MATOC
Metropolitan Area Transportation Operations Coordination

White Paper

Regional Traveler Information Dissemination Strategies for Informing the Public in the Washington, D.C. Area

December 2, 2009

d. District Department of Transportation
Maryland Department of Transportation
metro
VDOT Virginia Department of Transportation

"Working together to reduce incident-related travel delays through improved coordination, cooperation, and information-sharing."

(This page intentionally left blank)

Table of Contents

Acknowledgements

The preparation of this White Paper was carried out by the Telvent Team with most of the work performed by Robert Winick of Motion Maps, LLC. Guidance and support was provided by Gary Euler of Telvent Farradyne, Inc., Andrew Meese of COG/TPB staff, as well as some review by Michael Pack of the University of Maryland CATT Lab. Acknowledgement is due to Denise Nugent and Allison Henry of Travesky & Associates, Ltd. who provided editing support to the final drafts. Finally, a special acknowledgement is due to Lydia Fair of Travesky & Associates, Ltd. who provided considerable support throughout the duration of the project.

Executive Summary

The Maryland Department of Transportation (MDOT), the Virginia Department of Transportation (VDOT), the District of Columbia Department of Transportation (DDOT), and the Washington Metropolitan Area Transit Authority (WMATA) have partnered with the National Capital Region Transportation Board (TPB) to create the Metropolitan Area Transportation Operations Coordination Program (MATOC). MATOC's mission is to provide situational awareness of transportation operations in the National Capital Region (NCR) by communicating consistent and reliable information, which enables operating agencies and the traveling public to make effective and timely decisions. MATOC is developing the tools and processes needed to facilitate coordinated operating agency responses.

The MATOC Steering Committee – comprised of representatives from MDOT, VDOT, DDOT, and WMATA – act as MATOC's governing body. This White Paper is primarily for the MATOC Steering Committee to use as a foundation in coordinating efforts between MATOC's constituent agencies with respect to regional traveler information dissemination. In order to achieve their efforts, the MATOC Steering Committee works in coordination with two MATOC Subcommittees – Regional Operations and Regional Information Systems.

Information to develop the White Paper came from interviewing over two dozen affected stakeholders from four basic stakeholder groups – MATOC agencies, local transportation agencies, private sector information service providers (ISPs) and public agency public information officers (PIOs), and the media. The interviewees provided insight on their traveler information dissemination strategies and discussed what they believe needs improvement and what currently works well.

In addition to the structured interviews, a MATOC focus group was convened to discuss incident management and traveler information dissemination strategies. The focus group includes representatives from local transportation and public safety jurisdictions.

The key themes that developed from the interviews and initial focus group meeting assisted in creating the main action items for the White Paper. These key themes include:

- The importance of accurate and timely information
- The benefits of a regional traveler information Web site
- The need for better coverage of traveler information for local transit agencies and smaller arterials

Details regarding the interviews and focus group meeting can be found in **Section C** of the White Paper.

Section D of the White Paper identifies the critical issues for MATOC traveler information activities, which include:

- Expanding roadway monitoring coverage for incident management and traveler information
- Using travel time estimates as an important aspect of traveler information

- Improving interrelated information about freeway, arterial, and transit related traveler information
- Continuing to rely on the data provided by the private sector
- Improving the consistency among data and sources of information for traveler information
- Providing a MATOC branded Web site, which is accessible by various stakeholders to assist with incident management and traveler information
- Providing alerts and traffic flow information through the MATOC Web site
- Accounting for independent "511" traveler information services
- Providing personalized approaches for traveler information using advanced technologies

Section E of the White Paper discusses the strategic options for the critical issues identified in Section D. Section E also provides the Steering Committee's decisions on the strategic options. The strategic options are based upon current funding or expansions of services currently programmed. They are also dependent upon improved coordination that requires no new funding or small amounts of funding that fit within current operating budgets. The strategic options are short-term, which can be implemented within the current fiscal year. Other strategic options are available for both the near-term and long-term when more funding becomes available.

Listed below is a brief summary of the issues and strategic options followed by the Steering Committee's decision:

1. Extensive coverage of the roadways is an important aspect to timely and accurate traveler information. The extended coverage of freeway, parkway, and arterial travel conditions provided by the I-95 Vehicle Probe Data (as discussed in Section E) greatly benefits regional incident management and traveler information. The CATT Lab at the University of Maryland has incorporated the I-95 Vehicle Probe Data feed into the Regional Integrated Transportation Information System (RITIS), and some MATOC agencies have started using some of the data within their Traffic Management Centers (TMCs).

   The Steering Committee believes that the investment in data coverage will benefit the MATOC agencies. The Steering Committee also decided that the resulting data should be used immediately upon availability, and the MATOC subcommittees should help coordinate further stages of coverage among the MATOC agencies. The Steering Committee members should work with their respective state agencies to gain further coverage by using current funding and programming processes. The Steering Committee should also consider grant opportunities through the I-95 Corridor Coalition.

2. The White Paper also discusses using travel time estimates to enhance traveler information within the region. The I-95 Vehicle Probe Data regarding speed and travel time can be used for travel time information on freeways; however, it is not yet validated for major arterials. I-95 Vehicle Probe Data will be the basis for MDOT's travel time information program, anticipated for fall-winter 2009, which will be displayed on their dynamic message signs (DMS) statewide.

The Steering Committee should coordinate among the constituent agencies to help track MDOT's experience with travel time dissemination. The Steering Committee notes that there are different approaches among the agencies related to travel time, so sharing the information will be helpful. The Steering Committee also requests that travel time estimates be made available to the MATOC Web site, once the Web site is functional.

3. An interest within MATOC is providing useful information to travelers using different forms of transportation. The message signs located at Metrorail stations and the NextBus-type information, now available at Metro's 12,000 bus stops, benefit the region's transit riders. The use of pre-trip and en-route information can be used by many different travelers to decide which mode of transportation to use. However, there is currently little interdependency between roadway and transit oriented information, which would assist travelers in making more informed choices before they travel.

   The Steering Committee requests that the two MATOC subcommittees coordinate among the stakeholders to consider better methods of sharing information. This will assist travelers in making more informed choices and possibly increase the number of transit users.

4. Currently, some of the MATOC agencies work with private data sources to receive information for their internal operations. However, some data use agreements with private data sources restrict sharing the data provided. The agencies receiving data from these private sources can only use the data for their internal operations. These restrictions place technical burdens on the agencies sharing information through RITIS and create inefficiencies.

   The Steering Committee believes that the constituent MATOC agencies should use the private sector data sources that are available and provide feedback if they are restricted in sharing the data.

5. MATOC aims to facilitate better coordination between the MATOC agencies and other stakeholders to improve the quality of traveler information available to traveler information providers. Currently, there are some inconsistencies in the data types and sub-categorizations being used in information sharing among the agencies. Also, the data that agencies output is sometimes inconsistent with the data being received by RITIS.

   The Steering Committee suggests that the two subcommittees review and check for possible inconsistencies and discuss ways to make traveler information and data sharing within the region more consistent.

6. The MATOC Steering Committee wants to reinforce the importance of MATOC as a regional traveler information entity. A MATOC branded Web site can help strengthen the image of MATOC throughout the region. MATOC can refine the information available through the current RITIS Web site to build the MATOC Web site. MATOC can also create different layers within the MATOC Web site to make it adaptable for the different users identified in the RITIS Access Policy. For instance, regional

transportation and public safety agencies can view personal details, such as license plate numbers, when they access RITIS. However, the media would only see the details of the incident and not have access to personal information.

The Steering Committee has approved the RITIS Access Policy, which identifies procedures to facilitate data and information sharing initially among the MATOC agencies. After testing the Web site and ensuring the quality of the data, the access policy permits other public agencies to access the Web site. After a period of reliable sharing among the agencies, the access policy will allow the media and private sector ISPs to access the Web site.

7. The content of the MATOC Web site should cover a variety of data provided by the regions TMCs to inform the different types of travelers throughout the NCR. Enhancements to the current RITIS Web site are needed to provide better traveler information to the region. There are six potential enhancements (detailed in Section E), which the subcommittees should review and consider in their future work activities:

    a. Use a fourth speed range for freeways with the I-95 Vehicle Probe data
    b. Establish a separate set of four speed ranges for arterial data
    c. Provide roadway section travel time information
    d. Provide a time-stamp in the legend
    e. Provide more choice to the user for selection of a map-scale of the display
    f. Consider use of bus transit travel time data

    Along with these enhancements, the Steering Committee believes the Web site should:

    - Continue to be focused on exception reports of incident data from the agencies
    - Highlight normal or recurring variations in traffic congestion conditions
    - Provide new information with a MATOC Traveler Alert, which is activated by the MATOC facilitator when significant regional incidents or events occur

8. A cooperative 511 traveler information system for the NCR could assist in providing valuable traveler information to the public. Currently, there is a telephone based 511 system in Virginia. A similar system is being developed for Maryland and is a possibility in the District of Columbia. Many private sector companies also continue to provide more sophisticated and timely traveler information throughout the region. The transit agencies provide quality pre-trip and en-route information for their customers.

    The Steering Committee believes that there are more critical issues regarding traveler information that the MATOC agencies can focus on instead of developing a regional 511 system. However, the MATOC agencies would benefit from continued coordination between the MATOC Web site, Virginia's 511 system, and Maryland's proposed 511 system. If the District of Columbia develops a 511 system, coordination with this service would be beneficial as well.

9. Transportation agencies are experimenting with the use of social networking sites, such as Facebook and Twitter, and have been using other technology based approaches to

disseminate information to the public. While these options could provide additional outlets for MATOC to disseminate traveler information, MATOC needs to devote its limited resources to higher priorities.

The Steering Committee agrees that MATOC should depend upon the individual public agencies and private sector ISPs to provide personalized traveler information through their subscriber based services.

Section E also details three cross-cutting statements that underlie these recommendations:

1. The quality of the input data and resulting output information must be timely and sufficiently accurate.
2. There will be an on-going need for MATOC to manage the initial and subsequent expectations of the public and private stakeholders.
3. MATOC is currently deciding on how to address funding and administrative issues, which will govern some of the choices for the provision of traveler information.

Section F of the White Paper details funding strategies for the Steering Committee to consider for subsequent funding of the program. These strategies include:

- Receiving support from other functional areas outside of transportation agencies
- Developing more pooled funding opportunities among the transportation agencies
- Receiving support from other programs within the MATOC agencies
- Building stable partners with regional media outlets
- Building dynamic partners with Web based sources of information and disseminating information through newer technologies

Appendix A identifies seven stages for expanded coverage of I-95 Vehicle Probe Data for travel monitoring in the Washington, D.C. area. These are the same stages identified above in Section E (#7). Those stages of expansion will be dependent upon new sources of funding and should be coordinated through the two MATOC subcommittees before their details are reviewed by the Steering Committee.

White Paper on
Regional Traveler Information Dissemination Strategies for Informing the Public in the Washington, D.C. Area

Section A. Introduction

The dissemination of regionally oriented traveler information is an important concern to the agencies, organizations, residents, and businesses of the Washington, D.C. region. The Steering Committee of the Metropolitan Area Transportation Operations Coordination Program (MATOC) is the group in the region to address this concern. A fact finding and decision making process has been set up to help the MATOC Steering Committee. A series of briefings, meetings, and workshops have taken place in which the Steering Committee has had the opportunity to hear the perspectives of various stakeholders that may be affected by such regional traveler information dissemination strategies.

Implementation of strategies presented here will result in a better situation, although public agencies and various private sector companies are already working at serving some of the concerns and needs. Such organizations will continue to act in accord with their stated missions; which however, may not necessarily address our traveler information concerns. This White Paper has been written broadly to enable the Steering Committee to think strategically – but it is expected that they may choose to act narrowly to focus attention on what they perceive to be the most critical components and actions. MATOC intends to facilitate individual public agencies to work together in a coordinated and consistent fashion to use their implementation powers in order to achieve better overall results.

Introduction to the Audiences

This White Paper has been written primarily for the MATOC Steering Committee. Secondary audiences include leaders of the various stakeholder agencies, private sector companies interested in regional traveler information, and representatives of print and broadcast media. The main intent of this White Paper is to provide a foundation to use in coordinating the efforts of the main constituent agencies that comprise MATOC. It is also meant to provide a framework for the other stakeholders to utilize in their independent but related activities.

Context of the Review and Approval Process

This is the final draft White Paper on regional traveler information strategies for informing the public. It has been prepared by the consultant team that is supporting MATOC and has included substantial input and discussion over several months by the MATOC Steering Committee. A summary set of the recommended strategies and options from the prior preliminary draft was distributed to the MATOC Steering Committee at their July 2009 meeting. About half of the staff-proposed strategies were reviewed and discussed. The Steering Committee made choices as to which options would best achieve the goals and objectives of MATOC and be consistent with the policies and priorities of their own agencies. The second half of the strategies was similarly reviewed at the August 2009

meeting and tentatively approved and then revisited at the September 2009 meeting. A subsequent polling by e-mail achieved the necessary approval by the MATOC Steering Committee of the narrowed-down set of summary strategies.

This final draft of the White Paper includes the results of the Steering Committee's actions. They also directed that the full text of this final draft be concurrently distributed to the (a) Steering Committee for their final review, (b) two MATOC subcommittees, (c) MATOC Focus Group, and (d) other participants in the information gathering process. This will enable the key stakeholders to review and comment on this final draft White Paper prior to the Steering Committee's final approval. Based upon their final action, briefing material will be developed for the MATOC Steering Committee to use when sharing their ideas about regional traveler information strategies.

Identification of the Component Sections of the White Paper

In addition to **Section A** (Introduction), **Section B** identifies goals and objectives related to developing traveler information strategies, most of which were previously articulated as part of a MATOC Fact Sheet that was prepared in November 2008.

Section C reviews perspectives of the stakeholder providers of traveler information, based upon a series of interviews.

Section D discusses a strategic framework for considering such regional traveler information activities and is based on two workshops and briefings given to the MATOC Steering Committee during spring 2009.

Section E is the main body of the White Paper. It identifies issues, strategic options, and selected strategies that the MATOC Steering Committee will use in guiding its future actions and as direction for the two MATOC Subcommittees.

The strategic options presented in Section E are:

- Based upon current funding or expansions of services that have already been programmed
- Dependent upon improved coordination that requires no new funding, or small amounts that fit within operating budgets
- Short-term, many of which can be begun and implemented within FY2009-2010

Section F discusses possible strategies for cooperative funding of data sources and supportive services for travel monitoring in the Washington, D.C. area that may be feasible in the longer term when the current economy has rebounded and fiscal constraints are less extreme.

Appendix A identifies and discusses possible stages for expanded coverage of the I-95 Vehicle Probe Project datasets. These datasets could be used for travel monitoring in the Washington, D.C. area and in various activities for incident management, traffic management, and traveler information.

Section B. Goals and Objectives Related to Developing Traveler Information Strategies

The development of regional strategies for the dissemination of traveler information depends upon MATOC having clear goals and objectives. This section summarizes goals and objectives related to developing traveler information strategies that were previously developed for the MATOC Fact Sheet in November 2008.

Mission: MATOC's mission is to provide situational awareness of transportation operations in the National Capital Region (NCR). This will be achieved through the communication of consistent and reliable information that enables operating agencies and the traveling public to make effective and timely decisions.

Goal and Objective for Traveler Information: One of MATOC's goals is to provide timely and reliable information that enables individuals to make better travel decisions. Correlating with this goal, one of MATOC's objectives is to continually improve the region's ability to inform the public and manage the transportation system.

Strategies: To achieve this goal and objective, MATOC will employ a broad strategy to develop and maintain automated and personal communications between the regional information sharing systems, operations staffs, and the public and private information disseminators.

MATOC's strategies for regional traveler information can be interdependent with and feedback information that improves the ability of the traffic management activities of the agencies to be more effective so as to:

- Make it easier for the traffic and transit managers to better manage regional travel conditions
- Facilitate improved incident management coordination
- Enable better safety for travelers and the public
- Enhance the ability of stakeholder agencies to provide pertinent information to travelers

The regional traveler information activities of MATOC can become an effective means to enable the public sector agencies to collectively interact with the various private sector companies that provide traveler information. That could be done so there is improved coordination and consistency with activities of:

- **Regional Integrated Transportation Information System (RITIS)**: enabling the data and information to be shared with and among agencies, the media, and the public.
- **MATOC Facilitator**: helping ensure that accurate and timely information on regionally significant incidents is shared among operating agencies.

MATOC can help create a sustainable approach to enable the dissemination of traveler information throughout the region. This approach should continue expanding upon the current funding sources, and include additional sources such as pooled funding from interested stakeholders, in-kind contributions of services, and public-private cooperation or partnership agreements. This sustainable approach could serve the needs and objectives of the constituent agencies, and associated stakeholders, by enabling them to better meet their similar responsibilities.

Section C. Perspectives of the Stakeholder Providers

The strategies of this White Paper take into account the perspectives of many affected stakeholders, most of whom already provide one or more forms of traveler information. Over two dozen structured interviews were conducted with the following four stakeholder groups:

- MATOC agencies
- Local traffic, transit, and ridesharing agencies
- Private sector Information Service Providers (ISPs) and public agency Public Information Officers (PIOs)
- Broadcast and print media

The interview questions ranged from general opinions of what regional traveler information dissemination should include, to specific information about the type of traveler information each stakeholder may now provide and how it is provided. The interviewees provided insight on their traveler information dissemination strategies, what they believe needs improvement, and what currently works well. Each of the interviewees was asked essentially the same set of questions, in the same general sequence.

A MATOC Focus Group was convened and an initial session was held during this same time period. Some of the Focus Group participants were also among those individually interviewed. Pertinent information from that initial meeting is also discussed in this section, as is a meeting with the Regional Information Systems Subcommittee of MATOC. The following discussion is based upon synopses prepared for each interview of the four stakeholder groups. We heard common and divergent perspectives. The compilation and synthesis of concerns and issues are discussed next by group.

MATOC Agencies

The MATOC Steering Committee representatives were individually interviewed, usually along with one or more associates from their agency. The MATOC Agencies consist of the following five organizations: (1) District of Columbia Department of Transportation (DDOT), (2) Maryland Department of Transportation (MDOT) CHART Program, (3) Washington Metropolitan Area Transit Authority (WMATA), (4) Virginia Department of Transportation (VDOT), and (5) Metropolitan Washington Council of Governments/Transportation Planning Board (COG/TPB).The first four of these agencies are the voting members of the Steering Committee and COG/TPB is an ex-officio, non-voting member. The Center of Advanced Transportation Technology (CATT) of the University of Maryland is an important part of the MATOC program and representatives from CATT attend Steering Committee meetings.

This stakeholder group focuses on “exception-based processes” in that they usually deal with incident related information and not necessarily normal traffic conditions. That tends to be the case even if conditions are heavily congested at a particular time. If that condition is expected at that time period then minimal attention is given. Since there seems to be little modal and freeway-arterial integration, while the fusion with private sector data from several sources is a growing trend, there was a strong opinion that freer sharing of some of the private sector data sources is needed. There also appears to be a need for more intelligence/human oversight in

converting the data to information. There is an interest in being able to better assess the quality or reasonableness of the data and the resulting information. Current procedures tend to be accepting of results of automated processes. Some additional perspectives included the following:

- There historically has been a shortage of monitored data making situational awareness an acute issue. The new I-95 Corridor Coalition Vehicle Probe data set is starting to change that condition. The means used to disseminate traveler information is critical to these stakeholders.
- There is support for the media being provided access to the RITIS Web site or a version of it, but it needs to be done in a layered fashion based on a class or type of recipient.
- Steering Committee members gave qualified support for there being a regional traveler information Web site due to concerns such as: who hosts or should host it; what information would be included; whether it would be agency, media and/or public focused; and when to implement or stage access.
- There was a significant need to focus first on needs of commuters as a class of traveler. There is recognition that commuters need multimodal and arterial information and not just freeway related information to make more informed choices.
- Accuracy and timeliness of the data and resulting information is a universal concern. If this is absent, it will be a "show stopper" for any regional traveler information approach.

Local Traffic, Transit, and Ridesharing Agencies

Key staff from eight agencies were interviewed in the following order: (1) the Alexandria Transit Company (DASH), (2) City of Fairfax Public Works, (3) Arlington County Department of Transportation, (4) Montgomery County Department of Transportation, (5) Prince George's County Department of Transportation, (6) Potomac and Rappahannock Transportation Commission (PRTC), (7) Fairfax County Department of Transportation/Fairfax County Connector, and (8) the Commuter Connections Program at COG/TPB.

Many of these agencies are multimodal in their operations and also provide traveler information, which in some cases is only pre-trip information. There are significant variations in size, coverage, authority, ascribed mission, and funding resources for these agencies. Some agencies monitor their arterials and roads independently from the DOT in their state, such as Arlington County. Each agency agrees that traveler information is pertinent for those traveling throughout the region, whether the travelers are local or not. Other aspects discussed in these interviews included the following:

- Some agencies already focus on "real-time" traveler information, while others intend to provide this information in the future. Many of the agencies operate their own transit system. Some are working with WMATA to implement a form of the Next-Bus arrival system, which would enable travelers arriving at a stop to find out immediately when the next bus will arrive for each route. This would be real time and also disseminate incident related information. WMATA has recently implemented their own version of such an approach covering over 12,000 bus stops throughout the region.

- Roadway agencies are typically focused on main arterials and signal control systems, do not have much information regarding local arterials, and often divert traffic from local streets. Each agency hopes to gather more information in the future, depending on funding.
- The agencies typically share pertinent information regarding incidents that affect neighboring jurisdictions. Most agencies provide their bus route schedules with WMATA, and WMATA shares this information via their pre-trip planner.
- These stakeholders indicated that they welcome a single source of traveler information and believe that a regional traveler information Web site would be beneficial. They believe having such a Web site would benefit the media and reduce the media telephone calls the jurisdictions currently receive. Many of the agencies are not yet linked to RITIS, and most of them are more connected and aware of RICCS or CapWIN.
- Accurate and timely information is an important concern for each agency. The sources for information, the coverage, and the data can always be improved. Currently, commuter needs are focused on the major arterials and not on local arterials or smaller streets. Most of the region's transit information, like schedules and fares, are currently available for travelers via the individual agency Web site or through WMATA's Web site.

Information Service Providers and Public Information Officers

Representatives from INRIX, NAVTEQ, Delcan, TrafficLand, Total Traffic Network, and Traffic Cast International were interviewed as Information Service Providers (ISPs). Representatives from the Maryland State Highway Administration (MDSHA) and the Virginia Department of Transportation (VDOT) were interviewed as Public Information Officers (PIOs).

The ISPs and the PIOs are concerned with freeway information, but there is growing concern for arterials. They hardly have any focus on transit information. This appears to be primarily because it is difficult to obtain significant information from numerous transit agencies. Although not directly said, but implied, it is also because there is perceived to be limited market potential in providing such information. Although not interviewed, Google has made an effort in this regard nationally and somewhat locally. The ISPs and PIOs also tend to focus on incidents and "exception-based" information rather than congestion and traffic. There is little support for the 511-based systems among those interviewed. Other aspects discussed in these interviews included the following:

- The ISPs and PIOs rely on multiple data sources for their information and value the data provided. The data received must be accurate and timely, and most of the private sector companies employ teams to have an on-going information verification program. They often do double checking before providing new information to the public.
- Most of the ISPs and the agencies employing the PIOs have ties to RITIS. They support the media having access to RITIS and believe it would be beneficial. Many of the ISPs have proprietary data and do not want to compromise its market value to them by enabling third parties to access it through data sharing approaches such as RITIS. For instance, TrafficLand already provides camera information and images

via their Web site. They also provide information to people via SMS and alerts. Therefore, if RITIS supplies camera images through its Web site, TrafficLand believes they should be the provider, and they are willing to do that for the appropriate payment for their services. Regarding there being a new regional Web site, these stakeholders emphasized it should be done well.

- Many of the ISPs are "data fusion focused" in order to better provide more accurate and timely information to travelers, as opposed to using a single information source. Data fusion of information gives travelers a greater idea of what is currently happening on the roadways, and what their options are to avoid incidents, congestion, and delays.
- Regarding various new technologies available to use for the dissemination of traveler information, several of the companies put effort in being able to provide a broad range of connectivity using many different means and technologies. However, they avoid becoming a captive of any one technology and are eclectic in their use. That general strategy assists them well in serving different traveler markets and meeting concerns for more equal service to diverse users and customers.
- The PIOs focus on major incidents that affect their jurisdictions. If there is an incident capable of affecting the region, they communicate with the other jurisdictions to provide accurate and timely information.

Broadcast and Print Media

The main traffic reporter from 103.5 FM (WTOP), Bob Marbourg, and the "Dr. Gridlock" columnist of the Washington Post, Robert Thomson, were each interviewed. The interviewers had the opportunity to sit with the WTOP traffic reporter in the broadcast-studio and observe his live broadcast several times during about a 45-minute period, and while off-air continued aspects of the interview. Handout summaries of the approach of WTOP and features used by the broadcaster were selectively used in this summary. Aspects discussed in these interviews included the following:

- Trust of the information source is essential for traveler information to be well received and acted upon by travelers – both of these interviewees cultivate trust by their customers. To the interview team, and from market surveys, many travelers in the Washington, D.C. metropolitan area and beyond appear to trust these sources and use them as their main source of traveler information. These sources focus on the needs of the travelers before anything else. The WTOP traffic reporters receive phone calls from "dedicated travelers" regarding incident information, heavy congestion, and traffic related issues. This information goes beyond what most agencies and emergency responders receive. The reporters cultivate callers calling in such information.
- The media sources note that accurate, reliable, and up-to-date information sources are very important. The information must be verified before providing it to travelers. Feedback from the travelers can be useful, but it must be organized and managed. The information must be clear and concise for travelers so they can "visualize the traffic ahead." After-the-fact analysis of unusual or average conditions is also important. One of the features of the Post, "Which Way?" provides such information on an ad hoc basis.

- The media provide travelers with specific information of where problems are, what lanes are getting through, what alternate routes are appropriate, etc. They want to enable the traveler to make decisions based on updated information. If they receive information that is incorrect or untimely, then it is obsolete to customers.
- There is interest in a "one-stop-shop" with a regional perspective of incident and traveler information provided by the public agencies. However, there is a perception that some agencies provide better information than others. There is an opinion that agencies need to employ people to monitor the roads on-site, not via cameras or other forms of technology. There is a mixed interest in the current red-yellow-green maps of traffic congestion patterns. Travel time is important, but it needs to be sufficiently accurate.
- The media want better coverage for arterials and transit data so they can provide better information to their customers. The more information available, the easier it is to provide travelers with what is needed to make decisions for their commute and other aspects of their travel.

Other Stakeholder Involvement

MATOC Focus Group Meeting: MATOC also gathered a focus group made of staff from local traffic, local transit, and emergency management agencies to discuss traveler information dissemination strategies. The group met in March 2009 and reviewed a regional incident that crossed two jurisdictions. They discussed how their agencies gather and provide information to the public. They also discussed what role they believe MATOC will have with incident information in the future. They received a summary of the interviews from the first two stakeholder groups. There was a general discussion and a strong interest in hearing more in the future as work on developing the strategies for this White Paper. It is expected that MATOC will reconvene the Focus Group to review the White Paper and also provide on-going interaction about other MATOC activities.

Regional Information Systems Subcommittee Meetings: A briefing was given in March 2009 to the subcommittee from the MATOC agencies and other stakeholders as to the status of the development of this White Paper. Subsequent agenda items and participation in the subcommittee's monthly meetings have kept them up-to-date and helped account for a traveler information perspective in the draft of the RITIS Access Policy that was approved by the Steering Committee. The subcommittee also has a change request process to identify, discuss, and select enhancements to RITIS. That process has recently been initiated for traveler information needs and requirements that derive from this White Paper as discussed in Section E.

MATOC will further involve additional stakeholders in the review of this draft of the White Paper to gather more insight on traveler information dissemination. The previously prepared Communications Plan of MATOC can also be used as a guide to the continuous stakeholder involvement process for the implementation of traveler information strategies.

In summary, MATOC needs to consider how to expand traveler information strategies to reach beyond the immediate needs and activities of the MATOC agencies. An approach by MATOC to broaden interest in the needs and requirements of such "external stakeholders," and working

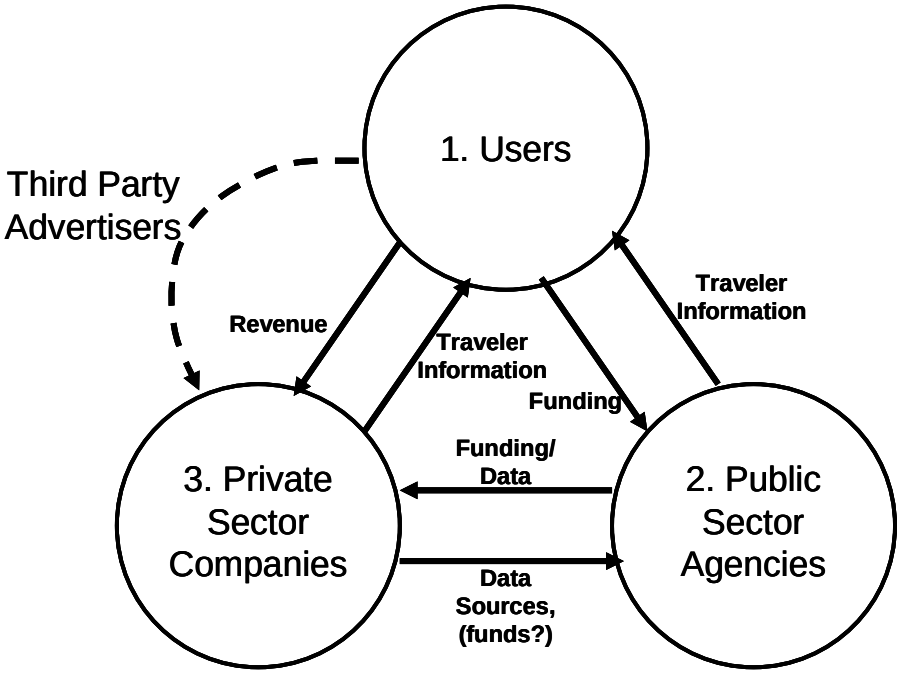
more closely with them, should result in improved availability, coverage, content, quality, and timeliness of regional traveler information.

Section D. Strategic Framework

The success of the traveler information strategies will depend upon how well the resulting traveler information meets the needs of travelers – the end users of these services. Thus a strategic framework needs to start with an understanding of who the users are and what they need and want to know. The availability of resources to the information providers, and limitations and variations in those resources, need to be accounted for by creating an overall regional set of strategies for MATOC. Further, the interdependencies with the media and private sector companies who have their own missions with respect to similar strategies also need to be considered. Some of the information and insights derive from discussions at the TRB sponsored national workshop on traveler information held in April 2009. Finally, this strategic framework identifies critical issues, which are given detailed consideration in the next Section, that need sufficient resolution by MATOC and associated stakeholders in the short, mid, and long terms.

Exhibit 1 presents a generalized overview of the interrelationships among the three main categories of actors: (1) Users, (2) Public Sector Agencies, and (3) Private Sector Companies. Users need to give funding via user fees, taxes, direct payments, or through third-party advertising and want traveler information in return. They have little willingness to pay for such information, understanding or support for systems that can obtain the information. The public sector agencies want to provide traveler information but are constrained by funding, lack of sufficient coverage, and available data. Public sector agencies are becoming increasingly dependent upon the private sector companies as data suppliers. Private sector companies paying the public sector for the data they collect has not been a successful working relationship locally or nationally. Private sector companies selectively provide traveler information to users and have been traditionally paid by "third-party advertisers." However, direct types of payments and other means such as bartering are becoming more prevalent.

Exhibit 1: Relationships among Users, Public Sector Agencies and Private Companies with Respect to Traveler Information



1. Who are users of MATOC supported traveler information, what do they need and want

- Each of us is a different type of traveler under various circumstances.
- At various times of the day, day of the week, holidays, and seasons there are users who collectively have a more defined set of needs
- Commercial activity users have needs that vary from individual travelers; they often avoid being out during weekday mornings and evening peak periods. As such they may be more dependent upon traveler information during non-peak times, particularly when travel conditions are impacted by incidents.
- Individual travelers desire information on their main modes and routes of travel when it can help them travel more efficiently.

- What constitutes "traveler information" is a challenge to succinctly define –it is any information that enables individual travelers to make informed decisions in their self-interest about:
  - ♦ Whether to travel, or satisfy their need some other way such as through communications.
  - ♦ When to begin their travel, and will they travel alone or part of a group.
  - ♦ How they travel, what mode(s) of transportation they use.
  - ♦ Which class of service, of the different modes can they use.
- From the perspective of MATOC, it is not about the particular roadway or transit route they take on a particular day – that is more the province of individual operating agencies.
- From the perspective of MATOC, it is not about whether they directly obtain travel information from MATOC supported sources, such as RITIS, or indirectly from MATOC supported sources through third parties, such as the media – either way, it can help MATOC meet their goals and objectives.

- Over the years, congested conditions have been increasing in time and extending over more parts of the transportation systems, making reliable travel more difficult. (This year the Washington region was designated the second most congested Metropolitan area by analyses prepared by the Texas Transportation Institute for the FHWA.)
- Sudden changes in travel conditions can occur due to changing weather or incidents.
- Special events and planned work zones can systematically disrupt normal travel conditions or exasperate already congested conditions. For example, the large number of Economic Stimulus Projects planned over the next two years may further congest traffic conditions in the short-to-mid-term making timely and accurate traveler information even more important.

- Travelers want reliable travel and need information when conditions are likely to dramatically change their expectations for reliability from their usual travel patterns.
- Other times when needing to take a new or infrequently used route, travelers do not know what to expect and want information regarding the "normal" travel constraints.
- Providers of traveler information, whether public sector agencies or private sector companies, tend to be exception-based and focus on incidents and events once they vary from normal travel conditions. Yet they also need to provide information to the infrequent users who do not know what is "normal."

2. Constrained resource availability to the public sector agency stakeholders –adapting to the likelihood of disparate responses in the short-term

- A key functional responsibility of transportation management and operations activities is providing information about travel conditions.
- Resources for management and operations are constrained and focused heavily on the functional responsibilities of other agencies such as incident management reactions, proactive management of system operations, monitoring of travel conditions, or preparedness for emergency management and homeland security.
- The "exception-based" focus of management and operations emphasizes managing moment-to-moment safe, efficient, and effective use of the limited supply of the transportation system.

- Public agencies have a need to upgrade their monitoring of system conditions to have better "situational awareness" and have training and practice so they are better prepared when major incidents happen.
- In limited situations, such management and operations activities are carried out to try to manage "system demand," such as detouring or suggesting alternative routing. However, MATOC agencies often focus their resources first in incident management, which includes the sharing of information among the agencies, and when possible work on improving the dissemination of information available to the media and individual travelers.

- The MATOC agencies agree there are times when a regional perspective on travel conditions are important to lessen the "ripple effects" on other jurisdictions – first for effective incident management and secondarily for enabling the dissemination of useful information to the media and perhaps directly to travelers.
- Public agency transportation providers are increasingly depending on users to make "better choices," which cumulatively lessens demand and makes it easier for providers to do their job of balancing and managing system supply and demand. Balancing of supply and demand is no longer just a long-term planning responsibility rather that increasingly needs to be done in a day-to-day and moment-to-moment basis.

- Federal transportation policy over the years has increasingly expected the state or local transportation agencies to provide basic traveler information services for travelers through programs such as (a) 511 Systems, (b) the addition of travel times on Dynamic Message Signs to destinations ahead along a route, or (c) be prepared to monitor and share traffic and travel conditions in accord with Section 1201.
- The current overall state of the economy and variations throughout the Washington, D.C. region may result in a disparate implementation of traveler information services and activities in the short and mid terms, and perhaps long-term.
- These types of services are seen as desirable for each of the state and local agencies to aspire to provide when they can dedicate appropriate fiscal resources to such important activities. In the interim, the regional MATOC activities will need to adapt to such disparate implementation due to disparate funding availability and differences in response.

3. Resources being developed or provided by private sector company stakeholders and the media – a specialization in the dissemination of traveler information using the latest technologies

- With the constraints on public sector traveler information related activities, various private sector companies have seen opportunities for profitable business ventures that are based upon providing information to various subsets of the traveling public.
- The public agencies are becoming increasingly "customer oriented," and their prime focus has been providing, maintaining, and operating the system supply; yet the sustainability of private sector media and Information Service Providers (ISPs) rests on customer acceptance of their products and services. The quality of the traveler information is critical.
- Traveler information has been a long standing customer service provided by numerous private sector companies in the radio, television, satellite-based broadcast, print media, and internet and mobile phone based services.
- The financing of such services has often been through third-party advertising and very limited but growing success through other means, such as subscriptions or bartering for interdependent services.

- The increasing popularity and affordability of in-vehicle navigation systems is pushing private sector companies towards various business relationships. Private entities want to conduct their business nationally and increase their market leverage. They have limited interest in local customization; however, a dominant radio station, like WTOP, is a unique exception in several metropolitan areas. They are also less concerned with the institutional dynamics that may affect the programs of individual public sector agencies.

- Many private sector companies have had some dependency on fiscal resources from public sector clients, for example, to help get them through their start-up phases, increase their coverage, or to effectively manage their fiscal resources. Increasingly, there has been more Public-Private-Partnerships, although many of the initial ones have been private sector companies acting as contractors to the public sector.
- The emergence of new companies, their agglomeration, and new business models may be signaling a sea of change, of which MATOC should maintain awareness. Several of the private sector ISPs may be able to sustain themselves with decreasing amounts of public sector financial participation.
- Due to the broader mission of the public sector agencies, there will always be a need for Public-Private-Partnerships in order for the public agencies to leverage their limited resources to better achieve their responsibilities.

- With the exception of basic traveler information being provided through 511 type systems, the public sector agencies are particularly challenged to: (a) effectively gather and maintain the appropriate resources to broadly disseminate traveler information to a variety of users; (b) maintain a knowledge base and connectivity to newer technologies, which the public in particular wants to use to receive traveler information; and (c) those trends suggest that the public sector agencies should not invest heavily in the technologies of traveler information dissemination and instead rely more on the media and private sector companies to do so.

4. Identification of Critical Issues for MATOC Traveler Information Activities

The MATOC Steering Committee has given sufficient consideration and narrowed down the possible options befitting the regional interest and that of their agencies. As discussed in Section A, further input is being sought regarding the perspectives of associated stakeholders on these issues and the direction of the MATOC Steering Committee. Section E addresses the following nine groupings of strategy options related to the dissemination of regional traveler information.

- Expanding roadway monitoring coverage for incident management and traveler information

- Using travel time estimates as an important aspect of traveler information
- Improving interrelated information about freeway, arterial, and transit related traveler information
- Continuing to rely on the purchase and/or bartering for data collected by the private sector
- Improving the consistency among data and sources of information for traveler information

- Providing for a MATOC-branded Web site to be accessed by various stakeholders for use in incident management and traveler information
- Focusing on the content and format of information on the Web site to show exceptions to normal flow and alerts
- Accounting for independent 511 traveler information services
- Providing for personalized approaches for traveler information using advanced technologies

The sequence of these nine groupings of strategy options generally follows the interrelationships among the main components of traveler information systems, which are:

Data Collection and/or Gathering of System Conditions: the first bullet grouping above and the material in Appendix 1 relate the direct collection of data or the secondary gathering of data collected by others that reflect the operating conditions that users are interested in.

Conversion of the Data into Traveler Information: The next four bullet groupings above deal with the conversion of the data into information.

Dissemination of the Traveler Information to Users: The last four bullet groupings above are approaches for the dissemination of that information to diverse users via various means.

Section E. Identification of Issues and Strategic Options for Traveler Information Activities

Over the years, the transportation management with operations units with the agencies that constitute MATOC have taken or emphasized similar approaches related to traveler information activities within their jurisdictions. There is a need to recognize that there are (a) a variety of units that operate different modes of travel or information related services within the MATOC agencies, (b) different levels of government with their own traffic, transit, and ridesharing agencies and approaches, and (c) many private sector organizations are also stakeholders providing various aspects of traveler information. Yet each is serving different segments of the same constituency – the travelers of the region. This White Paper takes that commonality as a starting point to identify issues and options for traveler information activities serving the Washington, D.C. area.

MATOC is based on the expectation that there would be better coordinated approaches if data and information were shared throughout constituent agencies and other stakeholders. An over-arching strategic approach that can result in better serving the needs of area travelers and visitors is to have interrelated and regionally-oriented traveler information that is:

- More multimodal, serving travelers transferring from one mode of transportation to another
- Targeted to travelers using different classes of transportation within each mode, such as:
  - Freeway and arterial roads
  - Regional rail, priority and express bus, and major bus routes on major arterial roads

There needs to be improved and sustained coordination of intergovernmental and interagency strategies – and more interdependent approaches and coordination with traveler information activities of the media and the private sector Information Service Providers. The bottom line of the strategy options, whether public or private, is that the option should directly or indirectly better serve the needs of area travelers and visitors.

At the end of the previous section, a number of critical policy issues and strategy concerns were identified. In this section they are detailed with respect to aspects such as current status, implementation potential or constraints, and are discussed, analyzed, and evaluated mainly from a perspective of serving traveler information needs. Throughout the discussion we are mindful of the current state of the economy and the extremely tight restrictions placed on governments and companies. The strategic options presented here are primarily:

- Based upon current funding or expansions of services that have already been programmed
- Dependent upon improved coordination that requires no new funding, or small amounts that fit within operating budgets
- Short-term, many of which can be begun and implemented within FY2009-2010

Yet we also discuss and anticipate strategies and options that will be more cost effective solutions when funding is less constrained, which could be implemented in the near-term of FY2010-2011, or beyond in the longer-term.

As noted at the end of the prior Section, the nine groupings of strategy options are being grouped into three interrelationships associated with traveler information systems, which are: (1) data collection and/or gathering of system conditions, (2) conversion of the data into traveler information, and (3) dissemination of the traveler information to users.

Data Collection and/or Gather of System Conditions

1A. Strategy Options Based on Coming Expansion of Roadway Monitoring Coverage for Incident Management and Traveler Information Purposes

A foundational aspect of traveler information systems is the monitoring of data about current operational conditions. However, experience has often been that small incremental investments in such monitoring are often challenged due to the concern that resulting benefits can be too remote in time to give them sufficient priority. While on the other hand, large scale deployment has been challenged in the past as being too costly to do all at once. Previous technologies of traffic flow data monitoring made it difficult and costly to do simultaneous widespread programs that could have a critical mass of data to provide adequate benefits to travelers concurrently. Recently, the newer technologies of probe vehicle based data systems and newer spot-location monitoring devices are making near-ubiquitous coverage more feasible for the entire freeway system, and possibly the major arterial system. Public agencies purchasing such data from private sector companies can also significantly enhance their ability to have a program of a relatively quick staging of widespread coverage in short amounts of time.

The cooperative funding through Congress, the I-95 Corridor Coalition, and the partnering states, including Maryland and Virginia, is about to demonstrate a significant step forward in this basic approach through the cooperative purchasing of the I-95 Vehicle Probe data set of link travel times and speeds, based upon estimates developed by the private company, INRIX. Over the past months, the CATT Lab of UMD has been incorporating that data feed into RITIS. Even though the use of RITIS is still undergoing testing and development, MATOC agencies are already using some of the resulting information at their Traffic Management Centers (TMCs).

This strategy, which is based upon coordination beyond MATOC, is resulting in an expansion of coverage of monitoring of freeway, parkway, and arterial travel conditions within the region. This programmed coverage of the I-95 Vehicle Probe Data set will be the best coverage thus far for regional incident management and traveler information purposes. **The Steering Committee acknowledges that this investment in data coverage has been programmed. The resulting data should be used as soon as it becomes available, and the subcommittees should be assigned to help coordinate further stages of coverage among the MATOC agencies. It is further noted that the Steering Committee members need to work within the particular state agencies to gain further coverage, through the various budgeting and programming processes of those agencies, using funds of those agencies, or perhaps further grants through the I-95 Corridor Coalition.**

The on-going development and use by RITIS of the I-95 Vehicle Probe data source will provide many opportunities for coordination of agency activities through the MATOC

Regional Information Subcommittee and the MATOC Operations Subcommittee. That will particularly be the case in converting data into information that will be most useful to the agencies individually, as well as in carrying out the responsibilities of the MATOC Facilitator and coordinated traveler information activities. The MATOC Steering Committee expects that such a "tactical review" of the use of this new data source will be carried out by the subcommittees as part of their on-going agendas. Such coordination has begun to possibly further refine the approaches being taken in RITIS to have this data source become an even more useful base for traveler information in the MATOC area.

A related potential strategy option for the near and short terms is to continue this quick expansion to have additional complete coverage, which can be a reachable goal and would be a desirable objective consistent with the goals and objectives articulated by the MATOC Steering Committee. The issue is whether funding support for such a strategy option can be achieved given the severely limited capital and operating budgets, as well as a need to have sufficient parity elsewhere in Maryland, Virginia, and beyond the Washington travel shed.

There are several interrelated strategies options that can be pursued such that the MATOC agencies can coordinate and promote a common strategy of relatively ubiquitous and quick expansion of monitoring of traffic flow on all freeways, major arterials, and other arterials serving priority transit services. This includes several groupings of roadways that MATOC can use to coordinate priorities and recommendations of the constituent agencies, from a regional perspective, for a sequence of incremental coverage expansion "stages" of this important new data source.

Appendix A presents an analysis and discussion of seven priority "stages" that builds upon the current programmed purchase of I-95 Vehicle Probe Data. The following are the seven identified stages:

- **Stage 1**: Remainder of freeways and parkways for incident management coordination; account for Safe Trip 21 expansion in the Tysons Corner area; anticipate the likely short-term expansion of coverage undergoing initial consideration by SHA/CHART for parts of I-270, US 50, and US 29
- **Stage 2**: Major arterials associated with emergency evacuation routes, to be coordinated with the schedule of approved detector enhancements using UASI funds
- **Stage 3**: Major arterials associated with the thirteen regional Priority Transit Service Priority Corridors that are part of the recent TPB Transportation Investment Discretionary Economic Recovery (TIGER) Grant application
- **Stage 4**: Arterials serving the I-270 Integrated Corridor Management project area
- **Stage 5**: Remainder of arterial roads identified for incident management coordination
- **Stage 6**: Additional Priority Options for Enhanced Arterial Coverage
- **Stage 7**: Additional arterials identified as being needed and sufficient for Traveler Information purposes

The utility and benefits of this expansion of coverage will primarily serve incident management purposes but also will secondarily provide and serve the traveler information

goals and objectives of MATOC. Thus the Steering Committee recognizes that reviewing and vetting such additional potential coverage should also be assigned to the MATOC subcommittees for their review and coordination. Recommendations from each of the subcommittees can then be reviewed with the MATOC Steering Committee to prepare guidance and make suggestions to the constituent agencies. Further, during these activities, participation and review with the MATOC Focus Group and other stakeholders would be desirable.

To implement an expansion of coverage in the near-to-longer term timeframe will depend upon the way broader issues of transportation funding are addressed nationally, at the state level, and locally. The MATOC Steering Committee held a workshop to address issues of sustainable funding for the activities of MATOC and other related activities, including traveler information covered in Appendix A. Section F provides ideas on possible strategy options for cooperative funding of data sources and supportive services for Travel Monitoring in the Washington Area.

Conversion of the Data into Traveler Information

2A. Strategy Options for Using Travel Time Estimates as an Important Aspect of Traveler Information

The prior set of strategy options focused on the data coverage that can be used in traveler information. This set of options deals with the information content derived from that data, particularly with travel time, speed, and their variation by location and time-of-day. The incorporation of this data into RITIS will provide a degree of integration and consistency for this type of data and its conversion into useful information for a variety of purposes, including traveler information. Work performed, and still being worked on, by UMD for the I-95 Corridor Coalition regarding the validation of the Vehicle Probe Data over the six-state area has shown that the I-95 Probe speed and travel time data appears to be a satisfactory source for freeway information. The validation project has not made a similar conclusion regarding the general validity of that data source for the major arterials already included in the data coverage.

The travel time information anticipated in the short term (fall-winter 2009), being displayed on Dynamic Message Signs (DMS) in Maryland, has the potential of becoming a very public test of data and information quality and timeliness. For example, it could be expected that the media will likely attempt to do their own travel time samples to see whether the information provided on the signs is sufficiently accurate. Similar media-testing of the NextBus-type arrival time information implemented by WMATA this summer was recently carried out and reported in the newspapers. MDOT is planning a public awareness program as part of the pre-implementation and early deployment activities for this new source of traveler information. Every indication so far is that the travel time information on DMS in Maryland, based on the I-95 Probe data, will be welcomed information by travelers using those roadways.

The MATOC Steering Committee should be used for coordination among the constituent agencies to help track the resulting experience of MDOT, particularly as it

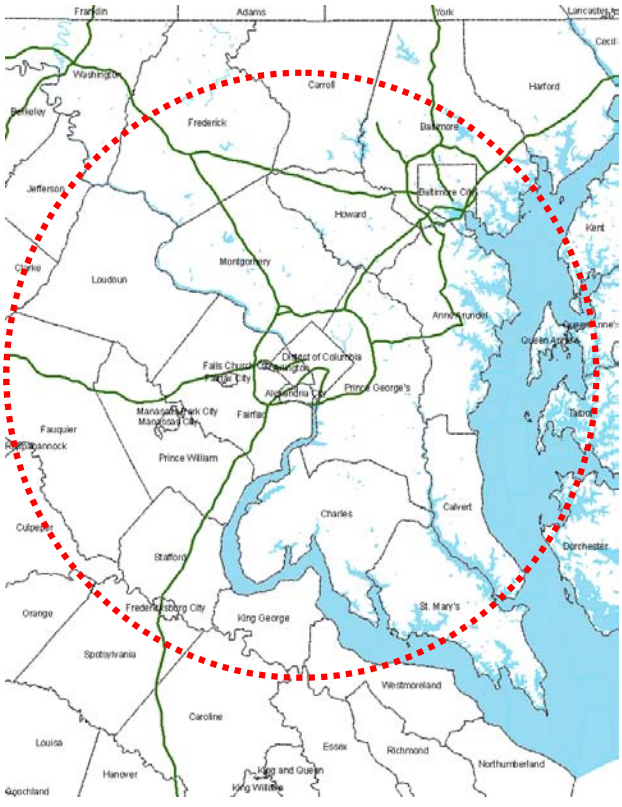
may apply to other MATOC agencies and stakeholders. The Steering Committee notes that there are differences in approach among the agencies related to the anticipated display of travel times, and that sharing information will be helpful to all. The Steering Committee also requests making the travel time estimates available on the MATOC Web site when the Web site is available.

In Virginia, work on an initial system prototype for displays on freeway DMS has been halted during this period of fiscal contraction that VDOT is undergoing. Overall constraints on funding deter any further implementation work, even though a data source of the I-95 Probe Data is available. As an effort to help the MATOC agencies, the Steering Committee can help advance the dissemination of traveler information during an interim period by asking that there be tests of Web-based travel time estimates in Virginia through RITIS that would be available through the MATOC-branded Web site. Such information can also be maintained in the RITIS archive to enable periodic checks of the quality of traveler information in anticipation that VDOT will eventually use that information in their VA511 activities and for posting the DMS messages on their roadways. It is noted that travel times on DMS for freeways, and perhaps for arterials, in the District of Columbia seems to be more distant, and will likely depend on specific activities selected by DDOT to facilitate traffic monitoring (particularly on arterials).

2B. Strategy Options for Improving Interrelated Information about Freeway, Arterial, and Transit Related Traveler Information

There is a strong need for appropriate coverage of freeway, major arterial, and priority transit service corridors that is interdependent with that of the incident management coordination. Regarding the extent of such coverage, one of the media's key providers of traveler information, Bob Marbourg of WTOP, uses a 50 mile radius from the White House as his listeners' targeted travel area. Exhibit 2 shows the approximate coverage of such an area.

Exhibit 2: The area covered by an approximate 50-mile radius from the White House



Regional transit services have long focused on the development, expansion, and operation of Metrorail, Commuter Rail, and sub-regional express-bus services, which have been operated by a variety of agencies. The recent traveler information approach of en-route train arrival for Metrorail has been a welcomed service to transit users. Further refinement and additional locations for similar Variable Message Signs (VMS) are being worked on by WMATA. WMATA has also recently launched a major innovation in transit-oriented traveler information with the initiation of a system that will enable travelers at any of the 12,000 bus stops to get information, through several means, about the expected time for the arrival of the next bus on each of the routes serving that stop. This approach by WMATA will help achieve some of the goals and objectives of all of the MATOC agencies. The MATOC Steering Committee should be generally supportive of this new WMATA at-bus-stop NextBus-type arrival traveler information system.

WMATA has also been working with various local transit agencies from within the region on similar efforts for NextBus arrival type systems. This type of traveler information is beneficial to current transit users and prospective riders. Studies show that lack of awareness as to where a bus goes, or when the next bus will arrive at a stop, have been main impediments to travelers' willingness to use transit. The MATOC Steering Committee should be generally supportive of the same or similar transit-related traveler information systems being developed, implemented, and expanded by local transit agencies and throughout the region.

From the perspective of the goals and objectives of MATOC, there is an interest in providing useful information to all travelers, whether using roads or transit. Pre-trip and en-route information can be used by travelers to choose the modes and class of service that best suits their needs for a particular trip at a specific time. Presently there seems to be little interdependency between roadway and transit oriented information associated with the MATOC agencies, as well as with public and private sector stakeholders who could enable travelers to make more informed choices. As such, **the Steering Committee requests that the two MATOC subcommittees coordinate among the stakeholders to consider ways to better share current transit, freeway, and arterial information to facilitate more informed choices by travelers and perhaps more use of transit services.**

2C. Strategy Options for Continuing to Rely on the Purchase and/or Bartering for Data Collected by Private Sector Companies Seems to be an On-Going Necessity

Each of the MATOC agencies has been working with a variety of data sources for their internal operations, which in some cases involve data from private sector sources. However, when it comes to sharing such data sources, an issue for MATOC is how much reliance should be placed on open source data sources, and will proprietary data sources become available to be shared for regional traveler information purposes? The MATOC agencies have been willing to share, among themselves and with RITIS, the operations detector flow data that they are collecting. That is not an issue for the regional assembly of traveler information for MATOC activities through the resources of RITIS. Some issues have arisen with the sharing and use of some data types collected by law enforcement stakeholders. Their concerns are being accounted for in the "RITIS Access Policy" that has been reviewed and acted on by the MATOC Steering Committee.

Data use agreements signed by the public agencies, and by UMD CATT Lab for RITIS, have restrictions on the use of some purchased private sector data sources limiting the public agencies to using the data for internal operations and prohibiting the sharing of the data, or some forms of it. Such prohibition can affect other units within the same agency or parallel agencies of the same political jurisdiction. They are in particular affecting other agencies, the media, other ISPs, and the public. These restrictions in data sharing and data reuse have been the case even though significant funding from USDOT has been and continues to be used in support of such proprietary data being generated.

Clearly, restrictive proprietary requirements have been placing extra technical and administrative burdens on the RITIS group in designing their information systems. Earlier it was indicated that RITIS needs to account for varying degrees of access and use of certain data sources in order to conform to the multiple proprietary requirements. Recent work by the RITIS staff may have loosened some of these restrictions with respect to the current RITIS Web site, which is now displaying several different layers, where each layer is associated with only one of the several private sector based data sets. With respect to data feeds and the sharing of those data feeds among the MATOC agencies or other stakeholders, the CATT Lab staff has little control over an agency they would provide the private sector data to, nor enforcement capabilities if issues of conflict over use-restrictions should arise.

In conclusion, over the years each of the MATOC agencies and other stakeholders have relied on some private data – either by direct purchase or some other exchange. Restrictions on shared use of data may be creating inefficiencies. **In reviewing this approach of using private data sources, the MATOC Steering Committee indicated that the constituent MATOC agencies should use the available private sector data sources and provide feedback if they appear restricted in their data sharing.**

2D. Strategy Options for Improving the Consistency and Quality among the Data and Sources of Information for Traveler Information

Achieving and maintaining appropriate data and information quality, including that of timeliness, is an important part of the MATOC approach for data and information sharing. Facilitating better coordination throughout the MATOC agencies and other stakeholders is a key element that can be done by MATOC to achieve these objectives regarding data and information quality.

MATOC has formed two subcommittees – one for Regional Operations and the other for Regional Information Systems. The missions for each of the subcommittees is to address many aspects and activities that can positively affect the quality and/or timeliness of information available for traveler information, including activities such as (a) seeking improved consistency in data types and sub-categorization being used in data and information sharing among the agencies, and (b) checking the consistency of the shared data being outputted by agencies with the data actually being received by other systems, such as RITIS.

In summary, there may be some inconsistency in the availability or format of traveler information across the Washington metropolitan region. **In reviewing this, the MATOC Steering Committee indicated that they would request that the two subcommittees review various differences and seek ways to have resulting traveler information become more consistent.** One aspect, which could be a focus initially, is data for travel times on DMS for freeways, and perhaps for arterials. That is one data type that travelers throughout the region will quickly expect to be dealt with by the agencies in a highly consistent manner.

Dissemination of the Traveler Information to Users

3A. Strategy Options for Providing a MATOC branded Web site that Various Stakeholders can Access for their use in Incident Management and Traveler Information

A RITIS Access Policy has been reviewed and approved by the MATOC Steering Committee. The draft was first reviewed at the Regional Information Subcommittee where comments included addressing concerns related to serving traveler information needs. There is an expectation of dissemination first to the media while dissemination to ISPs may be constrained due to proprietary private sector data. Options are needed that emphasize and support communicating traveler information using multiple channels of dissemination to directly or indirectly serve a broad cross-section of local traffic, transit, and ridesharing stakeholders as well as the media, ISPs and perhaps eventually individual travelers.

The MATOC Steering Committee wants to reinforce the role of MATOC as a regional coordinative body. As such, the Web site, through which this sharing of information gets accomplished, should be a MATOC branded Web site. This can be accomplished by building upon the strong foundation and work accomplished by the University of Maryland staff in their on-going development and refinement of RITIS and its Web site. The amount of effort needed to have a version of RITIS is transformed into a MATOC branded website is expected to be very feasible in the short-term. It will be appropriate to maintain some on-screen recognition to the CATT Lab and UMD for supporting and maintaining the Web site and RITIS as the underlying data and information management system.

This separation can facilitate refinements over time that will enable the MATOC-branded Web site to have enhanced features for serving traveler information, incident management, and traffic management needs. The MATOC Web site can be more multi-purposed than the current RITIS Web site. There can likewise be layered access to different stakeholders or users identified in the Access Policy. One way to simplify this transition is for the CATT Lab staff to think of their current RITIS developmental Web site as the site used internally for development, research, and academic needs. The current externally facing Web site will then become the MATOC branded Web site, focused on the needs of other stakeholders.

The physical location and network connectivity of RITIS has recently undergone changes that will improve the system's security and make it more easily accessible to various parties in accord with the Access Policy. Those changes should also make it easier to effectively and efficiently make such a transition in the programs and software that underlie RITIS. They should be able to support the potential stakeholders' access, with the exception of

access by the general public. The agencies of MATOC do not presently have funding resources to enable the University to have Web-portal capacity to directly serve, support, and maintain possible high level of demands and usage. That presents a dilemma because an important goal and objective for MATOC is to better serve the needs of area travelers and visitors. In the short terms, that will need to be accomplished through indirect means via the media and third parties. There has been a recent announcement by several TV broadcast media that they will be pooling resources to better contain their expenses, and perhaps access by them to the MATOC branded Web site will shortly be welcomed.

One way to view this situation is to think of access to MATOC's branded Web site as a wholesale activity. As such, third parties, such as the media and various ISPs would be considered as the retail component directly relating to consumers. As a matter of policy and uncertain future funding, the MATOC, agencies cannot afford to invest their limited resources for the purpose of direct traveler information for individuals. As discussed below, the investments the agencies of MATOC are making in the set-up and operations of their 511 systems will also serve some of these direct retailing needs in short term timeframes. In the longer-term, the MATOC agencies may be able to afford providing extensive direct access to the potentially large and broad-base of travel information users.

In summary, dissemination of traveler information can be facilitated through a well designed and supported Web site that can be multi-purposed with layered access to different stakeholders and users. **The MATOC Steering Committee has approved an Access Policy that (a) has a MATOC branded Web site based on the RITIS Web site for data and information sharing among the MATOC agencies, and after testing also enables access to other public agency stakeholders, and (b) after a period of reliable sharing among agencies, opens access to the media and then to private sector Information Service Providers' once issues are worked through.**

3B. Strategy Options for Focusing on the Content and Format of the Information on the MATOC Website to Show Normal Flow, Exceptions to Normal Flow, and Alerts

A concern is that the features that constitute a well designed MATOC branded Web site serving traveler information purposes may not be aligned with a Web site designed to serve incident management or traffic management purposes of the constituent agencies. To a large extent, the current design of the RITIS Web site is more of the latter case. That has been appropriate, since most of the intended users of the RITIS Web site have been agency personnel at the TMCs. As the external-facing-parts of the RITIS Web site are transitioned to become MATOC's Web site, it will begin to increasingly serve a broader audience, including other stakeholders and agency personnel. There appears to be a need for using additional types of information or formatting that is more oriented to traveler information needs. There is also a concern that various aspects of the Web site design will need to anticipate the incremental incorporation of more arterial and transit related information. These and other potential enhancements to RITIS are discussed more below.

It is recognized that there has been a long history of using operations data derived from freeway flow detectors for traveler information purposes, instead of using arterial or transit-based data. The use of freeway oriented data for traveler information is better understood by

the operating agencies and travelers, such as how representations of congested conditions based upon average link speed can be interpreted. However, in the discussion of the stakeholder interviews, some of the key media representatives were skeptical saying that such information displays are not very useful to them. Perhaps that is due to the limited coverage of the current fixed location detectors on freeways. There is an expectation that the newer traveler information sources, based upon the significantly improved coverage, continuity, and spatial-temporal resolutions associated with the I-95 Vehicle Probe data on freeways, will result in the media finding such new information sources as being more useful and of sufficient quality.

Presently, this discussion needs to focus more on travelers and what types of information they want and need to be more informed about and their travel choices – and less on the needs of the operators to perform their important responsibilities, although there are linkages between the two. Regular travelers, such as commuters, require information before and during their trip about (1) whether there is significant disruption to the regular travel means or route, and (2) even if conditions are normal, some travelers want to know what is happening so they can fine-tune their travels. Their focus is with the reliability of their trip relative to their summation of their experience. The coordination among the MATOC agencies and the resources directed to the Web site can indirectly serve some of these needs by directly working with the media and private sector ISPs to offer better traveler information.

There are a few other types of travelers who have different needs and expectations for traveler information. Many area residents often need to travel to a particular place at a particular time for business or personal reasons, but do not have previous experience and do not know what normal conditions to expect. When coupled with the needs of out-of-town travelers who have similar traveler information needs, such travelers need to know first what the expected normal variation is; and then, what is the reliability of the travel at the present time? Again, an approach that indirectly does that needs to be used for the short term.

The Regional Information Systems Subcommittee of MATOC has established a change request process of cooperatively identifying and prioritizing potential enhancements to RITIS that can improve the incident management, traffic management, and traveler information related functions associated with RITIS. Such enhancements to RITIS for traveler information purposes can also be incorporated as features of the MATOC Web site. The following are six potential enhancements that the Regional Information Systems Subcommittee has already begun to review and consider:

a. **Use a fourth speed range for freeways with the I-95 Vehicle Probe data**: This involves testing and using more effective representations of freeway-oriented data, such as adding a fourth speed-range category, so the current slowest range can be expanded to distinguish between a rolling-delay and heavy stop-and-go congested conditions. Such an enhancement will show more variation in traffic speeds along a given section of freeway, which can help agency staff, the media, and other stakeholders better assess current reliability. This is a relatively simple change for I-95 Vehicle Probe data from INRIX, but use agreement restrictions

for data from other sources (Traffic.com and SpeedInfo) will limit doing this for those sources. Given other differences among the data sources, using such a fourth speed range will not present an inconsistency.

b. **Establish a separate set of four speed ranges for arterial data**: Establishing a separate set of four speed ranges that better relate to people's experience with different degrees of congestion on arterials needs to be considered and cooperatively developed. For a major arterial with a 35 mph speed limit, a link travel speed of 35 mph represents a generally free-flowing condition, while a link speed of 35 mph for a freeway link represents a moderately congested condition. Such a change will be important for arterials in the District of Columbia and perhaps Arlington County where high proportions of overall travel occurs on their arterials. Attention also needs to be given to how arterial related travel conditions are displayed in order to better meet media stakeholders' needs.
c. **Provide roadway section travel time information**: Currently within RITIS, there are graphs of travel time that can be displayed for the specified links of the network associated with the I-95 Vehicle Probe data. CATT Lab staff has already started and should continue developing ways for the Web site user to get a section travel time for a series of links in the direction of flow. For example, if a series of ten links totaling five miles are all currently congested, what is the cumulative travel time estimate? This may also need to be coordinated with the processes being developed to produce travel time estimates for the VMS.
d. **Provide a time stamp in the legend**: When the current RITIS display is at a scale that also shows the weather intensity conditions, a time stamp is associated with the image. CATT Lab staff has been considering ways that an appropriate time stamp feature would be shown on the display and updated when a significant portion of the underlying data is updated. A concern is that not all data in a display will be current to that time stamp.
e. **Provide more choice to the user for selection of a map-scale of the display**: Currently in the RITIS Web site display, there are a limited number of fixed map-scales for viewing information. Perhaps the process can be altered so that there are more scales of display or that there is a smoother transition between scales. As more arterial information becomes available, consideration could be given to which map scale is used to display each roadway.
f. **Consider use of bus transit travel time data**: The newly developed data and information being used by WMATA for providing pre-trip, en-route, and at-bus-stop estimates of the arrival of the next bus are indirectly using arterial travel speeds and times in those estimates. An item to be considered is whether those estimates can be coordinated more effectively to provide a better estimate for each application. While consideration of this is a good idea, finding ways to efficiently and effectively do this may be too difficult or costly in the near term.

There is a new type of information needed by travelers, which can be done through the efforts of the MATOC Facilitator and would benefit incident management, traffic management, and traveler information purposes. This is the development of a MATOC Traveler Alert that notifies everyone that one or more incidents are occurring in which stakeholders need to inform travelers. The media, ISPs, and MATOC agencies already do a

good job for the truly significant incidents or events. However, there are increasingly more moderate sized incidents and events that occur that amplify their adverse affects. Such single moderate incidents or clusters of smaller events can begin to have a moderate to high level of impact about which agency managers and travelers need appropriate information. Fulfilling this need is one of the major goals and objectives for coordination among the MATOC agencies. How to best convert this need into a practice that results in a new type of traveler information – a MATOC Traveler Alert – needs to be worked on by the MATOC subcommittees and individual agencies.

There are other stakeholders who want to use the collective observations of the flow of travel and traffic. They want to better understand the performance trends and variation in reliability of different parts of the network or systems. That compilation and analysis of traveler information will enable them to consider short-term operational improvements and some mid-to-longer term capital improvement- intensive options.

In summary, regarding the content and format of the MATOC Web site, the Steering Committee believes the Web site should **(a) continue focusing on exception-reports of incident data from the agencies, (b) highlight normal or recurring variations in traffic congestion conditions, and (c) provide new information, a MATOC Traveler Alert, activated by the MATOC Facilitator when significant regional incidents and events are happening.**

3C. Strategy Options for Accounting for Independent 511 Traveler Information Services

511 systems are typically designed to provide a base level of pre-trip but also en-route traveler information to individual travelers. Such systems are designed to primarily be telephone-based using voice recognition techniques and query trees. They are not focused on having Web-based displays of travel conditions although that can be a system feature. The idea is to enable the public who do not have access to a computer or high-speed connectivity to have access to this basic information. It can also be accessible to users when they are en-route and can safely use their mobile phone to call the system. It is noted that usage of such systems often spike considerably during severe weather events, therefore these systems are a valuable public service. The provision through the phone systems of a consistent, nation-wide three digit code is a signature feature of these systems. Yet, various private sector companies are increasingly serving some of the same functions and markets, but use map-based graphics on travelers' mobile phones to display appropriate information.

A key issue for the MATOC Steering Committee has been whether the agencies of MATOC should work cooperatively on establishing a Regional 511 system. The following is the current status of the independent, but somewhat coordinated, 511 related work of the MATOC agencies.

VA511 System -has been in operation for a few years and has a state-wide focus. While some traveler information and coverage has an emphasis on Northern Virginia, its content is not focused in enough detail on the greater Washington Metropolitan area. The MATOC Web site should provide cross links to incorporate that system. The MATOC

subcommittees can also facilitate it having more detailed coverage and content in Northern Virginia.

MD511 System- is in the process of beginning to be developed. MDOT CHART has recently received proposals for setting up a system and a contractor may be under work this coming winter. The current expectation is that the resulting MD511 system will potentially be running by the summer of 2010. Likewise, the MATOC Web site should provide cross-links in conjunction with that system. It would help other agencies if particulars of its development are reviewed with the MATOC Regional Information Subcommittee. It could provide a basis of meaningful dialogue among the agencies. RITIS is anticipated to be a significant component of supplying basic data resources to the MD511 system, and as such it should have the necessary detailed coverage and content that concerns MATOC.

A "DC511" System- there is no current plan for a DC511. A challenge to DDOT in trying to establish such a program could be the small geographic coverage and trip making "base" of residents and District employees if DDOT tries to apply the typical model for a 511 system that most states are following. The limited geographic coverage may make the establishment of a traditional 511 system a challenge. While the District of Columbia does have their own 311 and 911 services, such services are focused primarily on homes and businesses located within the District. Traditional 511 systems depend upon having both an origin and a destination. In the case of the District, however, in many instances either one or the other will be outside the District, as illustrated by the fact that its daytime population doubles. This highlights the need for interfaces or sophisticated handoffs with the 511 systems in Maryland and Virginia. However, if DDOT was to emphasize serving more of a destination-oriented traveler market, such as the large number of tourists, parking availability and prices, transit users, and drivers impacted by construction activities, then such a limited geographic coverage may not be an important consideration. The destination oriented market is served to a certain extent through the www.godcgo.com Web site. If DDOT decides to establish their own 511 service, then the MATOC Web site should provide cross links to and with that system.

Another option is for DDOT to try to cooperatively become part of the MD511 or VA511 systems. In considering such options, it is noted that some aspects indicate that associating with MD511 would be easier because (a) travel in the District is more interdependent with Maryland than Virginia, (b) the focus of the District on arterial oriented traveler information can be more easily reinforced in a cooperative relationship, and (c) the status of development of the MD511 system will perhaps more easily allow its development to be modified to serve the District of Columbia.

WMATA and Other Transit System Traveler Information: While technically not a 511 system, WMATA and several of the other transit properties serving the region provide 511-like services to the users of their systems, pre-dating the establishment of the current 511 system of VDOT. In many respects the transit users in the region are better

served by transit-oriented traveler information systems than the roadway users are presently being served by the 511 system approach.

In summary, 511 systems focused on roadway travel that are mainly telephone-based are available for Virginia, being developed in Maryland, and possible in the District of Columbia. Various private sector companies are serving the needs of that market for traveler information with increasingly sophisticated and timely information. The transit agencies throughout the region provide quality pre-trip and en-route traveler information to their customer base. **At this time there seems to be more critical issues and unmet needs for traveler information, on which the MATOC agencies can focus their limited resources. The development of a National Capital Region 511 System seems to be a less critical need. However, the MATOC agencies would benefit by continued coordination, data-sharing, and cross links between the MATOC Web site, VA511, and MD511 systems, and a DC511, if DDOT establishes such a service.**

3D. Strategy Options for Providing Personalized Approaches for Traveler Information using Advanced Technologies

There is a very constrained amount of funding for MATOC activities in the short-term. Investing those resources to use new and potentially unproven technologies as a means of disseminating traveler information from MATOC would appear to be an ineffective use of limited resources. This situation will continue into the mid-term as well, but perhaps less so. Even in the long-term, resources needed by the MATOC agencies and public agency stakeholders to appropriately develop and maintain newly upgraded traveler information dissemination channels will likely be difficult and costly to implement.

However, the popularity among the computer-savvy generations with texting or social networking Web sites such as Facebook and Twitter, or other services is appealing and could be applied to disseminate traveler information. The issue is whether the objectives of MATOC and constituent agencies will be sufficiently served by expecting that private sector companies and the media will focus on the adaptation of newer technologies for the direct dissemination of traveler information to the general public. Under the current circumstances, the collective agencies that constitute MATOC are each facing uncertain funding conditions for some of their most basic services. As such, the MATOC agencies need to devote their limited resources to higher priorities.

In summary, while direct dissemination to the general public of traveler information via subscriber services is becoming more technologically feasible, MATOC should depend upon individual public agencies and private sector ISPs having subscriber services that will provide somewhat personalized traveler information to the public.

Cross-Cutting Statements

There are three statements that underlie the recommendations:

The quality of the input data and resulting output information must be sufficiently timely and accurate. The process of stakeholder interviews, including the MATOC

agencies, found strong consensus among all stakeholders that MATOC needs to support having quality data and information, especially making traveler information available to the media and the public. That is seen as a critical aspect of gaining and sustaining the trust and acceptance of other stakeholders, such as the media and private sector ISPs. That is also needed for the acceptance by the traveling public and their on-going willingness to rely upon such disseminated traveler information in making individual decisions. It is recognized that quality must be gained over time through consistency and hard work, but unfortunately can be broadly lost in an instant through one or a series of ill-timed or adverse publicized situations or events. Individuals tend to constantly test and check how much they can rely on traveler information for their future travel decisions.

There will be an on-going need for MATOC to work at managing the initial and subsequent expectations of public and private stakeholders and users. Relative to some other major metropolitan areas, the state-of-the-practice in traveler information in the National Capital Region is not as advanced as in the western, northwestern, and some southern major metropolitan areas. Expectations are currently low for a potentially significant initial set of improvements in travel information availability and content. As such stakeholders, officials, and the public may be surprised and expect more than can be delivered.

Broader funding and administrative issues/decisions that MATOC is also working on will govern some or many of the choices for the provision of traveler information. To have reliably available traveler information for their main modes and routes of travel will require a strategy of reliable funding. Travelers want reliable and relatively ubiquitous information to help them make and revise their usual travel choices of when to travel, what means of travel to use, what specific route to take, and where to pick-up or park the vehicle available to them. Having ad hoc and incomplete sources of data to prepare traveler information will continue to hamper such a vision being achieved in the short-term and mid to long term.

The current approach to funding will not result in a sustainable cooperative service in the long-term. Funding for MATOC traveler information related activities could evolve to a pooled funding strategy. A strategy of pooled funding from the main constituent members of MATOC could be considered and evolve into funding the basic MATOC programs, including the traveler information project. Pragmatically in the short-term, it appears that the MATOC agencies will need to continue reliance on direct congressional appropriations or similar sources.

Section F. Possible Strategy Options for Cooperative Funding of Data Sources and Supportive Services for Travel Monitoring in the Washington, D.C. Area

The strategic options presented in Section E are primarily (1) based upon current funding or expansions of services that have already been programmed, (2) dependent upon improved coordination that requires no new funding, or small amounts fitting within current operating budgets, and (3) short-term and can be implemented within FY2009-2010. However, the discussion in Section E also began to anticipate strategies and options that will be cost effective solutions when funding is once again less constrained and that can be implemented in the near-term of FY2010-2011, or beyond in the longer-term.

The strategy options discussed in this section are speculative because of the funding situation. They have an element of sustainability because they tend to bring along with them some element of funding and provide some aspect that is functionally supportive of improving the scope of data for regional traveler information. These are discussed in two groups (1) some are categorized as possible options for cooperative funding of data sources and supportive services and (2) others are categorized as options that anticipate evolving partnerships and new opportunities. It is appropriate for this White Paper to discuss possible strategies even though the current likelihood of them being implemented in the short-to-near term is remote.

The Steering Committee held a Sustainable Strategies Workshop in late September 2009 that broadly looked at examples, issues, and opportunities for funding and operating regional multi-agency programs. Discussions resulting from that workshop could refine the ideas and possible strategies discussed in this section. In addition, parallel work was recently started for MATOC that studies the benefits, such as reducing the costs and impacts of delays, likely to be achieved by MATOC coordinated activities.

1. Strategy Options for Cooperative Funding of Data Sources and Supportive Services

Having sufficient funding for data sources that support traveler information requirements are important considerations for this White Paper. Travelers need to know the current traffic conditions on freeways, major arterials, and main transit routes. While they may also want to know information for specific minor arterials along their usual routes, such an option is probably not feasible, even if funding was not constrained.

Options that expand the spatial coverage of the data sources, and provide on-going funding of operational programs for gathering, summarizing, and analyzing the appropriate traffic flow data are key considerations. Travelers want reliable and relatively ubiquitous information on travel conditions to help them decide on when to travel, what means of travel to use, what specific route to take, and where to pick-up and park their vehicle. Having ad hoc and incomplete sources of data to prepare traveler information will continue to hamper this vision being achieved.

Three approaches are discussed next that respectively identify funding opportunities from other functional areas outside transportation agencies_from among other transportation

agencies, and from other programs within the MATOC agencies. It is important to note that these potential strategies are institutional options and not technical ones.

a. Support and Funding from other Functional Areas outside Transportation Agencies

The agencies of MATOC recognize that investments in a more wide-spread system of monitoring traffic flow benefits other functional areas, particularly emergency preparedness, of which transportation is only one of the functional elements, i.e. RESF-1. Grants have been requested and are beginning to be approved and received through the UASI process enabling the MATOC agencies to make expansions in monitoring to serve emergency preparedness objectives – while enabling the same monitoring to be used for non-emergency traffic flow conditions. That is a successful example of where the benefits of better monitoring traffic conditions are widespread across the jurisdiction, and serve the objectives of other non-transportation agencies. Clearly, cooperative interagency and intergovernmental programs are appropriate and even desirable.

The available benefits of transportation monitoring data can accrue to other functional areas such as safety programs, development of more livable communities, reductions in greenhouse gas emissions, and comprehensive planning and growth management. The coordination by MATOC for their agencies in seeking similar cooperative funding support from other non-transportation agencies is an appropriate strategy to consider and pursue. Demonstration funds and special funding arrangements should be sought and implemented into the funding of the overall transportation monitoring program. Long-term, that could lead to a program that includes more cooperative and appropriate funding levels, which could help the MATOC agencies better sustain an on-going program of monitoring transportation system conditions to serve purposes more than their own.

b. Develop more Pooled-Funding Opportunities among Transportation Agencies

The initial funding of MATOC activities has come from an earmark from federal transportation programs. Currently, some funds from the planning program of MWCOG/TPB are slated to contribute funding for some planning-oriented MATOC activities in the current fiscal year. Discussion is underway for each of the main constituent agencies of MATOC to contribute a portion of funding for the coming fiscal year that could provide further increments of support for the developing MATOC activities, including traveler information.

Successfully implementing this strategy option for pooled funding among the MATOC transportation agencies is very uncertain given the extremely tight financial situation facing those agencies and their respective states. In the longer term, a strategy of pooled funding from the main constituent members of MATOC is feasible and could be sufficient to fund the basic MATOC programs and projects, including traveler information.

However, in the short and near term, a possible related strategy option is to seek some ad hoc funding, whether direct or as in-kind services, from local traffic and transit agencies. Such agencies have different tax bases than the MATOC agencies, and their programs

can benefit from the availability of services through MATOC, including traveler information. It is recognized that other local governmental agencies are also facing their own tight financial constraints, but there may be some feasible opportunities for the next and subsequent fiscal years.

c. Support and Funding from Construction Programs within the MATOC Agencies

A potential within-agency strategy options that can help support traveler information relates to the management of work zone travel impacts by the construction related parts of the DOTs. In the short and near terms, there could be various cooperative approaches related to region-wide incident management, traveler information responsibilities, and the project Traffic Management Plans (TMPs) that are part of construction and maintenance activities.

Instead of each construction project working independently, there can be effort to obtain some economy of scale and have the operations group within each of the DOTs provide some support to the construction groups. These groups in turn would release some of the construction funding to the operations group and help support regional coordination and assistance from MATOC activities. Thus some level of support from project development funds could off-set the costs of overall traffic management and traveler information activities, resulting in a new source of funding for those types of activities.

Funding that is becoming available in the short and near term for accelerated investment in "shovel ready" projects as part of the Economic Recovery Program will result in a large number of work zone conditions. In the past, practices that usually involve construction and lane closures are during non-peak periods during the week. When coupled with the potential impact of separately funded, major projects in the region, such as (a) the 14th Street Bridge and other bridge projects in the District, (b) the construction of the Intercounty Connector in Montgomery and Prince Georges' County, and (c) the Megaprojects in Virginia, the need for a regional perspective of combined effects on incident management and traveler information needs becomes very important. Some otherwise minor incidents in the wrong places at the wrong times, and perhaps coupled with a rapid change in weather conditions, can quickly escalate and ripple throughout the region – contrary to the goals, objectives, and other strategies of MATOC. While leaving this situation unattended risks a series of potential crises, it is recognized that addressing this would involve within-agency changes that may be difficult for various stakeholders.

Work zone traffic management on a project-by-project basis is an important activity of each of the member agencies of MATOC, which needs to continue being done well. There are tools and general data sharing efforts among the MATOC agencies developed for incident management that can help project construction management activities and traveler information activities. For example, an enhancement can be done to RITIS to put categorical emphasis on work zones condition tracking and lane closures that can be used in incident management and traveler information activities. This will enable the agencies to communicate more effectively among themselves and the media, to inform travelers.

Construction and maintenance resources currently have advanced construction coordination with near-by projects. These available resources could be pooled to provide a moment-to-moment response within the regional incident management and traveler information responsibilities envisioned for MATOC. Providing traveler information targeted for commercial vehicles and mid-day business travelers has not typically been done, but it could be a useful component.

Presently, there is a strong reluctance to think about such a strategy. However, parallels are seen with such an approach and current federal funding procedures throughout the nation provide for a systemic proportion of capital funding to be used for Regional Transportation Planning and Research and Development activities. It is possible, in the long-term, to envision a policy by the states and counties within the region of establishing a similar approach to the funding of some operations activities, including traveler information, particularly those needed to better manage work zone traffic impacts. Although the projects that would be the source of the funding would vary from year-to-year, the cumulative amount of derived funding would likely be steady. It would be the localities to which such operations activities would be applied that would differ each year.

There has been outreach from the group working on the Virginia Megaprojects regarding ways they can cost effectively get data and information on current traffic conditions within the impact area of that major, multi-year construction project. An informational sharing meeting was held with that work group, which included the regional data and information that is aggregated by RITIS. Staff from that work group has subsequently obtained access to RITIS.

2. Strategy Options that Anticipate Evolving Partnerships and New Opportunities

The private business of providing traveler information is in one sense stable and set in its patterns and ways. While in another sense, it is dynamic with many new private stakeholder companies expanding or shifting their role. The former characterization relates more to the traditional radio, television, and newspaper media of traffic reports. Their tried-and-true means of data and information gathering seems to fit the needs of many of their customers, and the system can sustain itself for a long time. The latter characterization relates more to the newer media of Internet and Web-based information, and dissemination over newer technologies such as Satellite broadcast, HD radio, mobile phone Web-based applications, and the use of social networking services (e.g., Facebook or Twitter). The latter group of stakeholders appear dynamic with some companies not succeeding in business and others growing through consolidations and even agglomerations of complementary companies. The strategies and approaches that will be used by MATOC need to anticipate evolving partnerships and private data sources that may be used for traveler information.

One strategy option that may provide some opportunities for enhanced funding or support for MATOC or of the Traveler Information related activities is to anticipate that companies from the latter group of stakeholders may find it in their interest to fund or barter with MATOC. This topic was explored at the MATOC Sustainable Strategies Workshop in September 2009 and was considered highly unlikely.

Appendix A
Possible Stages for Expanded Coverage of I-95 Vehicle Probe Data for Travel Monitoring in the Washington, D.C. Area

In Section E, the first strategy option for regional traveler information was based on expansions of monitoring coverage of transportation conditions for incident management and traveler information purposes. The MATOC Steering Committee recommends that the two subcommittees help coordinate further stages of coverage among the MATOC agencies. The Steering Committee needs to work with the particular state agencies to gain further coverage, through the various budgeting and programming processes of those agencies, using their funds or grants through the I-95 Corridor Coalition.

The expansion to have more complete coverage is a reachable goal and would be consistent with MATOC's goals and objectives. At issue is whether funding support for this strategy can be achieved despite the severe limits currently on capital and operating budgets and a need to have sufficient parity in Maryland and Virginia, beyond the Washington area travel shed. There are several interrelated strategies that can be pursued so the MATOC agencies can coordinate and promote a ubiquitous monitoring of traffic flow on freeways, parkways, major arterials, and other arterials serving priority transit services.

This includes several groupings of roadways that MATOC can use to coordinate regional priorities and recommendations of the constituent agencies for a sequence of coverage expansion stages of this new data source. This Appendix presents an analysis and discussion of the seven priority stages that build upon the current programmed purchase of I-95 Vehicle Probe Data:

- **Stage 1**: Current coverage of fixed-location detectors including the initial area-wide coverage of the I-95 Probe Vehicle Project dataset
- **Stage 2**: Remainder of freeways and parkways for incident management coordination, account for Safe Trip 21 expansion in the Tysons Corner area, anticipate the short-term expansion of coverage undergoing initial consideration by SHA/CHART for parts of I-270, US 50, and US 29
- **Stage 3**: Major arterials associated with emergency evacuation routes, to be coordinated with the schedule of approved detector enhancements using UASI funds
- **Stage 4**: Major arterials associated with priority transit service, such as the thirteen regional priority corridors that are part of the recent TPB TIGER Grant application
- **Stage 5**: Arterials serving the I-270 Integrated Corridor Management project area
- **Stage 6**: Remainder of arterial roads identified for regional incident management coordination and more localized enhanced arterial coverage
- **Stage 7**: Additional arterials identified as being needed and sufficient for traveler information

The ability to fund and implement an expansion of coverage in the near-to-longer term will depend on how and when the broader issues of transportation funding are addressed at national, state, and local levels. Section F discussed ways in which traveler information related activities could assist in funding resources that could help MATOC's goals and objectives. Section F also

provides ideas on strategy options for cooperative funding of data sources and supportive services for travel monitoring.

The utility and benefits of this expansion of coverage will primarily serve incident management purposes. The expansion of coverage will secondarily provide and serve MATOC's traveler information goals and objectives. The Steering Committee recognizes that reviewing and vetting the specifics of additional coverage should be assigned to the Regional Operations and Regional Information Systems Subcommittees. The subcommittees' recommendations can be reviewed with the Steering Committee to prepare guidance and suggestions to the constituent agencies. During these activities, review with the Focus Group and other stakeholders would be desirable.

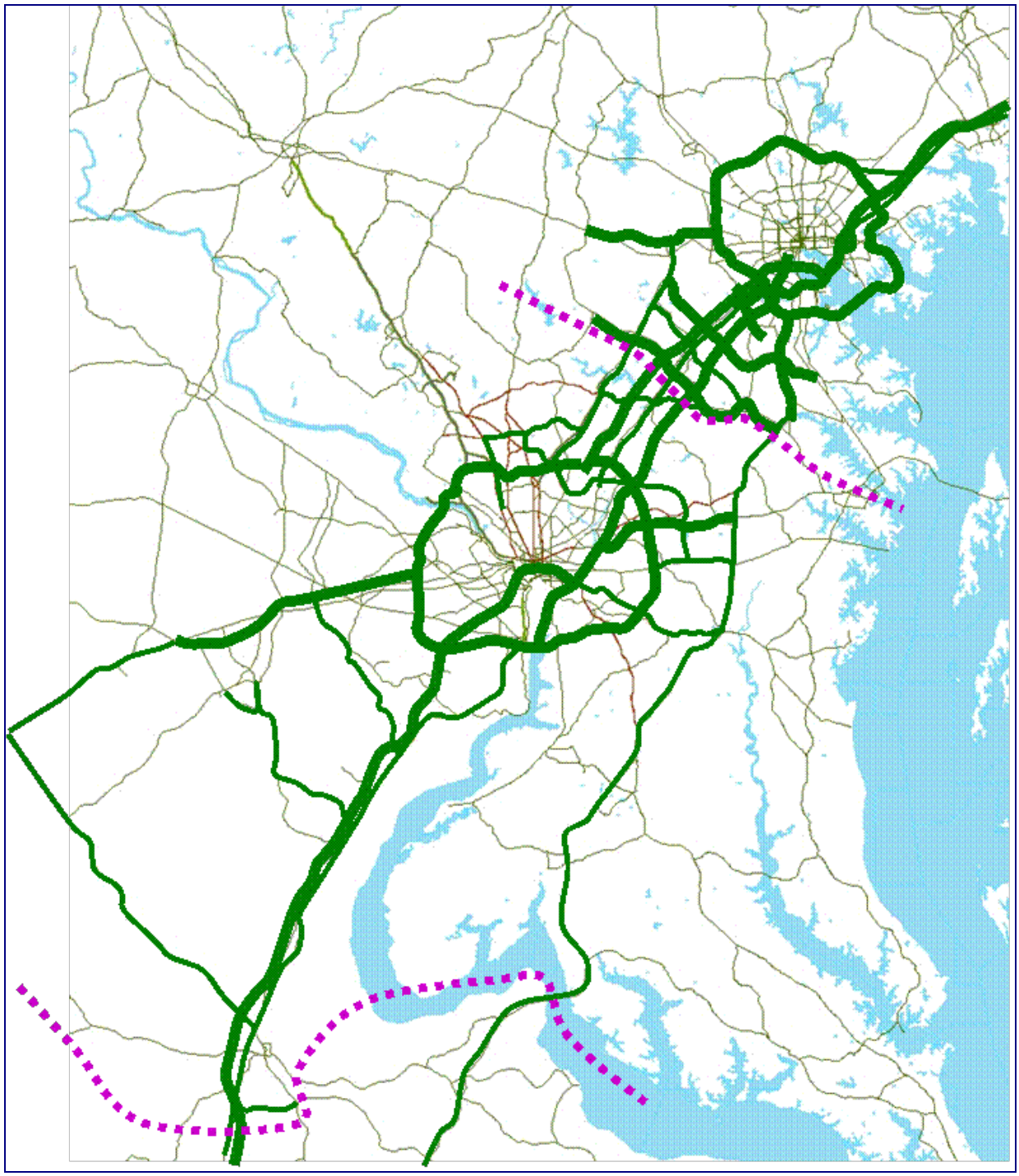
The following provides a more detailed discussion of the seven potential phases of expansion. This is an information and idea source for the two subcommittees in considering the usefulness and relative priorities for such expansions. However, other information sources and ideas should also be sought and used. While the discussion presented here proceeds incrementally through the identified stages, the agencies that will make these investments in this data source may chose not to acquire data from the I-95 Vehicle Probe Project source in the stages discussed here, or may choose to acquire similar data on traffic flow conditions from other potential sources. Where appropriate, various graphics have been prepared that help illustrate the spatial extent and/or pattern of such expanded coverage in that stage. The implied priority of the stages is a starting point for discussion and a way to systematically keep track of the whole set of options.

What is important is that the discussion begins and that decisions are made to enhance the spatial coverage.

Stage 1: **Current coverage of fixed-location detectors including the initial area-wide coverage of the I-95 Probe Vehicle Project dataset**

The purchase and on-going availability of speed and travel time estimates through the I-95 Corridor Vehicle Probe Project is providing coverage on most of the freeways, some parkways in the MATOC area, and limited coverage for some arterial roadways, as shown in Exhibit A1. The selected freeways and parkways were part of the allocated total number of miles for the six-states participating in the initial purchase of the data feed, which was partly negotiated with the respective State DOTs. Two of the six states, New Jersey and North Carolina, added to the funding to enhance their coverage from the start. Provision of data for arterials was not part of the requested proposals but was included in the selected proposal by the contractor. In both cases, the idea was to have I-95, parallel freeways and parkways, intersecting ones, and some key arterials used as diversion routes or provide access to I-95 at key locations.

Exhibit A1: Stage 1, Initial Area wide Coverage of the I-95 Probe Vehicle Data



Stage 2: **Remainder of freeways and parkways for incident management coordination, Safe Trip 21 in the Tysons Corner area, and anticipated short-term expansion of coverage undergoing initial consideration by SHA/CHART for parts of I-270, US 50, and US 29**

Current Short-term Expansions: Expansion of the coverage beyond the initial data feed has begun in the Washington, D.C. area as part of a shorter-term demonstration. A project is being done through USDOT and the I-95 Corridor Coalition as part of USDOT's Safe Trip 21 project. The demonstration is providing for a modest expansion of coverage of this data source for some roadways in the Tyson's Corner area to test the utility of on-site traveler information displays at selected locations. The Virginia Megaprojects team is also coordinating with this effort. This additional coverage, which is going into the RITIS data set, will be for a short-term duration through an evaluation period. It is expected that access to this enhanced coverage will cease unless new funding is allocated for continuing the data source.

There was a short-term expansion of coverage throughout the region that was provided by INRIX as a public service for approximately a week during the Presidential Inauguration in January 2009. INRIX provided more extensive and detailed coverage of their data source during this event, which was used at the event's main TMC. INRIX has already invested in gathering data samples on all of the region's freeways and parkways, most of the major arterials, and many minor arterials. To gain access to that additional data feed, INRIX just has to flip a switch. INRIX already provides such data to their private sector partners, such as MapQuest. These private sector partners have data coverage that is different than the coverage purchased through the I-95 project and have already incurred start-up costs for setting up this coverage.

Enhanced Freeway Coverage: Options for full coverage of freeways and parkways in the MATOC area should anticipate the short-term expansion of coverage being considered by MDOT CHART for parts of I-270, US 50, US 29, and other roadways not part of the initial coverage proposed by INRIX. It is also clear that MDOT CHART and VDOT have competing and legitimate needs for funding similar expansions of the Probe Vehicle data elsewhere in their states. One way to think about allocating limited resources statewide is to recognize that such funding can be complementary. That is because travelers who live in the MATOC area often travel to other parts of Maryland and Virginia and would benefit from data sources being available in those locations. The reverse is also true for residents elsewhere in Maryland and Virginia who benefit when they travel to/through the NCR.

Enhanced Parkway Coverage: With regards to parkways, perhaps MATOC can facilitate pursuing a strategy of cooperative funding and support that could be obtained from the National Park Service (NPS) for information related to the parkways they operate including: (1) George Washington Memorial and Mount Vernon Parkway, (2) Clara Barton Parkway, and (3) the Suitland Parkway. (The Baltimore-Washington Parkway is already part of the initial coverage.) Parts of the first parkway in that list are currently impacted by significant work zone conditions in several sections. Based upon experience with the NPS, such cooperative funding may not be a priority. However, given the emergency preparedness and

homeland security aspects, there may be some priority given through future UASI funding requests.

An Alternative Current Traveler Information Dissemination Resource: Another separate demonstration effort through USDOT and the I-95 Corridor Coalition of the Safe Trip 21 project has launched a long-distance trip planning Web site. This Web site provides travelers with the ability to view real-time traffic conditions across state borders from New Jersey to North Carolina. Users have the ability to zoom the map into any of the six participating states and Washington, D.C. to obtain a closer look at traffic conditions. The travel time feature enables users to select an origin and destination from a predetermined list of cities, airports, and other landmarks to obtain the normal and current real-time travel time and distance between selected points.

Exhibit A2 indicates the additional coverage that is possible from the identified freeways, parkways, and arterials discussed in Stage 2.

Stage 3: **Identified emergency evacuation routes including major arterials associated with the schedule of approved detector enhancements using UASI funds**

The state DOTs in coordination with the local governments within the Washington D.C. region have identified a set of emergency evacuation routes for which improved traffic monitoring and flow detection is needed to improve situational awareness during emergencies. For the past few years, Urban Area Security Initiative (UASI) grants have been requested and approved for traffic flow detection enhancements. A task force from three of the MATOC constituent agencies is working on coordinating the specifics of how, where, and when those approved funds will be used. Exhibit A3 shows the spatial extent of the routes identified in the FY08 and FY 09 grant applications. The additional detection will increase the coverage of roadways being monitored for traffic flow, which are included within RITIS and can be used for traveler information purposes.

Exhibit A2: Stage 2, Additional Freeways, Parkways, Safe Trip 21, and extra MDOT

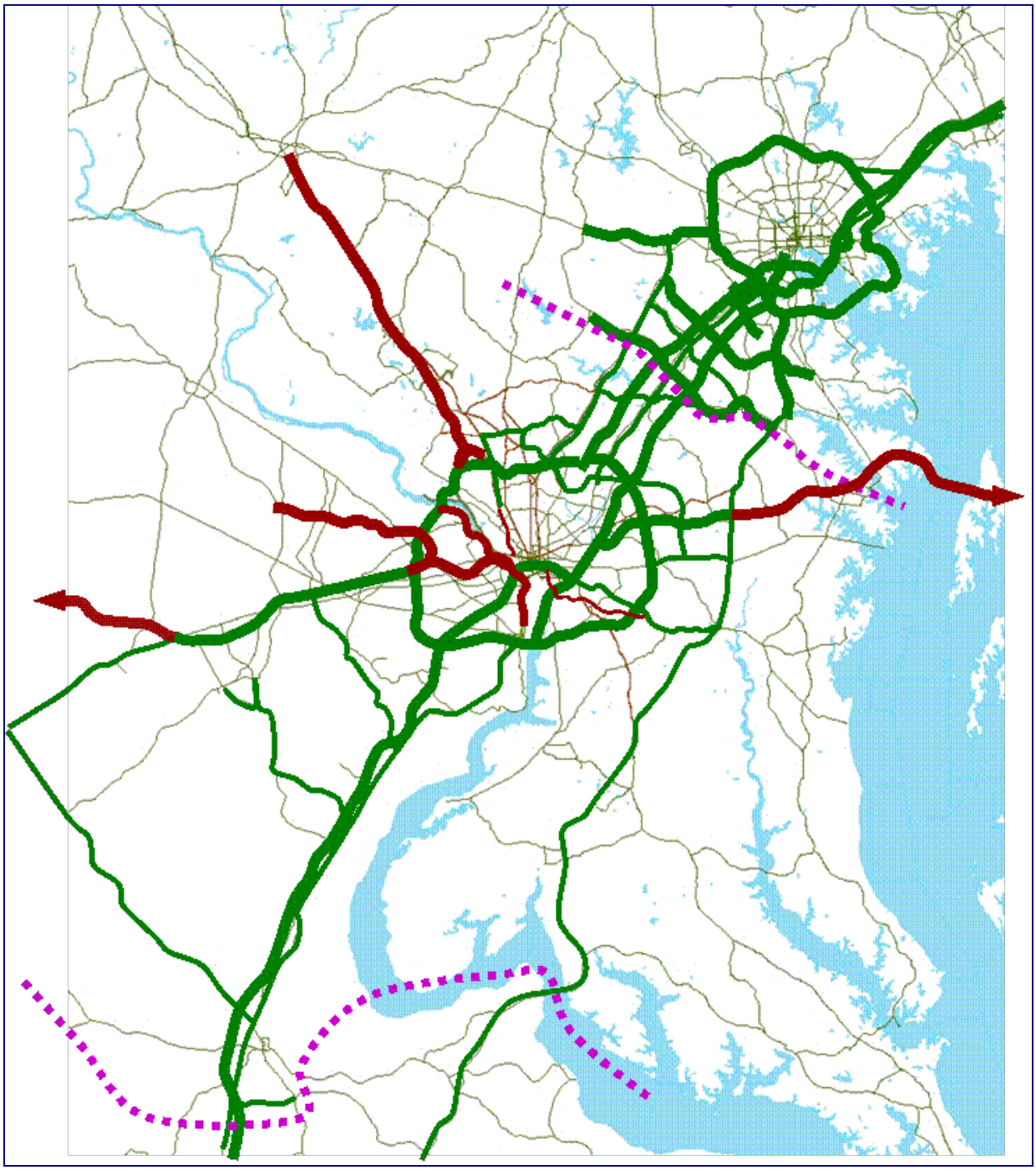
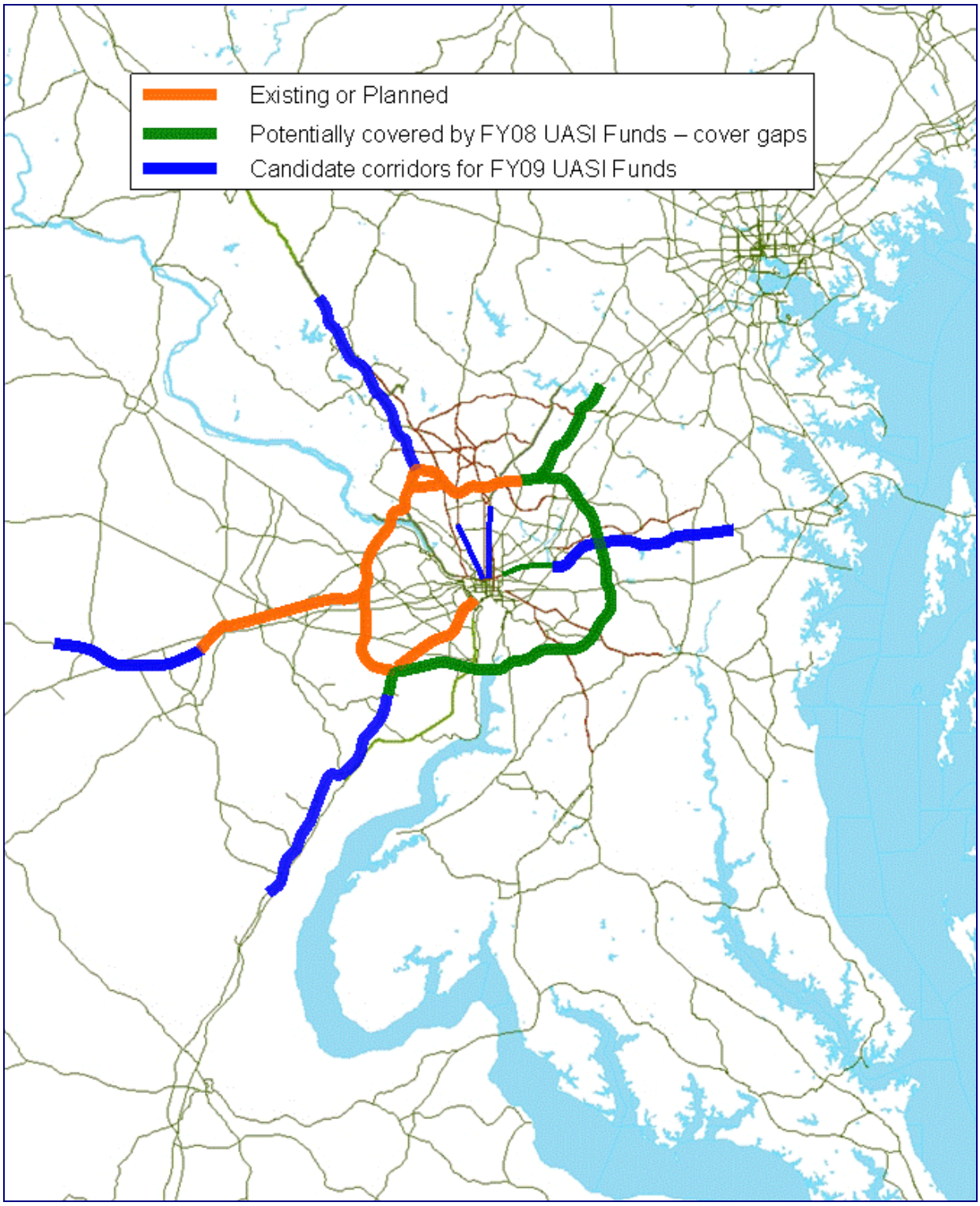


Exhibit A3: Stage 3, FY 08 and FY09 Detection Coverage of the UASI Grants



Stage 4: Major arterials associated with the thirteen regional priority transit service priority corridors that are part of the recent TPB TIGER Grant application

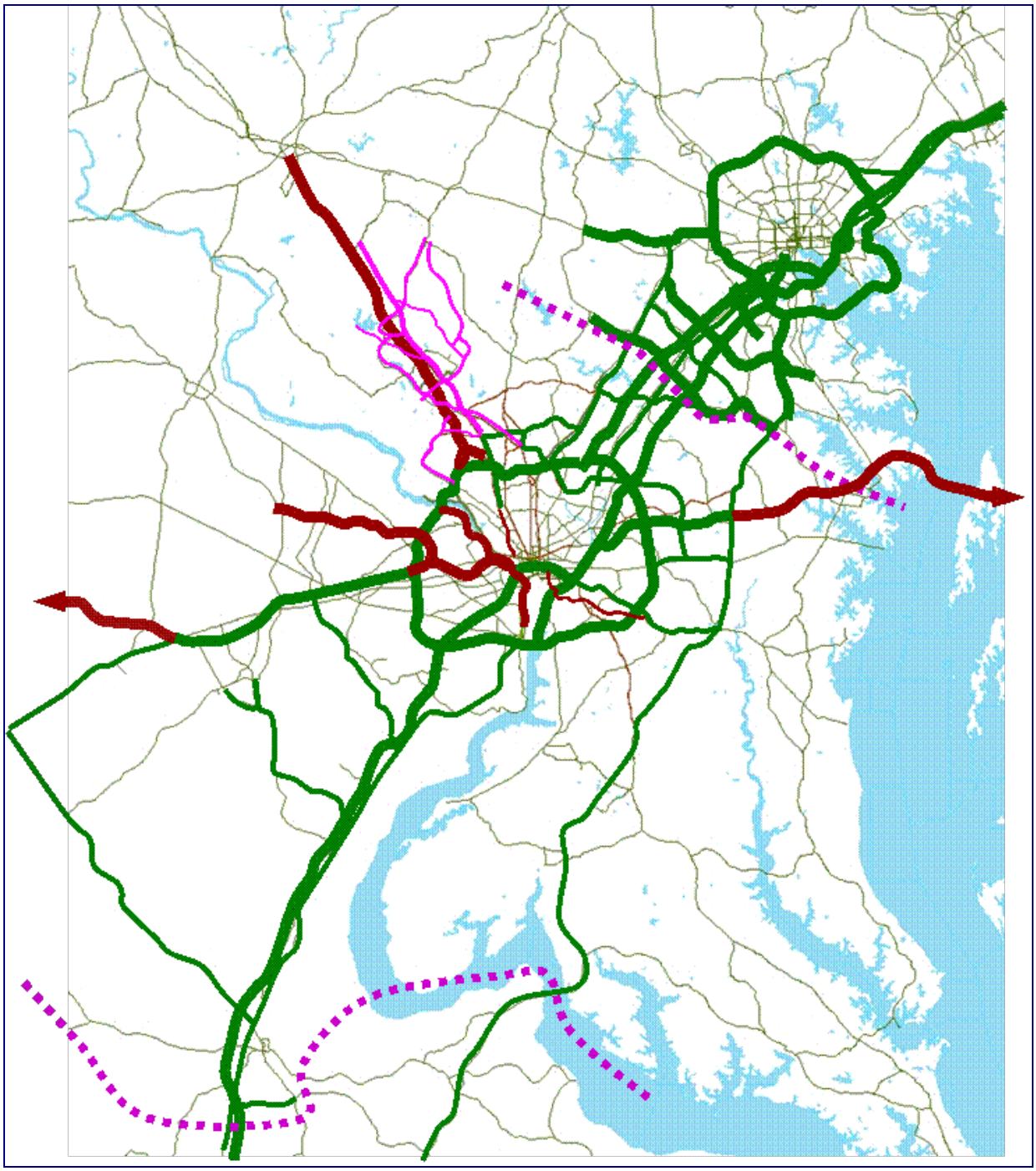
Travelers want information about their transit options. Enhancements to this information will facilitate more transit use and enable better management of the overall transportation system. The COG/TPB has recently submitted a grant application to USDOT through the Transportation Improvements Generating Economic Recovery (TIGER) Competitive Grant Program of the American Recovery and Reinvestment Act (ARRA). This grant includes a package of 13 priority bus corridors, most of which would be using arterial roadways. Exhibit A4 shows the spatial coverage of those 13 corridors. This grant proposal can simplify the issues of serving users of different transit service with traveler information, particularly for bus users, and how to distinguish the importance among the bus routes within the Washington, D.C. area. These corridors represent areas with some of the highest levels of bus ridership in the region and are central to the efficiency, equity, and sustainability of the region's entire transportation system. Having broader information about traffic flows on arterials and other roadways can facilitate transit improvements and traffic management activities, while also addressing incident management and travel information needs. These thirteen corridors provide a starting point, but additional effort needs to be made to have the regional transit agencies identify additional priority bus corridors for potential probe coverage. A priority for the MATOC agencies can be to get arterial incident and travel condition data into the traveler information systems and work on ways to disseminate information to serve the users of these priority transit corridors.

Stage 5: Arterials serving the I-270 Integrated Corridor Management project area

Transit oriented traveler information can facilitate multi-modal use and travel choices, particularly if it is integrated to serve all travelers using a popular travel corridor. The Integrated Corridor Management (ICM) approach is being conceptually tested in the I-270 Corridor as part of a national demonstration program of USDOT. From a traveler information perspective, an enhancement is needed for monitoring travel conditions of MDOT, MCDOT, and WMATA facilities/services, with RITIS used to blend and archive such data. Each of those agencies, led by MDOT, is participating in a Technical Advisory Committee for that project. These Stage 5 Enhancements would include sufficient coverage of I-270, I-370, major and minor arterials, Metrorail, MARC service, MTA, WMATA, Ride-On major access routes, and park and ride systems. These enhancements would provide users with more travel options and choices based upon the current operational conditions of the corridor's facilities and services. The Regional Information System Subcommittee could begin to identify and prioritize other travel corridors in the region that could benefit from a similar ICM approach.

Exhibit A4: Stage 4, Focus Coverage for Priority Transit Service Corridors

Exhibit A5: Stage 5, Focus Coverage for I-270 ICM Arterial Roadways



Stage 6: Remainder of arterial roads identified for regional and local incident management coordination

Coverage is needed to improve situational awareness for emergency preparedness, regional incident management coordination, and transit priority corridors. Integrated transportation corridors will drive the pace of expansion of coverage that could be used for traveler information purposes. The Regional Operations Subcommittee has identified a list of regional and local arterials that could benefit from an expansion of coverage for Probe Vehicle data. That list was preliminarily presented to the Steering Committee in spring 2009. Arterial data is a key to a sustainable traveler information system because a considerable portion of regional travel occurs on arterials. Most transit routes are operated on major arterials and their operation is interdependent with bus service operations. The District of Columbia and Arlington County are particularly dependent upon well functioning arterials. Extra consideration could be given to enhancements of I-95 Probe data in those jurisdictions. DDOT is currently investigating other possible data sources for arterial monitoring. Complementary expansion using the I-95 Probe Vehicle data for adjacent arterials in Maryland could be a priority.

Stage 7: Additional arterials identified as being needed and sufficient for traveler information

It is ironic that in this White Paper for the dissemination of regional traveler information the staging for additional expansion of the coverage for traveler information purposes is being given as the last of the seven identified stages. This recognizes the relative priorities among the needs, goals, and objectives that have been identified by the Steering Committee. We expect that the additional roadways shown in Exhibit A7 will undergo a review and vetting by the Regional Information Systems Subcommittee. It is expected this will be done as they consider coverage for the prior six stages, and that appropriate recommendations will then be reviewed with the Steering Committee for them to prepare recommendations to the constituent agencies.

Exhibit A6: Stage 6, Arterial Roadways for Incident Management Coordination

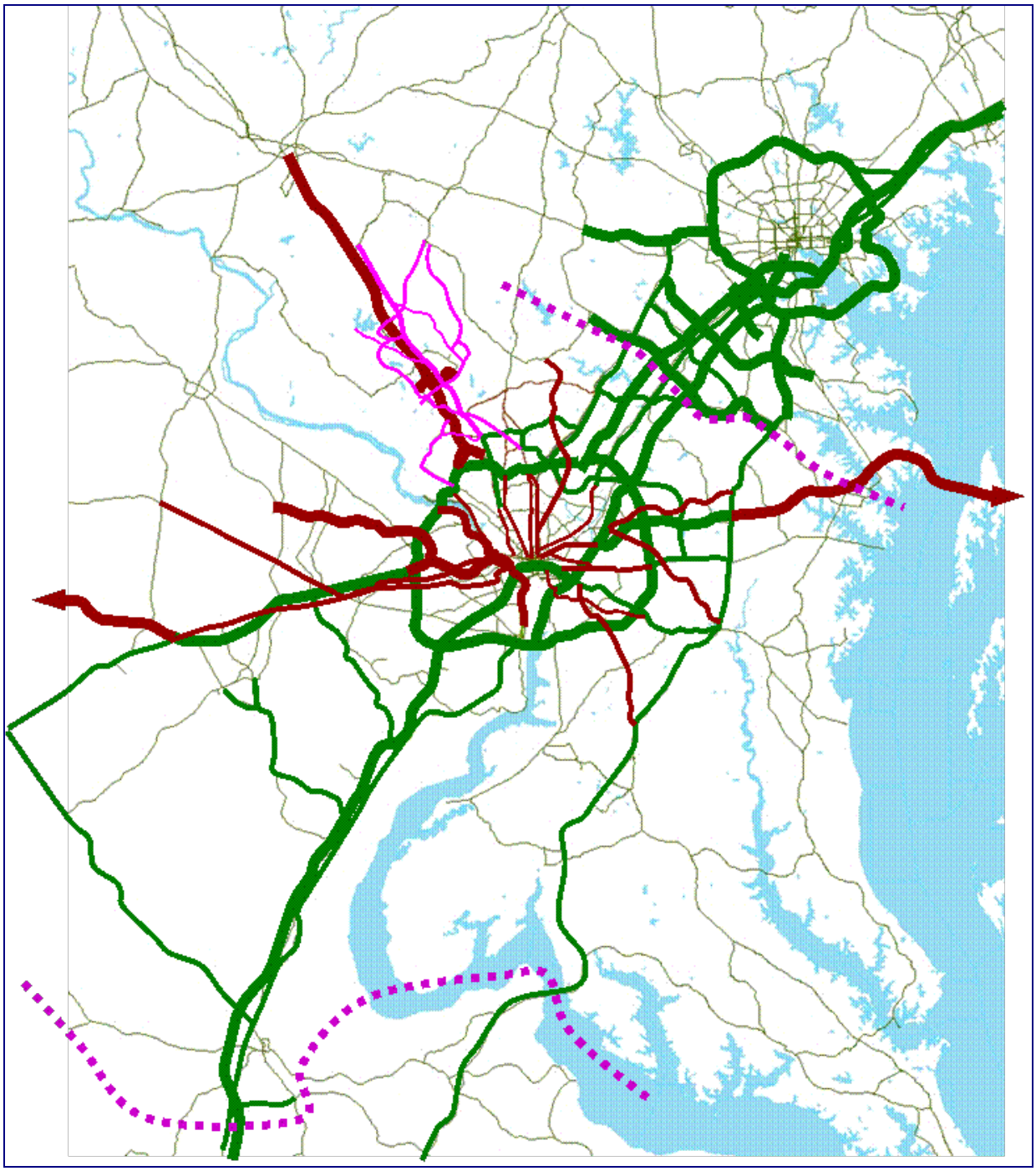


Exhibit A7: Stage 7, Arterial Roadways Needed for Regional Traveler Information