

# **Tracking the Deployment of the Integrated Metropolitan ITS Infrastructure in Richmond, Petersburg**

## **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<sup>1</sup> 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."*<sup>2</sup>

-- 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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<sup>1</sup> 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.

<sup>2</sup> 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.<sup>3</sup>

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 Richmond, Petersburg 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 Richmond, Petersburg region was 73% in 1997 and 68% 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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<sup>3</sup> Additional Resources: "Measuring ITS Deployment and Integration" (Electronic Document Number: 4372). U.S. Department of Transportation, Joint Program Office for Intelligent Transportation Systems, 400 Seventh St., SW (HVV-1), Washington, DC 20590, Phone: 202-366-9536, Fax: 202-366-3302, Web: <http://www.its.dot.gov>.

## Part 2 - Summary 1999 Survey Results

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

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

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

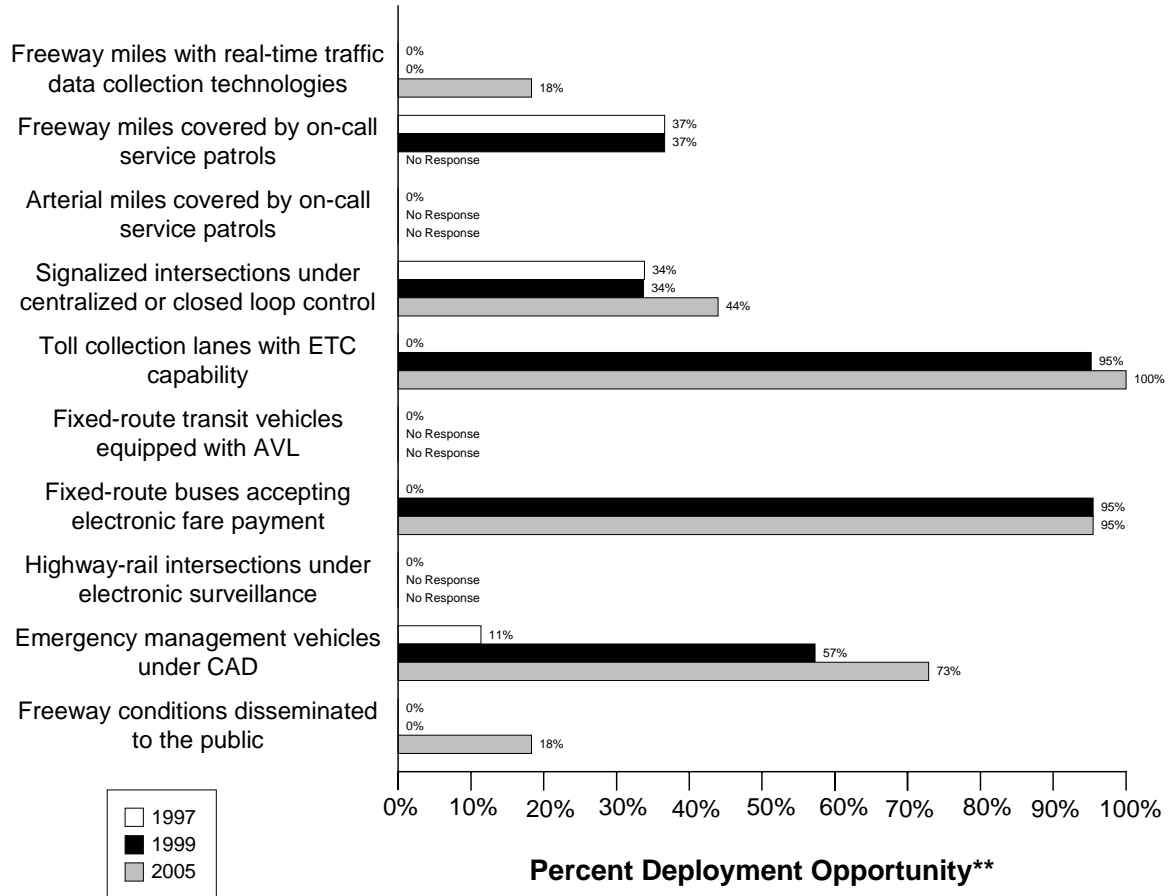
A critical aspect of ITS that provides much of its capability is the integration of individual components to form a unified regional traffic control system. Individual ITS components routinely collect information that is used for purposes internal to that component. For example, the Arterial Management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

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

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

Data as of 5/1/00

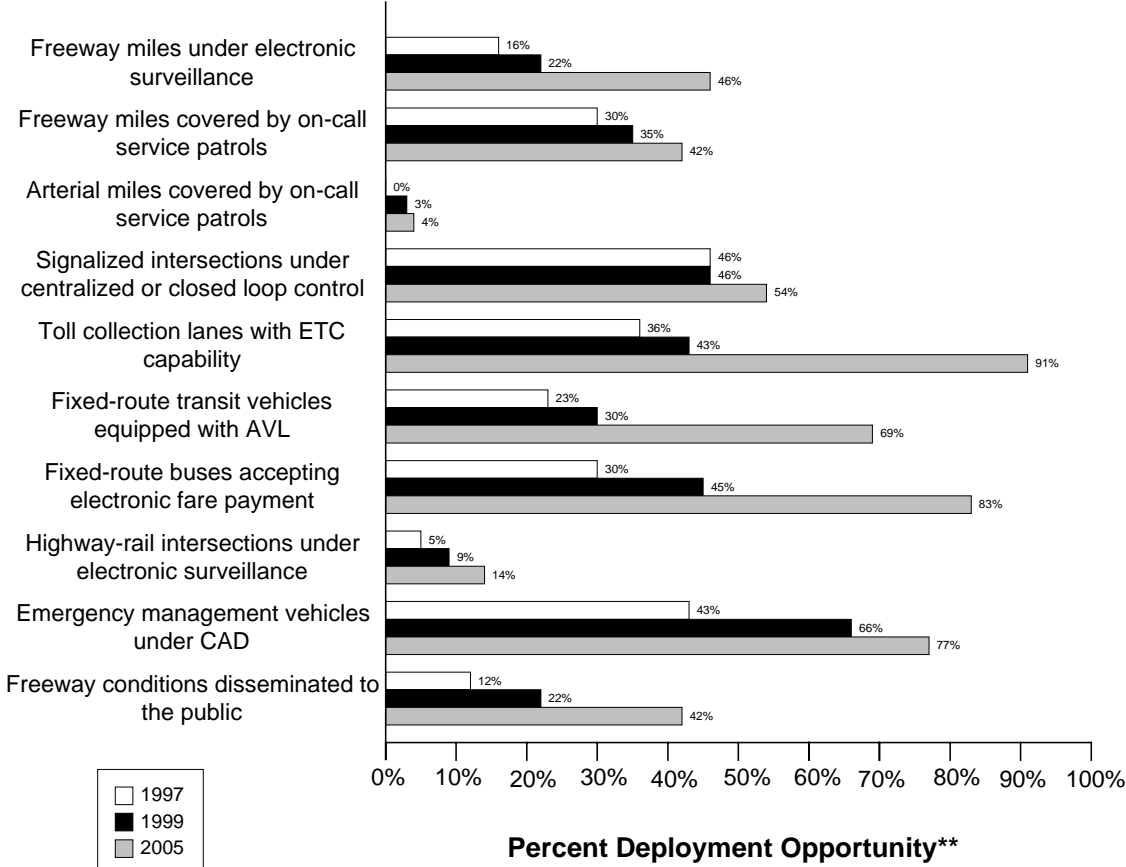
## Richmond, Petersburg Summary Indicators\*



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

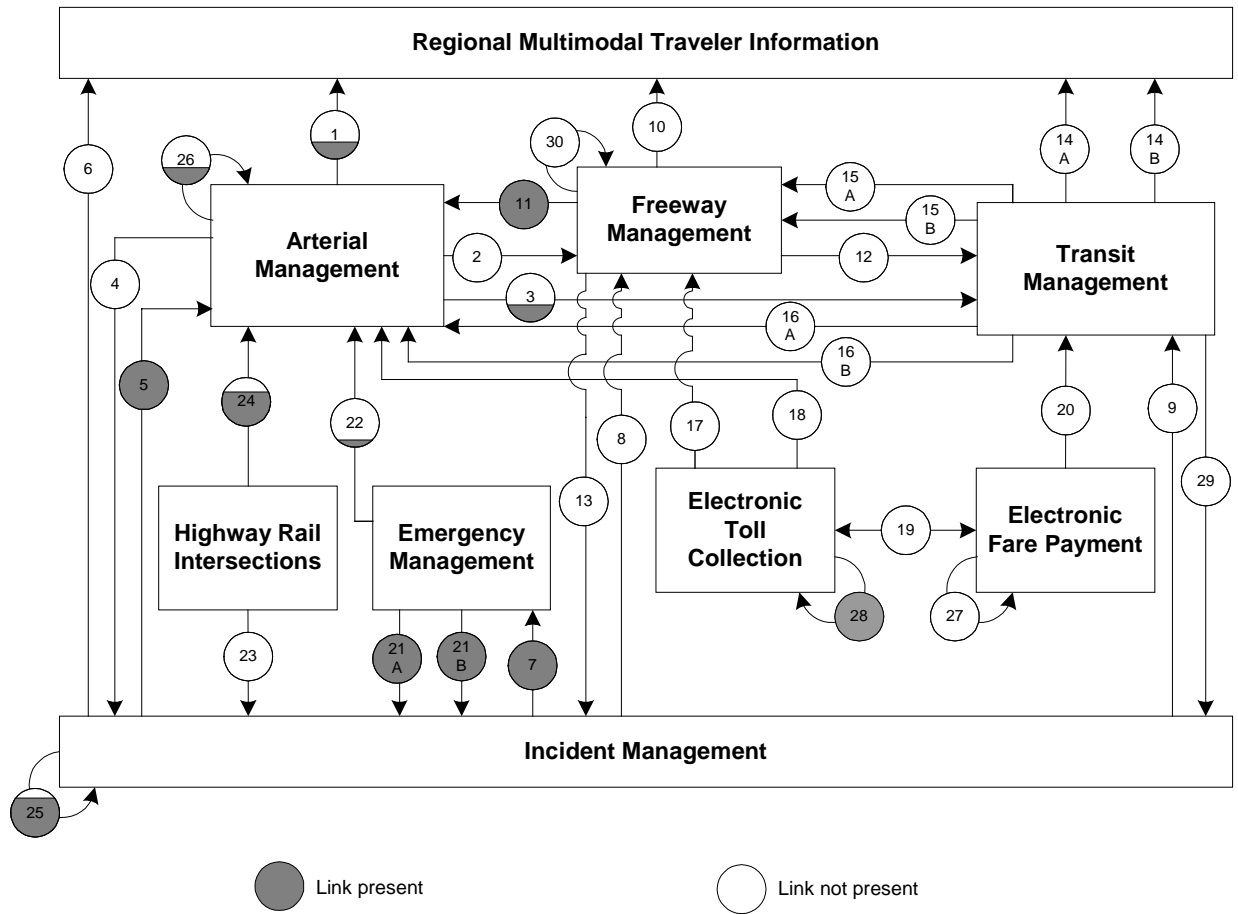
\*\* Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

# National Summary Indicators\*



\* 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

# Richmond, Petersburg 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



<b>Link</b>	<b>Description</b>	<b>Link</b>	<b>Description</b>
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 Richmond, Petersburg metropolitan area. The figures summarizing the component indicators consist of a bar chart portraying the deployment levels for 1997, 1999, and 2005 accompanied by detailed tables of the data used to calculate each component indicator value (*Num* stands for numerator and *Den* stands for denominator; blank space indicates that no response was received.)

Example: Calculating Component Indicators for Freeway Management

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

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

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

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

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

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

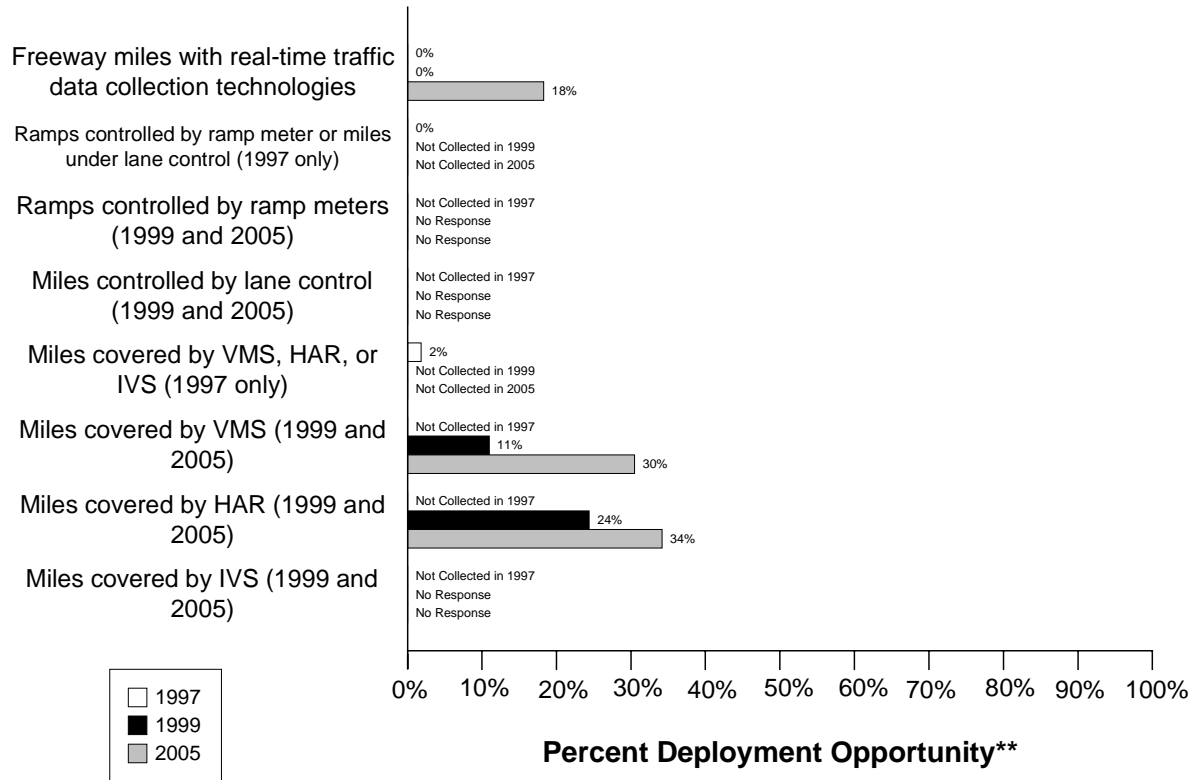
Example: Calculating Integration between Arterial Management and Regional Multimodal Traveler Information

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

# Freeway Management Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Freeway Management\*



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

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

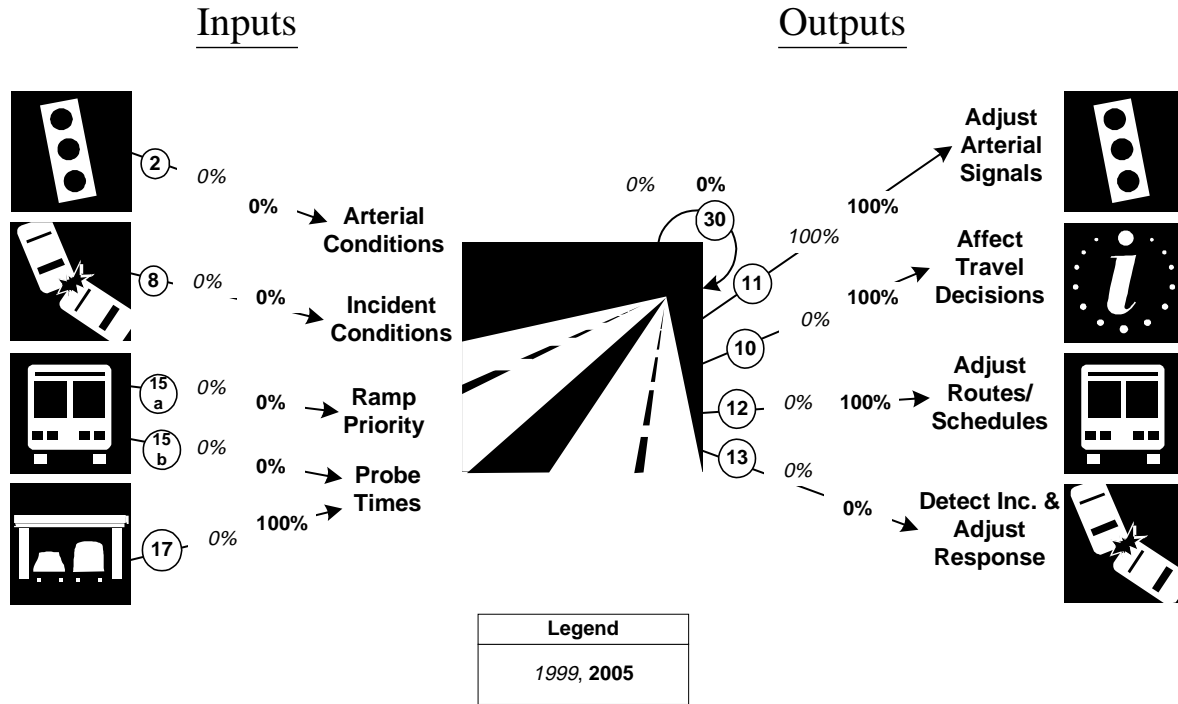
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway centerline miles are under electronic surveillance for monitoring traffic flow	0	164	0%	0	164	0%	30	164	18%
Freeway entrance ramps are controlled by ramp meters or miles under lane control	0	164	0%						

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway entrance ramps are controlled by ramp meters					216			216	
Freeway centerline miles will be controlled by lane control					164			164	
Freeway miles are covered by VMS, HAR, or IVS	3	164	2%						
Freeway miles are covered by VMS				18	164	11%	50	164	30%
Freeway miles are covered by HAR				40	164	24%	56	164	34%
Freeway miles are covered by IVS					164			164	

# Freeway Management Integration Indicators

## Richmond, Petersburg

### Freeway Management Integration\*



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

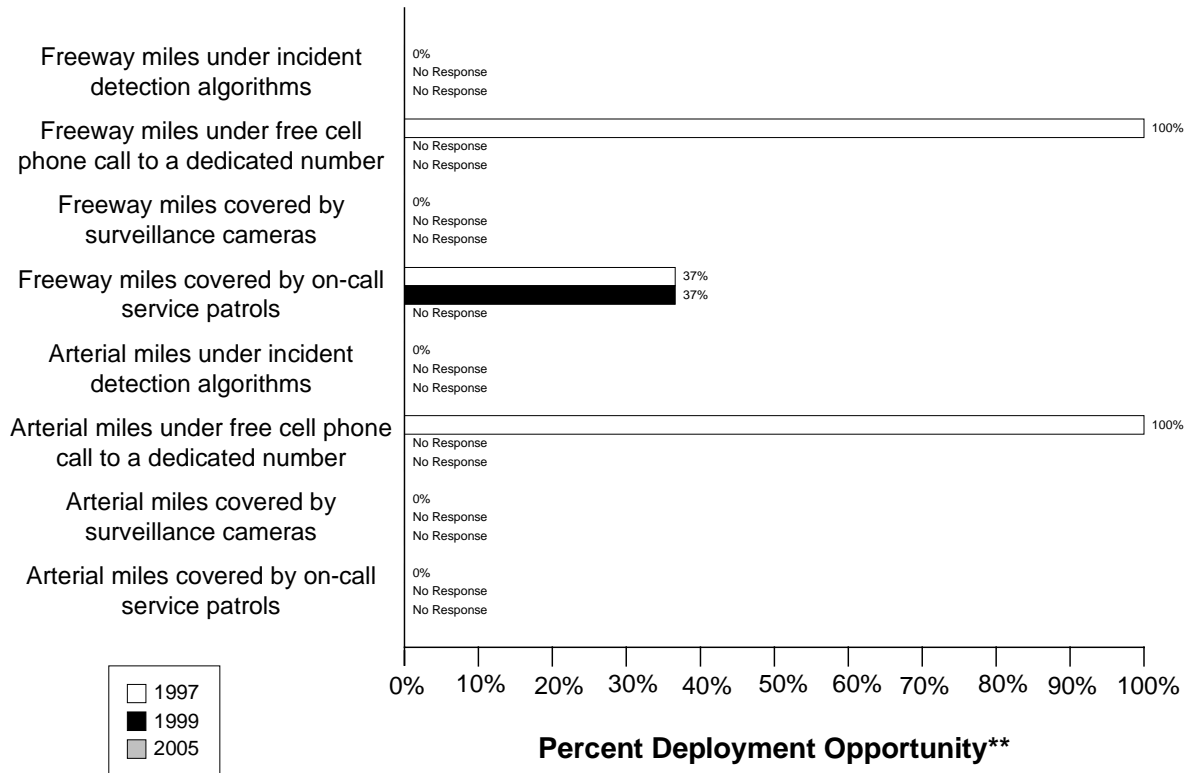
Link Description	1999	2005
2. Arterial Management agencies sending information to Freeway Management	( 0/ 3) 0%	( 0/ 3) 0%
8. Incident Management agencies sending information to Freeway Management	( 0/ 1) 0%	( 0/ 1) 0%
15a. Transit management agencies with vehicles equipped with ramp meter priority	(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

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

# Incident Management Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Freeway and Arterial Incident Management\*



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

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

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway miles are covered by incident detection algorithms	0	164	0%		164			164	
Freeway miles are covered by free cellular phone calls to a dedicated number	164	164	100%		164			164	
Freeway miles are covered by surveillance cameras.	0	164	0%		164			164	

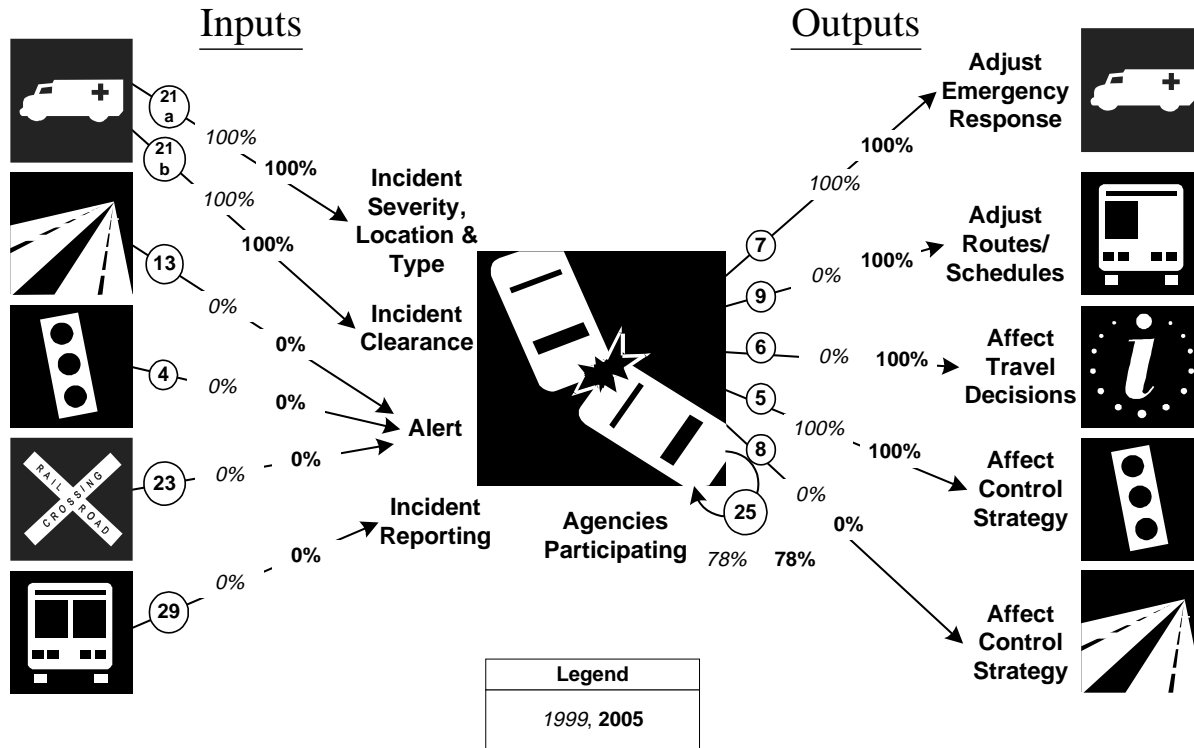
<b>Description</b>	<b>1997</b>			<b>1999</b>			<b>2005</b>		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway miles are covered by on-call publicly-sponsored service patrol or towing services.	60	164	37%	60	164	37%		164	
Arterial miles are covered by incident detection algorithms	0	679	0%		679			679	
Arterial miles are covered by free cellular phone calls to a dedicated number	679	679	100%		679			679	
Arterial miles are covered by surveillance cameras	0	679	0%		679			679	
Arterial miles are covered by on-call publicly-sponsored service patrol or towing services	0	679	0%		679			679	



# Incident Management Integration Indicators

## Richmond, Petersburg

### Incident Management Integration\*



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

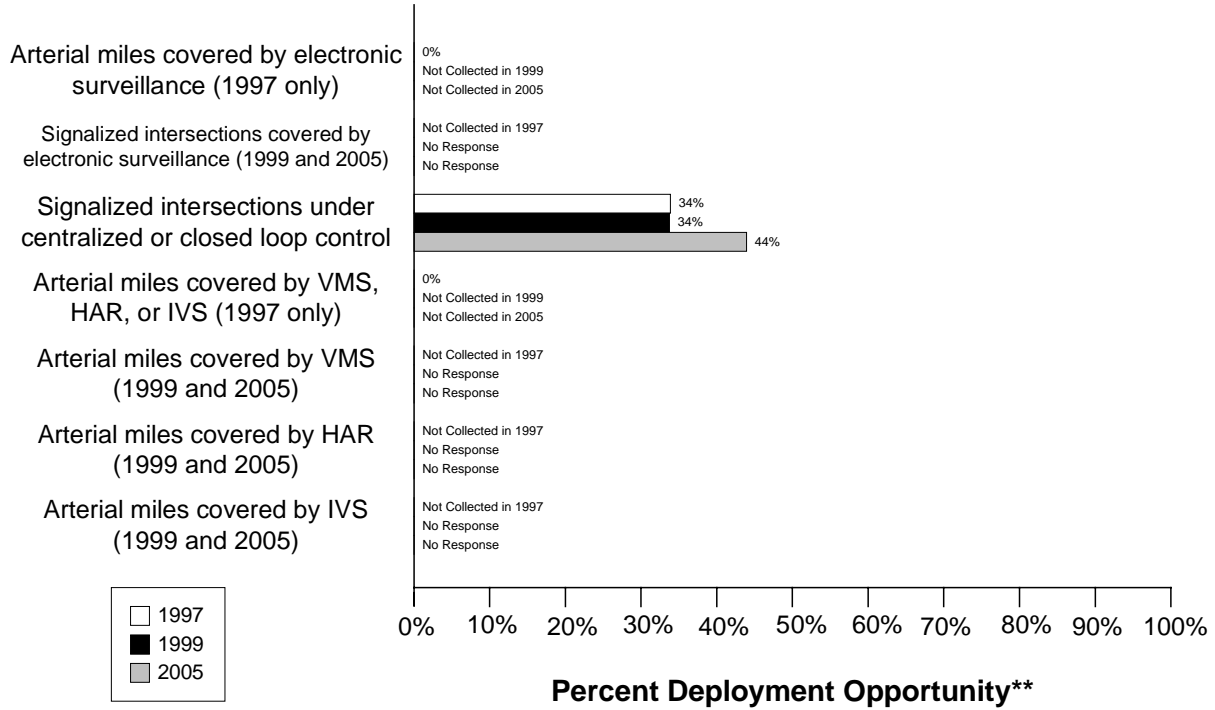
Link Description	1999	2005
21a. Incident management agencies receiving incident severity from Emergency Management	( 1 / 1 ) 100%	( 1 / 1 ) 100%
21b. Incident management agencies receiving incident clearance activities from Emergency Management	( 1 / 1 ) 100%	( 1 / 1 ) 100%
13. Freeway Management agencies sending freeway conditions to Incident Management	( 0 / 1 ) 0%	( 0 / 1 ) 0%
4. Arterial Management agencies sending arterial conditions to Incident Management	( 0 / 3 ) 0%	( 0 / 3 ) 0%
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	( 0 / 2 ) 0%	( 0 / 2 ) 0%

<b>Link Description</b>	<b>1999</b>	<b>2005</b>
7. Incident management agencies transfer information describing incident severity, location, and type to Emergency Management agencies	( 1/ 1) 100%	( 1/ 1) 100%
9. Incident Management agencies transfer information describing incident severity, location, and type to Transit Management agencies	( 0/ 1) 0%	( 1/ 1) 100%
6. Incident Management agencies disseminate information describing incident severity, location, and type to the public	( 0/ 1) 0%	( 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	( 7/ 9) 78%	( 7/ 9) 78%

# Arterial Management Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Arterial Management\*



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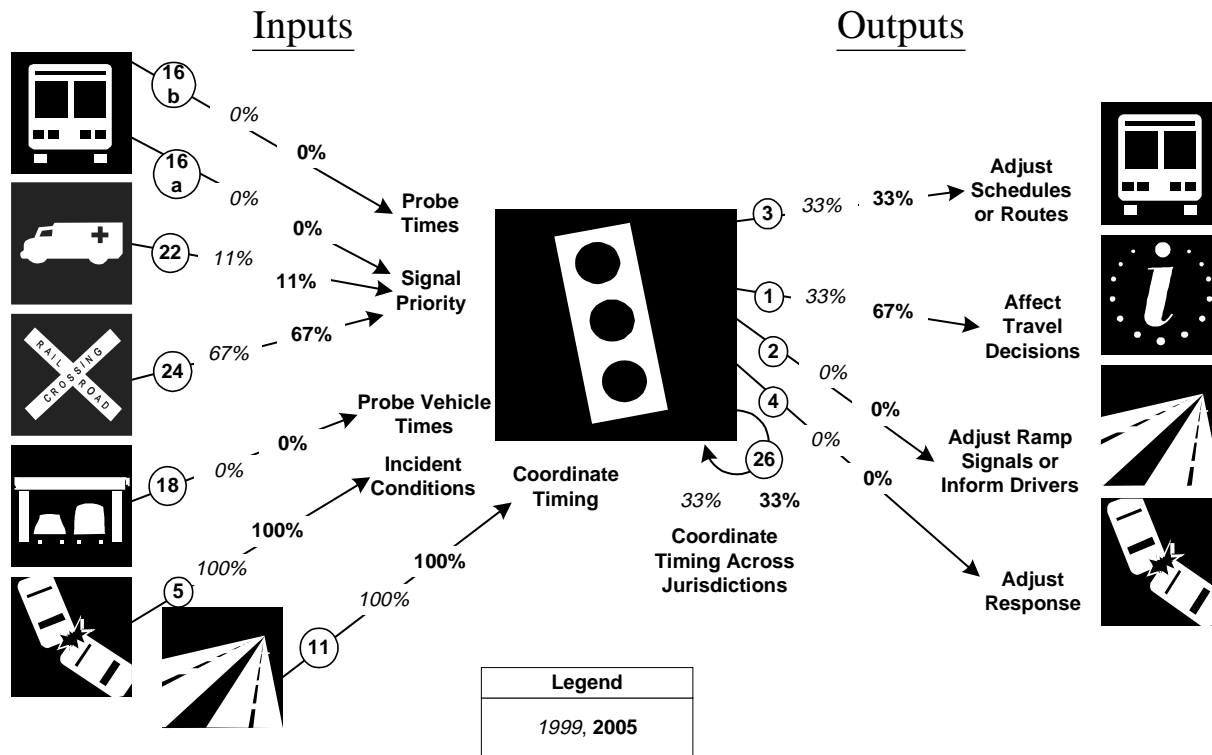
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Arterial miles covered by electronic surveillance	0	679	0%						
Signalized intersections are covered by electronic surveillance for monitoring traffic flow					534			683	
Signalized intersections are under centralized or closed loop control	110	325	34%	180	534	34%	300	683	44%

<b>Description</b>	<b>1997</b>			<b>1999</b>			<b>2005</b>		
	Num	Den	%	Num	Den	%	Num	Den	%
Arterial miles are covered by VMS, HAR, or IVS	0	679	0%						
Arterial miles are covered by VMS					679			679	
Arterial miles are covered by HAR					679			679	
Arterial miles are covered by IVS					679			679	

# Arterial Management Integration Indicators

## Richmond, Petersburg

### Arterial Management Integration\*



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

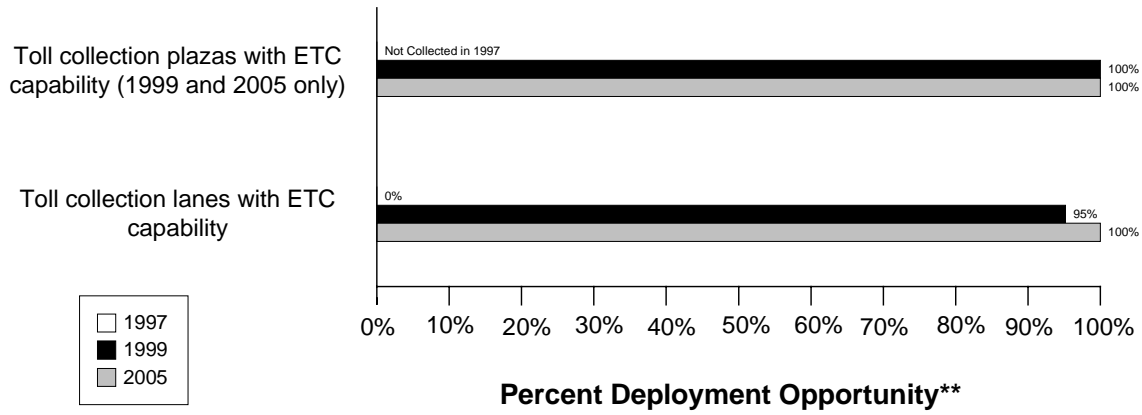
Link Description	1999	2005
16a. Transit management agencies with vehicles equipped with traffic signal priority	( 0 / 2 ) 0%	( 0 / 2 ) 0%
16b. Transit Management agencies have vehicles equipped as probes on arterials	( 0 / 2 ) 0%	( 0 / 2 ) 0%
22. Emergency Management agencies have vehicles equipped with traffic signal preemption capability	( 1 / 9 ) 11%	( 1 / 9 ) 11%
24. Arterial Management agencies have traffic signals within 200 feet of a highway rail intersection with the capability of having their signal timing adjusted in response to a train crossing	( 2 / 3 ) 67%	( 2 / 3 ) 67%
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%

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

# Electronic Toll Collection Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Electronic Toll Collection\*



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

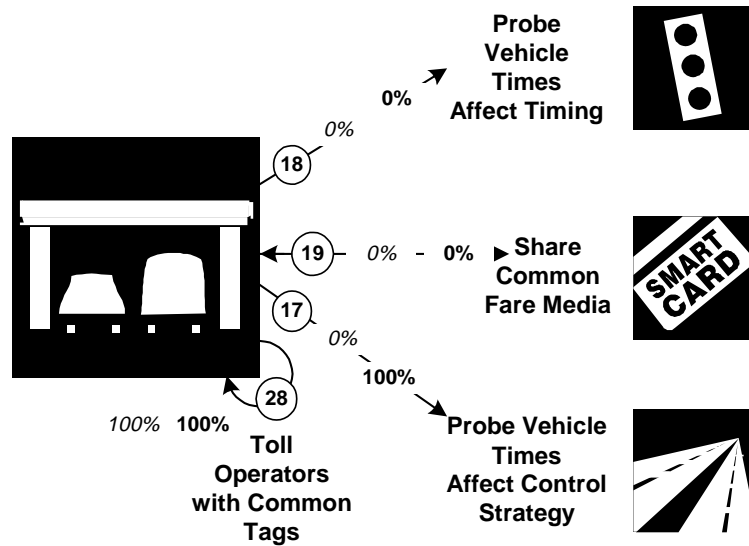
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Toll collection plazas with ETC capability				11	11	100%	9	9	100%
Toll collection lanes with ETC capability	0	68	0%	79	83	95%	63	63	100%

# Electronic Toll Collection Integration Indicators

## Richmond, Petersburg Electronic Toll Collection Integration\*

### Inputs

### Outputs



Legend
1999, 2005

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

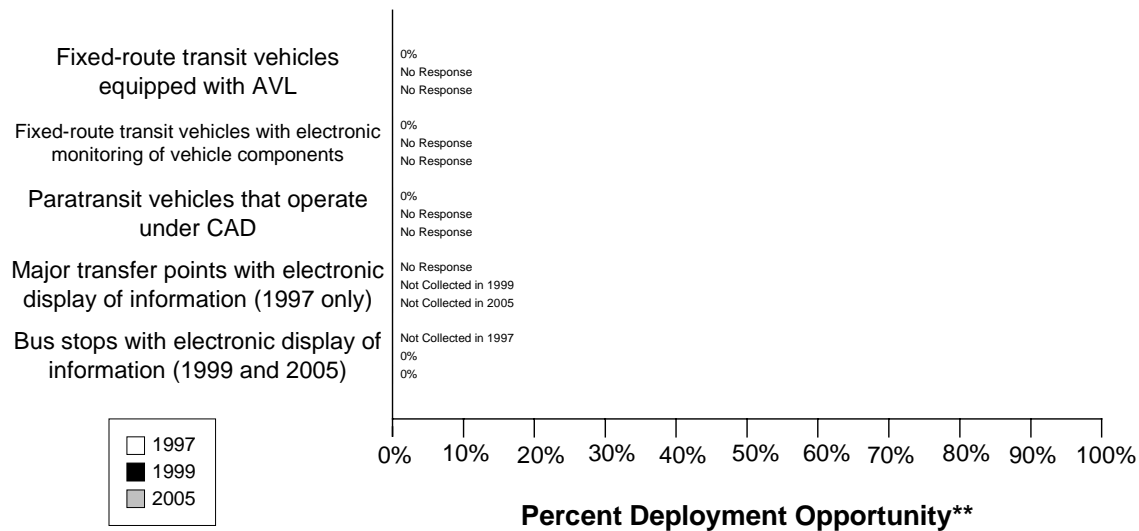
Link Description	1999	2005
18. Number of Arterial Management agencies receiving information from vehicle probes	( 0/ 3) 0%	( 0/ 3) 0%
19. Transit agencies that accept electronic payment through the use of electronic toll collection media	( 0/ 2) 0%	( 0/ 2) 0%
17. Freeway Management agencies receiving information from vehicle probes	( 0/ 1) 0%	( 1/ 1) 100%
28. Toll operators using common toll tag technology	( 4/ 4) 100%	( 4/ 4) 100%



# Transit Management Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Transit Management\*

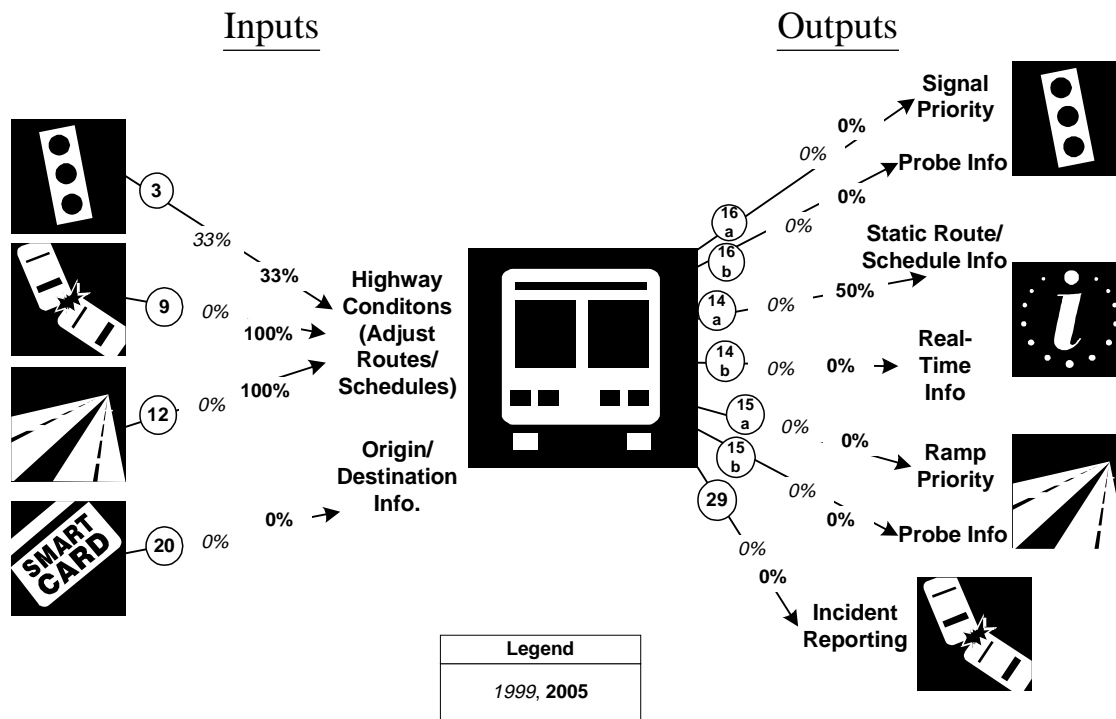


\* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.  
 \*\* Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Fixed-route transit vehicles are equipped with AVL	0	201	0%		198			9	
Fixed-route transit vehicles are equipped with electronic monitoring of vehicle component	0	201	0%		198			9	
Paratransit vehicles operate under computer-aided dispatch	0	31	0%		74			2	
Percent fixed-route transfer locations with electronic display of information	0	0							
Bus stops display information to the public				0	2500	0%	0	2500	0%

# Transit Management Integration Indicators

## Richmond, Petersburg Transit Management Integration\*



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

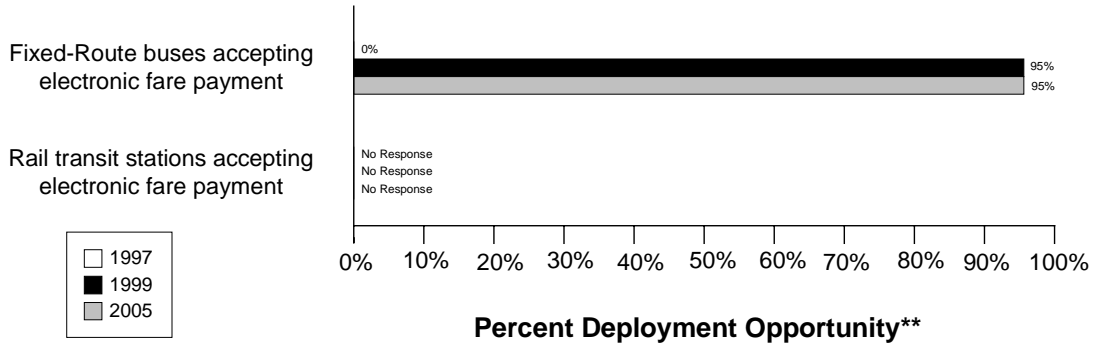
Link Description	1999	2005
3. Arterial Management agencies transfer arterial travel times, speeds, and conditions to Transit Management	( 1 / 3) 33%	( 1 / 3) 33%
9. Incident management agencies transfer information describing incident severity, location, and type to Transit Management	( 0 / 1) 0%	( 1 / 1) 100%
12. Freeway Management agencies transfer freeway travel times, speeds, and conditions to Transit Management	( 0 / 1) 0%	( 1 / 1) 100%
20. Transit Management agencies using Electronic Fare Payment data in transit service planning	( 0 / 2) 0%	( 0 / 2) 0%
16a. Transit Management agencies have vehicles equipped with traffic signal priority capability	( 0 / 2) 0%	( 0 / 2) 0%
16b. Transit Management agencies have vehicles equipped as probes on arterials	( 0 / 2) 0%	( 0 / 2) 0%
14a. Transit Management agencies disseminate information describing transit routes, schedules, and fares to travelers	( 0 / 2) 0%	( 1 / 2) 50%
14b. Transit Management agencies disseminate information describing schedule/route adherence to travelers	( 0 / 2) 0%	( 0 / 2) 0%

<b>Link Description</b>	<b>1999</b>	<b>2005</b>
15a. Transit Management agencies have vehicles equipped with ramp meter priority capability	( 0/ 2) 0%	( 0/ 2) 0%
15b. Transit Management agencies have vehicles equipped as probes on freeways	( 0/ 2) 0%	( 0/ 2) 0%
29. Transit Management agencies that report traffic incidents as part of an organized regional Incident Management program	( 0/ 2) 0%	( 0/ 2) 0%

# Electronic Fare Payment Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Electronic Fare Payment\*



\* 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.

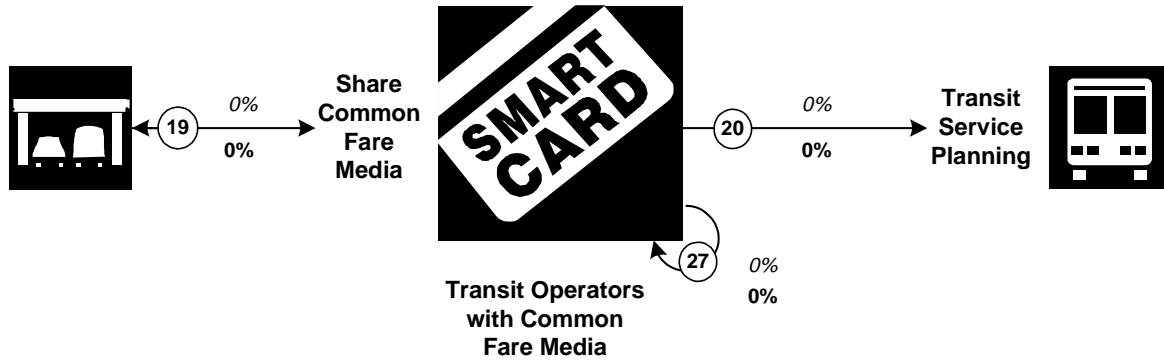
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Fixed-route transit vehicles that accept electronic payment	0	201	0%	189	198	95%	189	198	95%
Rail transit stations that accept electronic payment	0	0							

**Electronic Fare Payment Integration Indicators**

**Richmond, Petersburg  
Electronic Fare Payment Integration\***

Inputs

Outputs



Legend
1999
2005

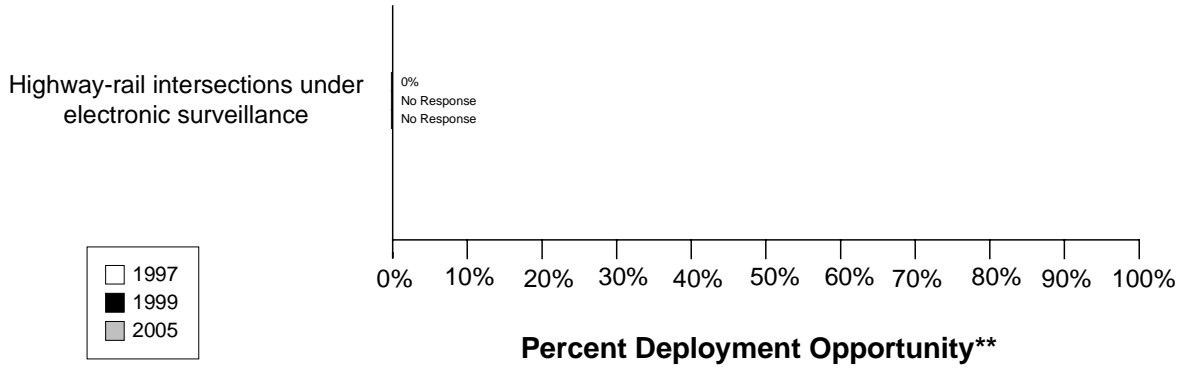
\* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

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

# Highway Rail Intersection Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Highway-Rail Intersections\*



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

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

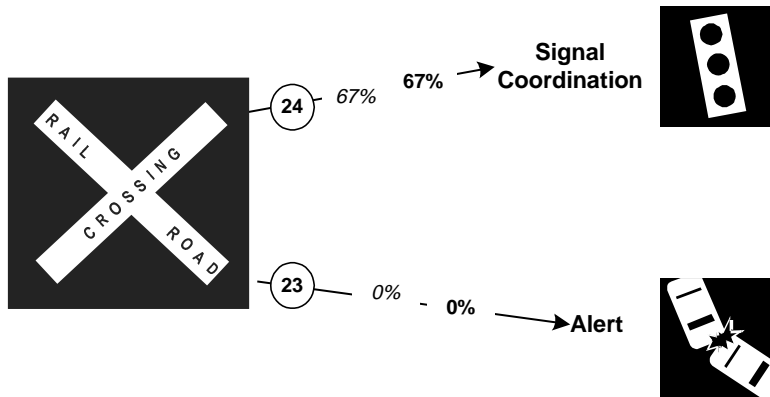
Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Highway-rail intersections are under electronic surveillance	0	110	0%		0			0	

# Highway Rail Intersection Integration Indicators

## Richmond, Petersburg Highway Rail Intersections Integration\*

Inputs

Outputs



Legend
1999, 2005

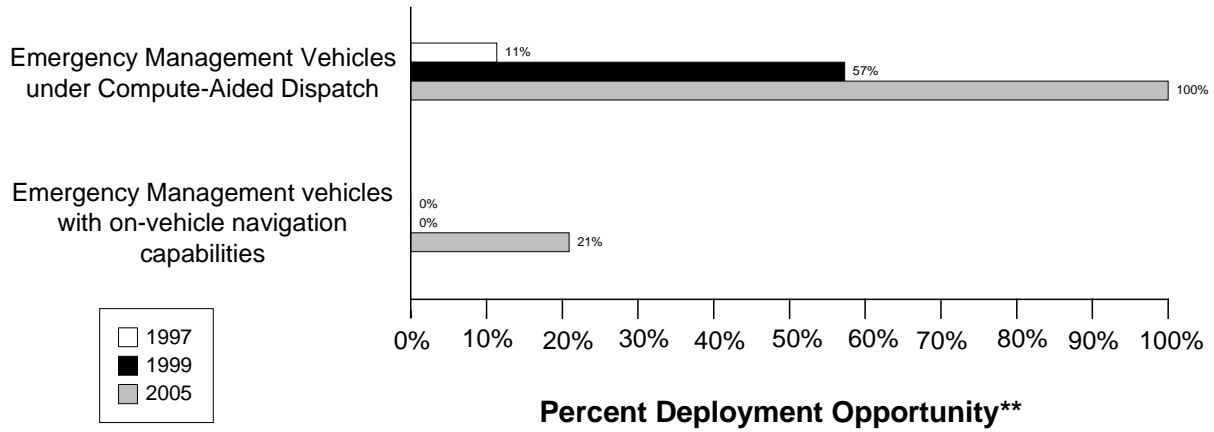
\* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
24. Arterial Management agencies with traffic signals within 200 feet of a highway rail intersection with the capability of having their signal timing adjusted in response to a train crossing	( 2/ 3) 67%	( 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%

# Emergency Management Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Emergency Management\*



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

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

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Public sector emergency vehicles that operate under computer-aided dispatch	262	2303	11%	891	1556	57%	1120	1120	100%
Public sector emergency vehicles that have in-vehicle route guidance capability	0	2303	0%	0	1556	0%	234	1120	21%



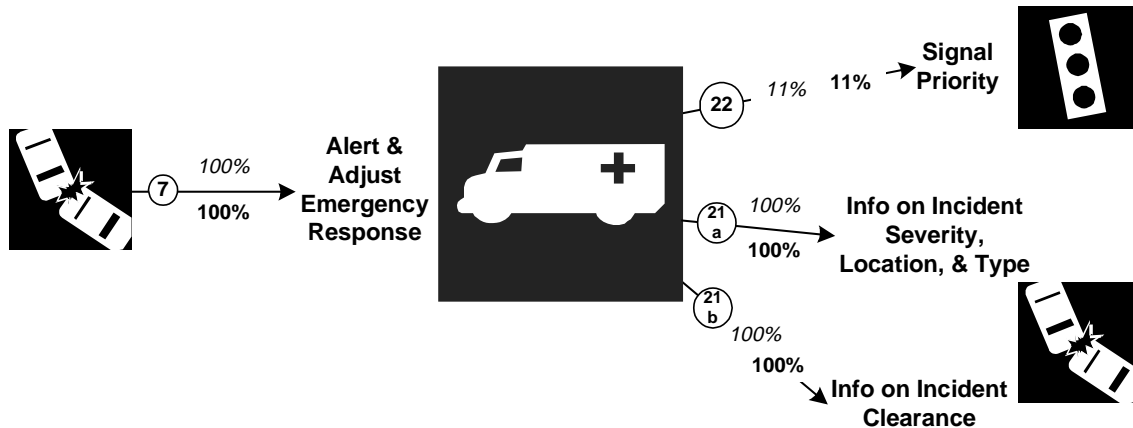
# Emergency Management Integration Indicators

## Richmond, Petersburg

### Emergency Management Integration\*

Inputs

Outputs



Legend
1999, 2005

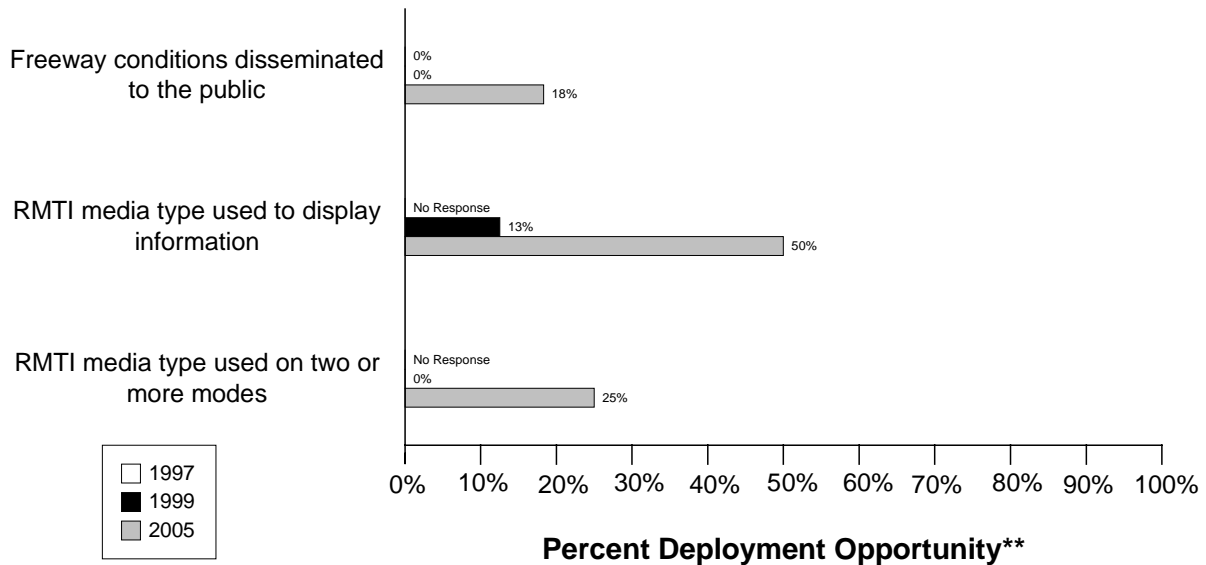
\* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
7. Freeway Management agencies transfer information describing incident severity, location, and type to Emergency Management agencies	( 1 / 1 ) 100%	( 1 / 1 ) 100%
22. Emergency Management agencies have vehicles equipped with traffic signal preemption capability	( 1 / 9 ) 11%	( 1 / 9 ) 11%
21a. Freeway Management agencies receive incident severity, location, and type data from Emergency Management agencies	( 1 / 1 ) 100%	( 1 / 1 ) 100%
21b. Freeway Management agencies receive incident clearance activities information from Emergency Management agencies	( 1 / 1 ) 100%	( 1 / 1 ) 100%

# Regional Multimodal Traveler Information Component Indicators

Data as of 5/1/00

## Richmond, Petersburg Regional Multimodal Traveler Information\*



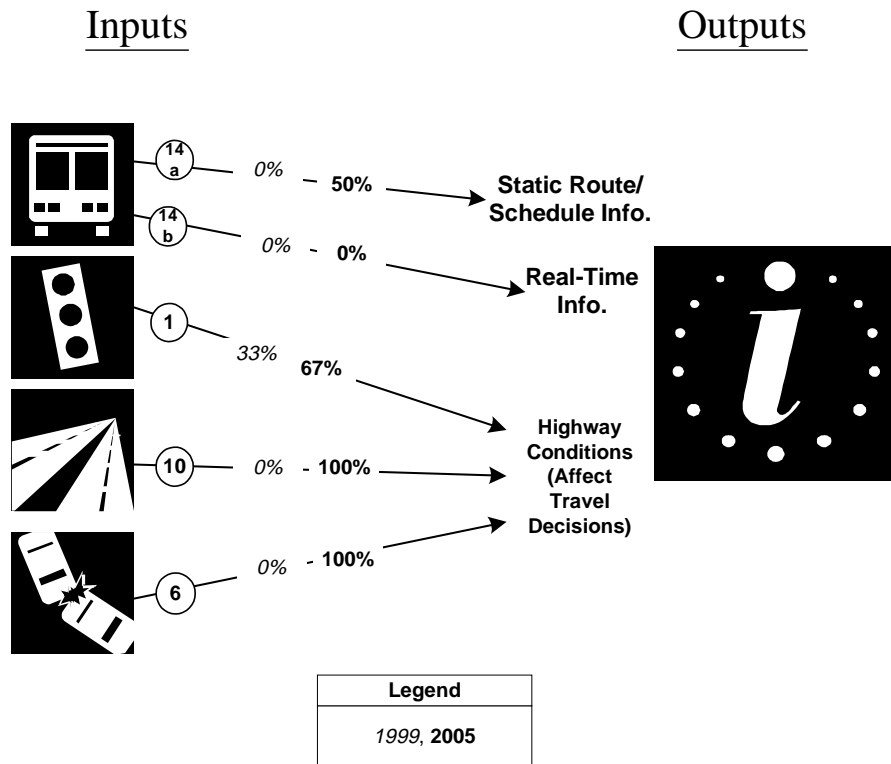
\* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity.  
 \*\* Deployment opportunity reflects potential totals that do not necessarily reflect actual need.

Description	1997			1999			2005		
	Num	Den	%	Num	Den	%	Num	Den	%
Freeway conditions disseminated to travelers	0	164	0%	0	164	0%	30	164	18%
Possible RMTI media types are used to display information to travelers				1	8	13%	4	8	50%
Possible RMTI media are used to display information on <i>two or more modes</i> to travelers				0	8	0%	2	8	25%

# Regional Multimodal Traveler Information Integration Indicators

## Richmond, Petersburg

### Regional Multimodal Traveler Information Integration\*

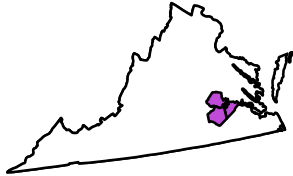
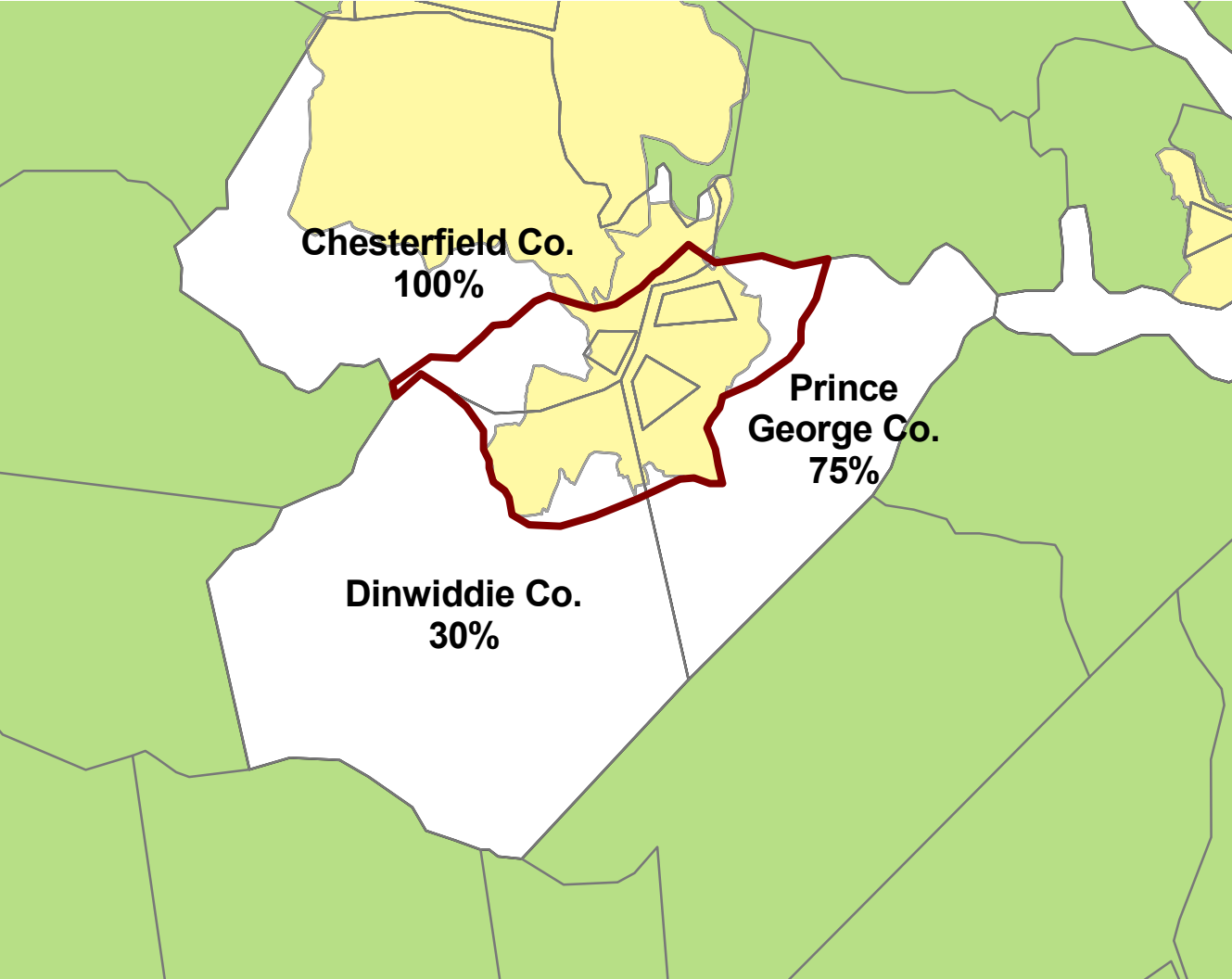


\* Indicators are single surrogates that do not necessarily reflect the full breadth of ITS deployment activity

Link Description	1999	2005
14a. Transit Management agencies that disseminate information describing transit routes, schedules, and fares to travelers	( 0/ 2) 0%	( 1/ 2) 50%
14b. Transit Management agencies that disseminate information describing schedule/route adherence to travelers	( 0/ 2) 0%	( 0/ 2) 0%
1. Arterial Management agencies that disseminate arterial travel times, speeds, and conditions to the public	( 1/ 3) 33%	( 2/ 3) 67%
10. Freeway Management agencies that disseminate freeway travel times, speeds, and conditions to travelers	( 0/ 1) 0%	( 1/ 1) 100%
6. Incident Management agencies that disseminate information describing incident severity, location, and type to the public	( 0/ 1) 0%	( 1/ 1) 100%

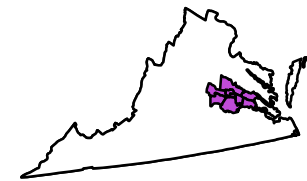
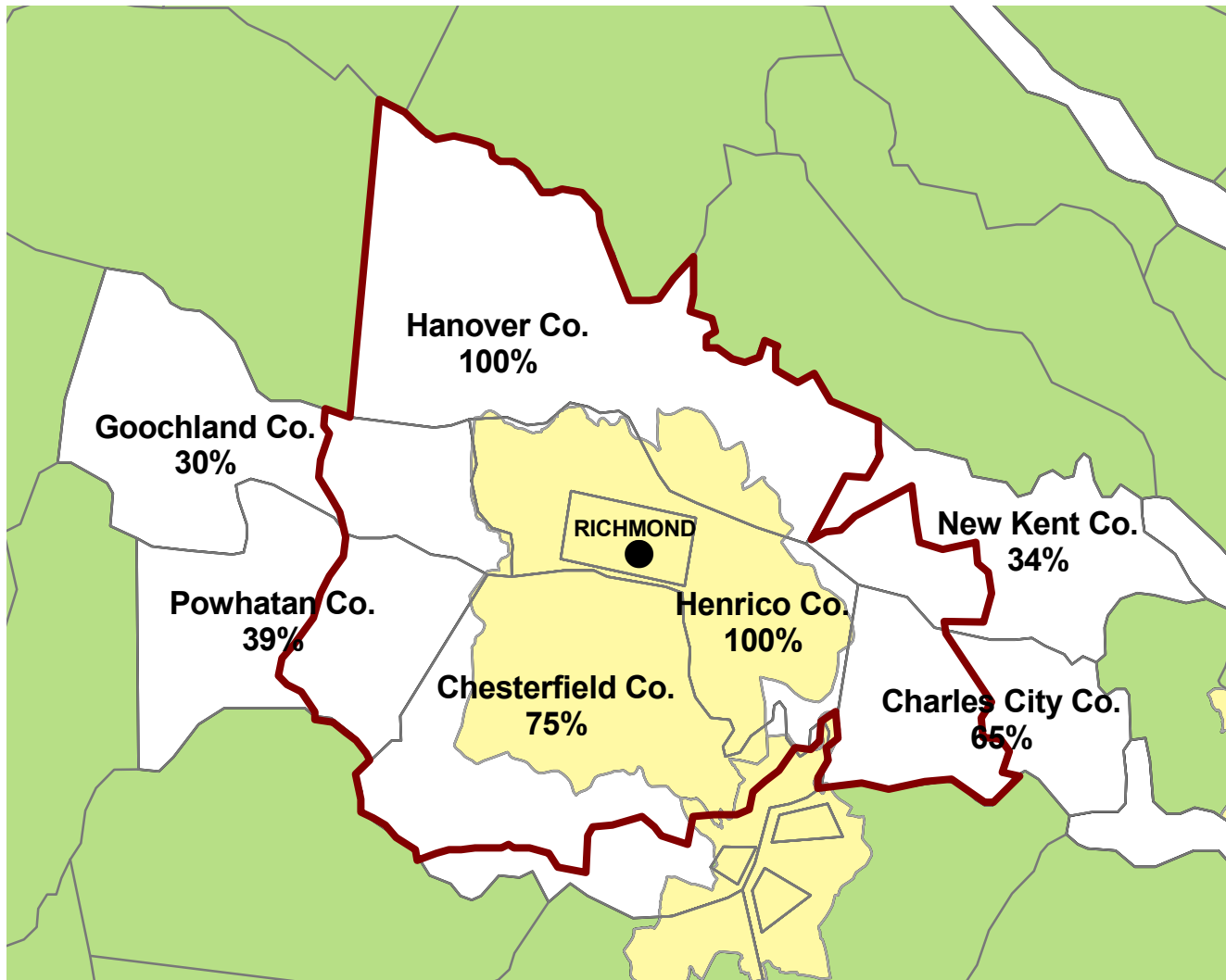
**Appendix A**  
**Survey Coverage Area**

**TRI-CITIES AREA METROPOLITAN  
PLANNING ORGANIZATION, VA**



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

# RICHMOND AREA METROPOLITAN PLANNING ORGANIZATION, VA



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

**Appendix B**  
**Surveyed Agencies**

### Surveyed Agencies

Agency Name	Phone	Fax	1999		1997	
			Out	In	Out	In
<b>RICHMOND, PETERSBURG</b>						
<b>Arterial Management</b>						
Henrico County	(804) 501-4393	(804) 501-4545	8/5/1999	9/20/1999	8/5/1997	
Virginia Department of Transportation	(804) 524-6127	(804) 524-6009	8/4/1999	9/7/1999	8/5/1997	11/14/1997
Richmond City	(804) 646-6503	(804) 646-6790	8/5/1999		8/5/1997	
Petersburg City	(804) 733-2355	(804) 732-2030	8/5/1999	10/22/1999	8/5/1997	
<b>Electronic Toll Collection</b>						
Richmond Metropolitan Authority/Downtown	804-649-8494	804-649-0902	7/6/1999	7/13/1999	8/5/1997	11/14/1997
Powhite Parkway Extension (VDOT)	(804) 378-3403	(804) 378-3407	7/6/1999	7/26/1999	8/5/1997	11/13/1997
Richmond Metropolitan Authority/Powhite	804-649-8494	804-649-0902	7/6/1999	7/13/1999	8/5/1997	11/14/1997
Richmond Metropolitan Authority/Boulevard	804-649-8494	804-649-0902	7/6/1999	7/13/1999	8/5/1997	11/14/1997
<b>Emergency Management</b>						
Chesterfield County Fire & EMS Department	804-748-1360	804-751-9022	8/16/1999	9/22/1999	8/5/1997	3/1/1998
Petersburg City Fire Department	(804) 733-2355	(804) 732-2030	6/23/1999	10/22/1999	8/5/1997	3/1/1998
Chesterfield County Sheriff Department	804-748-1261	804-748-5808	8/16/1999		8/5/1997	3/1/1998
Chesterfield County Police Department	804-748-1251	804-748-1239	8/16/1999	8/18/1999	8/5/1997	3/1/1998
Petersburg City Emergency Medical Services	(804) 733-2355	(804) 732-2030	6/23/1999	10/22/1999	8/5/1997	3/1/1998
Hanover County Sheriff Department	804-537-6000	804-537-6390	8/16/1999	8/17/1999	8/5/1997	3/1/1998
Richmond City Emergency Medical Services	(804) 646-6503	(804) 646-6790	6/23/1999		8/5/1997	3/1/1998
Richmond City Police Department	(804) 646-6503	(804) 646-6790	6/23/1999		8/5/1997	3/1/1998
Richmond City Fire Department	(804) 646-6503	(804) 646-6790	6/23/1999		8/5/1997	3/1/1998
Virginia State Police	(804) 674-2095	(804) 674-2234	6/23/1999	7/9/1999	8/5/1997	11/14/997
Hanover County Fire & Resuce Department	804-537-6185	804-537-5458	8/16/1999		8/5/1997	3/1/1998
Henrico County Emergency Medical Services	(804) 501-4900	(804) 201-4642	6/23/1999	6/25/1999	8/5/1997	3/1/1998
Henrico County Fire Department	(804) 501-4900	(804) 201-4642	6/23/1999	6/25/1999	8/5/1997	3/1/1998
Petersburg City Police Department	(804) 733-2355	(804) 732-2030	6/23/1999		8/5/1997	3/1/1998
Henrico County Police Department	(804) 501-4900	(804) 201-4642	6/23/1999	6/25/1999	8/5/1997	3/1/1998
<b>Freeway Management</b>						
Virginia Department of Transportation	(804) 524-6127	(804) 524-6009	8/4/1999	9/7/1999	8/5/1997	11/14/997
<b>MPO</b>						
Crater Planning District Commission	(804) 861-1666	(804) 732-8972	7/15/1999	7/28/1999		
Richmond Regional Planning District	(804) 358-3684	(804) 358-5386	7/15/1999	8/16/1999		
<b>Transit Management</b>						
Petersburg Area Transit	(804) 733-2301	(804) 732-9212	8/10/1999	10/22/1999	7/7/1997	7/15/1997



**Appendix C**  
**Freeway Management Components**

Freeway Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Virginia Department of Transportation	
	1999	2005
Agency Returned Survey?	Yes	
<b>FREEWAY MANAGEMENT SECTION</b>		
Number of freeway centerline miles that agency owns or maintains	183	
Number of freeway centerline miles that is used for planning	183	
Number of freeway entrance ramps that agency owns, operates or maintains	92	
Number of freeway entrance ramps that is used for planning	92	
<b>Type of facilities used to conduct freeway/incident management activities</b>		
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?	Yes	
Facilities are electronically linked to other transportation mgt facilities?	Yes	
<b>Staffing and hours of operation of freeway/incident management activities</b>		
Number of full-time agency staff members	3	
Number of full time contractor staff members	5	
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	agency	
Staffed during peak hours only by agency staff or by others	NR	
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	
<b>Types of operations conducted for freeway/incident management</b>		
Incident detection and management?	Yes	
This metropolitan area?	Yes	
Other metropolitan area?	No	
Statewide?	No	
Monitoring and troubleshooting status of system components?	No	
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?	No	
<b>Real-Time Traffic Data Collection Technologies</b>		
Total number of miles under surveillance with real-time data collection tech.	0	30

Freeway Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Virginia Department of Transportation	
	1999	2005
<i>Number of Stations with data collection technologies</i>		
Loop detectors	24	24
Video imaging detectors	0	0
Probe readers (elec. toll tags, transit vehicles, other technology)	0	20
Microwave radar	0	0
Other (e.g., acoustic detectors)	0	0
<i>Number of Miles covered with data collection technologies</i>		
Loop detectors	0	0
Video imaging detectors	0	0
Probe readers (elec. toll tags, transit vehicles, other technology)	0	15
Microwave radar	0	0
Other (e.g., acoustic detectors)	0	0
<b>Variable Message Signs (VMS) on Freeways</b>		
Candidate locations for deployment of VMS where VMS has been deployed	7	20
Candidate locations for deployment of VMS	NR	NR
<b>Roadside Technologies used to Distribute Traveler Information</b>		
Total number of miles where information is distributed	40	56
<i>Number deployed</i>		
Highway advisory radio	5	7
In-vehicle signing	0	0
Portable variable message signs	0	0
Other	0	0
<i>Miles covered</i>		
Highway advisory radio	40	56
In-vehicle signing	0	0
Portable variable message signs	0	0
Other	0	0
<b>Ramp Meters on Freeways</b>		
Number of entrance ramp meters operated under isolated control	NR	NR
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	NR
<b>Freeway centerline miles under lane control</b>	NR	NR
<b>Communication Links</b>		
<i>Freeway centerline miles covered by the following type of communication</i>		
Twisted pair cable	0	0
Coaxial cable	0	0
Fiber-optic cable	0	0
Microwave radio	0	0
Other	0	0
<b>ITS Standards Used Related to Freeway Management</b>		

Freeway Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Virginia Department of Transportation	
	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	
NTCIP Object Definitions for Dynamic Message Signs (AASHTO TS 3.6)	Yes	
NTCIP Object Definitions for Highway Advisory Radio (AASHTO TS 3.HAR)	No	
NTCIP Object Definitions for Ramp Meter Control (AASHTO TS 3.RMC)	No	
NTCIP Object Definitions for Transportation Sensor Systems (AASHTO TS 3.TSS)	No	
NTCIP Object Definitions for Video Camera Control (AASHTO TS 3.VCC)	No	
Would agency be willing to participate in testing of ITS Standards?	Yes	
<b>Have agreements in place with other agencies to use similar hardware and software to aid maintenance and interoperability?</b>	No	
<b>INCIDENT MANAGEMENT SECTION</b>		
<b>Use of Service Patrols to Assist in Detection and Response to Incidents</b>		
Publicly operated service patrol vehicles	No	
Privately operated service patrol vehicles operated under public contract	No	
Total number of freeway miles patrolled by these services	60	NR
<b>Miles Covered by Methods to Detect and Verify Incidents</b>		
Free cellular phone call to a dedicated phone number other than 911	NR	NR
Police patrols	60	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.)	NR	NR
<b>Procedures in place for Freeway Incident Response?</b>		
Working agreement(s)/arrangement(s) with other agencies	Yes	
Inter-agency incident management admin. team that meets regularly	No	
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	
<b>Central focal point for facilitating the two-way flow of information among agencies responding to an incident?</b>		
The central focal point is a Freeway or Traffic Management Center	No	
The central focal point is a Police, Fire or joint dispatch center	No	
The central focal point is another center	No	
<b>Methods of Communication Used On-Site at an Incident</b>		
<u>Police</u>		
Two-way radio	Yes	
800 MHz trunked radio	Yes	
Cellular telephone	Yes	

Freeway Management  
Agencies for Metropolitan Area: Richmond, Petersburg

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

Freeway Management  
Agencies for Metropolitan Area: Richmond, Petersburg

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

**Appendix D**  
**Freeway Management Integration**

Freeway Management Integration  
Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Virginia Department of Transportation	
	1999	2005
Agency Returned Survey?	Yes	
<b>Freeway Management Section</b>		
<b>Agencies your agency provides freeway travel times, speeds, and conditions information, share infrastructure or coordinates operation</b>		
<b><i>Freeway Management Agencies</i></b>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<b><i>Incident Management Agencies</i></b>		
Provide Information	None listed	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	None listed
<b><i>Arterial Management Agencies</i></b>		
Provide Information	Henrico County, Richmond City	Petersburg City Public Works Department
Share Infrastructure	None listed	None listed
Coordinate Operation	Henrico County, Richmond City	Petersburg City Public Works Department
<b><i>Public Transit Operators</i></b>		
Provide Information	None listed	Greater Richmond Transit Company, Petersburg Area Transit
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	Greater Richmond Transit Company, Petersburg Area Transit
<b><u>Receiving real-time information via electronic means from others</u></b>		
<b><i>Incident Management agencies from which your agency receives incident severity, location, and type information</i></b>	Virginia Maintenance Services	None listed
<b><i>Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions</i></b>	None listed	Henrico County, Petersburg City Public Works Department, Richmond City
<b><i>Public Transit operators from which your agency receives freeway travel times derived from vehicle probes</i></b>	None listed	Greater Richmond Transit Company
<b><i>Toll Collection agencies from which your agency receives freeway travel times derived from vehicles probes</i></b>	None listed	Powhite Parkway Extension (VDOT), Richmond Metropolitan Authority
<b>Freeway Incident Management Section</b>		
<b>Agencies your agency provides incident severity, location, and type info. and/or shares infrastructure and/or coordinates operation</b>		
<b><i>Arterial Management Agencies</i></b>		
Provide Information	Henrico County	Petersburg City Public Works Department, Richmond City



Freeway Management Integration  
Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Virginia Department of Transportation	
	1999	2005
Share Infrastructure	None listed	None listed
Coordinate Operation	Henrico County	Petersburg City Public Works Department, Richmond City
<b><i>Emergency Management Agencies</i></b>		
Provide Information	Virginia State Police	None listed
Share Infrastructure	None listed	None listed
Coordinate Operation	Chesterfield County Police Department, Henrico County Fire Department, Henrico County Police Department, Richmond City Fire Department, Richmond City Police Department, Virginia State Police	None listed
<b><i>Freeway Management Agencies</i></b>		
Provide Information	Virginia Maintenance Services	None listed
Share Infrastructure	Virginia Maintenance Services	None listed
Coordinate Operation	Virginia Maintenance Services	None listed
<b><i>Public Transit Operators</i></b>		
Provide Information	None listed	Greater Richmond Transit Company
Share Infrastructure	None listed	None listed
Coordinate Operation	None listed	Greater Richmond Transit Company
<b><i>Receiving real-time information via electronic means from others</i></b>		
<b><i>Emergency Management agencies from which your agency receives incident clearance and/or incident severity and type</i></b>		
Receive Arterial Incident Clearance Information	Virginia State Police, Virginia Maintenance Services	None listed
Receive Arterial Incident Severity Information	Virginia State Police, Virginia Maintenance Services	None listed
<b><i>Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions</i></b>		
	None listed	Henrico County, Petersburg City Public Works Department, Richmond City
<b><i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i></b>		
	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 F**  
**Arterial Management Components**

Arterial Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Henrico County		Petersburg City		Virginia Department of Transportation		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes		3	
<b>ARTERIAL MANAGEMENT SECTION</b>								
Number of arterial miles that agency owns or maintains	NR		NR		679		679	
Number of arterial miles that is used for planning	NR		NR		679		679	
Number of highway-rail intersections that agency maintains	0		NR		NR		0	
Number of highway-rail intersections that is used for planning	0		NR		NR		0	
<b>Type of facilities used to conduct arterial management activities</b>								
Activities housed in a free-standing dedicated building?	No		No		No		0	
Activities housed in a building shared with other activities?	Yes		No		No		1	
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		No		0	
Facilities are electronically linked to other transportation mgt facilities?	No		No		No		0	
<b>Staffing and hours of operation of arterial management activities</b>								
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	3		NR		NR		3	
Number of part-time contractor staff members	NR		NR		NR		0	
Staffed 24 hours day by agency staff or by others	NR		NR		NR		0	
Staffed during peak hours only by agency staff or by others	NR		NR		NR		0	
Staffed by others during off-peak hours	No		No		No		0	
Agency staff perform transportation management as an ancillary duty	No		No		No		0	
Agency staff dedicated to transportation management duty	No		No		No		0	
<b>Types of operations conducted for arterial management</b>								
Incident detection and management?	No		No		No		0	
This metropolitan area?	No		No		No		0	
Other metropolitan area?	No		No		No		0	
Monitoring and troubleshooting status of system components?	No		No		Yes		1	
Radio communications with other agencies?	No		No		No		0	
Exchange of electronic data with other agencies such as computer aided dispatch?	No		No		No		0	
Manual override of traffic signal timing plans	Yes		No		No		1	
Operating transportation mgt roadside devices (e.g., VMS, CCTV, etc.)	No		No		No		0	

Arterial Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Henrico County		Petersburg City		Virginia Department of Transportation		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
<b>Describe agency's role in traffic signal control</b>	County routes only		NR		Operate traffic signals on all roads except within cities and towns. Also, we do not operate signals in Henrico County unless the intersection is a state route.			
<b>Traffic Signals Operated by Agency</b>								
Number of signalized intersections operated and owned by agency	101	125	NR	NR	375	500	476	625
Number of signalized intersections operated by agency but owned by another	0	0	NR	NR	NR	NR	0	0
Total number of signalized intersections operated by agency	101	125	58	58	375	500	534	683
<i>Characteristics of signalized intersections that agency operates</i>								
Under closed loop or central system control	0	0	0	50	180	250	180	300
Under real-time traffic adaptive control using advanced software	0	60	0	0	NR	NR	0	60
Using SCOOT	No		No		No		0	
Using SCATS	No		No		No		0	
Name of software	NR		NR		NR			
Allow signal preemption for emergency vehicles	1	125	0	0	80	350	81	475
Allow signal priority for transit vehicles	0	0	0	0	NR	NR	0	0
Within 200 feet of a highway-rail intersection	0	0	1	1	5	7	6	8
Within 200 feet of a highway-rail intersection that adjust signal timing	0	0	1	1	5	7	6	8
<b>Software used to control the signals agency operates</b>								
Date of last upgrade to traffic signal control system software?	NR		NR		1999 (Y2K initiative)			
How often do you update signal timing?	NR		NR		once/6months			
Software used and number of signalized intersections under control (1999, 2005)	MARC System, 15, 60		NR		Eagle Marc Software, 180, 250			
<b>Controllers used to control signals</b>								
NEMA	101	125	0	0	375	500	476	625
170/179	0	0	0	0	0	0	0	0
2070 controller	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
<b>Technologies Associated with Highway-Rail Intersections</b>								
Total number of highway-rail intersections under electronic surveillance	NR	NR	NR	NR	NR	NR	0	0
<i>Highway-Rail intersection capabilities</i>								
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
<b>Real-Time Electronic Traffic Data Collection Technologies</b>								

Arterial Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Henrico County		Petersburg City		Virginia Department of Transportation		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
Total number of signalized intersections covered by electronic surveillance	NR	NR	NR	NR	NR	NR	0	0
<i>Number of signalized intersections with data collection technologies</i>								
Loop detectors	0	0	0	0	0	0	0	0
Video detection cameras	0	0	0	0	0	0	0	0
Probe readers reading toll tags	0	0	0	0	0	0	0	0
Probe readers reading license plates	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
<b>Roadside Technologies used to Distribute Traveler Information</b>								
<i>Number deployed</i>								
Highway Advisory Radio	NR	NR	NR	NR	NR	NR	0	0
In-Vehicle Signing (IVS)	NR	NR	NR	NR	NR	NR	0	0
VMS controlling parking access	NR	NR	NR	NR	NR	NR	0	0
<i>Miles covered</i>								
Highway Advisory Radio	NR	NR	NR	NR	NR	NR	0	0
In-Vehicle Signing (IVS)	NR	NR	NR	NR	NR	NR	0	0
<b>Variable Message Signs (VMS) on Arterials</b>								
Candidate locations for deployment of VMS where VMS has been deployed	NR	NR	NR	NR	NR	NR	0	0
Candidate locations for deployment of VMS	NR	NR	NR	NR	NR	NR	0	0
<b>Communication Technologies</b>								
<i>Signalized intersections communicated with by each type of communication</i>								
Twisted pair cable	NR	30	0	0	0	0	0	30
Coaxial cable	0	0	0	0	0	0	0	0
Fiber-optic cable	0	0	0	0	0	0	0	0
Other (e.g., wireless, dial-up modems, leased lines, etc.)	15	35	0	0	0	0	15	35
<b>Does agency convey information on highway-rail intersection crossing status to travelers via roadside media such as VMS or HAR?</b>	No		No		No		0	
<b>ITS Standards Used Related to Traffic Signal Control</b>								
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?	No		NR		NR		0	
<b>Have agreements in place with other agencies to use similar hardware and software to aid maintenance and interoperability?</b>	No		NR		No		0	
<b>INCIDENT MANAGEMENT ON ARTERIAL STREETS</b>								
<b>Receive information on highway-rail intersection crossing blockages for the purpose of managing incident response?</b>	No		No		No		0	
<b>Use of Service Patrols to Assist in Detection and Response to Incidents</b>								
Publicly operated service patrol vehicles	No		No		No		0	

Arterial Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Henrico County		Petersburg City		Virginia Department of Transportation		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
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	NR	NR	0	0
<b>Miles Covered by Methods to Detect and Verify Incidents</b>								
Free cellular phone call to a dedicated phone number other than 911	0	0	0	0	0	0	0	0
Free cellular phone call to an area radio station	0	0	0	0	0	0	0	0
Police patrols	0	0	0	0	0	0	0	0
Computer algorithms linked to traffic surveillance equipment	0	0	0	0	0	0	0	0
CCTV	0	0	0	0	0	0	0	0
Private sector sources (e.g., Shadow Traffic, Smart Routes)	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
<b>Procedures in place for Arterial Incident Response?</b>								
Working agreement(s)/arrangement(s) with other agencies	Yes		No		No		1	
Inter-agency incident management admin. team that meets regularly	No		No		No		0	
Major incident response team that responds to major incidents	No		No		No		0	
Set of goals/objectives for incident mgt that has been adopted by agencies in region	No		No		No		0	
<b>Methods of Communication Used On-Site at an Incident</b>								
<u>Police</u>								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		No		No		0	
Hand-held (i.e., walkie-talkie)	No		No		No		0	
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
<u>Fire</u>								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		No		No		0	
Hand-held (i.e., walkie-talkie)	No		No		No		0	
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
<u>DOT</u>								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	
Cellular telephone	No		No		No		0	
Hand-held (i.e., walkie-talkie)	No		No		No		0	
Automated data systems (i.e., CAD)	No		No		No		0	
Other	No		No		No		0	
<u>Towing</u>								
Two-way radio	No		No		No		0	
800 MHz trunked radio	No		No		No		0	

Arterial Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Henrico County		Petersburg City		Virginia Department of Transportation		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
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	
<b>Which police agencies typically respond to incidents on arterials?</b>								
State Police	No		No		No		0	
County Police or Sheriff	No		No		No		0	
City Police	No		No		No		0	
<b>Who provides on-site emergency medical response?</b>								
Fire	No		No		No		0	
Emergency Management Service Agency	No		No		No		0	
Private hospital	No		No		No		0	
<b>Has a multi-agency contact list been developed in area containing the names, phone numbers, etc. for the appropriate response personnel?</b>	NR		NR		NR		0	
<b>Is the Incident Command System used to manage incident scenes?</b>	NR		NR		NR		0	
<b>Is there a legal specification by state law or formal agreement as to who is "in charge" at the incident scene?</b>								
Specified by state law?	No		No		No		0	
Formal agreement?	No		No		No		0	
Not specified or don't know?	No		No		No		0	
<b>On-scene command post used to manage activities of responding agencies?</b>	NR		NR		NR		0	
Are there communication linkages to a communications traffic/freeway mgt center?	NR		NR		NR		0	
<b>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?</b>	NR		NR		NR		0	
<b>Respondents protected through law or court opinion for liability claims for damages to vehicles or cargoes during clearance activities?</b>	NR		NR		NR		0	
<b>Are overturned tank trucks, which are intact and not leaking, uprighted without first off-loading?</b>	NR		NR		NR		0	
<b>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?</b>	NR		NR		NR		0	
<b>Have laws or policies regarding the removal of stalled/abandoned vehicles from freeway shoulders?</b>	NR		NR		NR		0	
<b>Hours abandoned vehicles are allowed to remain on a freeway shoulder?</b>	NR		NR		NR		0	
<b>Have policies or procedures for quick removal of vehicles?</b>	NR		NR		NR		0	
<b>Is Total Station equipment used to investigate major incidents?</b>	NR		NR		NR		0	
<b>Handling of Towing Responses to Incidents</b>								
Formal contract based on qualifications?	No		No		No		0	
Rotation with companies under contract?	No		No		No		0	
Separate lists kept for light and heavy response and for specialty recovery?	NR		NR		NR		0	
Rotation list with minimal qualifications?	No		No		No		0	

Arterial Management  
 Agencies for Metropolitan Area: Richmond, Petersburg

	Henrico County		Petersburg City		Virginia Department of Transportation		Totals	
	1999	2005	1999	2005	1999	2005	1999	2005
<b>In towing qualifications, do you require towers to be certified under the</b>								
<b>Towing and Recovery Ass. of America's National Drivers Cert. Program?</b>	NR		NR		NR		0	
DK: Don't know								
NR: No Response								
Leg: Legislation or action being planned								



**Appendix G**  
**Arterial Management Integration**

Arterial Management Integration  
Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Henrico County		Petersburg City		Virginia Department of Transportation	
	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes	
<b>Arterial Management Section</b>						
<b><u>Arterial Mgt. agencies in metropolitan area with which you share info.</u></b>						
Share Timing Plans Information	Richmond City, Virginia Department of Transportation	Virginia Department of Transportation	None listed	None listed	None listed	None listed
Coordinate Changes to Timing Plans	Richmond City, Virginia Department of Transportation	Richmond City, Virginia Department of Transportation	None listed	None listed	None listed	None listed
Turn over Control of Signals	None listed	None listed	None listed	None listed	None listed	None listed
<b><u>Agencies your agency provides arterial travel times, speeds, and conditions information, share infrastructure or coordinates operation</u></b>						
<b><i>Freeway Management Agencies</i></b>						
Provide Information	None listed	None listed	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed	None listed	None listed
<b><i>Incident Management Agencies</i></b>						
Provide Information	None listed	None listed	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed	None listed	None listed
Coordinate Operation	Virginia Department of Transportation	Virginia Department of Transportation	None listed	None listed	None listed	None listed
<b><i>Public Transit Operators Agencies</i></b>						
Provide Information	None listed	None listed	short survey	None listed	None listed	None listed
Share Infrastructure	None listed	None listed	None listed	None listed	None listed	None listed
Coordinate Operation	None listed	None listed	None listed	None listed	None listed	None listed
<b><i>Arterial Management Agencies</i></b>						
Provide Information	Richmond City, Virginia Department of Transportation	Richmond City, Virginia Department of Transportation	None listed	None listed	None listed	None listed
Share Infrastructure	None listed	Department of	None listed	None listed	None listed	None listed
Coordinate Operation	Richmond City, Virginia Department of Transportation	Richmond City, Virginia Department of Transportation	None listed	None listed	None listed	None listed
<b><u>Receiving real-time information via electronic means from others</u></b>						
<b><i>Freeway Management agencies from which your agency receives</i></b>						

Arterial Management Integration  
Agencies for Metropolitan Area: Richmond, Petersburg

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

Arterial Management Integration  
 Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Henrico County		Petersburg City		Virginia Department of Transportation	
	1999	2005	1999	2005	1999	2005
<i>arterial travel times, speeds, and conditions</i>	None listed	None listed	None listed	None listed	None listed	None listed
<i>Freeway Management agencies from which your agency receives</i>						
<i>freeway travel times, speeds, and conditions</i>	None listed	None listed	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.

**Appendix H**  
**Arterial Management Information Collection and Dissemination**

Data Collection and Dissemination: Arterial Management  
 Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Henrico County		Petersburg City		Virginia Department of Transportation	
	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes	
<b>Arterial Management Section</b>						
<b>Data collected, archived, and/or transferred to another agency</b>						
Collected by your agency	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Phasing/cycle lengths, Road conditions, Emergency vehicle signal preemption, Weather conditions, Current work zones, Incidents, Highway operations coordination information	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Phasing/cycle lengths, Road conditions, Emergency vehicle signal preemption, Weather conditions, Current work zones, Incidents, Highway operations coordination information	NR	NR	NR	NR
Archived by your agency	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Phasing/cycle lengths, Road conditions, Emergency vehicle signal preemption, Weather conditions, Current work zones, Incidents, Highway operations coordination information	Traffic volumes, Traffic speeds, Vehicle classification, Turning movements, Phasing/cycle lengths, Road conditions, Emergency vehicle signal preemption, Weather conditions, Current work zones, Incidents, Highway operations coordination information	NR	NR	NR	NR
Transferred to another agency by your agency	Emergency vehicle signal preemption, Weather conditions	Emergency vehicle signal preemption, Weather conditions	NR	NR	NR	NR
<b>Importance of making information available to the public</b>						
Ranked High	Traffic volumes, Weather conditions, Current work zones, Incidents, Highway operations coordination information		NR		NR	

Data Collection and Dissemination: Arterial Management  
 Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Henrico County		Petersburg City		Virginia Department of Transportation	
	1999	2005	1999	2005	1999	2005
Ranked Medium	Traffic speeds, Vehicle classification, Turning movements, Phasing/cycle lengths, Emergency vehicle signal preemption		NR		NR	
Ranked Low	Road conditions		NR		NR	
<b>Groups that make requests for the data</b>	State DOT personnel, Citizens		NR		NR	
<b>What is the data used for?</b>	Do not know, Traffic analysis, Construction impact determination, Planning, Roadway impact analysis, Dissemination to the public		NR		NR	
<b>Methods used to disseminate arterial information to the public</b>						
Technologies your agency uses to disseminate:	NR	Internet Web sites	Telephone system	Web sites, E-mail or other direct	NR	NR
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR	NR	NR
<b>Internet web site reporting arterial conditions</b>	NR		NR		NR	
<b>Telephone system for reporting arterial information to the public</b>	NR		NR		NR	
<b>Organizations your agency sends information for dissemination to the public</b>	Cable TV News Media Internet		NR		NR	
<b>Arterial Incident Management Section</b>						
<b>Methods used to distribute incident location and severity information to the public</b>						
Technologies your agency uses to disseminate:	NR	NR	NR	NR	NR	NR
Technologies your agency (through another agency or org.) uses to disseminate:	NR	NR	NR	NR	NR	NR
<b>Internet web site reporting incident information</b>	NR		NR		NR	
<b>Telephone system for reporting incident information to the public</b>	NR		NR		NR	
<b>Organizations your agency sends information for dissemination to the public</b>	NR		NR		NR	

**Appendix I**  
**Transit Management Components**



Transit Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Greater Richmond Transit Company		Petersburg Area Transit		Totals	
	1999	2005	1999	2005	1999	2005
<b>Agency Returned Survey?</b>	Yes		Yes		2	
<b>Number of vehicles used in revenue service</b>						
Fixed Route Bus	189	NR	9	9	198	9
Heavy or Rapid Rail	NR	NR	0	0	0	0
Light Rail	NR	NR	0	0	0	0
Demand Responsive	72	NR	2	2	74	2
Commuter Rail	NR	NR	0	0	0	0
Ferry Boat	NR	NR	0	0	0	0
<b>Have of plan to have an Automated Vehicle Location System?</b>	No		No		0	
<b>Primary and Secondary Location Technologies Used</b>						
<i>Primary Technologies</i>						
GPS	No	No	No	No	0	0
Sign/Odometer	No	No	No	No	0	0
Dead-Reckoning	No	No	No	No	0	0
LORAN C	No	No	No	No	0	0
Other	No	No	No	No	0	0
<i>Backup Technologies</i>						
GPS	No	No	No	No	0	0
Sign/Odometer	No	No	No	No	0	0
Dead-Reckoning	No	No	No	No	0	0
LORAN C	No	No	No	No	0	0
Other	No	No	No	No	0	0
<b>Number of Vehicles Equipped with AVL</b>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0
<b>Motor Buses Operated as Vehicle Probes</b>						
Number of Motor Buses equipped as probes on freeways?	NR		NR		0	
Number of Motor Buses equipped as probes on arterials?	NR		NR		0	
<b>Have Organized Regional Incident Management Program?</b>	No		No		0	
<b>Have Automated Traveler Information System?</b>	Yes		No		1	

Transit Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Greater Richmond Transit Company		Petersburg Area Transit		Totals	
	1999	2005	1999	2005	1999	2005
<u>Services Automated Traveler Info. System Applies:</u>						
Fixed Route	Yes		No		1	
Heavy Rail	No		No		0	
Light Rail	No		No		0	
Demand Responsive	No		No		0	
Commuter Rail	No		No		0	
Ferry	No		No		0	
<b>Locations where traveler information is displayed to public</b>						
Number of bus stops on fixed transit routes	2,500	2,500	NR	NR	2500	2500
Bus stops on fixed transit routes that display traveler info to the public	0	0	NR	NR	0	0
Number of rail stations	NR	NR	NR	NR	0	0
Number of rail stations that display traveler information	NR	NR	NR	NR	0	0
Number of other locations that display traveler information to public	NR	NR	NR	NR	0	0
<b>Number of vehicles the traveler information system has available</b>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0
<b>Deployment of Communications Technology</b>						
<u>Attributes of Radio System:</u>						
Digital?	No		No		0	
Analog?	Yes		Yes		2	
Trunked?	No		No		0	
Regular?	Yes		Yes		2	
<b>Services that use a Digital or Trunked Radio System</b>						
<u>Digital Only</u>						
Fixed Route Bus	No	No	No	No	0	0
Heavy or Rapid Rail	No	No	No	No	0	0
Light Rail	No	No	No	No	0	0
Demand Responsive	No	No	No	No	0	0
Commuter Rail	No	No	No	No	0	0
Ferry Boat	No	No	No	No	0	0
<u>Trunked Only</u>						
Fixed Route Bus	No	No	No	No	0	0
Heavy or Rapid Rail	No	No	No	No	0	0
Light Rail	No	No	No	No	0	0

Transit Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Greater Richmond Transit Company		Petersburg Area Transit		Totals	
	1999	2005	1999	2005	1999	2005
Demand Responsive	No	No	No	No	0	0
Commuter Rail	No	No	No	No	0	0
Ferry Boat	No	No	No	No	0	0
<b>Have of plan to have Automatic Passenger Counters (APCs)?</b>	No		No		0	
<b>Methods used to count passengers</b>						
Treadle Mats	No		No		0	
Infrared Beams	No		No		0	
<b>Primary and Secondary Location Technologies Used</b>						
<u>Primary Technologies</u>						
GPS	No	No	No	No	0	0
Differential GPS	No	No	No	No	0	0
Signpost/Odometer	No	No	No	No	0	0
Dead_Reckoning	No	No	No	No	0	0
LORAN C	No	No	No	No	0	0
Other	No	No	No	No	0	0
<u>Backup Technologies</u>						
GPS	No	No	No	No	0	0
Differential GPS	No	No	No	No	0	0
Signpost/Odometer	No	No	No	No	0	0
Dead_Reckoning	No	No	No	No	0	0
LORAN C	No	No	No	No	0	0
Other	No	No	No	No	0	0
<b>Number of Vehicles with APCs</b>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0
<b>Remote Real-Time Monitoring and Computer Assisted Dispatching</b>						
<u>Remote Real-Time Monitoring</u>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0
<u>Automated Dispatching or Control Software</u>						

Transit Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Greater Richmond Transit Company		Petersburg Area Transit		Totals	
	1999	2005	1999	2005	1999	2005
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0
<b>Coordinate or plan to coordinate travel request and vehicle</b>						
<b>dispatching for multiple agencies?</b>	No		No		0	
<b>Is there or will there be a Transportation Management Center</b>						
<b>(TMC) in the region that controls transit and highway modes?</b>	No		No		0	
Modes that TMC currently controls:						
Highways	No	No	No	No	0	0
Fixed Route Bus	No	No	No	No	0	0
Heavy or Rapid Rail	No	No	No	No	0	0
Light Rail	No	No	No	No	0	0
Demand Responsive	No	No	No	No	0	0
Commuter Rail	No	No	No	No	0	0
Ferry Boat	No	No	No	No	0	0
Other	No	No	No	No	0	0
<b>Priority at Traffic Signals and Ramp Meter Priority</b>						
<u>Priority at Traffic Signals</u>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
<u>Ramp Meter Priority</u>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
<b>Number of Vehicles Equipped with Navigation Aids</b>						
Fixed Route Bus	NR	NR	NR	NR	0	0
Heavy or Rapid Rail	NR	NR	NR	NR	0	0
Light Rail	NR	NR	NR	NR	0	0
Demand Responsive	NR	NR	NR	NR	0	0
Commuter Rail	NR	NR	NR	NR	0	0
Ferry Boat	NR	NR	NR	NR	0	0
<b>ITS Standards Used Related to Transit Management</b>						
TCIP On Board Objects (TCIP-OB)	No		No		0	

Transit Management  
Agencies for Metropolitan Area: Richmond, Petersburg

	Greater Richmond Transit Company		Petersburg Area Transit		Totals	
	1999	2005	1999	2005	1999	2005
TCIP Traffic Management Objects (TCIP-TM)	No		No		0	
TCIP Common Public Transportation Objects (TCIP-CPT)	No		No		0	
TCIP Passenger Information Objects (TCIP-PI)	No		No		0	
TCIP Incident Management Objects (TCIP-IM)	No		No		0	
TCIP Fare Collection Objects (TCIP-FC)	No		No		0	
TCIP Spatial Representation Objects (TCIP-SP)	No		No		0	
TCIP Control Center Objects (TCIP-CC)	No		No		0	
TCIP Scheduling/Runcutting Objects (TCIP-SCH)	No		No		0	
Send data communication between micro computer and heavy duty vehicle applications (SAE J1708)	No		No		0	
Would agency be willing to participate in testing of ITS Standards?	NR		No		0	
Have agreements in place with other agencies to use similar hardware and software to aid maintenance and interoperability?	No		No		0	
<b>Electronic Fare Payment</b>						
<b>Have full operational Electronic Fare Payment System?</b>	Yes		No		1	
Methods of Fare Payment						
<u>Stored value card with fare deducted for each trip</u>						
Magnetic Stripe	No		No		0	
Smart Card	No		No		0	
Debit Card	No		No		0	
<u>Billed by the month for trips taken</u>						
Magnetic Stripe	No		No		0	
Smart Card	No		No		0	
Credit Card	No		No		0	
<u>Monthly Pass</u>						
Magnetic Stripe	Yes		No		1	
Smart Card	No		No		0	
Vehicles/Stations Equipped with Automated Payment Mechanism						
<u>Magnetic Stripe Readers</u>						
Fixed Route Bus Vehicles	189	189	NR	NR	189	189
Heavy or Rapid Rail Stations	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	0	0
<u>Smart Card Readers</u>						
Fixed Route Bus Vehicles	0	0	NR	NR	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	0	0

Transit Management  
 Agencies for Metropolitan Area: Richmond, Petersburg

	Greater Richmond Transit Company		Petersburg Area Transit		Totals	
	1999	2005	1999	2005	1999	2005
Light Rail Stations	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	0	0
<u>Credit Card</u>						
Fixed Route Bus Vehicles	NR	NR	NR	NR	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	0	0
<u>Debit Card</u>						
Fixed Route Bus Vehicles	NR	NR	NR	NR	0	0
Heavy or Rapid Rail Stations	NR	NR	NR	NR	0	0
Light Rail Stations	NR	NR	NR	NR	0	0
Demand Responsive Vehicles	NR	NR	NR	NR	0	0
Commuter Rail Stations	NR	NR	NR	NR	0	0
Ferry Boat Landings	NR	NR	NR	NR	0	0
NR: No Response						

**Appendix J**  
**Transit Management Integration**

Transit Management Integration  
 Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Greater Richmond Transit Company		Petersburg Area Transit	
	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes	
<b><u>Transit operators in the region that use the same electronic payment system</u></b>	None listed		None listed	
<b><u>Toll operators from whom you accept electronic payment of transit fare through the use of ETC media</u></b>	None listed		None listed	
<b><u>Receiving real-time information via electronic means from others</u></b>				
<b><i>Freeway Management agencies from which your agency receives freeway travel times, speeds, and conditions</i></b>				
<i>Receive Information</i>	None listed	Virginia Department of Transportation	None listed	None listed
<i>Share Infrastructure</i>	None listed	None listed	None listed	None listed
<b><i>Arterial Management agencies from which your agency receives arterial travel times, speeds, and conditions</i></b>				
<i>Receive Information</i>	None listed	None listed	Petersburg City	None listed
<i>Share Infrastructure</i>	None listed	None listed	None listed	None listed
<b><i>Incident Management agencies from which your agency receives incident severity, location, and type</i></b>				
<i>Receive Information</i>	None listed	None listed	None listed	None listed
<i>Share Infrastructure</i>	None listed	None listed	None listed	None listed



**Appendix K**  
**Transit Management Information Collection and Dissemination**

Data Collection and Dissemination: Transit Management  
 Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Greater Richmond Transit Company		Petersburg Area Transit	
	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes	
<b>Methods used to disseminate transit information to the public</b>				
<b>Technologies your agency uses to disseminate:</b>				
Transit routes, schedules and fares	NR	E-mail or other direct PC communication, Kiosks, Internet Web Sites, Telephone System	NR	NR
Real-time transit schedule adherence or arrival and departure times	NR	NR	NR	NR
<b>Technologies employed by other organization receiving your data</b>				
Transit routes, schedules and fares	NR	NR	NR	NR
Real-time transit schedule adherence or arrival and departure times	NR	NR	NR	NR
Internet web site reporting transit routes, schedules and fare, etc.	NR		NR	
Telephone system for reporting transit information to the public	804-358-GRTC		NR	
<b>Organizations your agency sends information for dissemination to the public</b>	NR		NR	
<b>Data collected, archived, and/or transferred to another agency</b>				
Collected by your agency	Scheduled roadway work zones for transit, Current roadway work zones for transit, Incidents, Passenger information (e.g., surveys, O/D), Passenger count	Scheduled roadway work zones for transit, Current roadway work zones for transit, Incidents, Passenger information (e.g., surveys, O/D), Trip itinerary planning records, Passenger count	Passenger count	NR
Archived by your agency	NR	NR	NR	NR
Transferred to another agency by your agency	NR	NR	NR	NR
<b>Importance of making information available to the public</b>				
Ranked High	Scheduled roadway work zones for transit, Current roadway work zones for transit		Incidents, Current roadway work zones for transit, Scheduled roadway work zones for transit	
Ranked Medium	Incidents, Passenger information (e.g., surveys, O/D), Trip itinerary planning records		Road conditions, Emergency vehicle signal preemption, Vehicle time and location, Route designations (snow emergency, etc), Transit operations coordination information, Emergency/evacuation routes and procedures,	
Ranked Low	Passenger count		Passenger count, Trip itinerary planning records, Passenger information (e.g., surveys, O/D), Intermodal (air, rail, water) conditions, Transit vehicle signal priority	

Data Collection and Dissemination: Transit Management  
 Agencies for Metropolitan Area: Richmond, Petersburg

Agency Name	Greater Richmond Transit Company		Petersburg Area Transit	
	1999	2005	1999	2005
<b>Groups that make requests for the data</b>	Consultants, MPOs, Media (i.e., TV stations, radio stations), Federal DOT personnel, State DOT personnel, Universities		MPOs, Federal DOT personnel	
<b>What is the data used for?</b>	Dissemination to the public		HTD	

**Appendix L**  
**Emergency Management**

Emergency Management Agencies for Metropolitan Area: Richmond, Petersburg

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			
Chesterfield County Fire & EMS Department	205	234	0	234	0	234	0	234	0	234	70	234	Yes	No	None listed
Chesterfield County Police Department	450	525	0	0	0	350	450	525	0	350	0	0	Yes	No	None listed
Hanover County Sheriff Department	178	200	0	0	0	0	178	200	0	25	0	0	Yes	No	None listed
Henrico County Emergency Medical Services	22	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Yes	Yes	PPCR-ODEMSA
Henrico County Fire Department	66	NR	NR	NR	NR	NR	40	NR	NR	NR	NR	NR	Yes	Yes	VFIRS, Virginia State Hazmat Reporting
Henrico County Police Department	487	NR	NR	NR	NR	NR	75	NR	NR	NR	NR	NR	Yes	Yes	Uniform Reporting, Federal Bureau of Investigation, Virginia State Police
Petersburg City Emergency Medical Services	10	10	0	0	0	0	10	10	0	0	0	0	No	Yes	Virginia Department of Emergency Medical Services
Petersburg City Fire Department	11	11	0	0	0	0	11	11	0	0	0	0	No	Yes	Virginia Department of Fire Programs
Virginia State Police	127	140	0	0	0	0	127	140	0	0	0	0	Yes	Yes	Virginia Department of Transportation

**Appendix M**  
**Electronic Toll Collection**

Electronic Toll Collection  
Agencies for Metropolitan Area: Richmond, Petersburg

	Powhite Parkway Extension (VDOT)		Richmond Metropolitan Authority/Boulevard Bridge		Richmond Metropolitan Authority/Downtown Expressway Rt. 195	
	1999	2005	1999	2005	1999	2005
Agency Returned Survey?	Yes		Yes		Yes	
<b>Number of toll Collection Plazas operated</b>	4	0	1	1	3	3
<b>Number of toll collection plazas with dedicated ETC</b>	2	0	0	0	1	1
<b>Number of toll collection plazas with both manual and ETC</b>	4	0	1	1	3	3
<b>Number of toll collection lanes operated</b>	28	0	6	6	22	22
<b>Number of toll collection lanes with dedicated ETC</b>	4	0	0	0	2	4
<b>Number of toll collection lanes with both manual and ETC</b>	16	0	6	6	22	22
<b>Number of toll collection tags issued</b>	14,500	0	16,000	0	16,000	0
<b>Antennae Location Technologies</b>						
In-Pavement?	No		No		No	
Focused Beam?	No		No		No	
Distributed Overhead?	Yes		Yes		Yes	
<b>In-Vehicle Equipment Technologies</b>						
Tag-based?	Yes		Yes		Yes	
Integrated circuit card-based?	No		No		No	
<b>Are toll tags used by other toll operations in metro area?</b>	Yes		Yes		Yes	
List of toll operators that use tags	Richmond Metropolitan Authority/Boulevard Bridge, Richmond Metropolitan Authority/Downtown Expresswa, Richmond Metropolitan Authority/Powhite Parkway Ex		Powhite Parkway Extension (VDOT)		Powhite Parkway Extension (VDOT)	
<b>Are toll tags used by operators of public transit to pay transit fares in metro area?</b>	No		No		No	
List of transit operators that use tags	None		None		None	
NR: No Response						

Electronic Toll Collection  
Agencies for Metropolitan Area: Richmond, Petersburg

	Richmond Metropolitan Authority/Powwhite Parkway Extension (Rt.76)		Totals	
	1999	2005	1999	2005
Agency Returned Survey?	Yes		4	
<b>Number of toll Collection Plazas operated</b>	3	3	11	7
<b>Number of toll collection plazas with dedicated ETC</b>	1	1	4	2
<b>Number of toll collection plazas with both manual and ETC</b>	3	3	11	7
<b>Number of toll collection lanes operated</b>	27	27	83	55
<b>Number of toll collection lanes with dedicated ETC</b>	2	4	8	8
<b>Number of toll collection lanes with both manual and ETC</b>	27	27	71	55
<b>Number of toll collection tags issued</b>	16,000	0	62,500	0
<b>Antennae Location Technologies</b>				
In-Pavement?	No		0	
Focused Beam?	No		0	
Distributed Overhead?	Yes		4	
<b>In-Vehicle Equipment Technologies</b>				
Tag-based?	Yes		4	
Integrated circuit card-based?	No		0	
<b>Are toll tags used by other toll operations in metro area?</b>	Yes		4	
List of toll operators that use tags	Powwhite Parkway Extension (VDOT)			
<b>Are toll tags used by operators of public transit to pay transit fares in metro area?</b>	No		0	
List of transit operators that use tags	None			
NR: No Response				