Application of Advanced Technologies to Data Collection for Transportation Planning

Task 2 Summary Memorandum:
Case Studies of Existing and Prospective Applications of Advanced Technology to Data Collection for Transportation Planning

Presented to
Binghamton Metropolitan Transportation Study
on Behalf of
NYSMPO SCI Data Study Steering Committee

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1. Purpose and Approach

This document is intended to provide current information on how a variety of advanced technology-based data collection systems in New York State and across the country are being used for or have the potential to be applied to transportation planning purposes in Metropolitan Planning Organization (MPO) settings. This is a summary of information collected under Task 2 of the NYSMPO “SCI Data Study” by the consultant team.

Approach

Based on the extensive research and analysis performed in Task 1 of this project, the consultant team established a knowledge base on the current state of data applications using advanced technologies, both in New York State and nationwide. In consultation with the BMTS project manager, a pool of candidate “case studies” was identified and researched in detail. Through an extensive interview and primary/secondary information source review process, the consultant team identified and developed a set of relevant case studies. The case studies have been prepared using a generally consistent structure to allow cross-application comparisons.

In consultation with the project steering committee and the BMTS project manager, the consultant team determined that the needs of this study would be best served by examining data applications from several perspectives of interest and value to MPOs. As a result, the case studies presented in the following pages are categorized as follows:

- **Established and operational applications** – data collection technology applications that are fully operational and being used for planning data by MPOs and/or other agencies

- **Prospective applications** – technologies in planning or implementation stages with likely applicability for addressing MPO planning data needs

- **Data mining and analysis applications** – approaches to applying and enhancing the value of technology-based transportation data for use in MPO planning processes. For these examples, the WSA team will investigate some current data sources not being utilized by the NYSMPOs. Depending on the nature of the data and its availability, we will attempt to generate example GIS based outputs to illustrate some of the potential uses of the data.

2. Case Study Selection Criteria

With the concurrence of the study Steering Committee, the consultant used four general criteria to screen and select applications for inclusion in the case studies selected for inclusion in this report:

- Whether and how the application has been and is intended to be integrated into the planning process;

- How readily the technology(ies) used in the application could be transferred to other agencies and/or situations;
• Whether the application could be transferred to MPOs and/or shared among MPOs; and
• The extent to which the application yields demonstrable benefits.

Table 1 below summarizes how each selected application used for the case studies satisfied the various criteria. The table also includes summary information on each application’s implementation cost, to the extent that information was available.
### Table 1: Case Study Summary Information

<table>
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<tr>
<th>Application</th>
<th>Data Produced</th>
<th>MPO Customization Effort (Actual or Predicted)</th>
<th>Institutional Barriers (Actual or Perceived)</th>
<th>Benefit/Cost Ratio for Planning Applications</th>
<th>Implementation Costs</th>
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<tr>
<td>Hampton Roads GPS Travel Time &amp; Speed Surveys (VA)</td>
<td>Travel Time &amp; Speeds</td>
<td>Moderate</td>
<td>Low</td>
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<td>$87,000 plus MPO staff time</td>
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<tr>
<td>Montgomery County DASH System (MD)</td>
<td>Arterial &amp; Intersection Volumes</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>$30,000 plus training costs</td>
</tr>
<tr>
<td>Maricopa Association of Governments RADS (AZ)</td>
<td>Freeway Speed &amp; Volumes, Local Traffic Signal Data, Transit AVL Data</td>
<td>Moderate</td>
<td>Low-Medium</td>
<td>High</td>
<td>$500,000</td>
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<tr>
<td>Herkimer-Oneida Automated Mobile Data Collection &amp; Entry (NY)</td>
<td>Highway Pavement Condition Information</td>
<td>Low-Moderate</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>Aerial Photography for Congestion Monitoring (DC/MD/VA)</td>
<td>Congestion Density &amp; Level of Service; Speed Information</td>
<td>Moderate</td>
<td>Low-Medium</td>
<td>Medium-High</td>
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<td>TRANSMIT System (TRANSCOM) (NY/NJ)</td>
<td>Vehicle Origin/Destination Information</td>
<td>Moderate</td>
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<td>Potentially High</td>
<td>$41,340 per year per detection site for 6-lane highway</td>
</tr>
<tr>
<td>Tompkins Transit Fare &amp; Passenger Data Collection System (NY)</td>
<td>Transit Ridership by Route/Location</td>
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<td>Potentially High</td>
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</tr>
<tr>
<td>AVL-Based Congestion and Incident Information (NY)</td>
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<td>Low-Moderate</td>
<td>Low</td>
<td>Potentially High</td>
<td>$8.5 million</td>
</tr>
<tr>
<td>NYSDOT Region 1 ATMS Data System (NY)</td>
<td>Freeway Speed, Volume, Occupancy &amp; Incident Logs</td>
<td>Moderate</td>
<td>Low-Medium</td>
<td>High</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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1. Refers only to cost for computer application; does not account for existing investment in County ATMS system.
2. Cost of entire corridor project; relevant data application cost breakout not available.
3. Observations and Assessment

Most applications reviewed are not currently MPO-led. However, MPOs have played significant partner or facilitator role in most. In addition, several themes emerged among most or all of these applications:

- **Willingness to Share Data**: In each application, lead agencies voiced a strong interest in and desire to share the data collected through the technology with planning agencies, including MPOs. It was acknowledged that varying degrees of data reformatting and/or “cleaning” may be required to make the data useful to MPOs, but the agency officials contacted typically wished to provide MPOs with helpful planning information.

- **Data Agencies’ Desire to Know More About MPO Data Needs and Interests**: Beyond a willingness to share data, officials of the lead agencies for data collection applications typically said they need to learn more about MPO data needs and interests. In several cases, the officials said they would be willing to facilitate MPO access to data collected through the application, but did not have an understanding of what MPOs need. The officials voiced a desire to have more substantive and continuous contact with MPOs in order to better understand their needs.

- **MPO Involved in Data Agency Application Planning**: In several cases, MPOs had a lead or support role in the planning of the data collection application. For the applications where this was true, addressing of MPO data needs was built into the technology design, thus minimizing the need to “retrofit” the data system in the future to meet planning agency needs. There was general agreement among officials interviewed that early and continuing involvement of the MPO in data application design and planning is important for minimizing redesign costs and maximizing data collection benefits for all users.

- **Use of a “Building Block” Approach**: Like much of modern telecommunications and data processing technology, most of the data applications reviewed for these case studies were designed in a “building block” manner that can be enhanced in a modular manner to address emerging and future data needs. In addition, some of the applications have built-in data collection and management capabilities that are not currently used, but will be available to MPOs and other data users as the need arises.

The remainder of this document contains the detailed case studies of the various data applications.
Established/Operational Application:
Hampton Roads, VA, Regional Planning District Commission
GPS Travel Time and Speed Data Collection

AGENCIES INVOLVED:

• Hampton Roads Planning District Commission (HRPDC), Virginia.

TECHNOLOGIES/PRACTICES ILLUSTRATED

• Using Global Positioning System (GPS) equipment for data collection and Geographic Information System tools for analysis of Regional Travel Time and Speed Data.

DESCRIPTION AND PURPOSE OF APPLICATION

HRPDC has conducted a comprehensive regional travel time study approximately every five years since 1986. The previous technique involved a laptop computer and distance-measuring device (DMD) for data collection and analysis. Using GPS for data collection and GIS for data analysis provided many advantages over the previous technique. The current study covers over 1,100 miles of roadway. The current technique is organized in four modules: (1) Data collection, (2) Data processing, (3) Data analysis, (4) Contour generator.

In this latest round of travel time data collection, HRPDC used a new stand alone, battery powered, Trimble GPS unit. No laptop was needed. Data was directly exported from the GPS as ArcView Shapefiles. Real-time differential correction was achieved by using a radio beacon signal from the Coast Guard.

Using customized software developed by Parsons-Brinckerhoff (PB), data collection, processing, and analysis tasks were greatly simplified. The data collection process was simplified through the use of drop-down menus.

Data processing was simplified through the use of software to automatically match the projection of the GPS run data to the projection of the agency’s GIS base map.

Several types of queries can be performed on the data from the ArcView environment using the customized software. In addition, the Contour Generator module makes the production of travel time contours much faster and easier than the previous, manual method.

Parameters available for each selected roadway segments include:

• Segment length
• Travel time
• Number of stops
• Delay time (time elapsed while stopped)

Travel Time Contours Generated from GPS Data
• Average speed
• Speed ratio (ratio of actual speed to posted speed limit)

ORGANIZATIONAL STRUCTURE / INSTITUTIONAL ARRANGEMENTS FOR APPLICATION

This project is an MPO Unified Planning Work Program (UPWP) task. HRPDC managed the entire project.

RELATIONSHIP TO EXISTING DATA COLLECTION ACTIVITIES

This application completely replaced the need for previous travel time data collection equipment (i.e., laptop with DMD). Since the project was only recently completed, all of the potential data uses have not yet been fully explored. However, the vehicle tracking data has helped to validate HRPDC’s current GIS roadway network.

The application takes advantage of the inherent GPS and GIS strengths. For example, since the GPS-collected data can be overlaid on the GIS base map geographically, linking the two databases was simplified. It would be very time consuming to tie the previous information to the GIS due to the lack of geographic references.

DATA QUALITY / EDITING

The data has been found to be extremely accurate and does not require much editing. One problem encountered has been that data can be missed along certain corridors with dense tree cover, and thus those runs need to be rerun. The data could be visually verified quickly. This helped ensure that routes were appropriately run. Previously, it was more difficult to detect if drivers deviated from the scheduled routes. With the visual verification, these problems were readily identified.

One of the data analysis outputs, the Contour Generator, does require some manual manipulation in ArcView to ensure that the contours make logical sense from a topological standpoint.

However, to effectively use the GPS results, it was found that a nearly perfect base map was required. Thus a considerable amount of effort was required to ensure that street names were correct and consistent, all roadways in the GIS were properly connected, and that the directionality attributes of roadway segments were accurate. The process of correcting these items in the GIS also helped to improve the accuracy of the agency’s base map.

INTEGRATION INTO PLANNING PROCESS

Travel time data collection is already an established activity at the Hampton Roads MPO. This application demonstrated the benefits of collecting the data in a new way.

IMPLEMENTATION ISSUES

No major implementation barriers were encountered. The effort cost about $87,000 in addition to MPO staff time expenses ($70,000 for consultant software development, $11,000 for GPS unit, and less than $10,000 salary for a part-time probe vehicle operator.

One limitation is that given the size of the regional network that needed to be covered (1,100 miles), it took 8 months to collect all the data. In addition, only 1 run in each direction during the AM and PM peak hours was performed for each roadway segment. However, HRPDC intends to perform additional runs to achieve more statistically significant results in sub-areas as needed for specialized studies.
BENEFITS

The GPS application allows HRPDC to collect and analyze the data much more quickly and efficiently. One of the major improvements over previous surveys, is the ease with which travel time contours can be generated. Using the customized interface, a contour (either toward a point or away from a point) can be generated almost instantaneously.

It is expected that the travel time contours will be useful for businesses and the public sector as well. Contours can be useful in selecting locations for certain types of development, especially shopping centers, distribution centers, and delivery service centers. When combined with census data, travel time contours can be very powerful for estimating market potential. Since the contours are based on real-world congested conditions, they are much more valuable than most canned applications, which are often based on posted speeds and usually do not take into account directional speed differentials.

The contours should also be useful to emergency responders in helping to identify the optimal location of emergency centers (e.g. fire stations) or where gaps in coverage might exist. The travel delay analysis tools will allow HRPDC to better assess arterial operations and help identify problems with respect to signal timings and access management.

HRPDC uses travel time contours to help evaluate mobility throughout the region and changes to that mobility over time. By comparing contours of one study year to another, HRPDC staff can even evaluate the effectiveness of certain types of improvements to the transportation system.

TRANSFERABILITY TO NEW YORK MPOS

Appears to be very high likelihood that the New York MPOs could pursue this application, either on their own or with consultant support. The major problems to overcome appear to be cleaning up the base GIS map.

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Established/Operational Application:
Montgomery County, MD Department of Parks and Planning
DASH System

Principal Agencies Involved:
- Maryland-National Capital Park & Planning Commission, Montgomery County Department of Park & Planning (MCPPD)
- Montgomery County Department of Public Works & Transportation (MCDPWT)

Technologies/PRACTICES ILLUSTRATED
- Use of archived traffic detection data
- Automated system for extracting data from traffic management center

Purpose of Application
Montgomery County sought to take advantage of the investment in the County ATMS vehicle detection technologies to replace or complement existing data collection activities. Data from the County ATMS supports travel demand model validation and is used to track traffic volume trends at intersections. The application software is still being refined and the system is expected to come on line in early 2002. As the County DPWT upgrades its vehicle detection technology, it is expected that additional data will be available to MCPPD, such as speed and classification.

Organizational Structure / Institutional Arrangements for Application
Since both organizations involved in this application are county agencies, coordination and cooperation has been relatively effective. Initial work was championed by a traffic engineer who worked at the planning agency after previously working at the operating agency. The DASH application was designed to ensure seamless and automated data transfer in a secure environment, thus responding to the operating agency’s concerns regarding staff support of the application and data security.

Relationship to Existing Data Collection Activities
DASH was conceived partially in response to a reduction in the County’s traditional traffic count data collection program, in favor of emerging ITS technologies. MCPPD does not have a constant data collection program of its own; they obtain traditional counts for specific projects. DASH will replace some of those counts.

Data Quality / Editing
Due to budget limitations, comprehensive quality control methods and techniques have not been implemented. MCPPD currently receives weekly log reports from the DPW indicating the date/time/location of the vehicle detectors that stopped performing. MCPPD recognizes the importance of data quality and hopes to implement data validation algorithms in the future. Having these algorithms in place is mandatory for sending DASH data into the regional ITS data sharing system currently being implemented by the Washington MPO.

Integration into Planning Process
DASH will feed model validation. The county’s model in turn is used for testing during the area master plan process, as well as for the county’s Annual Growth Policy. DASH may be used as a data source for other transportation planning studies as the need arises.
IMPLEMENTATION ISSUES

Minimal budget: $20K contract plus unanticipated “investment” of a $10K data server computer. Additional investment required for partially training transportation planner as an Oracle DBA.

Small budget meant many initial functional requirements had to be eliminated. In addition, available budget created bare-bones data transfer and aggregation application, with minimal reporting. Application does not include data validation algorithms or a user interface for administering the application or retrieving data. For now, the newly-trained part-time DBA will also serve as data gatekeeper.

Data privacy: the County ATMS is extremely concerned about unauthorized access to data and/or the signal control system. Thus, a private County fiber-optic backbone was used in response to security concerns. However, maintaining that data link has proven extremely difficult from an IT perspective and is not a high priority for the respective network administrators.

Institutional cooperation in bringing the project to this point has been good but maintaining the system will prove challenging.

BENEFITS

Not quantifiable at this time. However, in the future, an evaluation of the costs of the system versus the savings from eliminating the traditional count program could be undertaken. Having the data in a centrally accessible location will make query turnaround time faster. It is important to recognize that these data were essentially being discarded prior to the creation of DASH.

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Established/Operational Application:
Regional Archived ITS Data Server (RADS), Maricopa Association of Governments (Phoenix, AZ)

Principal Agencies Involved
- Maricopa Association of Governments (MAG)
- Maricopa County DOT
- Arizona DOT

Technologies/Practices Illustrated
- Archived vehicle travel data
- Building on existing ITS infrastructure to capture planning data

Purpose and Description of Application
AZTech™ is a seven-year project (two-year implementation and five-year operation) that will develop an integrated Intelligent Transportation System for the Phoenix metropolitan area. The project collects and provides information to the Arizona Department of Transportation (ADOT) Freeway Management System, local cities, fire, police, emergency management and city development services. AZTech™ also has been generating data that are relevant to the transportation community, but not all of these data were archived nor had they been readily available to planners and many other potential end users.

The Regional Archived ITS Data Server, or “RADS,” was launched through the Maricopa Association of Government’s (MAG) ITS Strategic Plan for the Phoenix Region. The purpose of the MAG regional ITS architecture is to ensure that an integrated ITS is deployed in the MAG region. This integration includes the logical, physical, and institutional components of the regional ITS program. Using the stakeholder needs, user services and market packages, logical processes were developed to support the desired functionality of the regional ITS. Management of Archived Data was among the key applications selected for near-term implementation to fulfill the transportation needs of the region through the ITS Strategic Planning process. The long-term goal of the RADS project is to implement hardware and software for storing both AZTech™ and other data as they come on-line, and allow for the data to be accessed, shared, and used.

The RADS enhancements to the AZTech™ Server allows transportation data to be pulled directly from the server and archived for planning, modeling, and other purposes as needed. The existing data available through the AZTech™ Data Server was reviewed to determine what data stakeholders will have access to initially through the RADS. These existing data are comprised of three primary categories:
- ADOT Freeway Management System Data;
- Local Jurisdiction Traffic Signal Data; and
- Transit Advanced Automated Vehicle Location Data.
ORGANIZATIONAL/INSTITUTIONAL ISSUES

MAG, as the Phoenix Region’s MPO, leads and conducts all ITS planning in the metropolitan area. MAG is a member of the AZTech oversight group, and led the process that identified a need for an AZTech data archiving function. The original RADS user requirements study was led by/sponsored by MAG Regional ITS Committee. This committee consists of state, local government, transit, aviation and university interests. The purpose of the ITS Committee is to carry out regional ITS planning, programming and coordination.

Although the initial concept of the RADS is to archive only existing AZTech™ data, new data elements will be added to the AZTech™ Server over time that could be incorporated into the RADS. To ensure that proper consideration was given to potential data elements that could be included in the RADS, all currently foreseeable data elements were included in surveys of stakeholders. The following data categories not currently being collected by the AZTech™ Server were included in the survey:

- Arterial Data;
- Parking Management Data;
- Commercial Vehicle Operation Data; and
- Weather Data.

RELATIONSHIP TO EXISTING DATA COLLECTION ACTIVITIES

It is clear that RADS-based transportation planning data will be an important supplement to MAG’s existing data collection processes, particularly in the areas of traffic volume, incident analyses, and congestion management. MAG is currently working to determine whether and how automated data can begin to substitute for some of the traditional “manual” data that is used in the planning process.

INTEGRATION INTO PLANNING PROCESS

Using archived automated transportation data is an important part of MAG’s strategy for improving transportation planning in the metropolitan area. For example, the recent regional ITS strategic plan calls for management of archived data to be a top, immediate priority in any ITS deployment scenario. Further, to ensure these data served and were integrated into the regional planning process, MAG requested and sponsored the RADS user requirements study, which helped define the project goals, data archive parameters, and customers.

IMPLEMENTATION ISSUES

The Maricopa County Department of Transportation (MCDOT) has taken the lead in implementing the RADS system. The project is behind schedule due to various MCDOT internal procurement issues. Since ADOT hosts the AZTech equipment and data, the RADS equipment will also be located within ADOT’s Traffic Operations Center, and ADOT staff will provide technical support. As of August 2002, the Phase I effort (Proof of Concept), scheduled for a June 2002 completion, was not yet complete. MAG officials did note that in retrospect, locating the RADS system at the MPO might have circumvented some of the institutional implementation obstacles encountered by the County.

MAG believes the majority of key institutional issues associated with RADS implementation has been successfully addressed and will not delay implementation any further. MAG officials believe that conducting a user requirements study in advance of RADS planning and design was key to resolving institutional and jurisdictional issues before they became serious obstacles.

There has been some disagreement among RADS stakeholders over whether the application should emphasize planning data or operations/real-time data. To adequately handle both types of needs, a significant level of computer processing power and a large data transmission “pipe” would be required, more than are currently available. Therefore, RADS is being launched initially with the immediate-need basic data functions, and the capability of building in additional functions in a modular fashion.
MAG has also found that some effort has been required to educate and “sell” to some stakeholders the benefits of the RADS implementation. Although most stakeholders support the RADS in concept, a general perception exists that only the MPO will have use for archived data, with other entities, particularly local governments, uncertain regarding whether and how they will be able to use RADS data.

MAG is working, through its ITS Committee and other means, to help communities and stakeholders develop beneficial applications for RADS data.

The initial capital and development cost of the RADS server is budgeted at $500,000. About $471,000 of this is federal funds. At this point, MAG has not dedicated any staff to RADS operation. However, it is anticipated that MAG’s ITS and modeling staff will eventually have continuous involvement in the RADS operation, and dedicated RADS staff is not out of the question.

**BENEFITS**

MAG officials believe that the RADS implementation will have both immediate and long-term benefits for the MPO planning process. They noted that “everything MAG does – modeling, traffic counts, etc. -- is based on data.” The current and potential amount of automated data available from the data archive is huge. Liberal application of these data could result in great cost-savings for MAG and the region (e.g., continuous volume data vs. manual data collection every other year).

**TRANSFERABILITY TO NEW YORK MPOS**

The transferability of a RADS-type system to the NYSMPO working environment is uncertain. For those regions that have TMCs high-functioning ATMS software applications (such as “MIST”), a RADS-type module may be quite feasible.

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**Established/Operational Application:**
Automated Mobile Data Collection and Entry, Herkimer-Oneida Counties Transportation Study (HOCTS)

**AGENCIES INVOLVED:**
- Herkimer-Oneida Counties Transportation Study (HOCTS)
- Oneida County Planning Department (OCPD)

**TECHNOLOGIES/PRACTICES ILLUSTRATED**
Using laptop computers, commercial GIS software, and custom ArcView “script” for mobile data collection and entry.

**DESCRIPTION AND PURPOSE OF APPLICATION**
HOCTS has been collecting and compiling data on the condition of highway pavements (e.g., extent and severity of surface cracking, need for surface re-striping) for a number of years. This data is used by HOCTS to plan for both maintenance activities and capital improvement of highways in Herkimer and Oneida Counties.

For the last three years, HOCTS has utilized laptop computers, commercial GIS software, and a custom ArcView “script” to automate this process. Previously, data was recorded in the field by using paper maps and pads, an approach long considered inefficient and prone to human error.

The automated process provides many advantages over the previous technique. In addition to improving the accuracy of data collected (covering approximately 307 highway miles throughout Herkimer and Oneida Counties), the automated system has allowed field personnel to cut by half the amount of time needed to collect the data. Agency staff are also now able to tabulate and map to data almost instantaneously.

Most recently (in the summer of 2001), HOCTS undertook this activity using a 667 MHz Pentium®-based laptop computer with 128 megabytes of RAM and a 10 gigabyte hard disk. Loaded with version 3.2 of ArcView GIS software and the ArcView script written in the Avenue programming language, the laptop was controlled by a single operator. This operator observed and recorded pavement conditions for predefined roadway segments, while a vehicle driver navigated the highways.

Parameters entered for roadway segment include the following.

For roads with rigid pavements:
- Faulting (vertical displacement of abutting slabs at transverse joints creating a step formation in the pavement surface); and
- Spalling (cracking, breaking, or chipping of slab edges at joints, or loss of surface material caused by wear and improper placement of construction mesh).

For overlaid pavements:
- Alligator cracking (interconnected or interlaced cracks forming a series of small polygons); and
- Widening drop-off (cracks and vertical displacement at the slab edge, caused when slabs are overlaid with asphalt extending beyond the slab edges).

For flexible pavements:
- Alligator cracking.

Once data is entered, any number of queries can be performed on the data from within the ArcView environment or by using common database management software (DBMS) such as Microsoft Access. Typically, however, HOCTS
staff use the application to create reports on existing conditions of pavement and to create thematic color coded maps illustrating differences in pavement condition (see figure below).

As described in the section of the work program relating to GIS:

HOCTS will continue to update the non-state Federal Aid Highway System on GIS. The data to be collected for input will be based on local and state needs, and national planning requirements. The data will include but not be limited to, pavement ratings, highway classifications, land use data, traffic counts, transit routes, transit facilities, and other traffic, transit and demographic data.

Finally, as described in the section of the work program relating to data collection and management for Management and Operations:

An inventory of infrastructure conditions of highways on the National Highway System and Surface Transportation Program will be completed using the standard NYSDOT sufficiency rating system. The results will be merged with the NY State results to display and report on the entire Federal Aid Highway System for the two counties.

**ORGANIZATIONAL STRUCTURE / INSTITUTIONAL ARRANGEMENTS FOR APPLICATION**

This project is a Unified Planning Work Program task and has been for three-plus years. For the benefit of agencies wishing to pursue similar activities, the language used to describe the task is presented below.

As described in the Summary of Major Programmed Activities 2002-2003:

Geographic Information System (GIS) activities will continue by adding data to the non-state Federal Aid Highway system…

**RELATIONSHIP TO PRIOR DATA COLLECTION ACTIVITIES**

This application replaced the need for manual tabulation and geo-referencing of road condition data. As noted above, the application has improved the accuracy of data collected. It has also allowed field personnel to cut by half the amount of time needed to collect the data.

Additionally, the application takes advantage of the inherent strengths of GIS. Since the data are digitally geo-referenced, they can be overlaid on and/or linked to vast amounts of other digital data. For example, the road condition information collected annually can be merged with data for traffic volumes and volume trends to provide insights into future maintenance and capital improvement needs.
DATA QUALITY / EDITING

There is no formal verification program in place to track the quality of the data collected. However, an internal “reality check” assessment based on a review of changes from year to year is conducted by HOCTS staff. To date, no significant re-editing of data has been required.

INTEGRATION INTO PLANNING PROCESS

Road condition data collection is already an established activity at HOCTS. This application demonstrates the benefits of collecting the data in an automated fashion. The system expedites the organization and comprehension of data so that it can be more effectively used by municipalities to plan their maintenance activities and program capital improvements.

IMPLEMENTATION ISSUES (E.G. FUNDING, DATA PRIVACY/SECURITY, INSTITUTIONAL, PERSONNEL/TRAINING, ETC.)

No major implementation barriers are encountered as a result of the application. Although work is conducted in part by staff of a HOCTS sister agency (Oneida-Herkimer Planning), this arrangement works smoothly (no significant personnel/training issues). Financially, the activity has a high benefit to cost ratio. According to HOCTS staff, the effort costs about $5000 per year.

BENEFITS

In summary the application allows HOCTS and member municipalities to collect, analyze, and understand roadway condition data much more quickly and efficiently. One of the major improvements over previous approaches is the ease with which maps and illustrations can be generated to communicate the geographic distribution of highways and their conditions.

TRANSFERABILITY TO NEW YORK MPO’S

There appears to be very high likelihood that the New York MPO’s could pursue this application, either on their own or with consultant support. The major challenges to address would appear to be identifying and training staff to conduct data collection in the field. A possible enhancement to the activity would involve the use of a fifth wheel device to dynamically record distances at the same time pavement condition assessments are made.

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Established/Operational Application:
Using Aerial Photography for Congestion Monitoring, Metropolitan Washington Council of Governments

Principal Agencies/Organizations Involved:
- Metropolitan Washington Council of Governments (MWCOG), Transportation Planning Board (TPB)
- Skycomp, Inc.
- MotionMaps™

Technologies/PRACTICES ILLUSTRATED
- Developing congestion surveys using aerial photography
- Employing time-lapse map animation to depict congestion and speed changes over periods of the day

Purpose and Description of Application
For several years MWCOG has contracted with Skycomp, Inc. to conduct aerial surveying of traffic flow conditions primarily on freeways and parkways throughout the Washington region. This activity has been periodically done for more than a decade.

MWCOG has found that travel speeds across congested freeway segments could be determined with reasonable accuracy and that aerial techniques closely matched data obtained using traditional ground methods.

Figure 1 shows an example of a graphic developed by Skycomp that shows PM peak period freeway travel speeds on a typical weekday.

Data is usually collected over several days for each corridor and the reported information is a composite from the different sampled days. This approach results in depicting average, non-incident related congestion patterns.

Freeway Speeds for a Typical Evening in 1999

The prime data estimated and counted from the photographs is the density of vehicles per mile. The density is used to calculate an average speed for each link and time period based upon researched relationships given in the Highway Capacity Manual and other sources. Skycomp’s display techniques do not depend on having GIS based locations for the surveyed link segments.

To obtain a more detailed picture of freeway performance, MWCOG contracted with Motion Maps™ to prepare time-lapse animated map graphics to show the sequence of the hour-by-hour speed variations.

Although Skycomp does have an ability to survey and report on arterial congestion in a similar fashion, MWCOG uses other methods, including GPS probes to monitor arterial speeds and congestion.
**ORGANIZATIONAL / INSTITUTIONAL ISSUES**

Since the project is completely funded and managed by MWCOG, no notable institutional barriers have been encountered.

**RELATIONSHIP TO EXISTING DATA COLLECTION ACTIVITIES**

This data collection activity, which falls under “congestion monitoring,” is performed on a three-year cycle similar to the fixed-schedule cordon count program.

**INTEGRATION INTO PLANNING PROCESS**

- Used for Congestion Management System monitoring
- TPB interested in performance measurement from a planning as well as an operational perspective
- Focused on a broad geographic sample of freeways
- Data collected over several days to get average, non-incident conditions
- Repetitive tours observes traffic about once per hour

There is a Travel Monitoring Subcommittee of the Technical Advisory Committee that reviews and advises on the scope and progress of such activities.

**IMPLEMENTATION ISSUES**

This application requires multiple flights in order to obtain a “typical day.” Maintaining the schedule can be compromised by weather and other less predictable factors.

Cost - $100,000 (consultant dollars) once every three years. (Note: Post-September 11th there are security concerns in the Washington, DC area because of sensitive sites. The cost of data collection may rise because off-duty law enforcement personnel may need to be in the plane.)

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<th>I-66 from Centerville to the Beltway</th>
<th>From</th>
<th>To</th>
<th>5:30-6</th>
<th>6-7</th>
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<th>AM Peak Period for Peak</th>
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Figure 2

**BENEFITS**

The aerial photography data has proved to be an extremely valuable planning tool for MWCOG. Variations in congestion across roadway segments and hours of the day can now be readily observed. For example, as shown in Figure 2, graphics and tables can be produced to clearly show bottlenecks temporally and spatially.

**TRANSFERABILITY TO NEW YORK MPOS**

MWCOG staff believes this application is a good tool to study congestion trends on limited access highways. It should be applicable anywhere in the country.

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Prospective Application:
TRANSCOM System for Managing Incidents and Safety (TRANSMIT)

AGENCIES INVOLVED:
- TRANSCOM (Transportation Operations Coordinating Committee)
- Port Authority of NY & NJ
- NYS DOT
- NJ DOT
- NYCDOT
- NJ Turnpike Authority
- NJ Highway Authority
- Federal Highway Administration

TECHNOLOGIES/PRACTICES ILLUSTRATED
- Use of archived traffic detection data.

PURPOSE AND DESCRIPTION OF APPLICATION

TRANSMIT, the TRANSCOM System for Managing Incidents and Traffic, is a Federal Highway Administration-funded operational test to determine the feasibility of using automatic vehicle identification (AVI) technology for traffic monitoring and detection of incidents.

TRANSMIT uses vehicles equipped with AVI transponders for electronic toll-collection (ETC) as probes to monitor traffic. Transponder readers are installed along roadways at approximately 1½ mile intervals to collect transponder ID’s. The TRANSMIT system scrambles the ID’s for privacy, and notes each ID with the time and date that it was read. As transponders are detected by successive readers, TRANSMIT compiles data on speeds, travel times, and the number of non-arriving vehicles (expected vehicles not yet detected by the next reader downstream). By comparing this information to historical data, TRANSMIT can detect incidents.

Phase I of TRANSMIT installed readers along nineteen miles of the New York State Thruway and Garden State Parkway, using transponders distributed by the Thruway Authority for ETC.

TRANSCOM’s member agencies now have plans to expand the system on both toll and non-toll roadways. The plan for TRANSMIT Phase II expands the current system along additional roadways in Westchester, Bronx, Kings, Queens, and Richmond counties in New York, and in Hudson, Middlesex, and Union counties in New Jersey. It also adds a major transit element for bus and facility management along the NJ Route 495/Lincoln Tunnel corridor into the Port Authority Bus Terminal. This expanded TRANSMIT system thus will not only cover more of the region, but will also be multi-modal.

TRANSCOM has had about 20 TRANSMIT sites in operation for about 5 years. Most are on the NYS Thruway, with some on the Garden State Parkway. The transponders were distributed by the Thruway Authority for ETC. The George Washington Bridge (GWB) also has 8 TRANSMIT sites in operation. TRANSCOM is currently testing about 60 additional TRANSMIT sites. Testing is expected to be completed within one month. Most existing TRANSMIT sites are within the 5 boroughs of New York City, with a few on the Garden State Parkway. TRANSCOM
is currently pursuing 20 to 30 additional sites in Westchester County, N.Y.

Currently, the New York State Thruway Authority, Garden State Parkway, and George Washington Bridge are the only agencies actively using the TRANSMIT data. Once testing and implementation are complete, the NYSDOT and Port Authority of NY/NJ will use the data as well. TRANSCOM and many planners believe that these data can be quite beneficial for a large number of transportation planning applications.

IMPLEMENTATION ISSUES

The TRANSMIT system involves multi-jurisdictional cooperation between different public agencies and the private sector. An alternative contracting approach that used a contractor for handling multi-jurisdictional projects was developed whereby the member agencies have control over the review of the bid packages and contractor selection procedure. The consultant resolves technical incompatibilities between the systems of the different agencies in a unified way, resulting in a simpler system. TRANSCOM believes this approach provided the flexibility to resolve administrative and technical difficulties between the agencies and reduced system implementation time.

TRANSMIT was initially primarily funded with federal resources. Since the initial implementation, TRANSOM’s member agencies have been contributing their own local and federal funds to finance TRANSMIT system expansion.

The privacy of the identity of vehicles equipped with E-ZPass tags was set as a requirement by TRANSCOM and the member agencies prior to implementing the project. The vehicle ID is encoded immediately upon reception at the Operations Information Center (OIC). This policy avoided potential negative public reaction to the system.

BENEFITS

The principal advantage of TRANSMIT over other traffic surveillance techniques lies in its ability to identify vehicles at successive reader locations, which provides the basis for the TRANSMIT system to determine real-time estimates of the space mean speed, link and path travel time. As more and more of the Metropolitan New York City region is equipped with the E-ZPass system, the benefits of the TRANSMIT system will increase.

The current and projected benefits of the TRANSMIT system include the following:

- Automated incident detection;
- Traffic flow parameter estimation (link travel time and space mean speed);
- Vehicle position estimation and tracking;
- Path travel time estimation;
- Origin/Destination (O/D) matrix direct estimation; and
- Traffic volume estimation.

Other future beneficial applications could include:

- Assisting with the development of strategic and/or tactical measures to reduce the
occurrence or duration of incidents;
• Assessing the effectiveness of implemented traffic management strategies;
• Measuring the impact of diversion messages on traffic flow;
• Increasing agency understanding of how their systems operate on a daily and hourly basis, by providing objective data;
• Transit and vehicle fleet management; and/or
• Helping facilitate freight movement through automated truck clearance and related uses.

TRANSFERABILITY TO NEW YORK MPOS

The MPO transportation planning process could benefit in a very real way from the TRANSMIT system, particularly if it becomes a model for similar installations in New York State and elsewhere. For example, the availability of data in smaller time intervals provides MPOs with additional opportunities to use microscopic simulation in evaluating various transportation projects. Further, TRANSMIT may enhance MPOs’ ability to conduct incident and delay analyses. An expanded TRANSMIT system that covers a large geographic area (e.g., entire metropolitan area) could become an important source of O/D data for the entire metropolitan transportation network.

Future uses of TRANSMIT and its information that would be particularly useful to MPOs could include:

• Determining travel patterns with origin-destination data
• Estimating traffic volumes to identify problem locations
• Assisting with the development of strategic and/or tactical measures to reduce the occurrence or duration of incidents
• Assessing the effectiveness of implemented traffic management strategies
• Measuring the impact of diversion messages on traffic flow

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Prospective Application:
Tompkins Consolidated Area Transit Fare and Passenger Data Collection System

AGENCIES INVOLVED:

- Tompkins Consolidated Area Transit System (TCATS)

TECHNOLOGIES/PRACTICES UTILIZED:

- Electronic fare collection, ridership data collection.

DESCRIPTION AND PURPOSE OF APPLICATION

TCATS installed a fare and passenger data collection system developed by Wayfarer Transit Systems (www.wayfarer.co.uk) in May 2001. The system includes electronic ticket machines (Figure 1) and magnetic card validators (Figure 2) to enable electronic fare payment by transit riders and for automated collection of passenger ridership data. This equipment was installed in all 70 fixed route vehicles (passenger vans and both large and small buses) in TCATS fleet.

The system provides TCATS with transfer issuing capabilities, along with the magnetic card validators for validation of pre-paid tickets such as time-based passes, multi-trip tickets, and, eventually, stored value cards.

Data collected from the vehicle devices are transferred to depot computers located in the garage facilities operated by TCATS and private service contractor facilities via infra-red communications. Data is then downloaded to TCATS main office computers from the depot computers via dial-up modem connections. The system also includes a point of sale machine, which allows the agency to program the fare structure onto the magnetic media issued for passes and the various ticket purchase packages.

Passenger data is encoded in one of two ways. Whenever a passenger enters the bus, the driver can press a button connected to electronic ticket machine corresponding to traveler classification (student, multi-trip pass, etc.). Since the system includes a GPS antenna and receiver on every bus, this passenger count/classification data can be correlated with boarding locations. Alternatively, if the passenger possesses a magnetic payment card, the card will transmit the traveler classification data automatically. In either case, the data is electronically stored and transferred to the agencies’ central computers automatically, with no human intervention.

TCATS is exploring the development of contactless smart cards which would be integrated with the Cornell University ID card. This would be a major benefit to the data collection process since 65% of all TCATS riders are affiliated with the University.

The current system provides location information between 2 time points. Wayfarer, TCATS vendor is working on enhancing the system so that passenger boarding information can be geo-located to specific bus stops and overlaid on GIS map networks.
TCATS is also considering providing an incentive to patrons that would allow the agency to collect data on passenger destinations. This would allow TCATS to develop trip length survey data to support data requirements for a National transit database.

![Wayfarer Magnetic Card Validator](image)

**Figure 2**

MPO Participation / Data Use
Up until this point, involvement by the MPO (Ithaca-Tompkins County Transportation Council (ITCTC)) has been limited to endorsing and approving TCATS capital operating activities as part of the TIP.

TCATS has expressed a willingness to share the passenger data collected through its Wayfarer system. Passenger loading data is regularly downloaded into Access databases. As noted earlier, the information includes time and location of boardings. At a minimum, the MPO could use the monthly class summary data prepared by TCATS to validate its mode choice model and evaluate multi-modal corridor alternatives.

**IMPLEMENTATION CONSIDERATIONS ISSUES**
The agency used 5307 Transit Funds for the project. The cost of the system was less than $500,000 (about $6,700 per bus).

**POTENTIAL BENEFITS**
The benefits to TCATS are dramatic. Previously, drivers had to count riders by category using 15 different counters. At the end of their shift, they would manually transfer the data to trip sheets. Trip sheet data would then be manually coded into databases, a process which took approximately 3 hours per day. The Wayfarer system has eliminated several steps. Ridership data is collected either by drivers pressing a button on an electronic ticket machine or by passengers themselves when they enter magnetic media into a magnetic card validator. The data is recorded electronically on a data storage module.

Secondly, since TCATS has installed GPS receivers as part of this project, if the agency decides to deploy automatic vehicle location systems in the future, they can take advantage of the existing GPS hardware.

Thirdly the system is used to verify bus arrival times and ultimately will provide the foundation for the real-time bus arrival system envisioned by the agency.

**TRANSFERABILITY TO NEW YORK MPOS**

In addition to TCATS, the Oneonta Public Transit System is also using the Wayfarer system. Other transit operators in the state have expressed interest in TCATS’ technology. TCATS is willing to share the benefit of its experience from the project as well as any documents it has, including its bid document and the subsequent contract documents.

TCATS is also willing to share any of its data with other systems or MPO’s who might be interested in taking a look at it. The database is in Access, and is readily accessible to anyone with knowledge in the software.

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**Prospective Application:**
Capital District Transportation Authority Automated Vehicle Location (AVL)-based Congestion & Incident Information

**AGENCIES INVOLVED:**
- Lead: Capital District Transportation Authority (CDTA)
- NYSDOT
- Cities of Albany and Schenectady
- Capital District Transportation Committee (CDTC)
- FHWA

**TECHNOLOGIES/PRACTICES UTILIZED:**
- Use of archived transit operations and performance data
- Use of freeway and arterial incident data

**DESCRIPTION AND PURPOSE OF APPLICATION**
CDTA, the Albany metropolitan region’s transit operator, is implementing a new Mobile Data Communication System (MDCS) for use in operation of its public transportation services. The MDSC includes installation of new GPS and radio receivers in all buses and at CDTA operations facilities. The goals of the system are to:

- Replace the existing and aging communication system;
- Provide real-time location of vehicles in route;
- Improve performance times of each vehicle and to provide CDTA with quantitative data to evaluate overall system performance;
- Improve traffic safety of the system;
- To coordinate with (interface with) Traffic Signal Priority System on Route 5 between the City of Albany and City of Schenectady and improve bus service performance along this route.

CTDA’s entire fleet, including all revenue and non-revenue vehicles, paratransit buses and demand-responsive shuttles, are being instrumented. In addition, all 4,000 bus stops in the system are being geocoded and precisely located for Transit System Priority applications. If a bus is running late, the late bus will be allotted additional green time or shortened red time on any of the traffic signals. If the bus is on time, no impact on traffic signals will occur.

TMC-dispatched “HELP” trucks are also receiving GPS locators that will appear on the MCDS display. This will allow for more efficient dispatch for incident response on the major freeways.

The MDSC will be linked directly into a computer terminal at the Albany area traffic management center (TMC). The terminal, which will allow the TMC read-only access with some basic queries, will display a regional map which will show, in real-time, different shaped dots for CDTA revenue vehicles, supervisor vehicles, etc. For revenue vehicles, the dot’s color will indicate its on-time status (green for on-time, red for late). In this way, the TMC personnel can use the MDSC map display for additional information in support of managing traffic on the region’s arterial system/freeway system.

In addition, the on-board MDSC system will have a keypad for drivers to use to report incidents to CDTA dispatchers through a set of "canned"
codes. Drivers will be able to specify that a non-bus traffic accident is causing that bus’s late running. Whenever that “accident” code is specified, a new “incident window” will automatically open on the CDTA computer display at the TMC.

**On-Bus Mobile Data Terminal & TMC Incident Display**

### MPO Participation

The region’s MPO, CDTC, has been involved in the planning of this system from the beginning. CDTC staff has actively participated in the project oversight committee and was involved in planning, design, specification development, and vendor selection. It is anticipated that a great deal of archived transit operations data will become available for MPO use through this project, and CDTA is hopeful that the MPO can apply those data in the regional planning process.

### Implementation Considerations/Issues

Funding of the overall AVL project involved lengthy negotiations with key players, including the state of New York and the large cities (Albany and Schenectady) in the Route 5 corridor. CDTA believes this is a project that required multi-agency interaction and cooperation to achieve success. The project was conceived in a way that benefited the maximum possible number of entities. For example, the two major cities will have new, state-of-the-art signals in the Route 5 corridor. Similarly, the regional TMC will benefit from new and valuable congestion and incident data flows. By looking at how the overall project could be enhanced to provide tangible benefits in various, relatively inexpensive ways, the buy-in of key entities was made much easier.

The Route 5 corridor project is a collaborative effort involving CDTA, NYSDOT, CDTC, and the cities of Albany and Schenectady. This is an 18-mile transportation corridor with 72 signalized intersections, 32 of which will be upgraded for use with the MDCS. The Route 5 corridor transit signal priority project is budgeted at $8.5 million. CDTA expects implementation of this initial phase to be complete in about two years.

This funding is coming from FTA Section 5307 funds and Congestion Mitigation and Air Quality (CMAQ) program funds, as well as non-federal matching funds from the state and local governments.

### Potential Benefits

CDTA officials believe that the archived data available to CDTC and others through the MDCS implement many benefits for the MPO planning process. Particular benefits could be realized in analyses and planning related to assessing relationships between incidents and congestion. For example, the MDCS offers the regional TMC the opportunity to use buses and related transit vehicles as real-time “congestion probes” on the regional arterial network. The CDTC should have access to processed data from this source, which may prove very valuable in CMS planning and transit corridor planning.

### Transferability to New York MPOS

To the extent that other regional transit systems are or will become equipped with AVL systems, similar transit operations data archiving
applications could be developed throughout the state and used by MPOs. The involvement of the MPO in planning and decision-making related to AVL design and implementation may be critical to ensure planning data requirements can be met through an archiving function.

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“Data Mining” Application: NYSDOT Region 1 (Capital District) ATMS Data System

AGENCIES INVOLVED:
- New York Department of Transportation’s Traffic Management Center (TMC), Region 1
- Capital District Transportation Committee (CDTC), Albany, New York

TECHNOLOGIES/PRACTICES ILLUSTRATED
- Use of archived traffic detection data.

DESCRIPTION AND PURPOSE OF DATA
The Transportation Management Center (TMC) is a joint operation between NYSDOT Region 1 and the NY State Police. The TMC opened in 1999 with the mission of applying intelligent transportation systems (ITS) management of the Northway (I-87 north of exit 24 Albany and south of exit 12 Malta). The unit has since expanded the miles of roads under its supervision to include most of the interstate network within the Capital District (I-787, the non-toll portions of I-90, and NY Route 7). The TMC also logs incidents (collisions, flats, stalled vehicles) occurring on these roadways via Highway Emergency Local Patrol (HELP) program, cellular E-911 calls to the State Police, and roving NYSDOT maintenance units.

The TMC’s ITS infrastructure includes inductive loop detectors, roadside cameras, permanent and portable variable message signs, and highway advisory radio communications. Loop detectors are imbedded within the pavement at multiple locations on the TMC managed roadways. Coverage is nearly complete along all roadways under the TMC’s supervision (see Figure 1: NYSDOT Traffic Detector Locations).

Data from the loop detectors, still photos from roadside cameras, and incident data reported to the TMC operators are all managed using a single, automated transportation management system (ATMS) software package called MIST. MIST was developed by PB Farradyne and uses a Sybase relational database management system.

Traffic management modules within MIST are used to record traffic volumes, occupancy (percentage of time a vehicle is in contact with a loop detector), and speed data generated by the loop detectors. MIST aggregates traffic data recorded every 30 seconds into 15-minute summaries and stores this data for retrieval by users.

Unlike the automated process of collecting and summarizing traffic flow data, incident data is
manually recorded as each event occurs. Within a MIST module, TMC traffic operators create a single database record for each accident by interactively clicking the approximate location of the incident on an on-screen map. MIST then geocodes this point against a NYSDOT base map and generates latitude and longitudinal values in the database record. The operators then enter additional data including the status of the incident (active vs. terminated), start time, duration, type (e.g. accident, construction, road closure, disabled vehicle), and number of lanes blocked.

NYSDOT aggregates data from MIST on a monthly basis as part of federal data reporting requirements for traffic monitoring. This data is distributed to the appropriate USDOT office and, upon request, to the local MPO (see the following sections for more detail on applications of this data for MPOs).

Currently, TMC operators do not heavily utilize aggregated MIST data. NYSDOT planners may use aggregate data to review congestion and traffic incidents at past public events within Albany to assist in the planning of future events. Planners will also review archival information to determine peak congestion times on specific road segments when scheduling construction and maintenance projects. Mostly, the advantage of MIST to the TMC is the ability of the software to manage real time data efficiently.

MIST is not unique to the Region 1 TMC. Each NYSDOT region may choose the ATMS that best fits its needs. Currently, the MIST software is used by Region 4 and may be adopted within Region 3. Other NYSDOT regions may use systems similar to MIST such as the ATMS produced by TRW. It is not clear whether any of the regional TMCs compile aggregated ATMS datasets for internal use or for data sharing with MPO’s.

ORGANIZATIONAL STRUCTURE / INSTITUTIONAL ARRANGEMENTS FOR APPLICATIONS

No major impediment exists between NYSDOT Region 1 and use of the aggregated MIST data by the local MPO, the Capital District Transportation Committee (CDTC). NYSDOT is generally willing to cooperate with CDTC requests for data. In fact, CDTC has dial up access into the MIST traffic management system via a MIST client installed on a CDTC computer. However, this real-time data link does not prove useful to MPO’s planning processes, which typically require data of a longitudinal nature.

The CDTC can benefit from two distinct components of MIST data aggregated over a period of one month or more: (1) traffic statistics and; (2) accident locations.

Timely information on traffic speed, volume, and congestion may prove useful for incorporation into MPO traffic models or congestion management projects. The drawback is the ability of the MPO to reference the detector IDs and the corresponding traffic data geographically. TMC staff do not yet record the geographic location of the loop detectors for inclusion as field values in MIST. However, information does exist within the Region 1 office to reference each detector ID to a NYSDOT mile marker. Reference markers are located every 1/10th of mile along the roadways. Using this reference distance of approximately 528 feet it is possible to generate an equivalency table to join detector IDs to a GIS point layer of mile markers (maintained by NYSDOT) for analysis within a GIS.

With regard to accident data, although the CDTC can obtain crash data for highways and interstates in the region from NYSDOT, this data tends to be almost two years old at the time of its distribution. Consequently, a MIST archive of accidents on the Capital District’s interstates and NY Route 7, produced on a monthly basis, may prove useful to planning analyses, which require data that are more current.

DATA QUALITY / EDITING

The only issue of data quality is that of the accuracy of the accident locations recorded in MIST. The TMC does not have a need for a highly accurate accounting of accident locations. What is more important to the unit is the
efficiency by which a response to an accident is initiated by the TMC. As such, TMC operators use a coarsely scaled base map on which to input the location of an accident on the interstates or NY Route 7.

A review of the latitude and longitude coordinate values indicates that there is limited precision of six digits or less. As a result, some accident locations may geocode over top one another although they occurred hundreds of yards apart. This would qualify the accident location values in MIST as having gross accuracy with limited application to discrete analysis and mapping at large scales.

As mentioned above, the MIST database does not maintain the exact spatial coordinates for each of the loop detectors. In order to analyze the transit statistics (volume, speed, and occupancy) within a GIS, the MPO must acquire the coordinates of each or relate the detector IDs to an existing GIS layer of mile marker point features. NYSDOT Region 1 may accomplish the former in the summer of 2002. The TMC plans to inventory all of its stationary ITS equipment using a GPS for the benefits of enhanced equipment management and analysis. The latter process would require the creation of equivalency table matching detector IDs to the nearest mile marker.

IMPLEMENTATION ISSUES (E.G. FUNDING, DATA PRIVACY/SECURITY, INSTITUTIONAL, PERSONNEL/TRAINING, ETC.)

CDTC may use the aggregated MIST data with minimal implementation barriers. For example, the MPO can easily geocode the accident data using their GIS software and latitude and longitude values stored within each accident record. At the present time, representing traffic statistics within a GIS is more problematic as the creation or acquisition of a geographic reference for each loop detector is required.

Use of aggregated MIST data leverages the MPO’s existing software (ArcView GIS and Microsoft Access) and does not require any additional expenditures. CDTC staff must only possess the requisite GIS knowledge to work with large, external databases.

BENEFITS

This application may provide the MPO with timely and accurate data on traffic volumes, speeds, and delays on interstates and NY Route 7 within the Capital District. In addition, current incident data on these roadways could be analyzed by type, duration, and time of occurrence.

TRANSFERABILITY TO NEW YORK MPO’S

Very high for those regions that have TMC’s with MIST or similar ATMS software applications. NYSDOT Region 4 (Rochester) is constructing its TMC and plans on using MIST. MIST software is licensed for use by NYSDOT offices throughout the state.

Each Regional TMC has the potential to export aggregated traffic and accident data for use by MPOs from its MIST or ATMS equivalent. In addition to Albany - Buffalo, Lower Hudson Valley, New York City, and Long Island and Rochester (under design) all have ATMS software.

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