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TRANSCOM/TRANSMIT CASE STUDY

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This operational test case study is one of six performed in response to a Volpe National Transportation Systems Center technical task directive (TTD) to Science Applications International Corporation (SAIC) entitled, “IVHS Institutional Issues and Case Studies.” ADVANCE, Advantage I-75, HELP/Crescent, TRANSCOM/TRANSMIT, TravTek, and Westchester Commuter Central were the subjects of the six case studies. The case studies were performed to determine (1) institutional issues and legal impediments encountered during the operational test, (2) the point in life cycle of the operational test at which the impediments occurred, (3) how project partners and participants overcame impediments, and (4) lessons that were learned that are applicable to future deployments of IVHS products and services. This case study also describes the operational test and documents its history. Interviews for this case study were conducted during the summer of 1993.

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Preface

This case study on Transportation Operations Coordinating Committee's (TRANSCOM) IVHS operational field test, TRANSCOM's System for Managing Incidents and Traffic (TRANSMIT), is one of six performed in response to a Volpe National Transportation Systems Center technical task directive (TTD) to Science Applications International Corporation (SAIC) entitled, "IVHS Institutional Issues and Case Studies." Other case studies were performed on the following projects: ADVANCE; Advantage I-75; Westchester Commuter Central; TravTek; and HELP/Crescent. SAIC conducted interviews and case studies of the ADVANCE, HELP/Crescent, TRANSCOM/TRANSMIT, and Westchester Commuter Central projects, and is leading the production of a separate "Analysis and Lessons Learned" report that synthesizes results from all six case studies. Cambridge Systematics, Incorporated (CSI), SAIC's primary subcontractor for this TTD, assisted with interviews of ADVANCE personnel and independently conducted interviews and case studies for the Advantage I-75 and TravTek programs. CSI is also assisting with production of the Analysis and Lessons Learned Report.

"Intelligent Vehicle-Highway Systems" (IVHS) is part of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 that formed the basis for the Department of Transportation's (DOT) initiative to solicit proposals for operational field tests of IVHS products and services. The goals of the DOT IVHS Program are:

1. To improve the safety of surface transportation.

2. To increase the capacity and operational efficiency of the surface transportation system.

3. To enhance personal mobility and the convenience and comfort of the surface transportation system.

4. To reduce the environmental and energy impacts of surface transportation.

5. To enhance the present and future productivity of individuals, organizations, and the economy as a whole.

6. To create an environment in which the development and deployment of IVHS can flourish. (DOT, 1992)

In response to the ISTEA's emphasis upon meeting both the technical and non-technical challenges affecting the achievement of the above goals, the Federal Highway Administration developed the "1992 Intelligent Vehicle Highway Systems Institutional Issues (Non-technical

Constraints) Program." As part of this program, the Volpe Center TTD has initiated the performance of six case studies with the primary purpose of answering four questions:

1. What institutional and legal impediments were encountered establishing partnerships and deploying IVHS services and products during the operational test?

2. Where in the life cycle of the operational test did these impediments occur?

3. How were these impediments overcome?

4. What lessons were learned in dealing with these impediments that can be applied to future deployments of IVHS products and services?

The secondary purpose of the case studies is to describe the operational test and document its history.

Information to support the development of the case studies included available documents on each program as well as interview notes and summaries based on an interview protocol especially created for this contract. A detailed description of the standardized procedures and methods followed during the conduct of the interviews is documented within a "Detailed Field Guide," produced as a separate deliverable of this TTD. A list of agencies interviewed is provided as Appendix A, and a bibliography of key references to the project being studied is provided as Appendix B.

Unlike many case studies where projects have been deployed and positive and negative lessons were learned after the total success of the system could be assessed, this case study report is on a project that is only in the initial stages of commercial deployment. Therefore, interviews represent a snapshot in time during the progress of the project and issues identified at the time of the interviews may only be temporary.

Interviews for this case study were performed during the summer of 1993. An attempt was made to use corroborating stories as evidence of the accuracy and/or significance of issues raised. However, as with any report heavily dependent upon interviews, the accuracy and completeness are only as good as the accuracy and completeness of personal accounts told to and recorded by the interviewers. To help ensure accuracy and a balanced view of the issues, the TRANSCOM/TRANSMIT program manager received a draft of the case study report for his project and was given the opportunity to comment. These comments were received and the author has responded to them in this version. Nevertheless, the author takes sole responsibility for the accounts portrayed in the case study reports.

As with any case study or lessons learned report, authors are subject to criticism that their evaluations either seek out the negative aspects with little emphasis on positive lessons, or are incorrect, biased, or lay blame. It is with great sensitivity to these issues that this case study report was written. Postured to identify issues, the authors acknowledge the fact that interviews were oriented toward finding problems; however, an attempt to identify positive lessons was

also made, and the results are reported. The intent of the authors was to avoid inaccuracies, bias, or blame, and to provide helpful hints to others who are about to embark on similar initiatives.

Separate from this case study, the "Analysis and Lessons Learned Report" will provide conclusions and observations about the institutional issues identified across the six case studies. It will also provide lessons that can be applied to the deployment of IVHS products and services and recommendations regarding: new procedures and programs; the relative magnitude of barriers and respective priorities for their amelioration; and, training requirements for those entering into IVHS programs.

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Of special note is the expert consultation and review provided to this effort by a specially formed, "Institutional Barriers Advisory Group." This group, chaired by Mr. John Mason of SAIC, consisted of Dr. Christopher J. Hill of Castle Rock Consultants, Mr. Lance Grenzeback of Cambridge Systematics, and Mr. Kenneth Orski of Urban Mobility Corporation. The contributions of this group added greatly to the insight of the interviewers and writers.

The authors would gratefully like to acknowledge the assistance rendered by the TRANSCOM/TRANSMIT program manager and the partners. Also, special thanks go to all of those who participated in the interview process and contributed such thoughtful insights which can be valued by others facing similar tasks. Finally, many thanks go to Mr. Allan DeBlasio from the Volpe Center for his guidance, understanding, and support.

1.0 SUMMARY

The Transportation Operations Coordinating Committee (TRANSCOM) is a coalition of 15 traffic, transit, and police agencies in the New York, New Jersey, and Connecticut metropolitan area. It was created with a mission to provide a means for establishing a regional cooperative approach to transportation management and improve inter-agency response to transportation incidents. TRANSCOM's Operations Information Center (OIC) sends out notifications on incidents simultaneously and selectively on its network of 90 highway, police and transit agencies, as well as to four media traffic services. By means of an alpha-numeric pager system and telephone and fax communications, the OIC serves as a central point of communication, linking all of the facilities in the network. The OIC operates 24 hours a day/365 days a year.

TRANSCOM's IVHS operational field test, the TRANSCOM System for Managing Incidents and Traffic (TRANSMIT), is testing Electronic Toll and Traffic Management (ETTM) technologies for collecting real-time traffic information, such as speed and travel time, and for detecting incidents. The TRANSMIT project will use the same electronic toll collection hardware that is being tested, and eventually implemented, by seven toll agencies in the region.

In order to understand the institutional issues encountered in TRANSCOM/TRANSMIT as well as the project's history, milestones, and accomplishments, interviews with a number of key personnel were conducted. The interviewees were selected using an approach which identified those participants most often recommended by project participants. Final selection of the twelve interviewees was made to gain a representative sample of interviewees across dimensions such as length of involvement in the program, role in the program, etc.

Interviewees were contacted, and one-on-one interviews were scheduled and conducted. The interviews followed a structured protocol and the collected data were summarized, integrated, and interpreted. These data are the source of the opinions, perceptions, and views that form the body of this report.

For the most part, the interviewees were the leaders, initiators, and champions of TRANSCOM and the TRANSMIT project. Most have been with the project since its inception and are very knowledgeable about the issues that have been encountered, overcome, or accommodated since the planning phase. Their various roles have included the program manager, members of the TRANSCOM Technology and Operations Committee and the TRANSMIT Steering Committee, FHWA focal points, and project consultants.

These interviewees saw a number of institutional issues as having been early barriers to TRANSCOM during its formative stage and to the TRANSMIT project. The major impact of the barriers was resultant delays in the project. Briefly, the major issues and remedial strategies were:

- TRANSCOM was viewed by many of its members with suspicion and mistrust during its early formative years.

  Issue: There was uncertainty concerning the role of this new regional organization vis-a-vis existing organizational entities. Some entities feared that TRANSCOM ultimately would usurp some of their operating responsibilities.

  Strategy: In its charter agreement, TRANSCOM made it clear that it had no operating authority - it was simply a clearinghouse for information.

- Initially, the TRANSMIT project lacked state DOT middle-level support.

  Issue: While the Transportation Commissioner personally supported the TRANSMIT project, the word did not always filter down, particularly to those in other departments such as financial, legal, and engineering.

  Strategy: Communications was the answer. The problem was identified and discussed at a TRANSCOM meeting and then with senior NJDOT officials. The strategy was to get the right people together in a central location and work things out face-to-face. The program now has good support from both upper and middle level people.

- Different administrative procedures have caused schedule delays.

  Issue: FHWA funds pass through NJDOT to the Port Authority. Each agency has its own administrative requirements - rules, regulations, and procedures - for contract procurement, review processes, accounting, etc. The various agencies were not familiar with all of the administrative requirements of the other organizations, thus leading to potential conflicts, misunderstandings, and administrative burdens for some of the partners.

  Strategy: Administrative requirements are still a burden. The situation has improved through the organizations learning the procedures through experience.

- Inefficiency of the TRANSCOM funding mechanism

  Issue: Federal funds pass through NJDOT to the Port Authority which provides financial support, including contract administration services to TRANSCOM. The state intermediary role has resulted in schedule delays.

  Strategy: TRANSCOM expressed interest in having FHWA funding pass directly to the Port Authority. A FHWA representative indicated that this would not necessarily speed up the process, but federal monies could pass through the state quickly. While progress has been made through face-to-face communication, the process may still require improvement.

- Significant change in the operational test venue

  Issue: A delay in the selection of an E-ZPass technology caused TRANSMIT planners to relocate the operational test area from the Staten Island corridor to Northern Jersey (Garden State Parkway) and Rockland County, NY (NY Thruway). New plans and contracts were required. There was concern because two different states and toll authorities with different specifications were involved.

  Strategy: Communication, enabled by the TRANSCOM organization infrastructure, was the answer. A new test site decision was made based upon what was best for the region, rather than individual agencies. Implementation of the decision was facilitated by providing the system integration contractor with turn-key responsibilities.

Based on the findings of this effort, five broad, general lessons learned were identified. Discussed more fully in Section V., they include:

1) Before an IVHS operational test is begun, a cooperative forum consisting of members from all the organizations involved should be in place.

2) Regional transportation agencies, such as TRANSCOM, can not implement IVHS projects without the support of not only the state Transportation Commissioner, but also the Treasurer, Controller, and Attorney General and their staffs.

3) The project manager is key. The PM must be good at communication and collaboration, be very detail-oriented, and be totally dedicated to the job.

4) Administrative requirements are complex and difficult to understand. Project managers need an information packet that identifies the various administrative requirements and those compliance actions required of the project manager.

5) Funding mechanisms should be as simple, direct, and efficient as possible. A cost/benefit assessment may be needed to determine whether FHWA money should be passed directly to an entity, rather than through a state.

2.0 PROJECT DESCRIPTION

While all of the transportation systems in the major metropolitan regions of the U.S. have to contend with inter-jurisdictional issues in managing traffic, none compare to the greater New York/New Jersey metropolitan region in the sheer magnitude and complexity of the jurisdictions involved. Toll roads, bridges and tunnels stretch across four states: Connecticut, New York, New Jersey, and Pennsylvania. These roads serve multiple commuter markets from the densely urban to rural in nature. Numerous departments of transportation, toll authorities, transit agencies and state, county and municipal police agencies play a role in managing some aspect the transportation system. Further, the toll authorities in the region process on the order of 1.5 billion toll transactions annually, or approximately 4 million daily. This represents over 37% of all U.S. toll transactions.

With a view toward developing an interagency approach to the transportation problems in the region, two separate but interdependent coalitions evolved during the mid-1980s, TRANSCOM and an interagency group (IAG) for a regional electronic toll collection (ETC) system. The ETC system that is being procured and marketed for the region is now known as E-ZPass.

TRANSCOM's IVHS operational field test, the TRANSCOM System for Managing Incidents and Traffic (TRANSMIT), is testing electronic toll and traffic management (ETTM) technologies for collecting real-time traffic information, such as speed and travel time, and for detecting incidents. The TRANSMIT project will use the same electronic toll collection hardware as the E-ZPass program. Although this report focuses on TRANSMIT, an understanding of TRANSCOM and E-ZPass is necessary due to the interrelationships of these programs. The following sections describe these inter-active, yet separate, initiatives.

2.1 TRANSCOM Background and Description

The Transportation Operations Coordinating Committee (TRANSCOM) is a coalition of 15 traffic, transit, and police agencies in the New York, New Jersey, and Connecticut metropolitan areas. It was created with a mission to provide a means for establishing a regional cooperative approach to transportation management and improve inter-agency response to transportation incidents. Collectively, the TRANSCOM member agencies are responsible for the safe and efficient operation of 38 limited access highways consisting of over 6,000 lane miles, more than 2,000 miles of commuter rail track, thousands of trains and buses daily, 19 tunnels and bridges, three major airports, various port facilities, and three major bus terminals located in the 500 square-mile TRANSCOM network area.

The following 15 agencies staff and fund TRANSCOM:

- Connecticut Department of Transportation
- Metropolitan Transportation Authority
- New Jersey Department of Transportation
- New Jersey Highway Authority
- New Jersey State Police
- New Jersey Transit Corporation
- New Jersey Turnpike Authority
- New York City Department of Transportation
- New York State Department of Transportation
- New York State Police
- New York State Thruway Authority
- Palisades Interstate Park Commission
- Port Authority of New York and New Jersey (PA)
- Port Authority Trans-Hudson Corporation (PATH).
- Triborough Bridge and Tunnel Authority

The initial agreement covered the period from January 1, 1986, through June 30, 1989. The current agreement covers the period through December 31, 1993 and defines TRANSCOM's mission, organizational structure, business activities, and a cost sharing plan using a sliding scale for contributions.

TRANSCOM Missions

According to this cooperative agreement, TRANSCOM's activities fall into two distinct mission categories: 1) base operations, and 2) technology development.

Base operations are those activities undertaken by TRANSCOM on a routine basis in carrying out its regional information coordination mission. TRANSCOM's base operations budget for 1993 is $1,860,353, which is apportioned among its 15 members. A member's cost share can be paid either in cash or, with the approval of the TRANSCOM manager, in in-kind services. The services of an employee who is on loan to TRANSCOM from a member agency is an example of an in-kind service.

Operational tests, as defined by TRANSCOM's multi-year agreement, are activities relating to new programs and testing and implementation of new technologies to improve TRANSCOM's base operations mission capabilities. Toward this objective, the agreement provides TRANSCOM with the mission to secure federal and private sector grants to fund technology demonstrations benefiting the region. Since federal fiscal year (FFY) 1990, TRANSCOM has secured $11,400,000 in FHWA funds, including $4.2 million for an operational test named TRANSMIT (TRANSCOM's System for Managing Incidents and Traffic), in support of its IVHS operational testing activities.

TRANSCOM Organizational Structure

TRANSCOM is organized and administered as follows:

- The TRANSCOM Executive Committee provides overall program direction and policy guidance. Its 15 members are the chief executive officers of the major transportation and transit agencies and the state police from New Jersey and New York. A unanimous affirmative vote of all member is required to authorize any action or determination. It meets on an annual basis.

- The Technology and Operations Committee consists of the top management personnel from the 15 member agencies. They make recommendations to the Executive Committee on budget, operating, and technology issues. Other committees, such as the Budget Committee, the Strategic Planning Committee, and the Transit Steering Committee, are formed based on the needs determined by the Technology and Operations Committee.

- A General Manager oversees and directs the day-to-day management and operation of TRANSCOM.

- TRANSCOM staff are provided by member agencies. Personnel on loan to TRANSCOM from member agencies are considered in-kind services and are provided in lieu of cash.

TRANSCOM Activities

In support of TRANSCOM's base operations activities and its mission to improve interagency response to traffic incidents, the coalition has a number of ongoing programs:

Incident Notification: TRANSCOM's Operations Information Center (OIC) sends out notifications on incidents simultaneously and selectively on its network of 90 highway, police and transit agencies, as well as to four media traffic services. By means of an alpha-numeric pager system and telephone and fax communications, the OIC serves as a central point of communication, linking all of the facilities in the network. The OIC operates 24 hours a day/365 days a year.

Incident Management: TRANSCOM has formed inter-agency incident management teams in six major highway corridors in the region. These teams plan the actions to be taken by agencies to handle traffic congestion resulting from a full or partial roadway closure, establish pre-approved detour routes, and determine where variable message signs (VMS) and highway advisory radio (HAR) should be used.

Construction Coordination: TRANSCOM produces a weekly telefax report of all major traffic and transit construction and traffic-generating events. It also has an inter-agency

database of construction activities, thus bringing modifications to project schedules when conflicts exist.

Resource Development: TRANSCOM is increasing private sector funding and support of its activities. In addition to providing current traffic situation reports, TRANSCOM issues weekly construction and road closing reports to over 200 recipients, including member agencies, news agencies, and area businesses and carriers. TRANSCOM is exploring the effectiveness of tying incident information directly into major employers as well.

Transit Development: TRANSCOM received a grant from Federal Transit Authority (FTA) to do incident management planning for a transit facility in New York, and a corresponding grant has recently been received from New Jersey. Based upon this work, the transit agencies in both states are now directly involved in TRANSCOM day-to-day incident notification and management activities.

2.2 E-ZPass Background and Description

During the mid-1980s, an interagency technical committee was formed to develop system standards for electronic toll collection (ETC) for the region. In 1990, toll agency managers determined that the successful implementation of an ETC system for the region required a regional management structure. Since 1990, an executive committee consisting of agency heads has met quarterly to coordinate the work of various subcommittees ranging from technical to marketing.

In 1991, the agencies jointly adopted an interagency policy statement that endorsed a plan to procure a unified and compatible system of tags and readers. The plan sought to ensure that one automatic vehicle identification (AVI) toll tag could be used for travel throughout the entire region.

To test and select an electronic toll collection (ETC) system, seven toll agencies formed the E-ZPass Policy and Technology Committee:

- New Jersey Highway Authority
- New Jersey Turnpike Authority
- New York State Thruway Authority
- Pennsylvania Turnpike Authority
- Port Authority of New York
- South Jersey Transportation Authority, and
- Triborough Bridge and Tunnel Authority.

An E-ZPass technology issue which was extensively debated concerned the question of purchasing a read-only or a read-write system. The toll authorities, with closed toll systems, desired read-write technology so they could track entry as well as exit points of their customers. Additionally, all recognized that if an ETC system was to migrate forward to the communications methods required for advanced traffic management and traffic information

systems, the electronic tags must be capable of two-way communications; hence, the selection committee expressed a strong preference for read-write technology.

The E-ZPass system for the region is being procured in three phases. The first phase is the selection of a manufacturer of the tag and read-write technology. The second phase is the installation and maintenance of the systems at toll collection sites of each individual toll authority, and the third phase is the creation and operation of a regional clearinghouse. The 1991 plan called for Phase I (selection of a manufacturer) to be completed by the end of 1992 and the entire region to be wired by mid 1995. However, because vendor-proposed technologies did not meet E-ZPass specifications, a Phase I decision was postponed until the end of 1993.

2.3 TRANSMIT Background and Description

TRANSCOM, which is also involved with the E-ZPass effort, saw the benefits of building incident detection and congestion monitoring functions into the E-ZPass system. Additional readers could be installed along the highway to build upon the E-ZPass information base and provide TRANSCOM with regional incident detection and congestion management data. Vehicles participating in the E-ZPass system could be used as probes to detect congestion/incidents and assess such factors as vehicle speed and travel times.

If the operational test is successful, it would provide the region an extensive traffic surveillance system at an incremental increase over the cost of providing Electronic Toll and Traffic Management (ETTM) for toll collection only. Thus, two systems, E-ZPass and an Advanced Traffic Management System (ATMS), both of which are needed in the region, are being combined into one integrated system which should produce economies of scale, such as reduced hardware and software needs.

Further, given the integrated system proves successful, TRANSCOM planners envision an Advanced Traveller Information System (ATIS) follow-up project to relay information produced by the ATMS project directly to motorists in their vehicles.

With the interest and support of Sen. Frank Lautenberg (D-N.J.), federal funds were earmarked to TRANSCOM via the FFY90 Appropriations Bill to fund several IVHS initiatives to include required funds to investigate the feasibility and to design an ATMS operational test based on ETTM technology.

TRANSMIT Feasibility Study and Milestone Schedule

After an open solicitation, TRANSCOM let a contract in February 1992 to Farradyne Systems, Inc. to perform a two phase contract. Phase I was to determine the feasibility of the ETTM technology for performing the incident detection and congestion monitoring activities. If the ETTM technology was found feasible, the Phase II objective was to provide the final design of the preliminary system, including required software, integration specifics and plans,

management support, training of personnel in both the operations and maintenance of the system, and design evaluation. If the Phase I study rejected the feasibility of ETTM technology, Phase II objectives were to perform another feasibility study to determine the optimum technology for use in the region for congestion monitoring and incident detection.

The feasibility study was completed in January 1993. It endorsed the ETTM approach and provided a preliminary system design.

Planned future milestones are:

- Final System Design - December 1993
- Implementation - March 1993
- Evaluation - March 1995

Goals and Objectives

The objectives of the TRANSMIT project, as defined by the June 29, 1990 Work Plan are:

1. To design an Advanced Traffic Management System (ATMS) for the New Jersey-Staten Island corridor based on Automatic Vehicle Identification (AVI),

2. To install and implement this ATMS,

3. To evaluate the effectiveness of this installed ATMS on incident management in the corridor.

As an ATMS project, TRANSMIT also is working toward improved safety, reduced congestion, and improved environmental impact -- all operational goals of the national IVHS program.

Management Structure

The TRANSMIT Steering Committee oversees the TRANSMIT project. It consists of representatives from the FHWA, TRANSCOM, and the eight TRANSCOM agencies who operate the bridges and roads in the study area. It coordinates its work with the E-ZPass Policy and Technology Committee. The members of the TRANSMIT Steering Committee are:

- Federal Highway Administration
- New Jersey Department Of Transportation
- New Jersey Highway Authority
- New Jersey Turnpike Authority
- New York City Department of Transportation
- New York State Department of Transportation
- New York State Thruway Authority
- Port Authority of New York and New Jersey (PA)

- TRANSCOM (Project Manager) .....
- Triborough Bridge and Tunnel Authority

Funding

TRANSMIT is a FHWA sponsored IVHS operational test, with $4.2 million earmarked to the project since FFY 1990. TRANSCOM is providing a 20% local match ($750 thousand) for Federal monies earmarked to TRANSCOM since FFY 1992 ($3.6 million). The funding mechanism for TRANSCOM IVHS monies is from FHWA through New Jersey DOT to New York/New Jersey Port Authority who, acting as host agency for TRANSCOM, provides contract administration support.

Geographic Scope

As originally designed and documented in the feasibility study, the ETTM hardware was to be installed at approximately 1.5-mile intervals on 65 miles of roadway in a corridor from Staten Island to central New Jersey. The E-ZPass program delay in selecting a read-write technology, however, caused TRANSCOM to assess options and move the test site to a new location. While the three toll authorities in the Staten Island corridor decided to wait for E-ZPass read-write technology, the New York Thruway Authority opted to install their initial E-ZPass system using Amtech read-only technology and upgrade to read-write equipment once it becomes available. With a view of ensuring that full-objectives would be achieved with minimal slip in schedule, TRANSCOM's member agencies decided to move the test site to 15 miles of roadway in the Bergen County, NJ and Rockland County, NY corridor. The new test location will cover the northern five miles of the Garden State Parkway, as well as the New York State Thruway from the Spring Valley Toll Plaza to the Tappan Zee Bridge Toll Plaza.

Risks and Benefits to the Partners

There are potential risks and benefits for all the participants of the TRANSMIT operational test. If TRANSMIT is successful the region benefits from an extensive traffic surveillance system at an incremental increase over the cost of providing ETTM for toll collection only. Further, with the installation of an E-ZPASS read-write technology system, TRANSMIT could be expanded into a region-wide advanced traffic management and traveler information system. This expanded system potentially could be operated on revenue generated by providing traffic information within a fee structure. While the benefits of success are high, there are also risks.

For the FHWA, the risks are that substantial resources will be committed to evaluate the effectiveness of ETTM technology for incident management. Among the various traffic surveillance technologies, ETTM generally is considered expensive and less effective than other alternatives such as infrared technology. If the TRANSMIT operational test is unsuccessful, there will be no way to recoup the investment, and federal and state governments

could be subject to public criticism for an unwise or unnecessary expenditure of "tax payers'" dollars.

For TRANSCOM, there are potential risks both with success as well as with failure. The risks with failure are that TRANSCOM's reputation as a leader in the IVHS arena could suffer, potentially diminishing an IVHS leadership role for the future. Success, however, also has its risks. With an advanced traffic management system, some members might perceive that TRANSCOM would seek to expand its charter from traffic coordination into traffic management, thereby usurping individual member operational roles.

For the toll agencies, the risks concern the "big brother is watching," privacy issue and the enormous costs of a regional ETTM surveillance system. The privacy issue could have a backlash effect on the E-ZPASS program, resulting in reduced acceptance and lower usage. The cost of construction, operations and maintenance of a regional ETTM surveillance system will be very high. If the cost of the system outweighs the perceived benefits from the perspective of the public, there could be a great public outcry.

3.0 PAST AND PRESENT INSTITUTIONAL ISSUES

The focus of this section is on identifying past and present issues. For TRANSMIT, such issues apply to the planning and design/development phases. Currently, TRANSMIT is in the second part of a two phase design/development program, with the objective to finalize system design, including required software, system integration specifics, and evaluation design. The next section (Section 4.0) synthesizes opinions and projections regarding future impediments with particular consideration to deployment issues.

3.1 Organizational Issues and Findings

Some organizational factors were cited frequently by interviewees as being positive, facilitating factors, whereas others were an impediment to progress.

Inter-coalition coordination is facilitated by the practice of key players holding leadership positions simultaneously in several organizations/committees. For example, the TRANSCOM general manager is the chair of the I-95 Corridor Coalition Steering Committee. And a member of the TRANSCOM Technology and Operations Committee is a member of the TRANSMIT Steering Committee and the chair (June 1990 - June 1993) of the E-ZPass Policy and Technology Committee.

Inter-agency Communications

During its developing stage, TRANSCOM was viewed by some of its members with suspicion and mistrust. There was a fear that TRANSCOM, a regionally based organization, would ultimately reduce or take away the operating authority of its members. The fact that the larger Port Authority of New York and New Jersey had a lead coordinating role in TRANSCOM reinforced this perception by the smaller, less influential member agencies. Three factors were cited as contributing to the abatement of this fear and promoting a measure of trust. These factors were:

1. The TRANSCOM cooperative agreement (1991) defined TRANSCOM's regional role as a clearinghouse for information and a forum for communications with no operating authority.

2. Federal IVHS funds provided a unifying force for member agencies to bond together and speak with a single voice.

3. Dedicated professionals who recognized the benefits of working together and the opportunities provided by the TRANSCOM forum were assigned to achieve regional goals.

Now, TRANSCOM is viewed as providing a positive, unifying force for the region and a forum for inter-agency communication. In support of this view, several persons cited the following example. Recall that the TRANSMIT operational test was designed to "piggyback" on the E-ZPASS ETTM installation in the Staten Island corridor. Because of a delay in the implementation of the E-ZPASS program, the TRANSMIT Steering Committee was faced with a dilemma: postpone the operational test for at least one year or relocate the test site to a new area. Relocating the test, at a minimum, would require the TRANSMIT PM to:

1. Obtain agreement from the host agencies of the original test;

2. Obtain agreement from the host agencies of the proposed location; and

3. Redesign the operational test in accordance with the construction specifications of the new host agencies.

The TRANSCOM Technology and Operations Committee met, assessed various options, coordinated with the old and new host agencies, and voted unanimously to relocate TRANSMIT to the new area. The systems integration contract was ultimately modified and the contractor was given full turn-key responsibility (i.e., develop specifications, prequalify contractors, supervise installation) to install the system at the new test location.

As stated by one interviewee, "Three years ago, if you said we want to move the initial test from South to North, it would have never happened. Now, none of the TRANSCOM agencies want to be a spoiler, so TRANSCOM has helped tremendously in getting consensus. TRANSCOM's member agencies realized that this was a regional issue and that they would still benefit over the longer term. It is more important to get this technology tested for the region than the immediate incident management feedback for the Staten Island Corridor. Before TRANSCOM, agencies were not able to consider regional solutions."

It is noted that in addition to TRANSCOM, there are least three other coalitions striving to meet the transportation challenge in the region: the I-95 Corridor Coalition, the E-ZPass Interagency Group, and the Committee for a Smart New Jersey. Each of these coalitions has a different mission and their own source of federal and local funding which promotes a synergistic approach to regional issues. Examples of synergism include the fact that TRANSCOM's OIC has served as the operations center for the I-95 Coalition at no cost to the Coalition. E-ZPass used TRANSCOM/FHWA funding to perform an ETTM user acceptance study, and TRANSCOM is using E-ZPass's investment in toll collection infrastructure as part of the overall TRANSMIT infrastructure.

Inter-coalition coordination is facilitated by the practice of key players holding leadership positions simultaneously in several organizations/committees. For example, the TRANSCOM general manager is the chair of the I-95 Corridor Coalition Steering Committee. And, a member of the TRANSCOM Technology and Operations Committee is also a member of the

TRANSMIT Steering Committee and was the chair of the E-ZPass Policy and Technology Committee.

Notwithstanding the obvious positive contributions to meeting the transportation challenges in the region, one interviewee expressed the view that the lines of responsibility are "very murky", as is often the case in a developing field such as IVHS. The various players, including state transportation agencies are competing for limited federal funds, though it is not clear who has the IVHS lead for the region. All the players in the various coalitions are often the same and they do their best to keep in touch with each other.

Intra-agency Communications

Several interviewees commented that intra-agency communications, particularly at State DOTs, have been an impediment to the progress of TRANSCOM's IVHS program, including the TRANSMIT project. This historical impediment, however, has shown some recent signs of improvement. As stated by one respondent, "State DOTs are especially bad due to the nature of DOTs. They were set up for the linear process of highway construction, not IVHS. IVHS is new technology and requires multi-disciplinary technical skills" (e.g., computers, information networking, satellite communications, etc.). State DOTs recognize the problem and are taking corrective actions by defining required skills and retraining/hiring personnel to satisfy the need. For example, NJ DOT has recently established an office and focal point for IVHS programs.

Upper Management Buy-in

Upper management buy-in was not an issue for TRANSMIT; the problem has been at the middle levels. As with intra-agency communications, the problem is principally attributed to linear organizational structures, particularly at the State DOT. While the Transportation Commissioner personally supported the TRANSMIT project, the word did not always filter down, particularly to those in other departments such as contract, budget, procurement, and legal specialists. This issue, together with TRANSCOM's strategy for resolving it for the TRANSMIT project, will be discussed further in the next subsection of this report.

3.2 Regulatory Issues and Findings

Regulatory issues, particularly contract administration procedures, were cited frequently by the interviewees as being a major impediment to progress.

Administrative Requirements

Interviewees who were involved in the federal funding process spoke with a single voice: The process does not work well for IVHS and improvements are required. The problems and strategies for resolving the problem from the perspective of those involved in the TRANSMIT program, are presented below.

- FHWA and state DOT's, as a whole, are trying to handle the IVHS program through their respective, pre-existing organizational structures which were originally set up for road construction projects. IVHS is new technology with higher risks. The ability to transfer federal funds directly to non-DOT agencies and public/private partners, while feasible under ISTEA, is very cumbersome. There is a need to examine existing processes and procedures. The current system may not be appropriate for IVHS projects. As stated by one interviewee intimately familiar with the problem, "Some of the problems that we have are because we do not have the infrastructure established that is needed to support ISTEA. We are stuck with our procurement and federal aid process." The problem was summarized by a second party, "It is not a matter of personalities, but rather a characteristic of the current system."

- The federal aid/procurement process is very complicated. Federal funds flow through NJ DOT to the Port Authority for TRANSCOM. Each agency in the chain has it own rules, specifications, and many forms to fill out. From a manager's perspective, it is very difficult for someone not already familiar with the various federal and state funding, procurement, and environmental regulations to learn the system.

- In general, state and local governments have different contract rules, procedures, and forms. Several interviewees commented that New Jersey's procurement regulations are more restrictive and the process is slower than the federal government's. For example, New Jersey has established an $80,000 consultant salary cap, limits overhead charges to 120% of salary, and takes in excess of 90 days to process cost vouchers.

TRANSCOM's strategy for mitigating this TRANSMIT impediment was to identify the potential bottle necks in the process, make allies of the people in those organizations that had difficult processes, and involve them in the problem solving process. The approach has worked well for the TRANSMIT project. From the perspective of TRANSCOM, the strategy has worked well and TRANSMIT has many supporters at FHWA and the State DOTs.

3.3 Human Resources Issues and Findings

The human resource area, including staff size and staff expertise, is considered a strength of the TRANSCOM's TRANSMIT project, not an impediment. Important factors and considerations emphasized by interviewees are as follows:

- The project manager is key. The PM must be good at communication and collaboration, be very detail-oriented, and be totally dedicated to the job. Additionally, the PM must be a good PR person with the ability to work with senior and middle management.

- Project team members need multiple and diverse skills. The individuals should be trained in new technologies, have good communication skills, and have the ability to run a meeting. With regard to meetings, it is important to ensure that those attending have decision making authority.

- Project team staffing should be austere. The emphasis should be on a lot of face-to-face communications, not in moving paperwork back and forth. Contractors should be utilized when a specific technical skill or expertise is needed that the program office does not have.

3.4 Financial Issues and Findings

Important financial issues were raised by many interviewees; however, these issues are discussed in Section 4.0 of this report, "Issues Projected for Future Program Phases." Up until this point in the project, financial issues have not been critical (except for the transfer of Federal money, discussed above).

3.5 Other Issues and Findings

Other issues were raised, including market uncertainty and privacy issues; however, these issues had not been an important concern to this point in the project. These issues are critical in the deployment phase and are discussed in the next section of this document.

4.0 ISSUES PROJECTED FOR FUTURE PHASES

Several issues were identified by many interviewees as critical to the successful deployment of TRANSMIT. These deployment issues concern program costs, market uncertainty/public acceptance, public privacy, and environmental impact.

4.1 Financial Issues

There were two issues related to financing of the TRANSMIT deployment. Each is discussed in turn.

Program Cost

The majority of those interviewed felt that the cost to deploy TRANSMIT was an overriding critical issue. On a scale of 1 to 5, most interviewees rated this issue a 5 - critical - a potential show stopper. There was a wide variance in view, however, concerning how or who would pay deployment costs. These contrasting views, as expressed by interviewees, include:

- If TRANSMIT works, program costs are not a problem. Toll authorities have a responsibility to provide users the best information and traffic management services available.

- TRANSMIT is a difficult project for private funding. The heart of the issue concerns whether a public organization, such as TRANSCOM, can sell information - it is not clear that it can.

- The trucking industry is supportive of E-ZPass, but this region is a very high toll area. It is doubtful that this industry would be willing to pay more. "This is the most heavily tolled region in the country."

- If the operational test is successful, there will be a serious budget issue: additional monies will be needed to expand the system beyond the 15-mile operational test area and to defray operations and maintenance (O&M) costs.

- To deploy a surveillance IVHS system, it costs on the order of $30K per mile, $30M if deployed throughout TRANSCOM (assumes 1000 highway miles), and $30B if deployed nationally. Annual O&M costs are another problem. O&M for the system will run on the order of 15 to 20 percent of installation cost. As stated by

one interviewee, "The answer is to privatize the whole thing. Sell information or turn it over to media traffic services."

Market Uncertainty

The issue of market uncertainty or user acceptance was also rated 5 (critical - could stop the program) by the majority of those interviewed. Consumers are asking, "What's in it for me?" The user does not necessarily see the value of all this new technology. For example, said one interviewee, "How do you explain to the user that this half hour delay would have been a one hour delay if not for the new technology?" There was a general consensus that "users" would have to be sold on the program. Possible arguments include: 1) reduced toll fees, 2) no need to stop at toll plazas, and 3) reduced travel time or at least no greater time. TRANSCOM has an on-going marketing survey (an element of the TRANSCOM federally funded IVHS program) which should provide insights into the depth of the problem. In summary, as one interviewee who spoke for the user community stated, "If IVHS is accepted here, it will be accepted anywhere."

4.2 Other Issues

Public Privacy

The privacy issue is closely linked to the user acceptance/market uncertainty problem. Drivers in the TRANSCOM region are very suspicious of "Big brother" and have a "What's in for me?" mentality. From the perspective of the TRANSMIT project, the principal privacy issues were considered to involve a public perception that the government could: 1) At any point in time, know the whereabouts of any vehicle using the system, and 2) Track vehicle speed and use it for law enforcement purposes.

In anticipation of these issues, TRANSMIT's strategy is to defuse them before they occur.

- First, for the purpose of protecting vehicle identification information, TRANSMIT will not track or maintain vehicle identification records. Rather, the TRANSMIT computer software assigns a random number to each vehicle which effectively replaces the vehicle identification for computational and record keeping purposes.
- Second, it has adopted the policy not to release vehicle speed/travel time information to traffic enforcement agencies.
- Third, prior to the implementation phase, TRANSCOM plans to promote a public education program to explain what the government can and cannot do.

5.0 LESSONS LEARNED

Based on comments of interviewees, five broad findings were derived:

1) Before an IVHS operational test is begun, a cooperative forum consisting of members from all the organizations involved should be in place. The secret to interagency cooperation is to have an advocate in every FHWA office and key agencies. The mere existence of the TRANSCOM organization has fostered cooperation among the participants involved in the project. This cooperative spirit has enabled the group to work through and solve a number of serious problems that potentially could have shut down the TRANSMIT project.

2) Regional transportation agencies, such as TRANSCOM, can not implement IVHS projects unless they obtain the support of not only the state Transportation Commissioner, but also the Treasurer, Controller, and Attorney General and their staffs. IVHS operational tests need management acceptance at two levels: upper- and mid-level!

3) The project manager is key. The PM must be good at communication and collaboration, be very detail-oriented, and be totally dedicated to the job. Additionally, the PM must be a good PR person with the ability to work with senior and middle management.

4) Administrative requirements are complex and difficult to understand. Project managers need an information packet that identifies the various administrative requirements and those compliance actions required by the project manager. The scope should include funding, contracting, and environmental impact statement requirements of all participating agencies (i.e., federal, state, toll authorities, etc.).

5) Funding mechanisms should be as simple, direct, and efficient as possible. A cost/benefit assessment may be needed to determine whether FHWA money should be passed directly to an entity, rather than through a state.

6.0 REFERENCES

Intermodal Surface Transportation Efficiency Act of 1991. U.S. Public Law 102-240.

IVHS Institutional Issues and Case Studies: Field Guide. (June 1993). (Science Applications International Corporation, Contract No. DTRS-57-89-D-00090, RA 3078) Volpe National Transportation Systems Center (unpublished).

IVHS Strategic Plan: Report to Congress. (1992). U.S. Department of Transportation.

APPENDIX A

AGENCIES CONTACTED

Federal Highway Administration
Farradyne Systems, Inc.
NJ DOT
NJ Highway Authority
NY/NJ Port Authority
NY Thruway Authority
TRANSCOM, Jersey City NJ
Triborough Bridge and Tunnel Authority

APPENDIX B

BIBLIOGRAPHY

"A Proposal to TRANSCOM Transportation Operations Coordinating Committee for IVHS Demonstration Based on ETTM Technology in New Jersey and Staten Island Corridor." Farradyne Systems, Inc. July 26, 1991.

"Advanced Traffic Management in New York/New Jersey Metropolitan Area Using ETC Technology," Lawrence Yermack and Thomas Batz, May 20, 1992.

"In Nation's Largest Metro Area, TRANSCOM Unifies Multiple Agencies in Traffic/Transit Control Efforts," IVHS AMERICA, Volume 2 Number 1, January 1992.

"Institutional Issues in ITMS - TRANSCOM's Experience in NY and NJ," Matt Edelman and Paul Einreinhofer, June 1992.

"IVHS Demonstration Based on ETTM Technology in New Jersey and Staten Island Corridor," Contract XCM 92-090.01. February 1992.

Request for Proposals, "A Study to Develop a TRANSCOM Region-Wide Strategy for Implementation of Intelligent Vehicle Highway Systems," November, 1992.

Request for Proposal, "IVHS Demonstration Based on ETTM Technology in New Jersey and Staten Island Corridor," June 1991.

"TRANSCOM ETTM IVHS Operational Field Test," Farradyne Systems, Inc., January 1993.

"TRANSCOM Multi-Year Agreement." January 1991.

"TRANSCOM Project Revised Work Plan: IVHS Demonstration Based on ETTM Technology in New Jersey and Staten Island Corridor," Contract XCM 92-090.01. Farradyne Systems, Inc. February 1992.

"TRANSCOM Project Work Plan for Demonstrations on Intelligent Vehicle Highway System, Highway Advisory Radio, Remote Surveillance, Computer Networking." June 1992.

"TRANSCOM Region-Wide Intelligent Vehicle Highway System (IVHS) Implementation Strategy Study." James H. Kell and Associates. December 7, 1992.

"TRANSCOM Traffic Management Project Agreement." June 1991.