving real-time information via electronic means from others</u>				
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>	None listed	None listed	None listed	None listed
<i>Public Transit operators from which your agency receives arterial travel times derived from vehicle probes</i>	None listed	None listed	None listed	None listed
<i>Incident Management agencies from which your agency receives incident clearance and/or incident severity, location, and type information</i>				
Receive information on Incident Clearance	None listed	None listed	None listed	None listed
Receive information on Incident Severity, Location, and Type	None listed	None listed	None listed	None listed
<i>Toll Collection agencies from which your agency receives arterial travel times derived from vehicles probes</i>	None listed	None listed	None listed	None listed
Arterial Incident Management Section				
Agencies your agency provides incident severity, location, and type info. and/or shares infrastructure and/or coordinates operation				
<i>Emergency Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Freeway Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Public Transit Operators</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<u>Receiving real-time information via electronic means from others</u>				
<i>Emergency Management agencies from which your agency receives arterial incident clearance and/or arterial incident severity</i>				
Receive Arterial Incident Clearance Information	None listed	None listed	None listed	None listed
Receive Arterial Incident Severity Information	None listed	None listed	None listed	None listed
<i>Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions</i>	None listed	None listed	None listed	None listed
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>	None listed	None listed	None listed	None listed

*short survey: Agency responded using a short survey. The survey did not include names of individual agencies, but only identified whether integration exists.

Arterial Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Cambridge City		Lynn City	
	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes	
Arterial Management Section				
<u>Arterial Mgt. agencies in metropolitan area with which you share info.</u>				
Share Timing Plans Information	None listed	None listed	None listed	None listed
Coordinate Changes to Timing Plans	None listed	None listed	short survey	None listed
Turn over Control of Signals	None listed	None listed	None listed	None listed
<u>Agencies your agency provides arterial travel times, speeds, and conditions information, share infrastructure or coordinates operation</u>				
<i>Freeway Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Incident Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Public Transit Operators Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Arterial Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed

Arterial Management Integration
Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Cambridge City		Lynn City	
	1999	2005	1999	2005
<u>Receiving real-time information via electronic means from others</u>				
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>	None listed	None listed	None listed	None listed
<i>Public Transit operators from which your agency receives arterial travel times derived from vehicle probes</i>	None listed	None listed	None listed	None listed
<i>Incident Management agencies from which your agency receives incident clearance and/or incident severity, location, and type information</i>				
Receive information on Incident Clearance	None listed	None listed	None listed	None listed
Receive information on Incident Severity, Location, and Type	None listed	None listed	None listed	None listed
<i>Toll Collection agencies from which your agency receives arterial travel times derived from vehicles probes</i>				
<i>Arterial Incident Management Section</i>				
<i>Agencies your agency provides incident severity, location, and type info. and/or shares infrastructure and/or coordinates operation</i>				
<i>Emergency Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Freeway Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Public Transit Operators</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<u>Receiving real-time information via electronic means from others</u>				
<i>Emergency Management agencies from which your agency receives arterial incident clearance and/or arterial incident severity</i>				
Receive Arterial Incident Clearance Information	None listed	None listed	None listed	None listed
Receive Arterial Incident Severity Information	None listed	None listed	None listed	None listed
<i>Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions</i>				
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>	None listed	None listed	None listed	None listed

*short survey: Agency responded using a short survey. The survey did not include names of individual agencies, but only identified whether integration exists.

Arterial Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Massachusetts Highway Department		Newton City	
	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes	
Arterial Management Section				
<u>Arterial Mgt. agencies in metropolitan area with which you share info.</u>				
Share Timing Plans Information	None listed	None listed	short survey	None listed
Coordinate Changes to Timing Plans	short survey	None listed	short survey	None listed
Turn over Control of Signals	None listed	None listed	None listed	None listed
Agencies your agency provides arterial travel times, speeds, and conditions information, share infrastructure or coordinates operation				
<i>Freeway Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Incident Management Agencies</i>				
Provide Information	short survey	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Public Transit Operators Agencies</i>				
Provide Information	None listed	None listed	short survey	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Arterial Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed

Arterial Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Massachusetts Highway Department		Newton City	
	1999	2005	1999	2005
<u>Receiving real-time information via electronic means from others</u>				
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>				
	None listed	None listed	None listed	None listed
<i>Public Transit operators from which your agency receives arterial travel times derived from vehicle probes</i>				
	short survey	None listed	None listed	None listed
<i>Incident Management agencies from which your agency receives incident clearance and/or incident severity, location, and type information</i>				
Receive information on Incident Clearance	None listed	None listed	None listed	None listed
Receive information on Incident Severity, Location, and Type	None listed	None listed	None listed	None listed
<i>Toll Collection agencies from which your agency receives arterial travel times derived from vehicles probes</i>				
	None listed	None listed	None listed	None listed
Arterial Incident Management Section				
Agencies your agency provides incident severity, location, and type info. and/or shares infrastructure and/or coordinates operation				
<i>Emergency Management Agencies</i>				
Provide Information	short survey	None listed	short survey	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Freeway Management Agencies</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<i>Public Transit Operators</i>				
Provide Information	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed
<u>Receiving real-time information via electronic means from others</u>				
<i>Emergency Management agencies from which your agency receives arterial incident clearance and/or arterial incident severity</i>				
Receive Arterial Incident Clearance Information	short survey	None listed	short survey	None listed
Receive Arterial Incident Severity Information	short survey	None listed	None listed	None listed
<i>Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions</i>				
	None listed	None listed	None listed	None listed
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>				
	None listed	None listed	None listed	None listed

*short survey: Agency responded using a short survey. The survey did not include names of individual agencies, but only identified whether integration exists.

Arterial Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Somerville City	
	1999	2005
Agency Returned Survey?	Yes	
Arterial Management Section		
<u>Arterial Mgt. agencies in metropolitan area with which you share info.</u>		
Share Timing Plans Information	short survey	None listed
Coordinate Changes to Timing Plans	short survey	None listed
Turn over Control of Signals	None listed	None listed
<u>Agencies your agency provides arterial travel times, speeds, and conditions information, share infrastructure or coordinates operation</u>		
<i>Freeway Management Agencies</i>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<i>Incident Management Agencies</i>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<i>Public Transit Operators Agencies</i>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<i>Arterial Management Agencies</i>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed

Arterial Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Somerville City	
	1999	2005
<u>Receiving real-time information via electronic means from others</u>		
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>	short survey	None listed
<i>Public Transit operators from which your agency receives arterial travel times derived from vehicle probes</i>	None listed	None listed
<i>Incident Management agencies from which your agency receives incident clearance and/or incident severity, location, and type information</i>		
Receive information on Incident Clearance	None listed	None listed
Receive information on Incident Severity, Location, and Type	None listed	None listed
<i>Toll Collection agencies from which your agency receives arterial travel times derived from vehicles probes</i>	None listed	None listed
Arterial Incident Management Section		
Agencies your agency provides incident severity, location, and type info. and/or shares infrastructure and/or coordinates operation		
<i>Emergency Management Agencies</i>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<i>Freeway Management Agencies</i>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<i>Public Transit Operators</i>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<u>Receiving real-time information via electronic means from others</u>		
<i>Emergency Management agencies from which your agency receives arterial incident clearance and/or arterial incident severity</i>		
Receive Arterial Incident Clearance Information	None listed	None listed
Receive Arterial Incident Severity Information	None listed	None listed
<i>Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions</i>	None listed	None listed
<i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i>	None listed	None listed

*short survey: Agency responded using a short survey. The survey did not include names of individual agencies, but only identified whether integration exists.

Appendix H
Arterial Management Information Collection and Dissemination

Data Collection and Dissemination: Arterial Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Boston City		Brookline Town		Cambridge City	
	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes	
Arterial Management Section						
Data collected, archived, and/or transferred to another agency						
Collected by your agency	Incidents, Highway operations coordination information	NR	NR	NR	NR	NR
Archived by your agency	NR	NR	NR	NR	NR	NR
Transferred to another agency by your agency	Incidents, Highway operations coordination information	NR	NR	NR	NR	NR
Importance of making information available to the public						
Ranked High	NR		NR		NR	
Ranked Medium	NR		NR		NR	
Ranked Low	NR		NR		NR	
Groups that make requests for the data	Consultants		NR		NR	
What is the data used for?	Traffic analysis, Construction impact determination		NR		NR	
Methods used to disseminate arterial information to the public						
Technologies your agency uses to disseminate:						
	NR	Internet Web sites	NR	NR	NR	NR
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR	NR	NR
Internet web site reporting arterial conditions	NR		NR		NR	
Telephone system for reporting arterial information to the public	NR		NR		NR	
Organizations your agency sends information for dissemination to the public	NR		NR		NR	
Arterial Incident Management Section						
Methods used to distribute incident location and severity information to the public						

Data Collection and Dissemination: Arterial Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Boston City		Brookline Town		Cambridge City	
	1999	2005	1999	2005	1999	2005
Technologies your agency uses to disseminate:						
	NR	NR	NR	NR	NR	NR
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR	NR	NR
Internet web site reporting incident information	NR		NR		NR	
Telephone system for reporting incident information to the public	NR		NR		NR	
Organizations your agency sends information for dissemination to the public	NR		NR		NR	

Data Collection and Dissemination: Arterial Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Lynn City		Massachusetts Highway Department		Newton City		Somerville City	
	1999	2005	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes		Yes	
Arterial Management Section								
Data collected, archived, and/or transferred to another agency								
Collected by your agency	NR	NR	NR	NR	NR	NR	NR	NR
Archived by your agency	NR	NR	NR	NR	NR	NR	NR	NR
Transferred to another agency by your agency	NR	NR	NR	NR	NR	NR	NR	NR
Importance of making information available to the public								
Ranked High	NR		NR		NR		NR	
Ranked Medium	NR		NR		NR		NR	
Ranked Low	NR		NR		NR		NR	
Groups that make requests for the data	NR		NR		NR		NR	
What is the data used for?	NR		NR		NR		NR	
Methods used to disseminate arterial information to the public								
Technologies your agency uses to disseminate:	NR	NR	NR	Dedicated cable TV, Internet Web sites, Kiosks, E-mail or other direct PC communication, In-vehicle navigation systems	NR	NR	NR	Dedicated cable TV, Telephone system, Internet Web sites, Kiosks
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR	NR	NR	NR	NR
Internet web site reporting arterial conditions	NR		NR		NR		NR	
Telephone system for reporting arterial information to the public	NR		NR		NR		NR	
Organizations your agency sends information for dissemination to the public	NR		NR		NR		NR	
Arterial Incident Management Section								
Methods used to distribute incident location and severity information to the public								

Data Collection and Dissemination: Arterial Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Lynn City		Massachusetts Highway Department		Newton City		Somerville City	
	1999	2005	1999	2005	1999	2005	1999	2005
Technologies your agency uses to disseminate:			Dedicated cable TV, Telephone system, Internet Web sites, Kiosks	Dedicated cable TV, Telephone system, Internet Web sites, Pagers or personal data assistants, Kiosks, E-mail or other direct PC communication, In-vehicle navigation systems				Dedicated cable TV, Telephone system, Internet Web sites, Kiosks
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR	NR	NR	NR	NR
Internet web site reporting incident information	NR		NR		NR		NR	
Telephone system for reporting incident information to the public	NR		NR		NR		NR	
Organizations your agency sends information for dissemination to the public	NR		NR		NR		NR	

Appendix I
Transit Management Components

Transit Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Bay Transportation Authority		Merrimack Valley Regional Transit		Totals	
	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		2	
Number of vehicles used in revenue service						
Fixed Route Bus	1,030	1,030	45	51	1,075	1081
Heavy or Rapid Rail	408	408	0	0	408	408
Light Rail	220	228	0	0	220	228
Demand Responsive	380	400	35	35	415	435
Commuter Rail	346	330	0	0	346	330
Ferry Boat	12	12	0	0	12	12
Have of plan to have an Automated Vehicle Location System?	Yes		Yes		2	
Primary and Secondary Location Technologies Used						
<i>Primary Technologies</i>						
GPS	No	No	No	Yes	0	1
Sign/Odometer	No	No	No	No	0	0
Dead-Reckoning	No	No	No	No	0	0
LORAN C	No	No	No	No	0	0
Other	Yes	Yes	No	No	1	1
<i>Backup Technologies</i>						
GPS	No	No	No	No	0	0
Sign/Odometer	No	No	No	No	0	0
Dead-Reckoning	No	Yes	No	No	0	1
LORAN C	No	No	No	No	0	0
Other	No	No	No	No	0	0
Number of Vehicles Equipped with AVL						
Fixed Route Bus	0	250	0	51	0	301
Heavy or Rapid Rail	408	408	0	0	408	408
Light Rail	220	228	0	0	220	228
Demand Responsive	0	0	0	30	0	30
Commuter Rail	0	0	NR	NR	0	0
Ferry Boat	0	0	NR	NR	0	0
Motor Buses Operated as Vehicle Probes						
Number of Motor Buses equipped as probes on freeways?	NR		0		0	
Number of Motor Buses equipped as probes on arterials?	NR		0		0	
Have Organized Regional Incident Management Program?	No		Yes		1	
Have Automated Traveler Information System?	Yes		Yes		2	

Transit Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Bay Transportation Authority		Merrimack Valley Regional Transit		Totals	
	1999	2005	1999	2005	1999	2005
<i>Services Automated Traveler Info. System Applies:</i>						
Fixed Route	Yes		Yes		2	
Heavy Rail	Yes		No		1	
Light Rail	Yes		No		1	
Demand Responsive	No		No		0	
Commuter Rail	Yes		No		1	
Ferry	Yes		No		1	
Locations where traveler information is displayed to public						
Number of bus stops on fixed transit routes	8,500	8,450	NR	NR	8,500	8,450
Bus stops on fixed transit routes that display traveler info to the public	0	0	2	3	2	3
Number of rail stations	236	247	NR	NR	236	247
Number of rail stations that display traveler information	236	247	NR	NR	236	247
Number of other locations that display traveler information to public	300	300	NR	NR	300	300
Number of vehicles the traveler information system has available						
Fixed Route Bus	6	250	45	51	51	301
Heavy or Rapid Rail	86	86	NR	NR	86	86
Light Rail	4	100	NR	NR	4	100
Demand Responsive	0	0	NR	NR	0	0
Commuter Rail	0	0	NR	NR	0	0
Ferry Boat	0	0	NR	NR	0	0
Deployment of Communications Technology						
<i>Attributes of Radio System:</i>						
Digital?	No		No		0	
Analog?	Yes		Yes		2	
Trunked?	No		No		0	
Regular?	Yes		Yes		2	
Services that use a Digital or Trunked Radio System						
<i>Digital Only</i>						
Fixed Route Bus	No	Yes	No	Yes	0	2
Heavy or Rapid Rail	No	Yes	No	No	0	1
Light Rail	No	Yes	No	No	0	1
Demand Responsive	No	No	No	No	0	0
Commuter Rail	No	No	No	No	0	0
Ferry Boat	No	No	No	No	0	0
<i>Trunked Only</i>						
Fixed Route Bus	No	No	No	No	0	0
Heavy or Rapid Rail	No	No	No	No	0	0

Transit Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Bay Transportation Authority		Merrimack Valley Regional Transit		Totals	
	1999	2005	1999	2005	1999	2005
Light Rail	No	No	No	No	0	0
Demand Responsive	No	No	No	No	0	0
Commuter Rail	No	No	No	No	0	0
Ferry Boat	No	No	No	No	0	0
Have of plan to have Automatic Passenger Counters (APCs)?	No		No		0	
Methods used to count passengers						
Treadle Mats	No		No		0	
Infrared Beams	No		No		0	
Primary and Secondary Location Technologies Used						
<u>Primary Technologies</u>						
GPS	No	No	No	No	0	0
Differential GPS	No	Yes	No	No	0	1
Signpost/Odometer	No	No	No	No	0	0
Dead_Reckoning	No	No	No	No	0	0
LORAN C	No	No	No	No	0	0
Other	No	No	No	No	0	0
<u>Backup Technologies</u>						
GPS	No	No	No	No	0	0
Differential GPS	No	No	No	No	0	0
Signpost/Odometer	No	No	No	No	0	0
Dead_Reckoning	No	Yes	No	No	0	1
LORAN C	No	No	No	No	0	0
Other	No	No	No	No	0	0
Number of Vehicles with APCs						
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0
Remote Real-Time Monitoring and Computer Assisted Dispatching						
<u>Remote Real-Time Monitoring</u>						
Fixed Route Bus	0	250	NR	NR	0	250
Heavy or Rapid Rail	0	0	NR	NR	0	0
Light Rail	0	0	NR	NR	0	0
Demand Responsive	0	0	NR	NR	0	0
Commuter Rail	0	0	NR	NR	0	0

Transit Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Bay Transportation Authority		Merrimack Valley Regional Transit		Totals	
	1999	2005	1999	2005	1999	2005
Ferry Boat	0	0	NR	NR	0	0
<u>Automated Dispatching or Control Software</u>						
Fixed Route Bus	0	1,000	0	51	0	1,051
Heavy or Rapid Rail	408	408	NR	NR	408	408
Light Rail	187	228	NR	NR	187	228
Demand Responsive	0	0	0	30	0	30
Commuter Rail	0	0	NR	NR	0	0
Ferry Boat	0	0	NR	NR	0	0
Coordinate or plan to coordinate travel request and vehicle dispatching for multiple agencies?	No		No		0	
Is there or will there be a Transportation Management Center (TMC) in the region that controls transit and highway modes?	No		No		0	
Modes that TMC currently controls:						
Highways	No	No	No	No	0	0
Fixed Route Bus	No	No	No	No	0	0
Heavy or Rapid Rail	No	No	No	No	0	0
Light Rail	No	No	No	No	0	0
Demand Responsive	No	No	No	No	0	0
Commuter Rail	No	No	No	No	0	0
Ferry Boat	No	No	No	No	0	0
Other	No	No	No	No	0	0
Priority at Traffic Signals and Ramp Meter Priority						
<u>Priority at Traffic Signals</u>						
Fixed Route Bus	0	20	NR	NR	0	20
Light Rail	0	0	NR	NR	0	0
Demand Responsive	0	0	NR	NR	0	0
<u>Ramp Meter Priority</u>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Number of Vehicles Equipped with Navigation Aids						
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0

Transit Management
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Bay Transportation Authority		Merrimack Valley Regional Transit		Totals	
	1999	2005	1999	2005	1999	2005
ITS Standards Used Related to Transit Management						
TCIP On Board Objects (TCIP-OB)	No		No		0	
TCIP Traffic Management Objects (TCIP-TM)	No		No		0	
TCIP Common Public Transportation Objects (TCIP-CPT)	No		No		0	
TCIP Passenger Information Objects (TCIP-PI)	No		No		0	
TCIP Incident Management Objects (TCIP-IM)	No		No		0	
TCIP Fare Collection Objects (TCIP-FC)	No		No		0	
TCIP Spatial Representation Objects (TCIP-SP)	No		No		0	
TCIP Control Center Objects (TCIP-CC)	No		No		0	
TCIP Scheduling/Runcutting Objects (TCIP-SCH)	No		No		0	
Send data communication between micro computer and heavy duty vehicle applications (SAE J1708)	Yes		No		1	
Would agency be willing to participate in testing of ITS Standards?	No		Yes		1	
Have agreements in place with other agencies to use similar hardware and software to aid maintenance and interoperability?	No		No		0	
Electronic Fare Payment						
Have full operational Electronic Fare Payment System?	Yes		Yes		2	
Methods of Fare Payment						
<i>Stored value card with fare deducted for each trip</i>						
Magnetic Stripe	Yes		No		1	
Smart Card	No		No		0	
Debit Card	No		No		0	
<i>Billed by the month for trips taken</i>						
Magnetic Stripe	No		No		0	
Smart Card	No		No		0	
Credit Card	No		No		0	
<i>Monthly Pass</i>						
Magnetic Stripe	Yes		No		1	
Smart Card	No		Yes		1	
Vehicles/Stations Equipped with Automated Payment Mechanism						
<i>Magnetic Stripe Readers</i>						
Fixed Route Bus Vehicles	1,030	1,030	NR	NR	1,030	1,030
Heavy or Rapid Rail Stations	29	29	NR	NR	29	29
Light Rail Stations	11	11	NR	NR	11	11
Demand Responsive Vehicles	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	0	0

Transit Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Bay Transportation Authority		Merrimack Valley Regional Transit		Totals	
	1999	2005	1999	2005	1999	2005
Ferry Boat Landings	NR	NR	NR	NR	0	0
<u>Smart Card Readers</u>						
Fixed Route Bus Vehicles	NR	NR	0	51	0	51
Heavy or Rapid Rail Stations	NR	NR	0	0	0	0
Light Rail Stations	NR	NR	0	0	0	0
Demand Responsive Vehicles	NR	NR	0	0	0	0
Commuter Rail Stations	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	0	0
<u>Credit Card</u>						
Fixed Route Bus Vehicles	NR	NR	0	0	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	0	0	0	0
Commuter Rail Stations	3	3	NR	NR	3	3
Ferry Boat Landings	3	3	NR	NR	3	3
<u>Debit Card</u>						
Fixed Route Bus Vehicles	NR	NR	0	0	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	0	0	0	0
Commuter Rail Stations	3	3	NR	NR	3	3
Ferry Boat Landings	3	3	NR	NR	3	3
NR: No Response						

Appendix J
Transit Management Integration

Transit Management Integration
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Massachusetts Bay Transportation Authority		Merrimack Valley Regional Transit	
	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes	
Transit operators in the region that use the same electronic payment system	None listed		None listed	
Toll operators from whom you accept electronic payment of transit fare through the use of ETC media	None listed		None listed	
Receiving real-time information via electronic means from others				
Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions				
<i>Receive Information</i>	None listed	Massachusetts Turnpike Authority (central artery I-90)	None listed	None listed
<i>Share Infrastructure</i>	None listed	Massachusetts Port Authority, Massachusetts Turnpike Authority (central artery I-90)	None listed	None listed
Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions				
<i>Receive Information</i>	None listed	Boston Transportation Department	None listed	None listed
<i>Share Infrastructure</i>		Massachusetts Highway Department, Boston Transportation Department, Lynn City, Waltham City, Cambridge City, Malden City	None listed	None listed
Incident Management agencies from which your agency receives incident severity, location, and type				
<i>Receive Information</i>	None listed	Massachusetts Turnpike Authority	None listed	None listed
<i>Share Infrastructure</i>	None listed	Massachusetts Turnpike Authority	None listed	None listed

Appendix K
Transit Management Information Collection and Dissemination

Data Collection and Dissemination: Transit Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Massachusetts Bay Transportation Authority	
	1999	2005
Agency Returned Survey?	Yes	
Methods used to disseminate transit information to the public		
Technologies your agency uses to disseminate:		
Transit routes, schedules and fares	Internet Web Sites, Telephone System	Internet Web Sites, Telephone System
Real-time transit schedule adherence or arrival and departure times	NR	Monitors/VMS (not in vehicle), Internet Web Sites
Technologies employed by other organization receiving your data		
Transit routes, schedules and fares	NR	NR
Real-time transit schedule adherence or arrival and departure times	Cell phone/voice, Internet Web Sites, Telephone System, Dedicated cable TV	
Internet web site reporting transit routes, schedules and fare, etc.	www.mbta.com www.smartraveler.com	
Telephone system for reporting transit information to the public	617.222.3200	
Organizations your agency sends information for dissemination to the public	Smart Routes System, Inc. 147 Portland Street Cambridge, MA	
Data collected, archived, and/or transferred to another agency		
Collected by your agency	Weather conditions, Passenger count, Trip itinerary planning records, Passenger information (e.g., surveys, O/D), Route designations (snow emergency, etc), Transit operations coordination information, Incidents, Current roadway work zones for transit, Scheduled roadway work zones for transit, Intermodal (air, rail, water) conditions, Emergency/evacuation routes and procedures, Highway operations coordination information	Vehicle monitoring status, Transit vehicle signal priority
Archived by your agency	Weather conditions, Passenger count, Trip itinerary planning records, Passenger information (e.g., surveys, O/D), Incidents, Scheduled roadway work zones for transit	Vehicle monitoring status

Data Collection and Dissemination: Transit Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Massachusetts Bay Transportation Authority	
	1999	2005
Transferred to another agency by your agency	Passenger count, Passenger information (e.g., surveys, O/D), Route designations (snow emergency, etc), Current roadway work zones for transit, Scheduled roadway work zones for transit	Transit vehicle signal priority
Importance of making information available to the public		
Ranked High	Trip itinerary planning records, Road conditions, Route designations (snow emergency, etc), Scheduled roadway work zones for transit, Emergency/evacuation routes and procedures, Transit vehicle signal priority	
Ranked Medium	Passenger information (e.g., surveys, O/D), Vehicle monitoring status, Vehicle time and location, Transit operations coordination information, Incidents, Current roadway work zones for transit, Intermodal (air, rail, water) conditions	
Ranked Low	Weather conditions, Passenger count, Emergency vehicle signal preemption, Highway operations coordination information	
Groups that make requests for the data	Advanced Traveler Information Systems (ATIS) providers, Consultants, MPOs, Media (i.e., TV stations, radio stations), Universities	
What is the data used for?	Dissemination to the public, Planning, Traffic analysis	

Data Collection and Dissemination: Transit Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Merrimack Valley Regional Transit	
	1999	2005
Agency Returned Survey?	Yes	
Methods used to disseminate transit information to the public		
Technologies your agency uses to disseminate:		
Transit routes, schedules and fares	Audible Enunciators, Variable Message Signs (in vehicle), In-vehicle navigation systems, E-mail or other direct PC communication, Internet Web Sites, Telephone System	Audible Enunciators, Variable Message Signs (in vehicle), In-vehicle navigation systems, E-mail or other direct PC communication, Internet Web Sites, Telephone System
Real-time transit schedule adherence or arrival and departure times	NR	NR
Technologies employed by other organization receiving your data		
Transit routes, schedules and fares	NR	NR
Real-time transit schedule adherence or arrival and departure times	NR	
Internet web site reporting transit routes, schedules and fare, etc.	www.mvrta.com	
Telephone system for reporting transit information to the public	NR	
Organizations your agency sends information for dissemination to the public	NR	
Data collected, archived, and/or transferred to another agency		
Collected by your agency	NR	NR
Archived by your agency	NR	NR

Data Collection and Dissemination: Transit Management
 Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Merrimack Valley Regional Transit	
	1999	2005
Transferred to another agency by your agency	NR	NR
Importance of making information available to the public		
Ranked High	NR	
Ranked Medium	NR	
Ranked Low	NR	
Groups that make requests for the data	NR	
What is the data used for?	NR	

Appendix L
Emergency Management

Emergency Management Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Total Vehicles		Navigation Capabilities		AVL		CAD		CAD Equipped with Mobile Data Terminal		Vehicles Equipped with Preemption		Participate in Formal Incident Mgt Program	Send Incident Info to other agencies	List of agencies receiving data
	1999	2005	1999	2005	1999	2005	1999	2005	1999	2005	1999	2005			
Boston City Fire Department	200	200	0	NR	NR	NR	0	NR	NR	NR	0	NR	Yes	Yes	Boston Emergency Management Agency, Massachusetts Emergency Management Agency, Federal Emergency Management Agency, Massachusetts Department of Fire Services, U.S. Fire Administrator
Boston City Police Department	1,027	NR	0	NR	0	NR	700	NR	320	NR	0	NR	NR	NR	None listed
Brookline City Fire Department	14	14	0	7	0	7	0	14	NR	8	0	10	No	No	None listed
Brookline City Police Department	45	50	0	0	35	50	20	50	17	35	0	0	No	Yes	Boston City Police Department
Cambridge City Fire & EMS Department	22	25	0	5	5	10	25	NR	10	20	0	0	Yes	Yes	Massachusetts State Fire Marshal
Cambridge City Police Department	70	NR	0	NR	2	NR	64	NR	25	NR	0	NR	Yes	Yes	Massachusetts State Fire Marshal
Framingham Town Emergency Medical Services	2	2	0	0	0	0	0	0	0	0	2	2	No	Yes	Massachusetts Department of Health
Framingham Town Fire Department	10	10	0	0	0	0	10	10	0	0	3	10	No	Yes	Massachusetts State Fire Marshal
Framingham Town Police Department	48	NR	0	NR	0	NR	48	NR	26	NR	0	NR	No	No	None listed
Lawrence City Fire Department	24	24	0	0	0	0	0	0	0	0	12	12	No	No	None listed
Lawrence City Police Department	49	52	0	0	0	0	0	25	0	25	0	0	No	No	None listed
Lynn City Fire & EMS Department	20	20	0	0	0	0	20	20	0	0	0	0	NR	NR	None listed
Lynn City Police Department	34	NR	0	NR	0	NR	34	NR	26	NR	0	NR	No	No	None listed
Malden City Fire Department	9	NR	0	NR	0	NR	0	NR	0	NR	0	NR	Yes	No	None listed
Malden City Police Department	32	39	0	0	0	0	8	13	8	13	0	0	No	No	None listed
Medford City Fire Department	9	NR	0	NR	0	NR	9	NR	0	NR	9	NR	No	Yes	Massachusetts Fire Incident Reporting System
Newton City Fire Department	35	NR	0	NR	0	NR	0	NR	0	NR	0	NR	Yes	Yes	Boston City Fire Department, Metro Fire Control
Newton City Police Department	62	65	0	NR	0	NR	NR	NR	12	20	NR	NR	No	No	None listed
Quincy City Fire Department	24	26	1	4	0	NR	0	20	0	4	0	8	Yes	Yes	Massachusetts State Fire Marshal, Massachusetts State Emergency Management, Massachusetts State Police
Quincy City Police Department	87	NR	0	NR	0	NR	4	NR	0	NR	0	NR	No	No	None listed

Emergency Management Agencies for Metropolitan Area: Boston, Lawrence, Salem

Agency Name	Total Vehicles		Navigation Capabilities		AVL		CAD		CAD Equipped with Mobile Data Terminal		Vehicles Equipped with Preemption		Participate in Formal Incident Mgt Program	Send Incident Info to other agencies	List of agencies receiving data
	1999	2005	1999	2005	1999	2005	1999	2005	1999	2005	1999	2005			
Somerville City Fire Department	13	NR	0	NR	0	NR	0	NR	0	NR	0	NR	Yes	Yes	Federal Emergency Management Agency, Massachusetts Emergency Management Agency, Department of Emergency Planning, Office of the State Fire Marshal
Somerville City Police Department	23	30	0	0	0	0	41	45	10	15	0	0	Yes	Yes	Massachusetts State Police
Waltham City Fire Department	18	NR	0	NR	0	NR	10	NR	0	NR	12	NR	Yes	Yes	None listed
Waltham City Police Department	25	30	0	0	0	15	25	30	20	30	0	0	Yes	Yes	Waltham Housing Authority, Bently College Campus Police, Web page
Weymouth City Fire Department	9	9	0	NR	0	NR	0	NR	0	NR	0	NR	Yes	Yes	Massachusetts Department of Fire Services
Weymouth City Police Department	33	NR	0	1	0	NR	33	NR	3	20	0	0	No	No	None listed

Appendix M
Electronic Toll Collection

Electronic Toll Collection
Agencies for Metropolitan Area: Boston, Lawrence, Salem

	Massachusetts Turnpike Authority/Callahan & Sumner Tunnel		Massachusetts Turnpike Authority/Massachusetts Turnpike-Metropolitan Highway System		Massachusetts Turnpike Authority/Massachusetts Turnpike-Western Turnpike		Massachusetts Turnpike Authority/Ted Williams Tunnel		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes		Yes		4	
Number of toll Collection Plazas operated	1	1	4	4	17	17	1	2	23	24
Number of toll collection plazas with dedicated ETC	1	1	4	4	17	17	1	2	23	24
Number of toll collection plazas with both manual and ETC	1	1	4	4	17	17	1	2	23	24
Number of toll collection lanes operated	8	8	47	47	166	166	6	10	227	231
Number of toll collection lanes with dedicated ETC	1	3	10	20	41	56	2	4	54	83
Number of toll collection lanes with both manual and ETC	1	1	0	0	0	0	2	0	3	1
Number of toll collection tags issued	220,000	0	220,000	500,000	220,000	500,000	220,000	0	880,000	1,000,000
Antennae Location Technologies										
In-Pavement?	No		No		No		No		0	
Focused Beam?	No		No		No		No		0	
Distributed Overhead?	Yes		Yes		Yes		Yes		4	
In-Vehicle Equipment Technologies										
Tag-based?	Yes		Yes		Yes		No		3	
Integrated circuit card-based?	No		No		No		No		0	
Are toll tags used by other toll operations in metro area?	Yes		Yes		Yes		Yes		4	
List of toll operators that use tags	Massachusetts Port Authority, Massachusetts Bay Transit Authority		Massachusetts Port Authority, Massachusetts Bay Transit Authority		Massachusetts Port Authority, Massachusetts Bay Transit Authority		Massachusetts Port Authority, Massachusetts Bay Transit Authority			
Are toll tags used by operators of public transit to pay transit fares in metro area?	No		No		No		No		0	
List of transit operators that use tags	None		None		None		None			
NR: No Response										