Tracking the Deployment of the Integrated Metropolitan ITS Infrastructure in Baltimore

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 75[1] 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

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[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 Baltimore 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 Baltimore region was 83% in 1997 and 81% 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 (HVH-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 Baltimore 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."

Baltimore
Summary Indicators*

Freeway miles with real-time traffic data collection technologies	1997: 0%, 1999: 38%, 2005: 57%
Freeway miles covered by on-call service patrols	1997: 54%, 1999: 59%, 2005: 59%
Arterial miles covered by on-call service patrols	1997: 0%, 1999: 0%, 2005: 4%
Signalized intersections under centralized or closed loop control	1997: 29%, 1999: 41%, 2005: 50%
Toll collection lanes with ETC capability	1997: No Response, 1999: 100%, 2005: 100%
Fixed-route transit vehicles equipped with AVL	1997: 26%, 1999: 43%, 2005: 97%
Fixed-route buses accepting electronic fare payment	1997: 0%, 1999: No Response, 2005: No Response
Highway-rail intersections under electronic surveillance	1997: No Response, 1999: No Response, 2005: No Response
Emergency management vehicles under CAD	1997: 0%, 1999: 52%, 2005: 64%
Freeway conditions disseminated to the public	1997: 0%, 1999: 38%, 2005: No Response

Legend: □ 1997, ■ 1999, ▨ 2005

Percent Deployment Opportunity

* 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*

Indicator	1997	1999	2005
Freeway miles under electronic surveillance	16%	22%	46%
Freeway miles covered by on-call service patrols	30%	35%	42%
Arterial miles covered by on-call service patrols	0%	3%	4%
Signalized intersections under centralized or closed loop control	46%	46%	54%
Toll collection lanes with ETC capability	36%	43%	91%
Fixed-route transit vehicles equipped with AVL	23%	30%	69%
Fixed-route buses accepting electronic fare payment	30%	45%	83%
Highway-rail intersections under electronic surveillance	5%	9%	14%
Emergency management vehicles under CAD	43%	66%	77%
Freeway conditions disseminated to the public	12%	22%	42%

Legend:
- ☐ 1997
- ■ 1999
- ▨ 2005

Percent Deployment Opportunity

* 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

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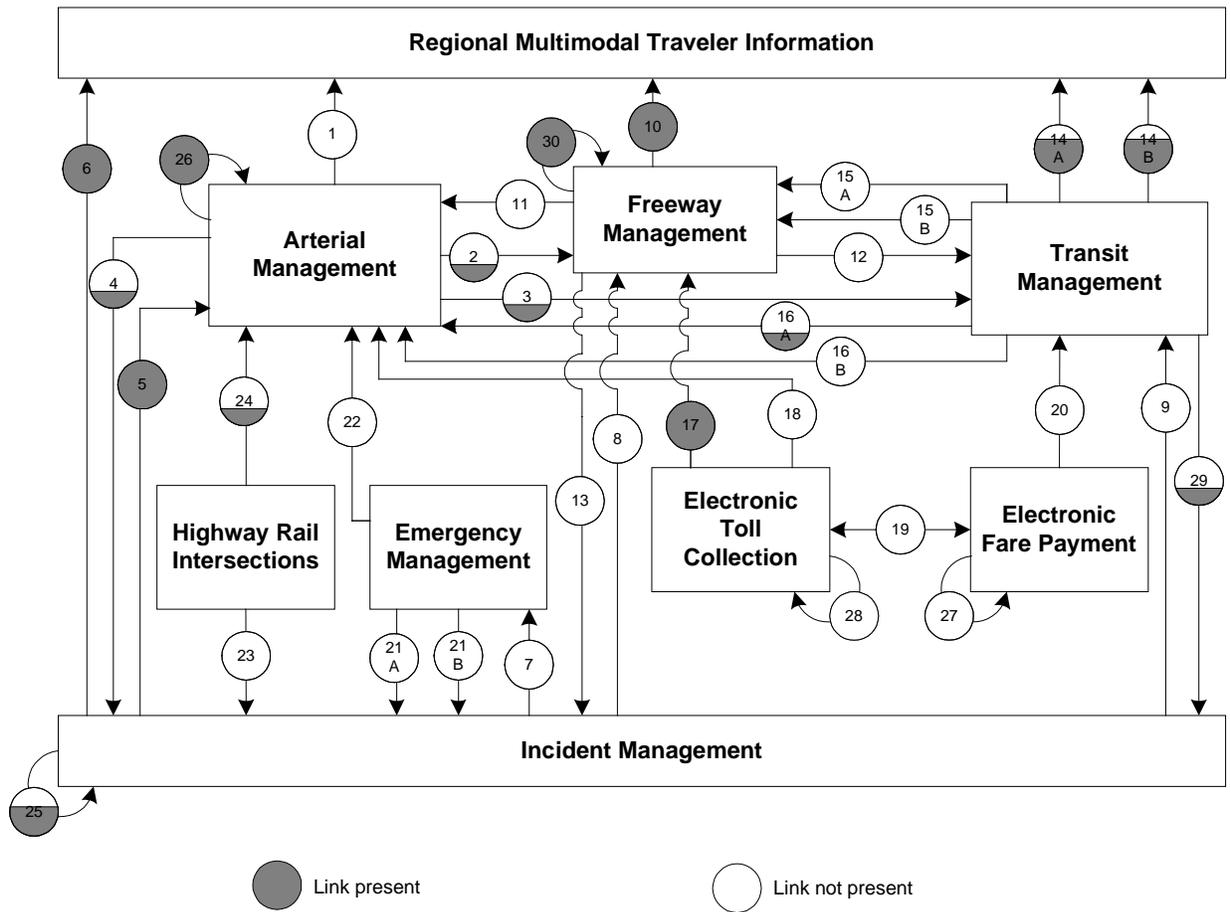
Note: Shading indicates the value of the link. For example a circle half shaded equals 50%

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 Baltimore 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.)

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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%.
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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).

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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%.
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Freeway Management Component Indicators

Baltimore
Freeway Management*

Freeway miles with real-time traffic data collection technologies	0% 38% 57%
Ramps controlled by ramp meter or miles under lane control (1997 only)	0% Not Collected in 1999 Not Collected in 2005
Ramps controlled by ramp meters (1999 and 2005)	Not Collected in 1997 No Response 0%
Miles controlled by lane control (1999 and 2005)	Not Collected in 1997 No Response No Response
Miles covered by VMS, HAR, or IVS (1997 only)	11% Not Collected in 1999 Not Collected in 2005
Miles covered by VMS (1999 and 2005)	Not Collected in 1997 No Response No Response
Miles covered by HAR (1999 and 2005)	Not Collected in 1997 20% 21%
Miles covered by IVS (1999 and 2005)	Not Collected in 1997 No Response No Response

Legend:
- ☐ 1997
- ■ 1999
- ▨ 2005

X-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

* 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.

	1997			1999			2005		
Description	Num	Den	%	Num	Den	%	Num	Den	%
Freeway centerline miles are under electronic surveillance for monitoring traffic flow	0	373	0%	142	373	38%	212	373	57%
Freeway entrance ramps are controlled by ramp meters or miles under lane control	0	373	0%						

Baltimore   9

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway entrance ramps are controlled by ramp meters					554		2	554	0%
Freeway centerline miles will be controlled by lane control					373			373	
Freeway miles are covered by VMS, HAR, or IVS	42	373	11%						
Freeway miles are covered by VMS					373			373	
Freeway miles are covered by HAR				76	373	20%	78	373	21%
Freeway miles are covered by IVS					373			373	

Baltimore
Freeway Management Integration*

Inputs   Outputs

2 — 33%

67% → Arterial Conditions

8 — 0% — 0% → Incident Conditions

15a — 0% — 0% → Ramp Priority

15b — 0%

0% → Probe Times

17 — 100% — 100%

100% 100%

30

0%

11 — 0%

10 — 100%

12 — 0% — 0%

13 — 0%

0%

Adjust Arterial Signals

0% — Affect Travel Decisions

100% — Adjust Routes/ Schedules

0% — Detect Inc. & Adjust Response

Legend
1999, **2005**
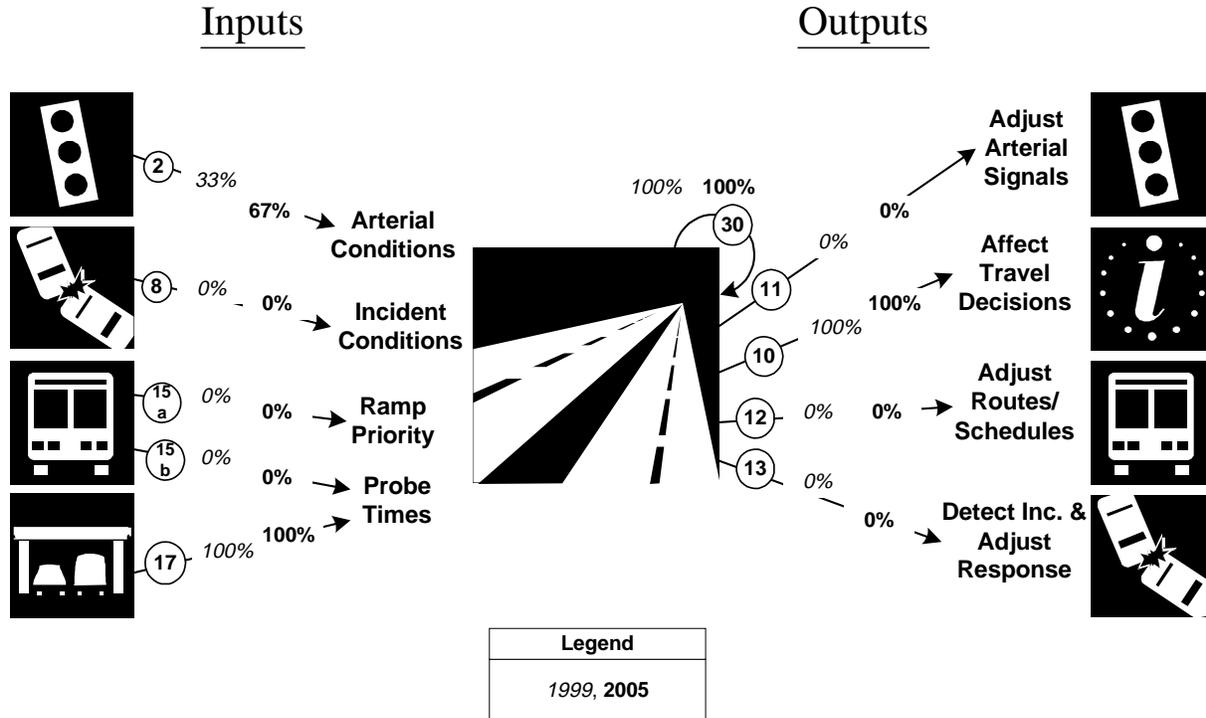
* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
2. Arterial Management agencies sending information to Freeway Management	(1/ 3) 33%	(2/ 3) 67%
8. Incident Management agencies sending information to Freeway Management	(0/ 1) 0%	(0/ 1) 0%
15a. Transit management agencies with vehicles equipped with ramp meter priority	(0/ 3) 0%	(0/ 3) 0%
15b. Transit Management agencies with vehicles equipped as probes	(0/ 3) 0%	(0/ 3) 0%
17. Freeway Management agencies receiving freeway conditions from vehicle probes	(1/ 1) 100%	(1/ 1) 100%
30. Freeway Management agencies sending information to another Freeway Management agency	(1/ 1) 100%	(1/ 1) 100%
11. Freeway Management agencies sending information to Arterial Management	(0/ 1) 0%	(0/ 1) 0%

Link Description	1999	2005
10. Freeway Management agencies disseminating freeway conditions to the public	(1/ 1) 100%	(1/ 1) 100%
12. Freeway Management agencies sending freeway conditions to Transit Management	(0/ 1) 0%	(0/ 1) 0%
13. Freeway Management agencies sending freeway conditions to Incident Management	(0/ 1) 0%	(0/ 1) 0%

Incident Management Component Indicators

Baltimore
Freeway and Arterial Incident Management*

Legend:
- 1997
- 1999
- 2005

Percent Deployment Opportunity**

Categories (top to bottom):
- Freeway miles under incident detection algorithms — 0%, No Response, No Response
- Freeway miles under free cell phone call to a dedicated number — 100%, No Response, 100%
- Freeway miles covered by surveillance cameras — 3%, No Response, No Response
- Freeway miles covered by on-call service patrols — 54%, 59%, No Response
- Arterial miles under incident detection algorithms — 0%, No Response, No Response
- Arterial miles under free cell phone call to a dedicated number — 100%, No Response, No Response
- Arterial miles covered by surveillance cameras — 0%, No Response, No Response
- Arterial miles covered by on-call service patrols — 0%, 0%, 4%

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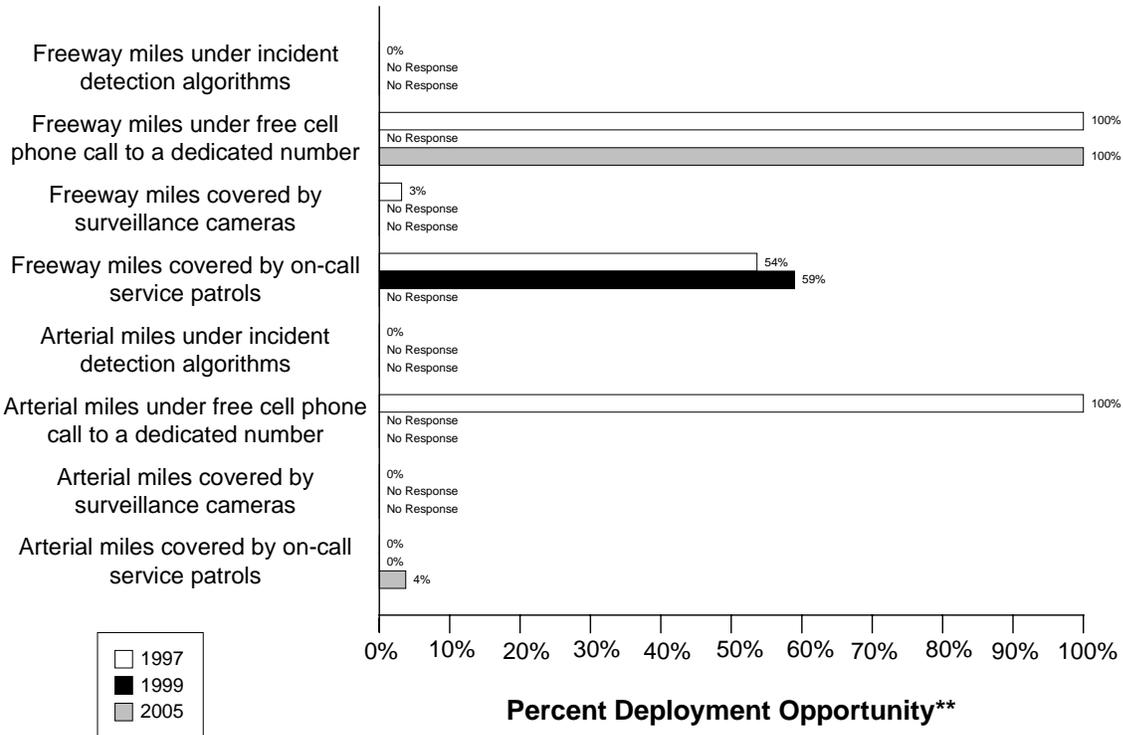** Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway miles are covered by incident detection algorithms	0	373	0%		373			373	
Freeway miles are covered by free cellular phone calls to a dedicated number	373	373	100%		373		373	373	100%
Freeway miles are covered by surveillance cameras.	12	373	3%		373			373	

	1997			1999			2005		
Description	Num	Den	%	Num	Den	%	Num	Den	%
Freeway miles are covered by on-call publicly-sponsored service patrol or towing services.	200	373	54%	220	373	59%		373	
Arterial miles are covered by incident detection algorithms	0	1325	0%		1325			1325	
Arterial miles are covered by free cellular phone calls to a dedicated number	1325	1325	100%		1325			1325	
Arterial miles are covered by surveillance cameras	0	1325	0%		1325			1325	
Arterial miles are covered by on-call publicly-sponsored service patrol or towing services	0	1325	0%	0	1325	0%	50	1325	4%

Baltimore

Incident Management Integration*
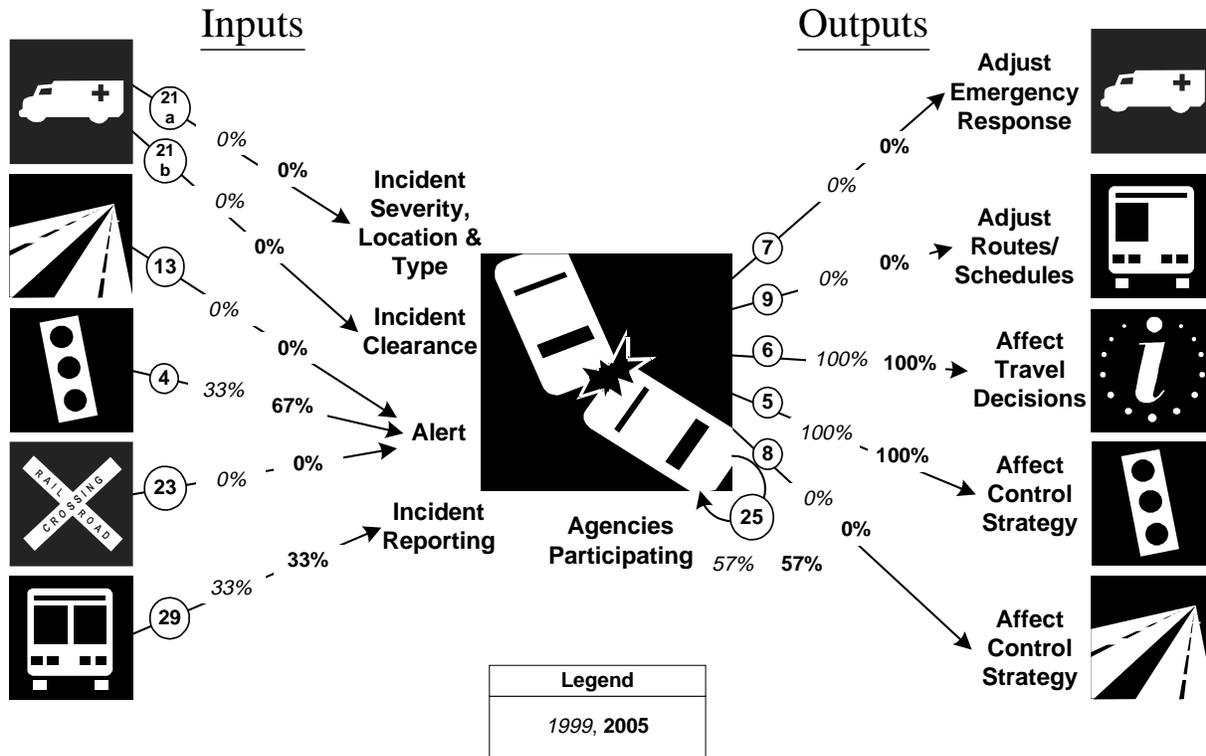
Inputs   ### Outputs

Legend

1999, **2005**

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

Link Description	1999	2005
21a. Incident management agencies receiving incident severity from Emergency Management	(0/ 1) 0%	(0/ 1) 0%
21b. Incident management agencies receiving incident clearance activities from Emergency Management	(0/ 1) 0%	(0/ 1) 0%
13. Freeway Management agencies sending freeway conditions to Incident Management	(0/ 1) 0%	(0/ 1) 0%
4. Arterial Management agencies sending arterial conditions to Incident Management	(1/ 3) 33%	(2/ 3) 67%
23. Arterial Management agencies receive information on highway-rail intersection crossing blockages for the purpose of managing incident response	(0/ 3) 0%	(0/ 3) 0%
29. Transit Management agencies report traffic incidents as part of an organized regional incident management program	(1/ 3) 33%	(1/ 3) 33%

Link Description	1999	2005
7. Incident management agencies transfer information describing incident severity, location, and type to Emergency Management agencies	(0/ 1) 0%	(0/ 1) 0%
9. Incident Management agencies transfer information describing incident severity, location, and type to Transit Management agencies	(0/ 1) 0%	(0/ 1) 0%
6. Incident Management agencies disseminate information describing incident severity, location, and type to the public	(1/ 1) 100%	(1/ 1) 100%
5. Incident Management agencies transfer information describing incident severity, location, and type to Arterial Management agencies	(1/ 1) 100%	(1/ 1) 100%
8. Incident Management agencies transfer information describing incident severity, location, and type to Freeway Management agencies	(0/ 1) 0%	(0/ 1) 0%
25. Police, fire, and EMS agencies participating in a formal incident management plan/team	(4/ 7) 57%	(4/ 7) 57%

Arterial Management Component Indicators

Baltimore
Arterial Management*

Arterial miles covered by electronic surveillance (1997 only)
- 9%
- Not Collected in 1999
- Not Collected in 2005

Signalized intersections covered by electronic surveillance (1999 and 2005)
- Not Collected in 1997
- 83%
- 83%

Signalized intersections under centralized or closed loop control
- 29%
- 41%
- 50%

Arterial miles covered by VMS, HAR, or IVS (1997 only)
- 0%
- Not Collected in 1999
- Not Collected in 2005

Arterial miles covered by VMS (1999 and 2005)
- Not Collected in 1997
- 1%
- 2%

Arterial miles covered by HAR (1999 and 2005)
- Not Collected in 1997
- No Response
- No Response

Arterial miles covered by IVS (1999 and 2005)
- Not Collected in 1997
- No Response
- No Response

Legend:
- 1997
- 1999
- 2005

Percent Deployment Opportunity**

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

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Arterial miles covered by electronic surveillance	125	1325	9%						
Signalized intersections are covered by electronic surveillance for monitoring traffic flow				418	503	83%	482	582	83%
Signalized intersections are under centralized or closed loop control	316	1104	29%	208	503	41%	290	582	50%

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Arterial miles are covered by VMS, HAR, or IVS	0	1325	0%						
Arterial miles are covered by VMS				18	1325	1%	30	1325	2%
Arterial miles are covered by HAR					1325			1325	
Arterial miles are covered by IVS					1325			1325	

Baltimore
Arterial Management Integration*

Inputs   Outgoing Outputs

* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity
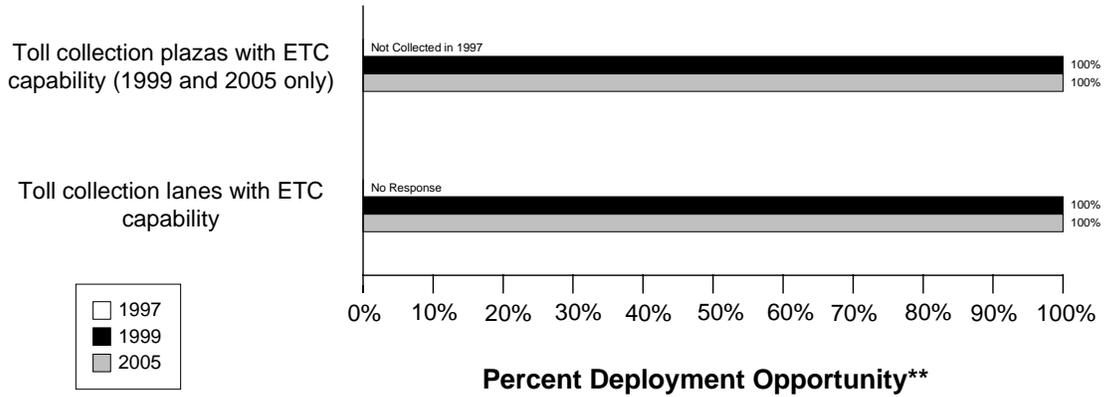
Link Description	1999	2005
16a. Transit management agencies with vehicles equipped with traffic signal priority	(1/ 3) 33%	(1/ 3) 33%
16b. Transit Management agencies have vehicles equipped as probes on arterials	(0/ 3) 0%	(0/ 3) 0%
22. Emergency Management agencies have vehicles equipped with traffic signal preemption capability	(0/ 7) 0%	(0/ 7) 0%
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	(1/ 3) 33%	(1/ 3) 33%
18. Number of Arterial Management agencies receiving information from vehicle probes	(0/ 3) 0%	(0/ 3) 0%
5. Incident Management agencies transfer information describing incident severity, location, and type to Arterial Management	(1/ 1) 100%	(1/ 1) 100%
11. Freeway Management agencies transfer freeway travel times, speeds, and conditions to Arterial Management agencies	(0/ 1) 0%	(0/ 1) 0%

Link Description	1999	2005
3. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Transit Management	(1/ 3) 33%	(1/ 3) 33%
1. Arterial Management agencies disseminate arterial travel times, speeds, and conditions to the public	(0/ 3) 0%	(0/ 3) 0%
2. Arterial Management agencies send traffic condition information to Freeway Management	(1/ 3) 33%	(2/ 3) 67%
4. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Incident Management	(1/ 3) 33%	(2/ 3) 67%
26. Arterial Management agencies under cooperative agreement to share traffic signal timing for coordinated response	(3/ 3) 100%	(3/ 3) 100%

Electronic Toll Collection Component Indicators

Baltimore
Electronic Toll Collection*

Toll collection plazas with ETC capability (1999 and 2005 only)

Not Collected in 1997

100%
100%

Toll collection lanes with ETC capability

No Response

100%
100%

Legend:
- ☐ 1997
- ■ 1999
- ▨ 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

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Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Toll collection plazas with ETC capability				6	6	100%	6	6	100%
Toll collection lanes with ETC capability				50	50	100%	50	50	100%

Baltimore
Electronic Toll Collection Integration*
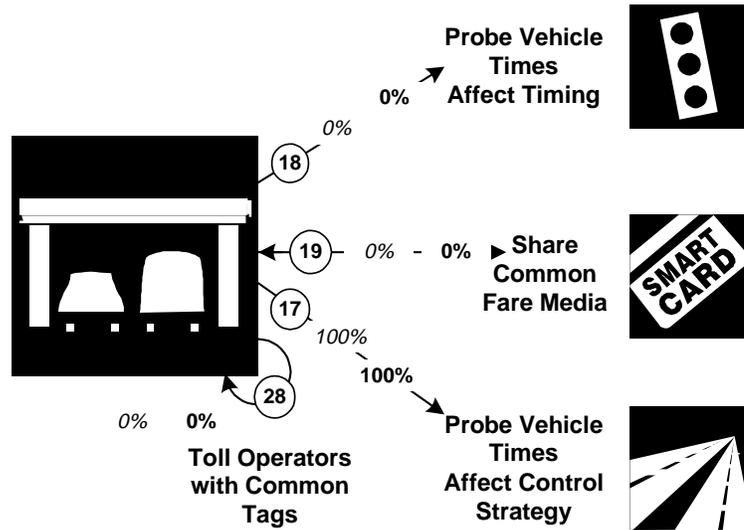
Inputs   Outputs

Probe Vehicle Times Affect Timing

0%

0%

18

0%

19   0% - 0%   **Share Common Fare Media**

17

100%

100%

28

0%   0%

Toll Operators with Common Tags

Probe Vehicle Times Affect Control Strategy

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/ 3) 0%	(0/ 3) 0%
19. Transit agencies that accept electronic payment through the use of electronic toll collection media	(0/ 3) 0%	(0/ 3) 0%
17. Freeway Management agencies receiving information from vehicle probes	(1/ 1) 100%	(1/ 1) 100%
28. Toll operators using common toll tag technology	(0/ 1) 0%	(0/ 1) 0%

Transit Management Component Indicators

Baltimore
Transit Management*

Fixed-route transit vehicles equipped with AVL — 26%, 43%, 97%

Fixed-route transit vehicles with electronic monitoring of vehicle components — 0%, No Response, No Response

Paratransit vehicles that operate under CAD — 33%, 56%, No Response

Major transfer points with electronic display of information (1997 only) — No Response, Not Collected in 1999, Not Collected in 2005

Bus stops with electronic display of information (1999 and 2005) — Not Collected in 1997, 0%, No Response

Legend: 1997, 1999, 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

* 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	%
Fixed-route transit vehicles are equipped with AVL	246	932	26%	380	892	43%	868	894	97%
Fixed-route transit vehicles are equipped with electronic monitoring of vehicle component	4	897	0%		892			894	
Paratransit vehicles operate under computer-aided dispatch	20	60	33%	20	36	56%		18	
Percent fixed-route transfer locations with electronic display of information	0	0							
Bus stops display information to the public				0	8000	0%			

Baltimore
Transit Management Integration*

Inputs   ### Outputs
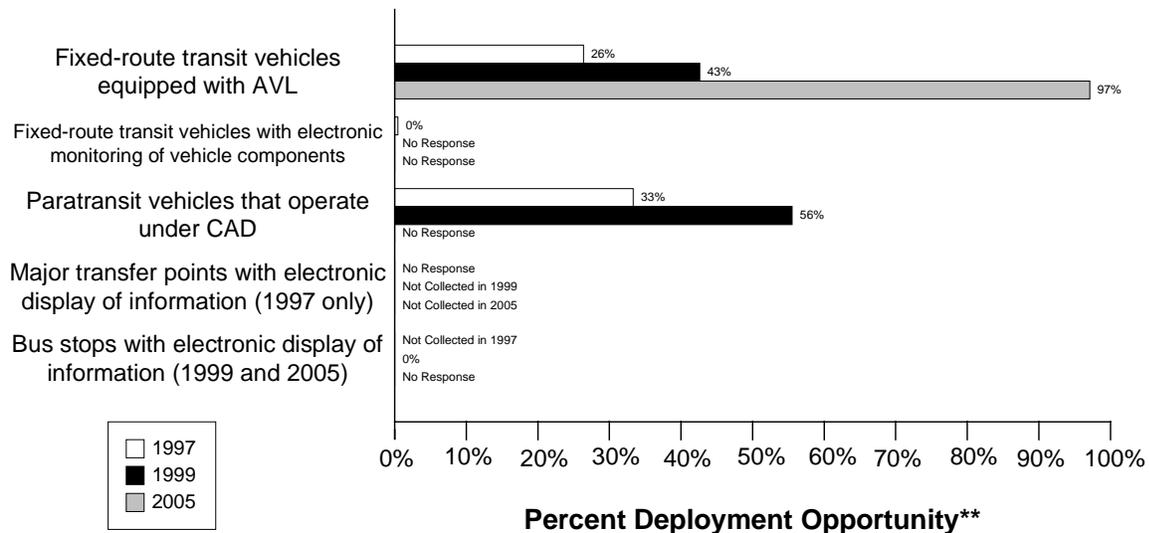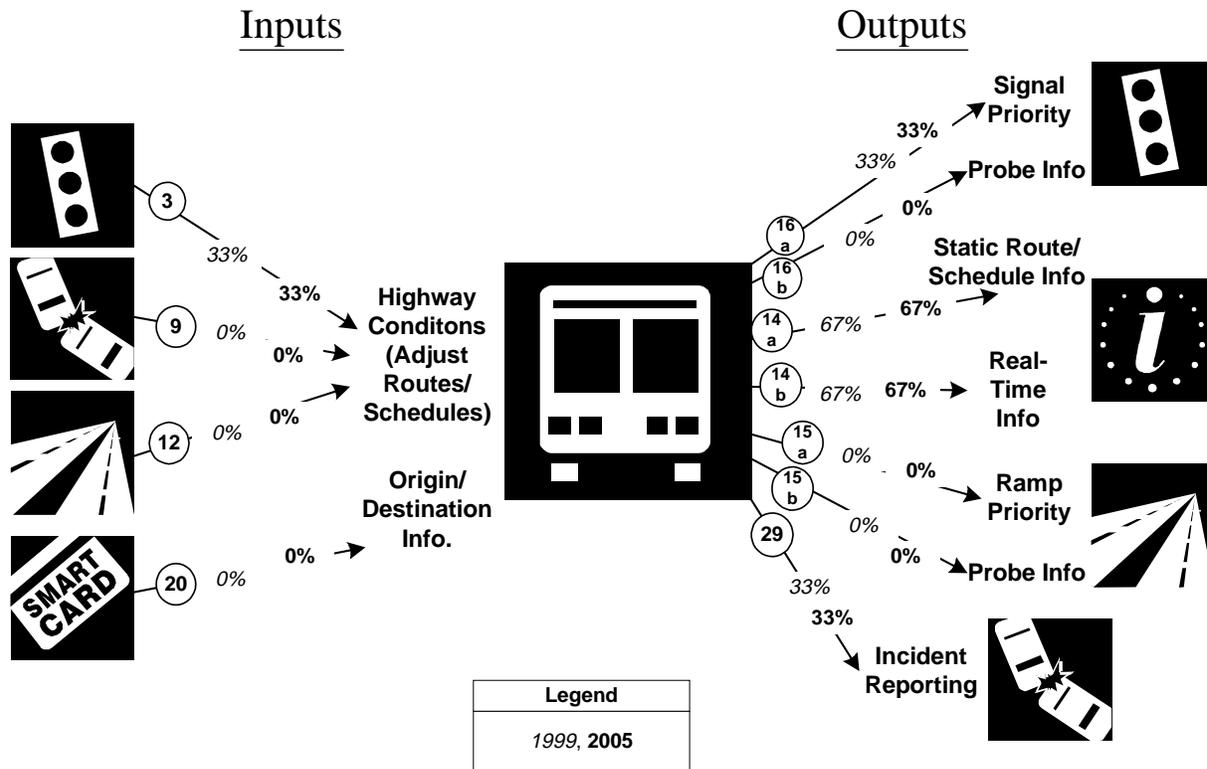

Legend
1999, **2005**

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

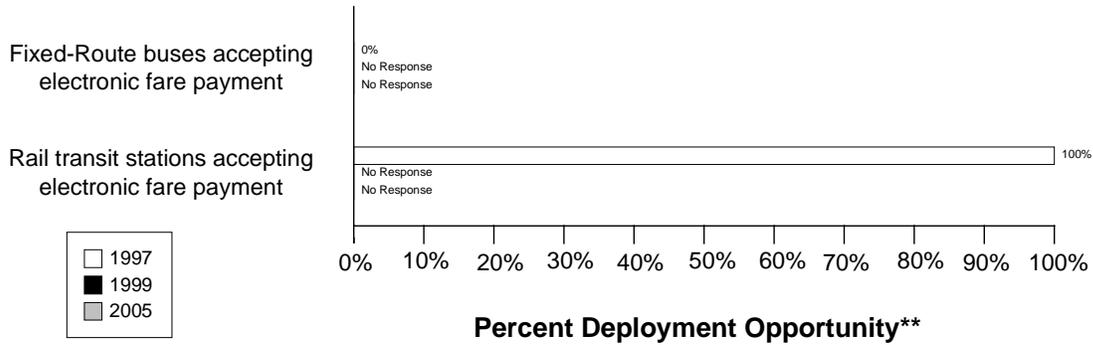| Link Description	1999	2005
3. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Transit Management	(1/ 3) 33%	(1/ 3) 33%
9. Incident management agencies transfer information describing incident severity, location, and type to Transit Management	(0/ 1) 0%	(0/ 1) 0%
12. Freeway Management agencies transfer freeway travel times, speeds, and conditions to Transit Management	(0/ 1) 0%	(0/ 1) 0%
20. Transit Management agencies using Electronic Fare Payment data in transit service planning	(0/ 3) 0%	(0/ 3) 0%
16a. Transit Management agencies have vehicles equipped with traffic signal priority capability	(1/ 3) 33%	(1/ 3) 33%
16b. Transit Management agencies have vehicles equipped as probes on arterials	(0/ 3) 0%	(0/ 3) 0%
14a. Transit Management agencies disseminate information describing transit routes, schedules, and fares to travelers	(2/ 3) 67%	(2/ 3) 67%

Link Description	1999	2005
14b. Transit Management agencies disseminate information describing schedule/route adherence to travelers	(2/ 3) 67%	(2/ 3) 67%
15a. Transit Management agencies have vehicles equipped with ramp meter priority capability	(0/ 3) 0%	(0/ 3) 0%
15b. Transit Management agencies have vehicles equipped as probes on freeways	(0/ 3) 0%	(0/ 3) 0%
29. Transit Management agencies that report traffic incidents as part of an organized regional Incident Management program	(1/ 3) 33%	(1/ 3) 33%

Electronic Fare Payment Component Indicators

Baltimore
Electronic Fare Payment*

Fixed-Route buses accepting electronic fare payment

0%
No Response
No Response

Rail transit stations accepting electronic fare payment

100%
No Response
No Response

☐ 1997
■ 1999
▧ 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

* 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.

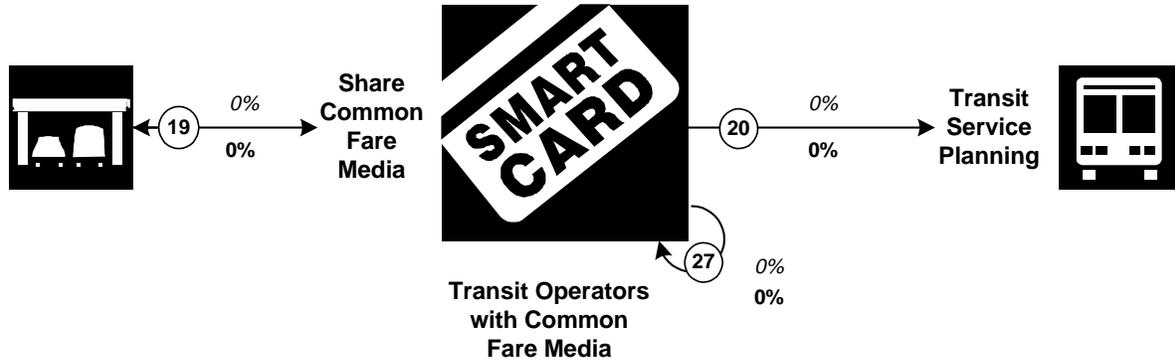| Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Fixed-route transit vehicles that accept electronic payment	0	932	0%		892			894	
Rail transit stations that accept electronic payment	14	14	100%		75				

Baltimore
Electronic Fare Payment Integration*

Inputs   Outputs

Share Common Fare Media

19   0%   0%

SMART CARD

20   0%   0%   **Transit Service Planning**

27   0%   0%

Transit Operators with Common Fare Media
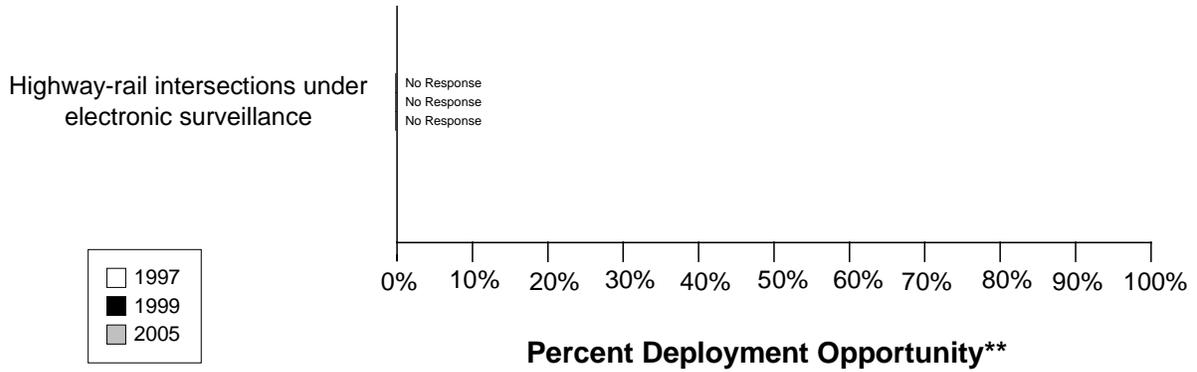
Legend
1999
2005

* 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/ 3) 0%	(0/ 3) 0%
20. Transit Management agencies use Electronic Fare Payment data in transit service planning	(0/ 3) 0%	(0/ 3) 0%
27. Transit Management agencies that use the same electronic payment system	(0/ 3) 0%	(0/ 3) 0%

Highway Rail Intersection Component Indicators

Baltimore
Highway-Rail Intersections*

Highway-rail intersections under electronic surveillance

No Response
No Response
No Response

☐ 1997
■ 1999
▨ 2005

0%   10%   20%   30%   40%   50%   60%   70%   80%   90%   100%

Percent Deployment Opportunity**

* 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	0	0			12			12	

Baltimore
Highway Rail Intersections Integration*

Inputs
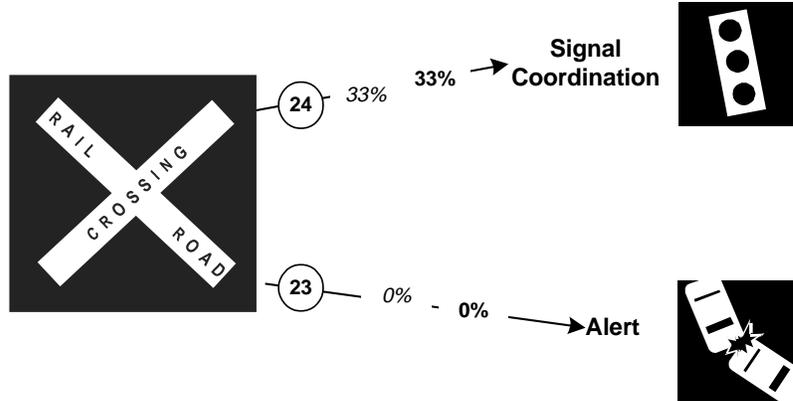
Outputs

33% → **Signal Coordination**

24 — 33%   33%

23 — 0%   - 0% → **Alert**

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	(1/ 3) 33%	(1/ 3) 33%
23. Arterial Management agencies receive information on highway-rail intersection crossing blockages for the purpose of managing incident response	(0/ 3) 0%	(0/ 3) 0%

Emergency Management Component Indicators

Baltimore
Emergency Management*

Emergency Management Vehicles under Compute-Aided Dispatch — 0%, 52%, 80%

Emergency Management vehicles with on-vehicle navigation capabilities — 0%, 0%, 18%

Legend: 1997, 1999, 2005

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

* 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	0	2803	0%	1555	2977	52%	852	1069	80%
Public sector emergency vehicles that have in-vehicle route guidance capability	0	2803	0%	0	2977	0%	195	1069	18%

Baltimore
Emergency Management Integration*

Inputs

Outputs
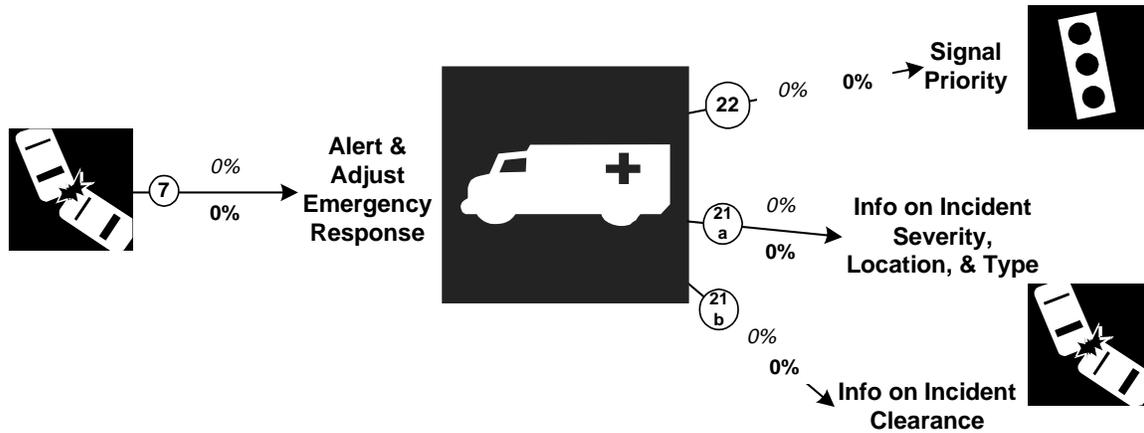
Legend

1999, **2005**
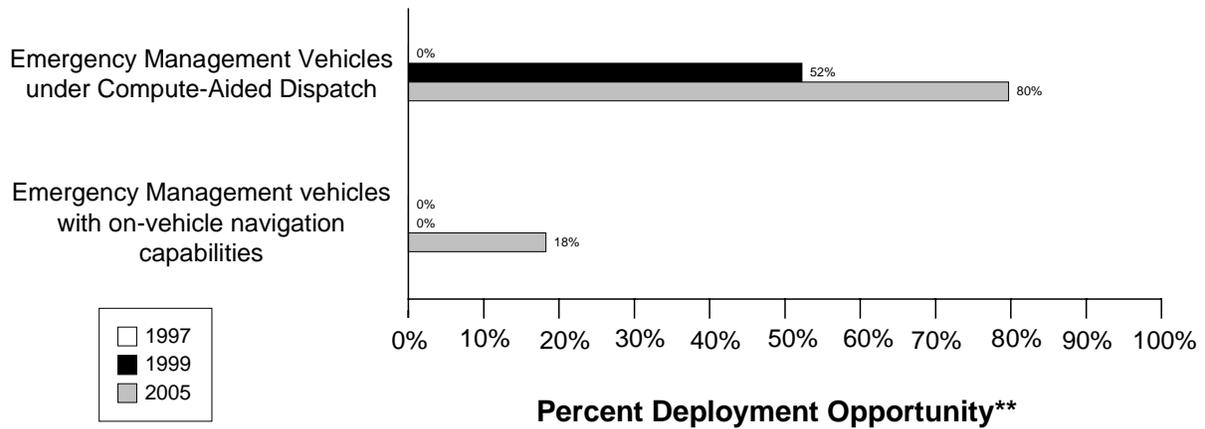
* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
7. Freeway Management agencies transfer information describing incident severity, location, and type to Emergency Management agencies	(0/ 1) 0%	(0/ 1) 0%
22. Emergency Management agencies have vehicles equipped with traffic signal preemption capability	(0/ 7) 0%	(0/ 7) 0%
21a. Freeway Management agencies receive incident severity, location, and type data from Emergency Management agencies	(0/ 1) 0%	(0/ 1) 0%
21b. Freeway Management agencies receive incident clearance activities information from Emergency Management agencies	(0/ 1) 0%	(0/ 1) 0%

Regional Multimodal Traveler Information Component Indicators

Baltimore
Regional Multimodal Traveler Information*

Freeway conditions disseminated to the public
- 0%
- 38%
- No Response

RMTI media type used to display information
- No Response
- 75%
- 13%

RMTI media type used on two or more modes
- No Response
- 75%
- 13%

Legend:
- ☐ 1997
- ■ 1999
- ▨ 2005

X-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Percent Deployment Opportunity**

* 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	0	373	0%	142	373	38%		373	
Possible RMTI media types are used to display information to travelers				6	8	75%	1	8	13%
Possible RMTI media are used to display information on *two or more modes* to travelers				6	8	75%	1	8	13%

Baltimore
Regional Multimodal Traveler Information Integration*

Inputs   ### Outputs
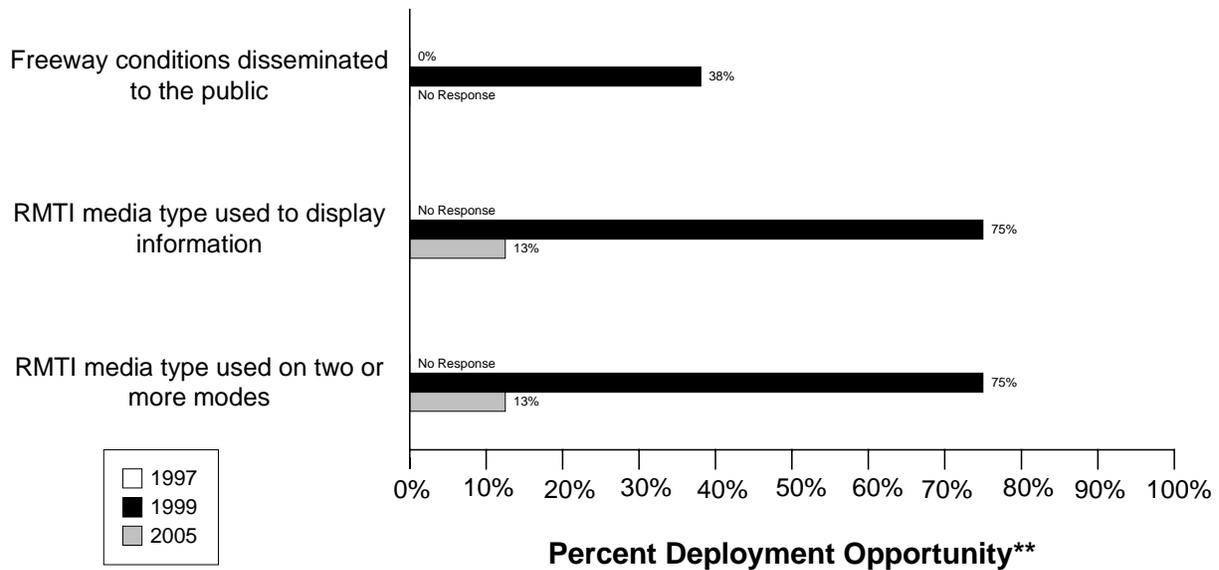

Legend
1999, **2005**

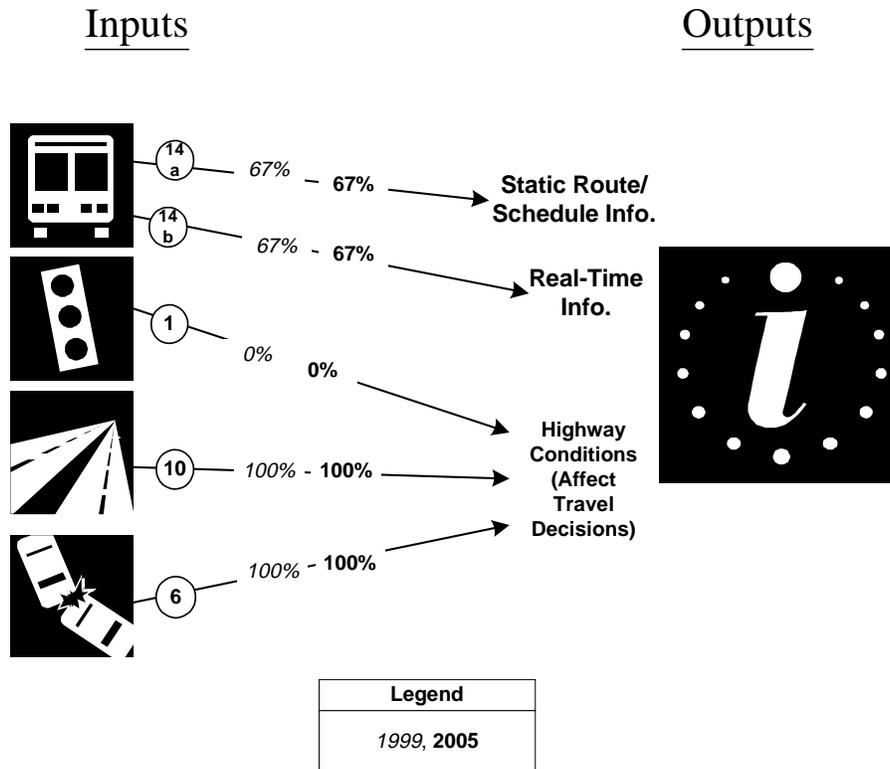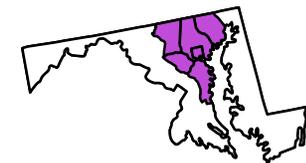* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
14a. Transit Management agencies that disseminate information describing transit routes, schedules, and fares to travelers	(2/ 3) 67%	(2/ 3) 67%
14b. Transit Management agencies that disseminate information describing schedule/route adherence to travelers	(2/ 3) 67%	(2/ 3) 67%
1. Arterial Management agencies that disseminate arterial travel times, speeds, and conditions to the public	(0/ 3) 0%	(0/ 3) 0%
10. Freeway Management agencies that disseminate freeway travel times, speeds, and conditions to travelers	(1/ 1) 100%	(1/ 1) 100%
6. Incident Management agencies that disseminate information describing incident severity, location, and type to the public	(1/ 1) 100%	(1/ 1) 100%

Appendix A
Survey Coverage Area

BALTIMORE METROPOLITAN COUNCIL, MD

Harford Co.
100%

Carroll Co.
100%

Baltimore Co.
100%

BALTIMORE

DUNDALK

Baltimore
City
100%

Howard Co.
100%

COLUMBIA

Anne
Arundel Co.
100%
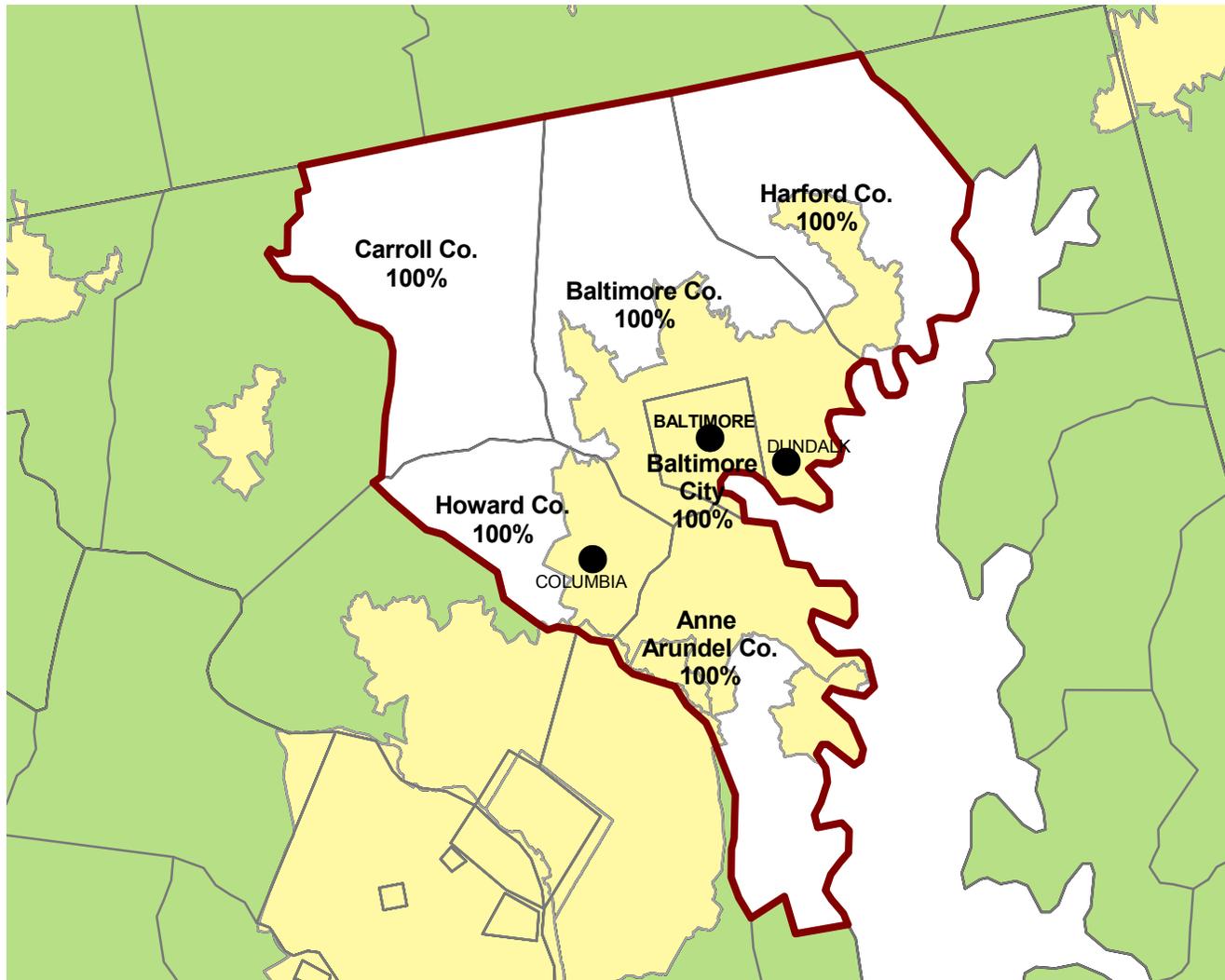
- **City Included in Surveys**
- **Metropolitan Planning Area Boundary**
- **County Boundary**
- **Urbanlized Area**
- **Outside Survey Area**

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**
BALTIMORE						
Arterial Management						
Anne Arundel County	(410) 222-7331	(410) 222-7366	7/30/1999	12/11/1999	08/05/1997	10/01/1997
Baltimore County	(410) 887-3554	(410) 887-5784	7/30/1999	8/24/1999	08/05/1997	
Baltimore City	(410) 396-3310	(410) 539-6119	7/30/1999		08/05/1997	
Howard County	(410) 313-2430	(410) 313-3435	7/30/1999	8/24/1999	08/05/1997	
Maryland State Highway Administration	(410) 787-5878	(410-582-9469)	7/30/1999		08/05/1997	11/04/1997
Electronic Toll Collection						
Maryland Transportation Authority	(410) 288-8484	(410) 288-8475	9/8/1999	9/22/1999	08/05/1997	
Emergency Management						
Howard County Police Department	(410) 313-3203	(410) 313-3295	6/22/1999	7/8/1999	07/16/1998	07/16/1998
Baltimore County Police Department	(410) 887-2200	410-887-4958	6/22/1999	8/24/1999	07/28/1998	07/28/1998
Anne Arundel County Police Department	(410) 222-8655	(410) 222-8626	6/22/1999	6/29/1999	07/15/1998	07/15/1998
Harford County Sheriff Department	(410) 838-6600	(410) 879-2782	6/22/1999	8/4/1999	07/15/1998	07/15/1998
Baltimore City Fire Department	(410) 396-4692	(410) 752-7249	6/22/1999	6/22/1999	07/16/1998	07/16/1998
Baltimore City Police Department	(410) 396-2012	(410) 625-0578	6/22/1999	8/12/1999	07/15/1998	07/15/1998
Carroll County Sheriff Department	(410) 386-2900	(410) 876-1152	6/22/1999	7/8/1999	07/15/1998	07/15/1998
Freeway Management						
Maryland State Highway Administration	(410) 787-5866	(410) 582-9469	7/29/1999	10/12/1999	08/05/1997	11/04/1997
MPO						
Baltimore Metropolitan Council	(410) 333-4743	(410) 333-1060	7/15/1999	8/11/1999		
Transit Management						
Mass Transit Administration	(410) 767-3316	(410) 333-0374	8/5/1999	10/12/1999	07/03/1997	07/21/1997
Howard Area Transit Service (HATS)	(301) 725-4000	(301) 725-0776	8/9/1999	8/31/1999	07/07/1997	10/09/1997
Harford County Transportation	(410) 838-2562	(410) 638-3069	8/9/1999	8/30/1999	07/07/1997	07/08/1997

Appendix C
Freeway Management Components

	Maryland State Highway Administration	
	1999	**2005**
Agency Returned Survey?	Yes	
FREEWAY MANAGEMENT SECTION		
Number of freeway centerline miles that agency owns or maintains	275	
Number of freeway centerline miles that is used for planning	210	
Number of freeway entrance ramps that agency owns, operates or maintains	548	
Number of freeway entrance ramps that is used for planning	250	
Type of facilities used to conduct freeway/incident management activities		
Activities housed in a free-standing dedicated building?	No	
Activities housed in a building shared with other activities?	Yes	
Activities conducted in a dedicated control room?	Yes	
Control room contains operator console(s)?	Yes	
Control room contains electronic wall map?	Yes	
Control room contains CCTV display(s)?	Yes	
Activities conducted in a room containing workstations or PCs that manage traffic?	No	
Facilities are electronically linked to other transportation mgt facilities?	Yes	
Staffing and hours of operation of freeway/incident management activities		
Number of full-time agency staff members	18	
Number of full time contractor staff members	NR	
Number of part-time agency staff members	NR	
Number of part-time contractor staff members	NR	
Staffed 24 hours day by agency staff or by others	others	
Staffed during peak hours only by agency staff or by others	others	
Staffed by others during off-peak hours	No	
Agency staff perform transportation management as an ancillary duty	No	
Agency staff dedicated to transportation management duty	No	
Types of operations conducted for freeway/incident management		
Incident detection and management?	Yes	
This metropolitan area?	No	
Other metropolitan area?	No	
Statewide?	Yes	
Monitoring and troubleshooting status of system components?	Yes	
Manual override of ramp metering rates at freeway on-ramps?	No	
Operating transportation management roadside devices?	Yes	
Radio communications with other agencies?	Yes	
Exchange of electronic data with other agencies such as computer aided dispatch?	Yes	
Real-Time Traffic Data Collection Technologies		
Total number of miles under surveillance with real-time data collection tech.	142	212

Freeway Management
Agencies for Metropolitan Area: Baltimore

	Maryland State Highway Administration	
	1999	**2005**
Number of Stations with data collection technologies		
Loop detectors	0	0
Video imaging detectors	0	0
Probe readers (elec. toll tags, transit vehicles, other technology)	0	0
Microwave radar	68	116
Other (e.g., acoustic detectors)	0	0
Number of Miles covered with data collection technologies		
Loop detectors	0	0
Video imaging detectors	0	0
Probe readers (elec. toll tags, transit vehicles, other technology)	0	0
Microwave radar	142	212
Other (e.g., acoustic detectors)	0	0
Variable Message Signs (VMS) on Freeways		
Candidate locations for deployment of VMS where VMS has been deployed	NR	NR
Candidate locations for deployment of VMS	37	56
Roadside Technologies used to Distribute Traveler Information		
Total number of miles where information is distributed	76	78
Number deployed		
Highway advisory radio	10	1
In-vehicle signing	0	0
Portable variable message signs	18	22
Other	0	0
Miles covered		
Highway advisory radio	76	78
In-vehicle signing	0	0
Portable variable message signs	NR	NR
Other	0	0
Ramp Meters on Freeways		
Number of entrance ramp meters operated under isolated control	NR	2
Number of entrance ramp meters operated under central control	NR	NR
Number of entrance ramp meters that provide preemption for emergency vehicles	NR	NR
Number of entrance ramp meters that provide priority for transit vehicles	NR	NR
Total number of metered ramps	NR	2
Freeway centerline miles under lane control	NR	NR
Communication Links		
Freeway centerline miles covered by the following type of communication		
Twisted pair cable	0	0
Coaxial cable	0	0
Fiber-optic cable	57	99
Microwave radio	15	NR
Other	0	0
ITS Standards Used Related to Freeway Management		

	Maryland State Highway Administration	
	1999	**2005**
ATMS Data Dictionary Sections 1 and 2 (ITE TM 1.01)	No	
ATMS Data Dictionary Sections 3 and 4 (ITE TM 1.02)	No	
Message Set for External TMC Communication (ITE-9604-1)	No	
NTCIP Class B Profile (AASHTO TS 3.3)	Yes	
NTCIP Data Collection and Monitoring Devices (AASHTO TS 3.DCM)	No	
NTCIP Object Definitions for Environmental Sensor Stations (AASHTO TS 3.7)	No	
NTICP Object Definitions for Dynamic Message Signs (AASHTO TS 3.6)	Yes	
NTICP Object Definitions for Highway Advisory Radio (AASHTO TS 3.HAR)	Yes	
NTICP Object Definitions for Ramp Meter Control (AASHTO TS 3.RMC)	No	
NTICP Object Definitions for Transportation Sensor Systems (AASHTO TS 3.TSS)	No	
NTICP Object Definitions for Video Camera Control (AASHTO TS 3.VCC)	Yes	
Would agency be willing to participate in testing of ITS Standards?	Yes	
Have agreements in place with other agencies to use similar hardware		
** and software to aid maintenance and interoperability?**	Yes	
INCIDENT MANAGEMENT SECTION		
Use of Service Patrols to Assist in Detection and Response to Incidents		
Publicly operated service patrol vehicles	Yes	
Privately operated service patrol vehicles operated under public contract	No	
Total number of freeway miles patrolled by these services	220	NR
Miles Covered by Methods to Detect and Verify Incidents		
Free cellular phone call to a dedicated phone number other than 911	NR	NR
Police patrols	NR	NR
Computer algorithms linked to traffic surveillance equipment	NR	NR
CCTV	NR	NR
Private sector sources (e.g., Shadow Traffic, SmartRoutes)	NR	NR
Other (e.g., free cell phone call to an area radio system, etc.)	0	0
Procedures in place for Freeway Incident Response?		
Working agreement(s)/arrangement(s) with other agencies	Yes	
Inter-agency incident management admin. team that meets regularly	Yes	
Major incident response team that responds to major incidents	Yes	
Set of goals/objectives for incident mgt that has been adopted by agencies in region	Yes	
Central focal point for facilitating the two-way flow of information		
** among agencies responding to an incident?**		
The central focal point is a Freeway or Traffic Management Center	Yes	
The central focal point is a Police, Fire or joint dispatch center	Yes	
The central focal point is another center	No	
Methods of Communication Used On-Site at an Incident		
Police		
Two-way radio	No	
800 MHz trunked radio	No	
Cellular telephone	No	

Freeway Management
Agencies for Metropolitan Area: Baltimore

	Maryland State Highway Administration	
	1999	**2005**
Hand-held (i.e., walkie-talkie)	No	
Automated data systems (i.e., CAD)	No	
Fire		
Two-way radio	No	
800 MHz trunked radio	No	
Cellular telephone	No	
Hand-held (i.e., walkie-talkie)	No	
Automated data systems (i.e., CAD)	No	
DOT		
Two-way radio	No	
800 MHz trunked radio	No	
Cellular telephone	No	
Hand-held (i.e., walkie-talkie)	No	
Automated data systems (i.e., CAD)	No	
Towing		
Two-way radio	No	
800 MHz trunked radio	No	
Cellular telephone	No	
Hand-held (i.e., walkie-talkie)	No	
Automated data systems (i.e., CAD)	No	
Which police agencies typically respond to incidents on freeways?		
State Police	Yes	
County Police or Sheriff	No	
City Police	No	
Who provides on-site emergency medical response?		
Fire	Yes	
Emergency Management Service Agency	Yes	
Private hospital	Yes	
Has a multi-agency contact list been developed in area containing the		
names, phone numbers, etc. for the appropriate response personnel?	Yes	
Is the Incident Command System used to manage incident scenes?	Yes	
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	
Formal agreement?	No	
Not specified or don't know?	Yes	
On-scene command post used to manage activities of responding agencies?	Yes	
Are there communication linkages to a communications traffic/freeway mgt center?	Yes	
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?	Yes	
Respondents protected through law or court opinion for liability claims		

Baltimore   C - 4   Freeway Management Components

	Maryland State Highway Administration	
	1999	**2005**
for damages to vehicles or cargoes during clearance activities?	Yes	
Are overturned tank trucks, which are intact and not leaking, uprighted		
without first off-loading?	Yes	
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?	Yes	
Have laws or policies regarding the removal of stalled/abandoned vehicles		
from freeway shoulders?	NR	
Hours abandoned vehicles are allowed to remain on a freeway shoulder?	25-36	
Have policies or procedures for quick removal of vehicles?	Yes	
Is Total Station equipment used to investigate major incidents?	Yes	
Handling of Towing Responses to Incidents		
Formal contract based on qualifications?	Yes	
Rotation with companies under contract?	No	
Separate lists kept for light and heavy response and for specialty recovery?	NR	
Rotation list with minimal qualifications?	No	
In towing qualifications, do you require towers to be certified under the		
Towing and Recovery Ass. of America's National Drivers Cert. Program?	Yes	
_____		
DK: Don't know		
NR: No Response		
Leg: Legislation or action being planned		

Appendix D
Freeway Management Integration

Agency Name	Maryland State Highway Administration	
	1999	**2005**
Agency Returned Survey?	Yes	
Freeway Management Section		
Agencies your agency provides freeway travel times, speeds, and		
conditions information, share infrastructure or coordinates operation		
Freeway Management Agencies		
Provide Information	Maryland State Highway Administration, Maryland State Police, Maryland State Transportation Authority	None listed
Share Infrastructure	Maryland State Highway Administration, Maryland State Police, Maryland State Transportation Authority	None listed
Coordinate Operation	Maryland State Police, Maryland State Transportation Authority	None listed
Incident Management Agencies		
Provide Information	Maryland State Police, Maryland State Transportation Authority	None listed
Share Infrastructure	Maryland State Police, Maryland State Transportation Authority	None listed
Coordinate Operation	Maryland State Police, Maryland State Transportation Authority	None listed
Arterial Management Agencies		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
Public Transit Operators		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
Receiving real-time information via electronic means from others		
Incident Management agencies from which your agency receives		
incident severity, location, and type information	Maryland State Police, Maryland State Transportation Authority	None listed
Arterial Management agencies from which your agency receives		
arterial travel times, speeds, and conditions	None listed	None listed
Public Transit operators from which your agency receives		
freeway travel times derived from vehicle probes	None listed	None listed

| Agency Name | Maryland State Highway Administration | |
	1999	2005
Toll Collection agencies from which your agency receives freeway travel		
times derived from vehicles probes	Maryland Transportation Authority	None listed
Freeway Incident Management Section		
Agencies your agency provides incident severity, location, and type info.		
and/or shares infrastructure and/or coordinates operation		
Arterial Management Agencies		
Provide Information	Maryland State Highway Administration	None listed
Share Infrastructure	Maryland State Highway Administration	None listed
Coordinate Operation	None listed	None listed
Emergency Management Agencies		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
Freeway Management Agencies		
Provide Information	Maryland State Police, Maryland State Transportation Authority	None listed
Share Infrastructure	Maryland State Police, Maryland State Transportation Authority	None listed
Coordinate Operation	Maryland State Police, Maryland State Transportation Authority	None listed
Public Transit Operators		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
Receiving real-time information via electronic means from others		
Emergency Management agencies from which your agency receives		
incident clearance and/or incident severity and type		
Receive Arterial Incident Clearance Information	Maryland State Police, Maryland State Transportation Authority	None listed
Receive Arterial Incident Severity Information	Maryland State Police, Maryland State Transportation Authority	None listed
Arterial Management agencies from which your agency receives		
arterial travel times, speeds, and conditions	None listed	None listed
Freeway Management agencies from which your agency receives		
freeway travel times, speeds, and conditions	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 E
Freeway Management Information Collection and Dissemination**

Agency Name	Maryland State Highway Administration	
	1999	**2005**
Agency Returned Survey?	Yes	
Freeway Management Section		
Data collected, archived, and/or transferred to another agency		
Collected by your agency	Traffic volumes, Traffic speeds, Vehicle classification, Road conditions, Route designations (snow emergency, etc.), Weather conditions, Incidents, Current work zones, Scheduled work zones, Emergency/evacuation routes and procedures, Highway operations coordination information, Transit operations coordination information	NR
Archived by your agency	Traffic volumes, Traffic speeds, Vehicle classification, Road conditions, Route designations (snow emergency, etc.), Weather conditions, Incidents, Current work zones, Scheduled work zones, Emergency/evacuation routes and procedures	NR
Transferred to another agency by your agency	NR	NR
Importance of making information available to the public		
Ranked High	Weather conditions, Incidents, Current work zones, Scheduled work zones, Emergency/evacuation routes and procedures, Highway operations coordination information	

Agency Name	Maryland State Highway Administration	
	1999	**2005**
Ranked Medium	Traffic volumes, Traffic speeds, Vehicle classification, Road conditions, Route designations (snow emergency, etc.), Intermodal (air, rail, water) connections, Transit operations coordination information	
Ranked Low	NR	
Groups that make requests for the data	Universities, State DOT personnel, Federal DOT personnel, Media (I.e., TV stations, radio stations), MPOs, Consultants, Advanced Traveler Information Systems (ATIS) provi	
What is the data used for?	Traffic analysis, Construction impact determination, Planning, Incident detection algorithm development, Roadway impact analysis, Accident prediction models, Dissemination to the public	
Methods used to disseminate freeway information to the public		
Technologies your agency uses to disseminate:	Dedicated cable TV, Telephone system, Internet Web sites, Pagers or personal data assistants, E-mail or other direct PC communication, Cell phone/voice	NR
Technologies your agency (through another agency or org.) uses to disseminate:	Dedicated cable TV, Telephone system, Internet Web sites, Pagers or personal data assistants, E-mail or other direct PC communication, Cell phone/voice	NR
Internet web site reporting freeway conditions	www.chart.state.md.us	
Telephone system for reporting freeway information to the public	NR	

Agency Name	Maryland State Highway Administration	
	1999	**2005**
Organizations your agency sends information for dissemination to the public	Montgomery County Maryland State Police Maryland Transportation Authority Department of Public Works-Baltimore City Local Television Stations Smartroutes E-911 Centers Local Fire Companies Local Police	
Freeway Incident Management Section		
Methods used to distribute incident location and severity information		
to the public		
Technologies your agency uses to disseminate:	Dedicated cable TV, Telephone system, Internet Web sites, E-mail or other direct PC communication, Facsimile, Pagers or personal data assistants	NR
Technologies your agency (through another agency or org.) uses to disseminate:	Dedicated cable TV, Telephone system, Internet Web sites, E-mail or other direct PC communication, Facsimile, Pagers or personal data assistants	NR
Internet web site reporting incident information	NR	
Telephone system for reporting incident information to the public	NR	
Organizations your agency sends information for dissemination to the public	Montgomery County Maryland State Police Maryland Transportation Authority Department of Public Works-Baltimore City Local Television Stations Smartroutes E-911 Centers	

Appendix F
Arterial Management Components

	Anne Arundel County		Baltimore County		Howard County		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes		3	
ARTERIAL MANAGEMENT SECTION								
Number of arterial miles that agency owns or maintains	NR		199		120		319	
Number of arterial miles that is used for planning	NR		0		80		80	
Number of highway-rail intersections that agency maintains	NR		0		12		12	
Number of highway-rail intersections that is used for planning	NR		0		16		16	
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		0	
Activities conducted in a dedicated control room?	No		No		No		0	
Control room contains operator console(s)?	No		No		No		0	
Control room contains electronic wall map?	No		No		No		0	
Control room contains CCTV display(s)?	No		No		No		0	
Activities conducted in a room containing workstations or PCs that manage traffic?	No		No		Yes		1	
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		3		3	
Number of full time contractor staff members	NR		NR		NR		0	
Number of part-time agency staff members	NR		NR		0		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		agency		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		0	
This metropolitan area?	No		No		Yes		1	
Other metropolitan area?	No		No		No		0	
Monitoring and troubleshooting status of system components?	No		No		Yes		1	
Radio communications with other agencies?	No		Yes		Yes		2	
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		Yes		1	
Operating transportation mgt roadside devices (e.g., VMS, CCTV, etc.)	No		No		No		0	
Describe agency's role in traffic signal control	NR		operation county roads and some state roads		All roads in county except state routes			

	Anne Arundel County		Baltimore County		Howard County		Totals	
	1999	**2005**	**1999**	**2005**	**1999**	**2005**	**1999**	**2005**
Traffic Signals Operated by Agency								
Number of signalized intersections operated and owned by agency	NR	NR	294	319	71	75	365	394
Number of signalized intersections operated by agency but owned by another	NR	NR	53	78	2	10	55	88
Total number of signalized intersections operated by agency	83	100	347	397	73	85	503	582
Characteristics of signalized intersections that agency operates								
Under closed loop or central system control	57	100	115	140	36	50	208	290
Under real-time traffic adaptive control using advanced software	NR	2	0	0	0	0	0	2
Using SCOOT	No		No		No		0	
Using SCATS	No		No		No		0	
Name of software	NR		NR		NR			
Allow signal preemption for emergency vehicles	2	3	19	21	31	60	52	84
Allow signal priority for transit vehicles	0	0	2	7	0	0	2	7
Within 200 feet of a highway-rail intersection	0	0	5	10	0	0	5	10
Within 200 feet of a highway-rail intersection that adjust signal timing	0	0	2	5	0	0	2	5
Software used to control the signals agency operates								
Date of last upgrade to traffic signal control system software?	NR		1999		June 1995			
How often do you update signal timing?	NR		Yearly		Monthly			
Software used and number of signalized intersections under control (1999, 2005)	NR		ARIES, 115, 140		MONARCH, 36, 50			
Controllers used to control signals								
NEMA	0	0	307	397	71	75	378	472
170/179	0	0	0	0	0	0	0	0
2070 controller	0	0	0	0	0	0	0	0
Other	0	0	40	0	0	0	40	0
Technologies Associated with Highway-Rail Intersections								
Total number of highway-rail intersections under electronic surveillance	NR	NR	NR	NR	NR	NR	0	0
Highway-Rail intersection capapbilities								
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
Real-Time Electronic Traffic Data Collection Technologies								
Total number of signalized intersections covered by electronic surveillance	NR	NR	347	397	71	85	418	482
Number of signalized intersections with data collection technologies								
Loop detectors	0	0	347	397	71	75	418	472
Video detection cameras	0	0	0	0	17	40	17	40
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	0	0
Roadside Technologies used to Distribute Traveler Information								
Number deployed								

	Anne Arundel County		Baltimore County		Howard County		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
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
Miles covered								
Highway Advisory Radio	NR	NR	NR	NR	NR	NR	0	0
In-Vehicle Signing (IVS)	NR	NR	NR	NR	NR	NR	0	0
Variable Message Signs (VMS) on Arterials								
Candidate locations for deployment of VMS where VMS has been deployed	NR	NR	NR	NR	7	12	7	12
Candidate locations for deployment of VMS	NR	NR	NR	NR	25	30	25	30
Communication Technologies								
Signalized intersections communicated with by each type of communication								
Twisted pair cable	0	0	115	140	25	10	140	150
Coaxial cable	0	0	0	0	0	0	0	0
Fiber-optic cable	0	0	0	0	NR	30	0	30
Other (e.g., wireless, dial-up modems, leased lines, etc.)	0	0	230	280	30	30	260	310
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		Yes		No		1	
Have agreements in place with other agencies to use similar hardware								
and software to aid maintenance and interoperability?	NR		Yes		No		1	
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	No		No		Yes		1	
Privately operated service patrol vehicles operated under public contract	No		No		No		0	
Total number of arterial miles patrolled by these services	NR	NR	NR	NR	0	50	0	50
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	890	960	890	960
Police patrols	0	0	0	0	190	225	190	225
Computer algorithms linked to traffic surveillance equipment	0	0	0	0	0	0	0	0
CCTV	0	0	0	0	0	0	0	0

	Anne Arundel County		Baltimore County		Howard County		Totals	
	1999	**2005**	**1999**	**2005**	**1999**	**2005**	**1999**	**2005**
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		Yes		1	
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								
Police								
Two-way radio	No		No		Yes		1	
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	
Fire								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		No		Yes		1	
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	
DOT								
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		Yes		1	
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
Towing								
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		No		No		0	

	Anne Arundel County		Baltimore County		Howard County		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
County Police or Sheriff	No		No		Yes		1	
City Police	No		No		No		0	
Who provides on-site emergency medical response?								
Fire	No		No		Yes		1	
Emergency Management Service Agency	No		No		Yes		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		DK		0	
Is the Incident Command System used to manage incident scenes?	NR		NR		No		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		No		No		0	
Formal agreement?	No		No		No		0	
Not specified or don't know?	No		No		Yes		1	
On-scene command post used to manage activities of responding agencies?	NR		NR		No		0	
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		Yes		1	
Respondents protected through law or court opinion for liability claims								
for damages to vehicles or cargoes during clearance activities?	NR		NR		DK		0	
Are overturned tank trucks, which are intact and not leaking, uprighted								
without first off-loading?	NR		NR		Yes		1	
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		Yes		1	
Have laws or policies regarding the removal of stalled/abandoned vehicles								
from freeway shoulders?	NR		NR		No		0	
Hours abandoned vehicles are allowed to remain on a freeway shoulder?	NR		NR		0-24		0	
Have policies or procedures for quick removal of vehicles?	NR		NR		No		0	
Is Total Station equipment used to investigate major incidents?	NR		NR		Yes		1	
Handling of Towing Responses to Incidents								
Formal contract based on qualifications?	No		No		Yes		1	
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		Yes		1	

Appendix G
Arterial Management Integration

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

Agency Name	Anne Arundel County		Baltimore County	
	1999	**2005**	**1999**	**2005**
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
Receiving real-time information via electronic means from others				
Freeway Management agencies from which your agency receives				
freeway travel times, speeds, and conditions	None listed	None listed	None listed	None listed
Public Transit operators from which your agency receives				
arterial travel times derived from vehicle probes	None listed	None listed	None listed	None listed
Incident Management agencies from which your agency receives				
incident clearance and/or incident severity, location, and type information				
Receive information on Incident Clearance	None listed	None listed	Maryland State Highway Administration, Surrounding Counties, Baltimore City	Maryland State Highway Administration, Surrounding Counties, Baltimore City
Receive information on Incident Severity, Location, and Type	None listed	None listed	Maryland State Highway Administration, Surrounding Counties, Baltimore City	Maryland State Highway Administration, Surrounding Counties, Baltimore City
Toll Collection agencies from which your agency receives arterial travel				
times derived from vehicles probes	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				
Emergency Management Agencies				
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
Freeway Management Agencies				

Agency Name	Anne Arundel County		Baltimore County	
	1999	**2005**	**1999**	**2005**
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
Public Transit Operators				
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
Receiving real-time information via electronic means from others				
Emergency Management agencies from which your agency receives				
arterial incident clearance and/or arterial incident severity				
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
Arterial Management agencies from which your agency receives				
arterial travel times, speeds, and conditions	None listed	None listed	None listed	None listed
Freeway Management agencies from which your agency receives				
freeway travel times, speeds, and conditions	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.

Agency Name	Howard County	
	1999	**2005**
Agency Returned Survey?	Yes	
Arterial Management Section		
Arterial Mgt. agencies in metropolitan area with which you share info.		
Share Timing Plans Information	Howard County Traffic Engineering, Maryland State Highway Administration	None listed
Coordinate Changes to Timing Plans	Howard County Traffic Engineering, Maryland State Highway Administration	None listed
Turn over Control of Signals	Howard County Traffic Engineering	None listed
Agencies your agency provides arterial travel times, speeds, and		
conditions information, share infrastructure or coordinates operation		
Freeway Management Agencies		
Provide Information	None listed	Maryland State Highway Administration
Share Infrastructure	None listed	Maryland State Highway Administration
Coordinate Operation	None listed	Maryland State Highway Administration
Incident Management Agencies		
Provide Information	None listed	Maryland State Highway Administration
Share Infrastructure	None listed	Maryland State Highway Administration
Coordinate Operation	None listed	Maryland State Highway Administration
Public Transit Operators Agencies		
Provide Information	Howard Area Transit Service (HATS)	None listed
Share Infrastructure	Howard Area Transit Service (HATS)	None listed
Coordinate Operation	Howard Area Transit Service (HATS)	None listed
Arterial Management Agencies		

Agency Name	Howard County	
	1999	**2005**
Provide Information	Howard County Traffic Engineering, Maryland State Highway Administration	None listed
Share Infrastructure	Howard County Traffic Engineering	None listed
Coordinate Operation	Howard County Traffic Engineering, Maryland State Highway Administration	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	None listed	Maryland State Highway Administration
Public Transit operators from which your agency receives		
arterial travel times derived from vehicle probes	None listed	Howard Area Transit Service (HATS)
Incident Management agencies from which your agency receives		
incident clearance and/or incident severity, location, and type information		
Receive information on Incident Clearance	Maryland State Highway Administration	None listed
Receive information on Incident Severity, Location, and Type	Maryland State Highway Administration	None listed
Toll Collection agencies from which your agency receives arterial travel		
times derived from vehicles probes	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		
Emergency Management Agencies		
Provide Information	Howard County Police Department	None listed
Share Infrastructure	Howard County Police Department	None listed
Coordinate Operation	Howard County Police Department	None listed
Freeway Management Agencies		

Agency Name	Howard County	
	1999	**2005**
Provide Information	Maryland State Highway Administration	None listed
Share Infrastructure	Maryland State Highway Administration	None listed
Coordinate Operation	Maryland State Highway Administration	None listed
Public Transit Operators		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
Receiving real-time information via electronic means from others		
Emergency Management agencies from which your agency receives		
arterial incident clearance and/or arterial incident severity		
Receive Arterial Incident Clearance Information	Harford County Sheriff Department	None listed
Receive Arterial Incident Severity Information	Harford County Sheriff Department	None listed
Arterial Management agencies from which your agency receives		
arterial travel times, speeds, and conditions	Howard County Traffic Engineering, Maryland State Highway Administration	Howard County Traffic Engineering
Freeway Management agencies from which your agency receives		
freeway travel times, speeds, and conditions	Maryland State Highway Administration	Maryland State Highway Administration

*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**

Agency Name	Anne Arundel County		Baltimore County	
	1999	**2005**	**1999**	**2005**
Agency Returned Survey?	Yes		Yes	
Arterial Management Section				
Data collected, archived, and/or transferred to another agency				
Collected by your agency	NR	NR	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Queues, Phasing/cycle lengths, Emergency vehicle signal preemption, Transit vehicle signal priority, Route designations (snow emergency, etc.), Incidents, Current work zones, Scheduled work zones, Highway operations coordination information	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Queues, Phasing/cycle lengths, Emergency vehicle signal preemption, Transit vehicle signal priority, Route designations (snow emergency, etc.), Incidents, Current work zones, Scheduled work zones, Highway operations coordination information
Archived by your agency	NR	NR	Traffic volumes, Turning movements, Queues, Phasing/cycle lengths, Emergency vehicle signal preemption, Transit vehicle signal priority, Route designations (snow emergency, etc.), Incidents, Current work zones, Scheduled work zones, Highway operations coordination information	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Queues, Phasing/cycle lengths, Emergency vehicle signal preemption, Transit vehicle signal priority, Route designations (snow emergency, etc.), Incidents, Current work zones, Scheduled work zones, Highway operations coordination information

Agency Name	Anne Arundel County		Baltimore County	
	1999	**2005**	**1999**	**2005**
Transferred to another agency by your agency	NR	NR	Traffic volumes, Turning movements, Queues, Phasing/cycle lengths, Emergency vehicle signal preemption, Transit vehicle signal priority, Route designations (snow emergency, etc.), Incidents, Current work zones, Scheduled work zones, Highway operations coordination information	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Queues, Phasing/cycle lengths, Emergency vehicle signal preemption, Transit vehicle signal priority, Route designations (snow emergency, etc.), Incidents, Current work zones, Scheduled work zones, Highway operations coordination information
Importance of making information available to the public				
Ranked High	NR		Incidents, Current work zones, Scheduled work zones	
Ranked Medium	NR		Traffic volumes, Traffic speeds, Vehicle classification, Queues, Route designations (snow emergency, etc.)	
Ranked Low	NR		Turning movements, Phasing/cycle lengths, Emergency vehicle signal preemption, Transit vehicle signal priority, Highway operations coordination information	
Groups that make requests for the data				
	NR		State DOT personnel, Federal DOT personnel, MPOs, Consultants	
What is the data used for?				
	NR		Traffic analysis, Construction impact determination, Planning, Incident detection algorithm development, Roadway impact analysis, Dissemination to the public	
Methods used to disseminate arterial information to the public				
Technologies your agency uses to disseminate:	NR	NR	NR	NR

Agency Name	Anne Arundel County		Baltimore County	
	1999	**2005**	**1999**	**2005**
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR
Internet web site reporting arterial conditions	NR		NR	
Telephone system for reporting arterial information to the public	NR		NR	
Organizations your agency sends information for dissemination to the public	NR		NR	
Arterial Incident Management Section				
Methods used to distribute incident location and severity information				
to the public				
Technologies your agency uses to disseminate:	NR	NR	NR	NR
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR
Internet web site reporting incident information	NR		NR	
Telephone system for reporting incident information to the public	NR		NR	
Organizations your agency sends information for dissemination to the public	NR		NR	

Agency Name	Howard County	
	1999	**2005**
Agency Returned Survey?	Yes	
Arterial Management Section		
Data collected, archived, and/or transferred to another agency		
Collected by your agency	Traffic volumes, Phasing/cycle lengths	Traffic speeds, Lane occupancy, Vehicle classification, Turning movements, Queues, Road conditions, Emergency vehicle signal preemption, Route designations (snow emergency, etc.), Weather conditions, Incidents, Current work zones, Scheduled work zones, Highway operations coordination information
Archived by your agency	Traffic volumes, Phasing/cycle lengths	Traffic speeds, Lane occupancy, Vehicle classification, Turning movements, Queues, Road conditions, Emergency vehicle signal preemption, Route designations (snow emergency, etc.), Weather conditions, Incidents, Current work zones, Scheduled work zones, Highway operations coordination information

Agency Name	Howard County	
	1999	**2005**
Transferred to another agency by your agency	NR	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Queues, Road conditions, Emergency vehicle signal preemption, Route designations (snow emergency, etc.), Weather conditions, Incidents, Current work zones, Scheduled work zones, Highway operations coordination information
Importance of making information available to the public		
Ranked High	Road conditions, Emergency vehicle signal preemption, Route designations (snow emergency, etc.), Weather conditions, Incidents, Current work zones, Scheduled work zones, Highway operations coordination information	
Ranked Medium	Traffic volumes, Traffic speeds	
Ranked Low	Lane occupancy, Vehicle classification, Turning movements, Queues, Phasing/cycle lengths	
Groups that make requests for the data	Universities, State DOT personnel, Federal DOT personnel, Media (I.e., TV stations, radio stations), MPOs, Consultants	
What is the data used for?	Do not know	
Methods used to disseminate arterial information to the public		
Technologies your agency uses to disseminate:	NR	NR

Agency Name	Howard County	
	1999	**2005**
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR
Internet web site reporting arterial conditions	NR	
Telephone system for reporting arterial information to the public	NR	
Organizations your agency sends information for dissemination to the public	NR	
Arterial Incident Management Section		
Methods used to distribute incident location and severity information		
to the public		
Technologies your agency uses to disseminate:	NR	NR
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR
Internet web site reporting incident information	NR	
Telephone system for reporting incident information to the public	NR	
Organizations your agency sends information for dissemination to the public	NR	

Appendix I
Transit Management Components

Transit Management
Agencies for Metropolitan Area: Baltimore

	Harford County Transportation		Howard Area Transit Service (HATS)		Mass Transit Administration		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes		3	
Number of vehicles used in revenue service								
Fixed Route Bus	12	14	NR	NR	880	880	892	894
Heavy or Rapid Rail	NR	NR	NR	NR	100	NR	100	0
Light Rail	NR	NR	NR	NR	53	NR	53	0
Demand Responsive	16	18	NR	NR	20	NR	36	18
Commuter Rail	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	NR	NR	0	0
Have of plan to have an Automated Vehicle Location System?	No		No		Yes		1	
Primary and Secondary Location Technologies Used								
Primary Technologies								
GPS	No	No	No	No	No	No	0	0
Sign/Odometer	No	No	No	No	No	No	0	0
Dead-Reckoning	No	No	No	No	No	No	0	0
LORAN C	No	No	No	No	No	No	0	0
Other	No	No	No	No	Yes	No	1	0
Backup Technologies								
GPS	No	No	No	No	No	No	0	0
Sign/Odometer	No	No	No	No	No	No	0	0
Dead-Reckoning	No	No	No	No	Yes	No	1	0
LORAN C	No	No	No	No	No	No	0	0
Other	No	No	No	No	No	No	0	0
Number of Vehicles Equipped with AVL								
Fixed Route Bus	NR	NR	NR	NR	380	868	380	868
Heavy or Rapid Rail	NR	NR	NR	NR	53	NR	53	0
Light Rail	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	NR	NR	0	0
Motor Buses Operated as Vehicle Probes								
Number of Motor Buses equipped as probes on freeways?	NR		NR		NR		0	
Number of Motor Buses equipped as probes on arterials?	NR		NR		NR		0	
Have Organized Regional Incident Management Program?	No		Yes		No		1	
Have Automated Traveler Information System?	Yes		No		Yes		2	

Transit Management
Agencies for Metropolitan Area: Baltimore

	Harford County Transportation		Howard Area Transit Service (HATS)		Mass Transit Administration		Totals	
	1999	**2005**	**1999**	**2005**	**1999**	**2005**	**1999**	**2005**
Services Automated Traveler Info. System Applies:								
Fixed Route	Yes		No		Yes		2	
Heavy Rail	No		No		No		0	
Light Rail	No		No		No		0	
Demand Responsive	Yes		No		No		1	
Commuter Rail	No		No		No		0	
Ferry	No		No		No		0	
Locations where traveler information is displayed to public								
Number of bus stops on fixed transit routes	NR	NR	NR	NR	8,000	NR	8000	0
Bus stops on fixed transit routes that display traveler info to the public	NR	NR	NR	NR	0	NR	0	0
Number of rail stations	NR	NR	NR	NR	75	NR	75	0
Number of rail stations that display traveler information	NR	NR	NR	NR	3	NR	3	0
Number of other locations that display traveler information to public	NR	NR	NR	NR	1	NR	1	0
Number of vehicles the traveler information system has available								
Fixed Route Bus	NR	NR	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	NR	NR	0	0
Deployment of Communications Technology								
Attributes of Radio System:								
Digital?	No		Yes		No		1	
Analog?	No		No		Yes		1	
Trunked?	No		Yes		Yes		2	
Regular?	No		No		No		0	
Services that use a Digital or Trunked Radio System								
Digital Only								
Fixed Route Bus	No	No	No	No	No	No	0	0
Heavy or Rapid Rail	No	No	No	No	No	No	0	0
Light Rail	No	No	No	No	No	No	0	0
Demand Responsive	No	No	No	No	No	No	0	0
Commuter Rail	No	No	No	No	No	No	0	0
Ferry Boat	No	No	No	No	No	No	0	0
Trunked Only								
Fixed Route Bus	No	No	No	No	Yes	No	1	0
Heavy or Rapid Rail	No	No	No	No	No	No	0	0

Transit Management
Agencies for Metropolitan Area: Baltimore

	Harford County Transportation		Howard Area Transit Service (HATS)		Mass Transit Administration		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Light Rail	No	No	No	No	No	No	0	0
Demand Responsive	No	No	No	No	Yes	No	1	0
Commuter Rail	No	No	No	No	No	No	0	0
Ferry Boat	No	No	No	No	No	No	0	0
Have of plan to have Automatic Passenger Counters (APCs)?	No		No		Yes		1	
Methods used to count passengers								
Treadle Mats	No		No		No		0	
Infrared Beams	No		No		Yes		1	
Primary and Secondary Location Technologies Used								
Primary Technologies								
GPS	No	No	No	No	No	No	0	0
Differential GPS	No	No	No	No	Yes	No	1	0
Signpost/Odometer	No	No	No	No	No	No	0	0
Dead_Reckoning	No	No	No	No	No	No	0	0
LORAN C	No	No	No	No	No	No	0	0
Other	No	No	No	No	No	No	0	0
Backup Technologies								
GPS	No	No	No	No	No	No	0	0
Differential GPS	No	No	No	No	No	No	0	0
Signpost/Odometer	No	No	No	No	No	No	0	0
Dead_Reckoning	No	No	No	No	Yes	No	1	0
LORAN C	No	No	No	No	No	No	0	0
Other	No	No	No	No	No	No	0	0
Number of Vehicles with APCs								
Fixed Route Bus	NR	NR	NR	NR	25	100	25	100
Heavy or Rapid Rail	NR	NR	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	NR	NR	0	0
Remote Real-Time Monitoring and Computer Assisted Dispatching								
Remote Real-Time Monitoring								
Fixed Route Bus	NR	NR	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	NR	NR	0	0

	Harford County Transportation		Howard Area Transit Service (HATS)		Mass Transit Administration		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Automated Dispatching or Control Software								
Fixed Route Bus	NR	NR	NR	NR	380	868	380	868
Heavy or Rapid Rail	NR	NR	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	20	NR	20	0
Commuter Rail	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	NR	NR	0	0
Coordinate or plan to coordinate travel request and vehicle								
dispatching for multiple agencies?	No		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		NR		0	
Modes that TMC currently controls:								
Highways	No	No	No	No	No	No	0	0
Fixed Route Bus	No	No	No	No	No	No	0	0
Heavy or Rapid Rail	No	No	No	No	No	No	0	0
Light Rail	No	No	No	No	No	No	0	0
Demand Responsive	No	No	No	No	No	No	0	0
Commuter Rail	No	No	No	No	No	No	0	0
Ferry Boat	No	No	No	No	No	No	0	0
Other	No	No	No	No	No	No	0	0
Priority at Traffic Signals and Ramp Meter Priority								
Priority at Traffic Signals								
Fixed Route Bus	NR	NR	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	53	NR	53	0
Demand Responsive	NR	NR	NR	NR	NR	NR	0	0
Ramp Meter Priority								0
Fixed Route Bus	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	NR	NR	0	0
Number of Vehicles Equipped with Navigation Aids								
Fixed Route Bus	NR	NR	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	NR	NR	0	0
ITS Standards Used Related to Transit Management								

Transit Management
Agencies for Metropolitan Area: Baltimore

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

Transit Management
Agencies for Metropolitan Area: Baltimore

	Harford County Transportation		Howard Area Transit Service (HATS)		Mass Transit Administration		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Smart Card Readers								
Fixed Route Bus Vehicles	NR	NR	NR	NR	NR	NR	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	NR	NR	0	0
Credit Card								
Fixed Route Bus Vehicles	NR	NR	NR	NR	NR	NR	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	NR	NR	0	0
Debit Card								
Fixed Route Bus Vehicles	NR	NR	NR	NR	NR	NR	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	NR	NR	0	0
NR: No Response								

Appendix J
Transit Management Integration

Agency Name	Harford County Transportation		Howard Area Transit Service (HATS)	
	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				
Receive Information	None listed	None listed	None listed	Maryland State Highway Administration
Share Infrastructure	None listed	None listed	None listed	None listed
Arterial Management agencies from which your agency receives				
arterial travel times, speeds, and conditions				
Receive Information	None listed	None listed	None listed	Howard County Traffic Engineering
Share Infrastructure	None listed	None listed	None listed	None listed
Incident Management agencies from which your agency receives				
incident severity, location, and type				
Receive Information	None listed	None listed	None listed	Maryland State Highway Administration
Share Infrastructure	None listed	None listed	None listed	None listed

Agency Name	Mass Transit Administration	
	1999	2005
Agency Returned Survey?	Yes	
Transit operators in the region that use the same electronic payment system	None listed	
Toll operators from whom you accept electronic payment of transit		
fare through the use of ETC media	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		
Receive Information	None listed	None listed
Share Infrastructure	None listed	None listed
Arterial Management agencies from which your agency receives		
arterial travel times, speeds, and conditions		
Receive Information	None listed	None listed
Share Infrastructure	None listed	None listed
Incident Management agencies from which your agency receives		
incident severity, location, and type		
Receive Information	None listed	None listed
Share Infrastructure	None listed	None listed

Appendix K
Transit Management Information Collection and Dissemination

Agency Name	Harford County Transportation	
	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	Facsimile, Internet Web Sites	Facsimile, Internet Web Sites
Real-time transit schedule adherence or arrival and departure times	Facsimile, Internet Web Sites	Facsimile, Internet Web Sites
Technologies employed by other organization receiving your data		
Transit routes, schedules and fares	Facsimile, Internet Web Sites	Facsimile, Internet Web Sites
Real-time transit schedule adherence or arrival and departure times	Facsimile, Internet Web Sites	Facsimile, Internet Web Sites
Internet web site reporting transit routes, schedules and fare, etc.	NR	
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
Transferred to another agency by your agency	NR	NR
Importance of making information available to the public		
Ranked High	NR	
Ranked Medium	Transit operations coordination information, Incidents, Vehicle monitoring status, Passenger information (e.g., surveys, O/D), Passenger count, Vehicle time and location	
Ranked Low	NR	
Groups that make requests for the data	Federal DOT personnel, State DOT personnel	
What is the data used for?	Planning	

Agency Name	Howard Area Transit Service (HATS)	
	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	NR	NR
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	NR
Internet web site reporting transit routes, schedules and fare, etc.	NR	
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	Transit operations coordination information, Emergency/evacuation routes and procedures, Incidents, Weather conditions, Passenger information (e.g., surveys, O/D), Trip itinerary planning records, Passenger count	Intermodal (air, rail, water) conditions, Current roadway work zones for transit, Route designations (snow emergency, etc), Road conditions, Vehicle monitoring status, Vehicle time and location
Archived by your agency	NR	NR
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	Consultants, MPOs, Media (I.e., TV stations, radio stations), Federal DOT personnel, State DOT personnel	
What is the data used for?	Dissemination to the public, Planning	

Agency Name	Mass Transit Administration	
	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	System	NR
Real-time transit schedule adherence or arrival and departure times	Kiosks, Telephone System	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	NR
Internet web site reporting transit routes, schedules and fare, etc.	NR	
Telephone system for reporting transit information to the public	1-410-539-5000; 1-800-543-9809	
Organizations your agency sends information for dissemination to the public	NR	
Data collected, archived, and/or transferred to another agency		
Collected by your agency	Transit operations coordination information, Incidents, Transit vehicle signal priority, Vehicle monitoring status, Passenger information (e.g., surveys, O/D), Trip itinerary planning records, Passenger count, Vehicle time and location	NR
Archived by your agency	Transit operations coordination information, Incidents, Transit vehicle signal priority, Vehicle monitoring status, Passenger information (e.g., surveys, O/D), Trip itinerary planning records, Passenger count, Vehicle time and location	NR
Transferred to another agency by your agency	NR	NR
Importance of making information available to the public		
Ranked High	Vehicle monitoring status, Trip itinerary planning records	
Ranked Medium	Transit vehicle signal priority	
Ranked Low	Transit operations coordination information, Incidents, Passenger information (e.g., surveys, O/D), Passenger count, Vehicle time and location	
Groups that make requests for the data	Consultants, Media (I.e., TV stations, radio stations)	
What is the data used for?	Planning	

**Appendix L
Emergency Management**

Emergency Management Agencies for Metropolitan Area: Baltimore

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			
Anne Arundel County Police Department	650	NR	0	NR	0	NR	0	NR	NR	NR	0	NR	Yes	Yes	None listed
Baltimore City Fire Department	254	254	0	0	37	37	37	37	0	0	0	0	No	No	None listed
Baltimore City Police Department	1,091	NR	0	NR	0	NR	1,091	NR	150	NR	0	NR	Yes	Yes	None listed
Baltimore County Police Department	427	450	0	0	307	400	427	450	427	450	0	0	Yes	Yes	Maryland Emergency Management Administration
Carroll County Sheriff Department	35	50	0	0	0	0	0	50	0	0	0	0	No	Yes	None listed
Harford County Sheriff Department	234	NR	0	NR	0	NR	0	NR	0	NR	0	NR	Yes	No	None listed
Howard County Police Department	286	315	0	195	0	195	0	315	0	195	0	0	No	Yes	Maryland State Police

**Appendix M
Electronic Toll Collection**

Electronic Toll Collection
Agencies for Metropolitan Area: Baltimore

	Maryland Transportation Authority	
	1999	**2005**
Agency Returned Survey?	Yes	
Number of toll Collection Plazas operated	6	6
Number of toll collection plazas with dedicated ETC	3	3
Number of toll collection plazas with both manual and ETC	3	3
Number of toll collection lanes operated	50	50
Number of toll collection lanes with dedicated ETC	8	12
Number of toll collection lanes with both manual and ETC	42	38
Number of toll collection tags issued	40,000	200,000
Antennae Location Technologies		
In-Pavement?	No	
Focused Beam?	No	
Distributed Overhead?	Yes	
In-Vehicle Equipment Technologies		
Tag-based?	No	
Integrated circuit card-based?	Yes	
Are toll tags used by other toll operations in metro area?	No	
List of toll operators that use tags	None	
Are toll tags used by operators of public transit to pay transit fares		
in metro area?	No	
List of transit operators that use tags	None	
_____		
NR: No Response		