Incorporating Security into the Transportation Planning Process

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Surface Transportation Security

Volume 3

Incorporating Security into the Transportation Planning Process

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Daniel L. Dornan, P.E., Vice President with AECOM Consult, Inc., was the principal investigator for this study. The other author of this report is M. Patricia Maier, President of Maier Consulting, Inc.

The work was done under the supervision of Daniel L. Dornan, who served as project manager for this study.

FOREWORD

By Ronald D. McCready
Staff Officer
Transportation Research Board

This report contains the results of research into the status of state and metropolitan transportation planning processes and the extent to which security issues and strategies are reflected in long-range plans and priority programs. The study focused on consideration of security in the transportation planning processes of state departments of transportation (DOTs) and metropolitan planning organizations (MPOs). It included a comprehensive review of recent literature and a review of transportation improvement programs of 10 major metropolitan areas and more detailed case examinations in four areas. The research found limited evidence that security has yet been given major priority in plans and programs of either the states or the metropolitan areas. This report presents a broad assessment of the status, constraints, opportunities, and strategies for incorporating security into transportation planning at the state and metropolitan levels and for including security-related projects in their priority programming decisions. This report should be useful to state DOTs, MPOs, and local transportation planners as well as other practitioners concerned with planning, programming, and implementing transportation projects.

Since the September 11, 2001, terrorist attacks on the World Trade Center and the Pentagon, state and metropolitan transportation planners have been asked to address many security-related issues and to begin to consider security within the context of their transportation planning and programming activities. Questions are increasingly asked regarding the implications of security on the transportation system, such as the potential long-term effects of terrorist attacks against transportation facilities; the effects of increased security on transportation investment decisions; the impacts of tightened security at sensitive locations on the long-term operations of the transportation system; and the redundancy or resiliency of the transportation system if certain elements of it have to be closed for security- or terrorist-related reasons. Although related, these issues are different from short-term operational issues that deal with immediate response to incidents in that they deal with longer-term and systemwide effects. Transportation planners have little guidance on what issues need to be considered or how long-term planning for transportation can best address security-related issues. The Transportation Research Board sponsored a panel discussion at its January 2002 Annual Meeting in Washington, D.C., on this subject that identified and discussed security-related issues in transportation planning. On the basis of that session, it is clear that there is a need for more guidance to assist state and metropolitan planners in addressing more effectively security issues within the long-range transportation planning process.

This research was initiated to provide guidance to assist transportation planners in addressing security-related issues in transportation planning and priority programming for surface modes, both at the statewide and metropolitan levels. The research was intended to identify long-term security-related issues that transportation planners need

to consider and provide an indication of how to deal with these issues including types of analyses that are appropriate, who needs to be involved in the planning efforts, and what outcomes could typically be expected from the planning efforts.

Under NCHRP Project 8-36 (34), "Incorporating Security into the Transportation Planning Process," AECOM Consult, Inc., of Fairfax, Virginia, reviewed current practice in dealing with security issues within the state and metropolitan transportation planning processes. The research team reviewed planning documents from major metropolitan areas and their states. The research team also developed detailed case studies on four of those metropolitan areas: New York, New York; Portland, Oregon; San Francisco, California; and Washington, D.C. This report provides a wealth of information regarding approaches, strategies, and procedures for strengthening the consideration and analysis of security issues and projects within the planning and decisionmaking processes of the state DOTs and the MPOs.

Emergencies arising from terrorist threats highlight the need for transportation managers to minimize the vulnerability of travelers, employees, and physical assets through incident prevention, preparedness, response, and recovery. Managers are seeking to reduce the chances that transportation vehicles and facilities will be targets or instruments of terrorist attacks and to be prepared to respond to and recover from such possibilities. By being prepared to respond to terrorism, each transportation agency is simultaneously prepared to respond to natural disasters such as hurricanes, floods, and wildfires, as well as human-caused events such as hazardous materials spills and other incidents.

This is the third volume of *NCHRP Report 525: Surface Transportation Security*, a series in which relevant information is assembled into single, concise volumes—each pertaining to a specific security problem and closely related issues. These volumes focus on the concerns that transportation agencies are addressing when developing programs in response to the terrorist attacks of September 11, 2001, and the anthrax attacks that followed. Future volumes of the report will be issued as they are completed.

To develop this volume in a comprehensive manner and to ensure inclusion of significant knowledge, available information was assembled from numerous sources, including a number of state DOTs. A topic panel of experts in the subject area was established to guide the researchers in organizing and evaluating the collected data and to review the final document.

This volume was prepared to meet an urgent need for information in this area. It records practices that were acceptable within the limitations of the knowledge available at the time of its preparation. Work in this area is proceeding swiftly, and readers are encouraged to be on the lookout for the most up-to-date information. Volumes issued under *NCHRP Report 525: Surface Transportation Security* may be found on the TRB website at http://www4.trb.org/trb/crp.nsf/All+Projects/NCHRP+20-59.

CONTENTS

INCORPORATING SECURITY INTO THE TRANSPORTATION PLANNING PROCESS

SUMMARY

Since the terrorist attacks of September 11, 2001, significant attention has been devoted to securing our nation's infrastructure from further attack. These efforts have focused on what can be done now to prevent these threats from being carried out, to mitigate the results if they do occur, and to expedite the response and recovery efforts following the event. These include determining the vulnerability of transportation infrastructure to terrorist attack, developing strategies to better protect these assets from terrorist attack, and generating policies and procedures to mitigate the effects of terrorist events and to expedite response and recovery. Despite these various efforts, it is unclear whether and to what extent security issues associated with prevention, mitigation, response, and recovery are being considered during the development of capital improvement programs at the state and local levels of government.

With security prevention and mitigation strategies heavily oriented to facility design and retrofit, it is recognized that the most cost-effective time to begin to address security issues during the life-cycle of transportation infrastructure assets is when they are being planned and designed. Leaving consideration of security issues to the post-construction or operations phase can make efforts to enhance the protection of transportation assets much more expensive. With the scarcity of available resources, transportation agencies can little afford to wait until after projects are planned and developed to consider the requirements of securing transportation assets from terrorist attack.

The purpose of this study was to research the status of transportation planning processes at the state and local levels and determine the extent to which these program development processes incorporate security issues and strategies for securing the nation's transportation infrastructure. For the purpose of this study, the research team defined the term security as follows:

> *Protection from terrorist threats or actions due to acts of extreme violence resulting in significant loss of life, injury, and/or damage or destruction of facilities and infrastructure, whether or not these acts are intended to further political or social objectives.*

The study considered those efforts undertaken to produce metropolitan transportation improvement programs (TIPs) and statewide transportation improvement programs (STIPS). Through literature search, review of the most recent TIPs for 10 major

metropolitan planning organizations (MPOs) across the country, and development of detailed case studies of four metropolitan areas selected for their unique features, the research team has provided a comprehensive assessment of the status, constraints, opportunities, and strategies for incorporating security into the transportation planning process at the local and state levels. The sample TIPs provided insights into the current status of transportation planning documents relative to security considerations. The case studies examined the transportation efforts of four metropolitan areas (New York City, Washington, D.C., San Francisco, and Portland, Oregon) to address security issues and develop security-enhancement projects. The research team also discussed how safety has become a more significant element of transportation improvement plans. Safety, therefore, may provide a model for promoting the importance of security into the program development process.

The study produced a number of key findings and provided a series of strategies to help transportation planners at state and local levels to address these findings and better consider and promote security enhancement much earlier in the program and plan development processes. The study showed that overall, there is widespread confusion over what specifically security refers to, which level of government is responsible for addressing national security issues, where the funding for these initiatives will come from, and how federal legislation can be interpreted regarding the need to specifically address security as a core element of the required transportation planning process. These areas of confusion have impeded efforts to consider security earlier in the project development process. In the absence of local interest and commitment and federal funding support, security is addressed on a sporadic basis, at best.

Most efforts to address security issues at the metropolitan planning level appear limited to the operational aspects of the asset, with little or no consideration of security in the development TIPs or STIPs. While safety has emerged as a major factor in the transportation planning process, security as a distinct issue area is either not addressed or subsumed under the safety element. Security issues are considered to a greater extent where the local community has already been sensitized to the threats posed by terrorist attacks, such as in New York City and in Washington, D.C. In contrast, metropolitan areas such as San Francisco and Portland, Oregon are focused on more imminent natural disasters or local security threats, such as earthquakes and vandalism, respectively, where the linkage between security and emergency preparedness is more pronounced.

To address these findings, the research team offered a menu of strategies that federal transportation agencies and state and local transportation planning groups might consider to better incorporate security issues and strategies in state and local transportation planning processes. Solution strategies include establishing greater consistency and understanding the definition and concepts, roles and responsibilities, and tools and methodologies relating to security enhancement of the nation's transportation infrastructure. This involves defining what security means in the context of transportation infrastructure; developing the purpose, goals, objectives, and performance criteria to strategically guide consideration of security in the transportation planning process; determining the key components of a process for incorporating security into transportation planning; identifying the individuals and groups to be responsible for these activities and held accountable for the results; establishing the level of funding and other resources to support these activities, defining the institutional relationships among different groups involved in security enhancement for the area, and educating public officials, the private sector, and citizens regarding security issues and how they are being addressed in the transportation planning process.

Leadership is needed to move security to a position of prominence among the factors considered in the transportation planning process. Such leadership is required at the federal, state, and local (metropolitan and rural) levels of government to promote security considerations on an ongoing and sustainable basis.

CHAPTER **1**

INTRODUCTION AND RESEARCH APPROACH

Although the United States has been fortunate in that domestic acts of terrorism have been relatively infrequent historical occurrences, transportation infrastructure and assets have long been among the most common targets of terrorism worldwide. The terrorist attacks of September 11, 2001, placed into sharp focus the potentially devastating impacts of such attacks on the U.S. transportation network. Roadways around the World Trade Center (WTC) were ruined in the attack, a Port Authority Trans Hudson (PATH) station beneath the WTC along with 1,400 ft of New York City Metropolitan Transportation Authority (MTA) tunnel were destroyed, and four MTA stations were damaged (*1*).

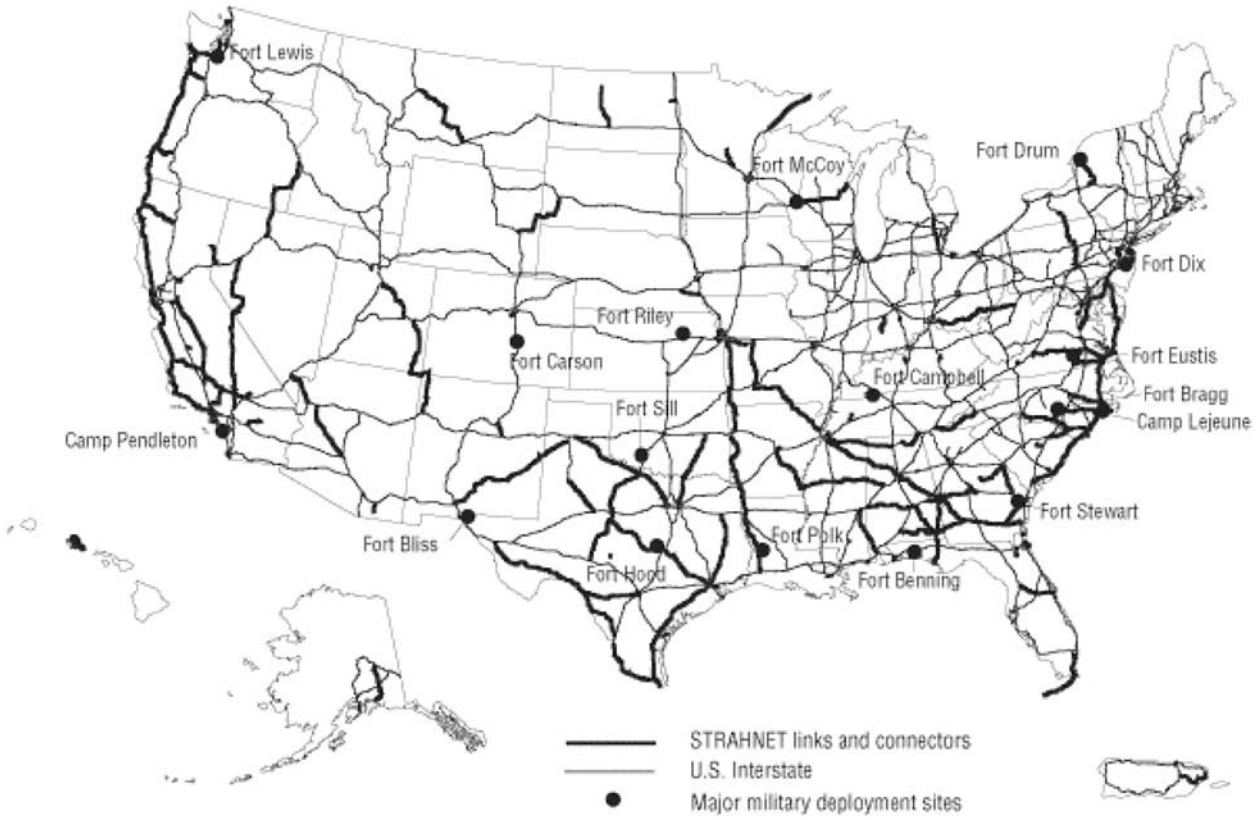
Further, this attack illustrated one of the key realities associated with transportation—assets such as bridges, tunnels, and intermodal facilities serve not only as tangible targets for intentional acts of destruction, but these same assets must be vigilantly safeguarded due to their value in the context of an emergency response. Roadways in lower Manhattan, for example, especially bridges and tunnels, served as critical links after September 11, 2001. In addition, PATH trains continued to ferry victims and bystanders to safety from the WTC station located directly below the towers until their collapse; in all, trains carrying thousands of commuters passed out of the station before the collapse, with no passengers among the casualties (*2*). The roadways in Washington, D.C., provided similarly useful escape routes, with local departments of transportation and transit systems receiving generally high marks for their evacuation of the area (*3*).

The nation's highway infrastructure is an intricate and interconnected network that supports such disparate national objectives as personal mobility and accessibility, community connectivity, evacuation preparedness, military readiness, freight movement, and commercial viability. Highways accommodate more than 2.7 trillion vehicle-miles of traffic every year, including passenger travel and an increasing portion of the nation's surface freight capacity. There are 600,000 bridges, 337 highway tunnels, and 211 transit tunnels interspersed across this national system (*4*). Among the nearly 4 million mi of roads in the nation, the Strategic Highway Network (STRAHNET) comprises 61,000 mi of key roadway to support troop and materiel transport in the case of military need (see Figure 1). Other surface modes of transportation, in particular public transportation, complement the highway system; transit modes provided more than 47 billion passenger mi in 2000 and more than 9 billion passenger trips (*5*).

It is a fundamental reality that unlimited funding does not exist to safeguard all surface transportation assets to the highest level; compromises, based on national, state, and local priorities, funding availability, and criticality assessments rooted in structured counter-terrorism analyses must be performed to make the difficult choices required to disperse limited security dollars among available choices. Among the nation's 3.9 million mi of roadway, there are certain elements that, by virtue of their transport role, location, and uniqueness are particularly valuable, particularly vulnerable, or both. These assets, vulnerable to high likelihood/high consequence attacks, must be protected against threats. Attacks on any one of the nation's 1,000 major bridges would result in substantial casualties and other losses (*6*). Many tunnels traverse bodies of water with little system redundancy (*7*). An overarching counter-terrorism strategy must identify these key assets through classification of critical infrastructure combined with vulnerability analysis, relying especially on existing analyses performed at an asset level.

Long-range and short-range transportation planning processes incorporate information, tools, and public input that are preconditions for evaluating prospective transportation projects and recommending improvements to the overall transportation infrastructure. The process requires consideration of a number of strategic elements, including the safety and security of assets and the services they provide. Passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) explicitly included safety and security assessments in the transportation capital planning process, though not as a rigorous and uniform methodological requirement. In 1998 the Transportation Equity Act for the 21st Century (TEA-21) defined the following seven areas to be considered in the transportation planning process (Public Law 105–178):

- Support the economic vitality of the metropolitan/local area, especially by enabling global competitiveness, productivity, and efficiency;
- **Increase the safety and security of the transportation system for motorized and non-motorized users**;
- Increase the accessibility and mobility options available to people and for freight;



(Source: Transportation Statistics Annual Report 2001, Bureau of Transportation Statistics.)

Figure 1. STRAHNET roadways.

- Protect and enhance the environment, promote energy conservation, and improve quality of life;
- Enhance the integration and connectivity of the transportation system across and between modes for people and freight;
- Promote efficient system management and operation; and
- Emphasize the preservation of the existing transportation system.

The metropolitan/local transportation planning process exists expressly to provide a common, accepted methodology to select capital improvement projects from among multiple options, considering a range of constraints and priorities, including the following:

- Enhancing the security of the surface transportation network,
- Increasing the resilience of critical elements against terrorism,
- Preserving the system's capability to evacuate the population following such events, and
- Maintaining the nation's military and civilian mobility.

The terrorist attacks of September 11, 2001, have altered the priorities of those responsible for safeguarding the nation's transportation infrastructure and its users, and new programs have been developed to reflect this reality. For example, federal and state agencies have been assessing the vulnerability of infrastructure systems to determine which assets are of the highest priority in applying countermeasures. The President's Commission on Critical Infrastructure Protection (PCCIP) was specifically formed to review the physical and electronic vulnerabilities of transportation infrastructure as well as other key areas of the nation's critical infrastructure sectors. The Office for Domestic Preparedness (ODP), now part of the Department of Homeland Security, has developed and refined a State Homeland Security Assessment and Strategy (SHSAS), which is designed to assist states and local jurisdictions in updating their needs assessment data, identifying progress on their homeland security strategies, and serving as a planning tool for state and local jurisdictions. In addition, ODP offers an online data collection tool to states and local jurisdictions to input data from the SHSAS online and for states to develop and submit a revised state homeland security strategy (*8*).

Structured methodologies to determine the highest likelihood/highest consequence events are being developed and used by agencies responsible to protect and respond to threats against transportation assets and systems. Such analyses generally represent some variation of the following process:

- Identify high value assets, such as intermodal facilities, bridges, tunnels, and stations.

- Assess credible threats to the system or assets based on scenarios, such as bombings or commission of criminal acts.
- Understand the vulnerability of the high value assets to these threat scenarios.
- Quantify the consequences of an attack against these assets (casualties, property damage, and loss of access to and/or use of the asset).
- Array scenarios based on high consequence, high vulnerability events.
- Develop short-term and long-term countermeasures to address high impact scenarios.
- Prioritize countermeasures based on their estimated cost-effectiveness in reducing the risks and consequences of potential threats (the so-called "impact value" of the project).

Measures for increasing security may take a number of forms. Progress has been made to develop prevention and response measures to protect and maintain the transportation system in case of attack. The advent of intelligent transportation systems and new technologies, such as advanced access control and intrusion detection systems, state-of-the-art communications systems, traffic monitoring and surveillance cameras, and GPS-enabled vehicle tracking systems, offer law enforcement and security agencies enhanced capabilities to prevent and respond to security threats to the nation's transportation infrastructure and systems. Design techniques are being used that limit access to facilities to mitigate certain security concerns and vulnerabilities, best practices exist from other sectors (telecommunications and defense industries) for the identification and management of security concerns, and successful processes and practices from other segments of the transportation industry (such as the airline and pipeline industries) can be used as models.

Many of the actions taken to date by transportation agencies to address security threats and issues have focused on the assessment of infrastructure vulnerability, development of mitigation measures, and improvement of incident response and recovery capabilities. These strategies are more short-term in their focus and application. Despite these various developments, it remains unclear the extent to which security factors have been or are being incorporated in the longer-term metropolitan/local transportation planning processes used by state and local transportation planning organizations across the country. As a result, there is concern that transportation assets and systems are being developed without adequate consideration of the security-related issues, subsequently requiring more costly mitigation measures for these facilities.

One of the challenges posed by the introduction of domestic security concerns into the traditional transportation planning process is the difference in traditional roles and responsibilities among the levels of government with respect to transportation and security. Historically, national defense responsibilities have rested with the federal government while public safety responsibilities (i.e., police, fire, and rescue) have resided with state and local governments. The terrorist attacks of September 11, 2001, and the continuing terrorist threats to the domestic security of the United States have blurred traditional distinctions between the roles and responsibilities of federal, state, and local governments for protecting citizens from acts of extreme violence launched by terrorists. As a result, there is widespread uncertainty among state and local transportation agencies regarding whether and how they should address security issues in planning for transportation programs and projects and regarding the federal government's role in funding and regulation.

STUDY PURPOSE AND OBJECTIVES

The purpose of this study is to assess whether and how traditional transportation planning processes at the state and local levels of government incorporate the potential for security threats and events. The study also suggests ways in which security considerations can be more effectively integrated into these processes at the state and metropolitan/local levels of government.

Though previous studies have assessed the integration of safety into the transportation planning process, no similar, recent, and comprehensive analysis has been performed on the progress made towards including security as a planning factor. This study is intended to help fill this gap by achieving the following objectives:

- Quantify the extent to which security has been incorporated into the planning process to date through an examination of planning documents and stakeholder policies.
- Document strategies, processes, and practices for incorporating security considerations into the transportation planning process in a manner that promotes enhanced preparedness and response capabilities.

SCOPE OF EFFORT

This study defines the current context for transportation planning at the state and local levels of government, profiles what is currently being done to incorporate security into transportation program and project planning, illustrates what several major metropolitan/local areas are doing to address security issues in preparing their transportation improvement programs, and suggests ways to better incorporate security considerations into these processes. The focus of the study effort is on the transportation planning processes used by state and local transportation agencies to develop their capital improvement programs and the ways in which terrorist-related security threats and issues are taken into consideration in these processes. The study addresses only those aspects of national or local security that are directly

related to the provision and operation of transportation infrastructure.

Security is often grouped with safety as a consideration for sponsors and operators of transportation facilities because of their related natures. This might leave the impression that the concepts are synonymous. However, safety initiatives often have no bearing on the security of transportation facilities or services, and security initiatives may not impact the safety of transportation facilities or services. This study recognizes the following distinction between safety and security:

- Safety can be defined as protection of persons or property from unintentional damage or destruction caused by accidental or natural events.
- Security can be defined as the protection of persons or property from intentional damage or destruction caused by vandalism, criminal activity, or terrorist events.

This study focuses on "high consequence events," such as terrorist acts, a term which, in itself, requires clarification since no consistent, universally accepted definition exists. The Code of Federal Regulations defines terrorism as follows:

> *. . . The unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives. (28 C.F.R. Section 0.85, Judicial Administration).*

Similarly, the Department of Defense describes terrorism as follows:

> *. . . the calculated use of violence or threat of violence to inculcate fear; intended to coerce or to intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological. (Department of Defense Directive 5107.1.)*

These definitions are too narrowly defined to encompass all infrastructure threats under consideration for this effort, because the definitions describe only acts that are focused on political or social objectives, rather than other acts that may be committed for broader purposes yet having the same net consequences of mass casualties, system disruption, and destruction of property enacted against a civilian population, which may include elements of intimidation.

This study uses a more narrow definition of the term security: **protection from terrorist threats or actions due to acts of extreme violence resulting in significant loss of life, injury, and/or damage or destruction of facilities and infrastructure, whether or not these acts are intended to further political or social objectives.** Not covered will be routine criminal activity such as theft, vandalism, quality of life offenses, and other lesser crimes.

The definition used in the Homeland Security Act of 2002 is closest to capturing the focus of this effort:

> *The term 'terrorism' means any activity that (A) involves an act that—(i) is dangerous to human life or potentially destructive of critical infrastructure or key resources; and (ii) is a violation of the criminal laws of the United States or of any state or other subdivision of the United States; and (B) appears to be intended—(i) to intimidate or coerce a civilian population; (ii) to influence the policy of a government by intimidation or coercion; or (iii) to affect the conduct of a government by mass destruction, assassination, or kidnapping.* (*HR 5005, Homeland Security Act of 2002*.)

INTENDED AUDIENCE

This research is intended to assist a variety of stakeholders, including the following:

- Highway capital planners prioritizing and programming viable transportation projects in a manner that considers security;
- MPO staff seeking options for complying with TEA-21's requirement that security be incorporated in the planning process;
- State transportation agencies, such as departments of transportation, who must weigh alternative projects and select those that best meet short and long term objectives within financial and other constraints;
- Multimodal transportation planning organizations charged with incorporating a range of priorities, including security, into the development and improvement of facilities serving multiple passenger and freight modes of surface transportation;
- Persons responsible for transportation planning and project programming in these agencies;
- Surface transportation system managers seeking strategies that promote selection of security vulnerability reduction measures to address the most pressing threats against assets and systems;
- Private sector groups participating in surface transportation facility planning;
- State and local emergency planning and preparedness staff and decisionmakers, as well as their counterparts in the private sector, especially freight carriers and shippers; and
- Private industry staff and decisionmakers responsible for logistics and continuity of service planning.

The study focuses on issues common to the greatest number of states and localities; specialized issues, such as the study of border facilities for immigration and customs, are not included explicitly within this effort.

METHODOLOGY

The use of security in the transportation planning process is in its early stages, and in few cases has the factor translated into concrete, visible results (that is, the explicit incorpora-

tion of security factors within the TIPs of MPOs. Therefore, three efforts were conducted to highlight not only how the incorporation of security had been formalized but also the thought processes and planning that had been done in an informal or preliminary way:

- A literature search was performed to ascertain the current state of expert opinion on security in the transportation planning process, obtain recommendations for how security might be incorporated into the process, and determine the perceived need to do so.
- The TIPs for the ten largest cities in the nation were reviewed to assess the extent to which security had been formally incorporated within planning processes at a local level.
- Case studies of four urban regions making progress incorporating security in their planning processes were performed to identify innovative practices.

Literature Search

A review of applicable literature and ongoing research and applications of security within the planning process was performed, including an extensive online search that drew from government, industry, legal, and university databases. The scope of the literature search included both the transportation industry itself and related fields that share fundamental similarities with transportation. In addition, the search focused on related topics, such as transportation security vulnerabilities; incorporation of safety into the planning process; the planning process, in general; and legal background. Prospects for case study organizations were assessed during the course of the literature search. A study bibliography was compiled based on the literature search and is presented in Appendix A.

Transportation Improvement Program Review

To assess formal progress in the incorporation of security into the transportation planning process, the TIPs of the designated MPOs of the largest 10 cities in the nation were reviewed, and the extent to which security is treated in these documents is presented as a baseline.

Case Studies

Because incorporation of security into the transportation planning process is a new concept and progress is still in its nascent stages, case studies were used to further understand the steps that MPOs, state departments of transportation, and other organizations are taking to include security in the development of TIPs and STIPs. For the case studies, organizations were selected that have made progress towards this goal. That is, they represent groups employing state-of-the-art practices. A list of potential case study organizations was compiled from the results of the literature search as well as information collected from industry experts. An interview guide (see Appendix B) was developed for use in guiding discussions with case study agencies or soliciting their input**.**

Finally, the literature review, TIP review, and case study results were consolidated, analyzed, and detailed in this report.

REPORT ORGANIZATION

This report is divided into five chapters and two appendices:

- **Chapter 1**—provides an introduction to the study topic and research approach.
- **Chapter 2**—presents background on the planning process itself and how safety has been previously incorporated. It was hypothesized that the relatively recent addition of safety to the transportation planning process might offer a model for incorporating security features in the transportation planning process. This chapter outlines the overall framework used to accomplish the former effort as well as similarities and differences to implementing procedures to introduce security considerations.
- **Chapter 3**—provides a framework for the discussion of the conceptual need for adding security to the planning process, concrete progress in this direction, and potential roadblocks. It also describes the four major categories of existing security incident countermeasures that address threats and vulnerabilities to the nation's transportation infrastructure.
- **Chapter 4**—describes the results of the research performed in this effort to quantify and present progress being made to integrate security into the transportation planning process.
- **Chapter 5**—concludes the report and contains recommendations for further actions to improve the state of the practice.
- **Appendix A**—contains an annotated bibliography.
- **Appendix B**—contains an interview guide.

CHAPTER 2

PLANNING PROCESS AND SAFETY ELEMENTS

This chapter describes the traditional transportation planning process and how safety has recently been incorporated into this formalized process. This framework provides a useful model for demonstrating how additional considerations, such as security, might be incorporated into the traditional transportation planning process. This chapter also discusses how safety has been incorporated into the transportation planning process and how security considerations might be incorporated in similar or different ways.

TRANSPORTATION PLANNING PROCESS (*9*)

Because members of the security community may be unfamiliar with the process for transportation planning for highway and transit capital investments, the following overview is provided.

Statistics show that almost 11% of the nation's gross economic product is involved in the transportation industry, representing more than $1 trillion in expenditures per year. With transportation permeating every aspect of the nation's economy, it is critical that programs that aim to influence this industry be carefully planned and executed so that optimum results can be achieved with minimum reduction in personal mobility, individual freedom, and cost/convenience to the traveling public.

Transportation planning has been performed since the 1930s by some states and urbanized regions. Since 1962, planning has been an integral part of the transportation program and project development process for federally funded transportation projects. During these past 40 years, the transportation planning process has become more diversified and complex, involving multiple issues and stakeholders. In addition to the traditional issues of transportation mobility and accessibility, land use, and economic development, transportation planning considerations have evolved to include the following:

- Congestion management;
- System efficiency, integration, and preservation;
- Environmental protection;
- Neighborhood and historic preservation;
- Public involvement;
- Social justice;
- Sustainability;
- Smart growth;
- Funding and financing;
- Safety and security; and
- Many other local and regional concerns.

The number of stakeholders involved in the transportation planning process has also expanded to include MPOs, councils of government, local government agencies, economic development agencies, neighborhood groups, public transit advocacy groups, environmental advocacy groups, developer groups, and freight shippers and carriers.

Under federal law, planning, prioritizing, and budgeting capital transportation projects is a formalized, ongoing process, whose elements are conducted at each of several levels of government. Long-range and short-range elements make up the process. In each metropolitan area with a population of more than 50,000, one or more MPOs are responsible for carrying out the region's transportation planning activities. (Note: more than one MPO might be designated for an urbanized area where the metropolitan area spans more than one state, such as for the metropolitan area around Portland, Oregon, which is served by two MPOs.) Under federal legislation reauthorizing the Federal-Aid Highway Trust Fund (ISTEA in 1991 and TEA-21 in 1998), each MPO must accomplish a number of steps to assess, recommend, and implement capital improvements to the regional transportation infrastructure, including the following:

- Forecast data reflecting transportation needs, including population and employment growth.
- Assess projected area land uses.
- Identify major growth corridors and analyze various transportation improvements to address the mobility needs of the region.
- Develop alternative capital and operating strategies for moving people and goods.
- Estimate the impact of the transportation system on air quality within the region.
- Develop a financial plan that covers new capital investments, operating costs, maintenance of the system, and system preservation costs able to be funded.

A summary of the transportation planning process is shown in Figure 2. Four major documents are generated as a result of this transportation planning process:

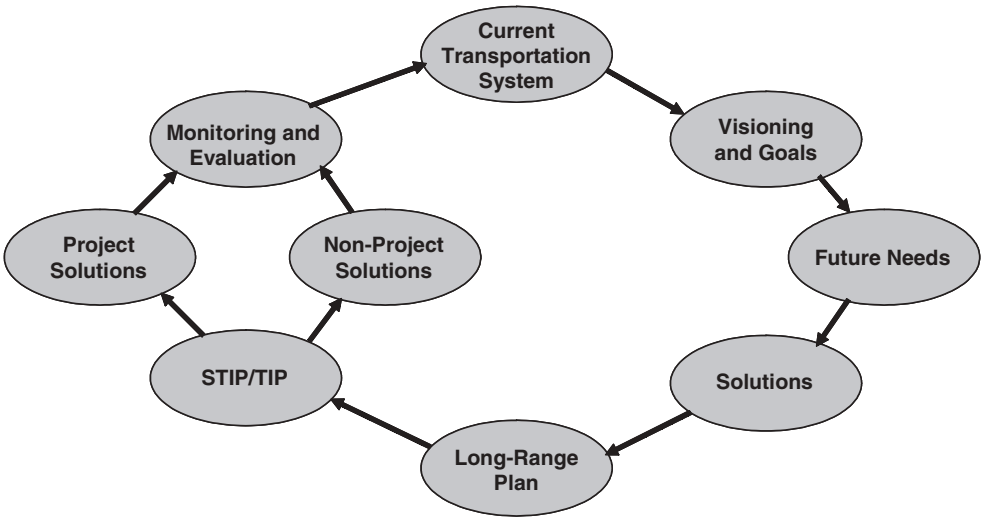


Figure 2. Overview of the transportation planning process (FHWA, *Citizen's Guide to Transportation Decisionmaking,* FHWA EP-01-013, 2001).

- Unified Planning Work Program (UPWP)—The UPWP describes the details of activities the MPO performs, including studies and other analyses, funding sources, and organizational responsibilities. This document covers 1 to 2 years, is updated annually by the MPO, and may include information on changes in the metropolitan planning process.
- Long-Range Transportation Plan (LRTP)—The LRTP is updated every 5 years (or 3 years in air quality maintenance or nonattainment areas). It covers a 20-year period and outlines long- and short-range strategies, policies, and projects with an overview of all elements (including land use, development, funding sources, and congestion). The Transportation Plan serves as the guiding document for transportation planning, incorporating policy direction, goals, program objectives, and performance criteria within expected fiscal constraints for the area.
- Transportation Improvement Program (TIP)—The TIP has a shorter horizon than the LRTP, typically 3 to 6 years, and considers only the most immediate transportation needs of the region. It is more focused than the LRTP, allocating specific resources to detailed capital improvements within existing fiscal constraints. The TIP is multimodal in scope, outlining how existing transportation funds will be used to address the most vital transportation needs within budgetary limitations through the implementation of defined projects. Public participation is an important component in developing and updating this planning document. The TIP is required to cover at least 3 years and be updated no less than every 2 years.
- Statewide Transportation Improvement Program (STIP)—The STIP incorporates the regional TIPs to achieve overall cohesion of transportation programs and plans. This document encompasses all projects included at the statewide level, based on those approved by MPOs in their respective TIPs as well as projects from nonmetropolitan areas. This integrated capital improvement program reveals the capital improvement strategy for the statewide transportation system. The STIP is multimodal and balances such issues as land use, economic development, the environment, safety, traffic congestion, and available funding. The STIP identifies which transportation programs and projects can be undertaken across the state in the next 3 years with available federal, state, and local funding.

Ultimately, the goal of these documents and the procedures behind their generation is the programming of federal, state, and other transportation funding in a fashion that satisfies competing priorities, visions, legal constraints, and public demands. Much of the planning process is undertaken by MPOs, which have a firmer grasp on localized issues than do, for example, the FHWA and other, nonlocal or nonregional organizations (such as statewide transportation agencies). Cooperative efforts and partnerships are reflected in planning agreements and memoranda of understanding that exist between stakeholders in the transportation planning process.

Funding for transportation projects contained in TIPs and STIPs is largely based on the availability of federal funds. Federal funding is authorized over a multiyear period and appropriated annually. Distribution (apportionment) of funds to states is also done annually (scheduled for October 1 of each year), and funds are obligated based on the states' approved STIPs. States and localities generally contribute matching funds, dependent on project type, at a typical level of 20%. Restrictions are placed on the use of certain funding sources, which are designated for specific project types (e.g., safety).

States often place restrictions on funding that may exceed federal requirements. However, in recent years there is a growing trend toward greater funding flexibility by federal transportation agencies that provides increased state and local discretion in the use of available funds, while also permitting the application of innovative financing techniques. These changes are intended to further leverage available public funds and expedite project delivery.

INTRODUCTION OF SAFETY INTO THE TRANSPORTATION PLANNING PROCESS

Safety has been considered in the transportation planning and programming processes for a much longer period than has security. The evolution of this process provides useful insights into the steps that might be taken to ensure that security factors are considered in the transportation planning process.

Legislative Bases for Safety Planning

Safety has traditionally been a goal of organizations planning and maintaining highways and other surface transportation assets, though it may not have been considered an element in a cohesive long-range planning process. Instead, safety considerations used to be focused on the operational aspects of the project development process—after the planning process was completed. For example, crash data has long been used to highlight dangerous intersections and to direct transportation engineering changes. It took a number of legislative initiatives to develop the requirements and incentives to ensure that safety features would be considered on a more consistent basis during the transportation planning process.

The Highway Safety Act of 1966 (USC Chapter 4, Section 402) required that states develop a data-driven safety program with the goal of reducing highway crashes, fatalities, and injuries. The Highway Safety Act of 1973 authorized appropriations for a number of programs relating to projects for improvement of highway safety, including the rail-highway grade crossings program, projects for high-hazard locations, programs for the elimination of roadside obstacles, and the incorporation of safety in the cost-benefit analysis methodology used to justify and prioritize capital improvements.

Since 1982, Federal-Aid transportation funding legislation has included safety in the list of important issues for the transportation planning processes at all levels of government. In 1991, ISTEA mandated a minimum 10% set-aside for its Surface Transportation Program (STP) to go exclusively to the Hazard Elimination Program (Section 152) and the Rail/Highway Crossings Program (Section 130). Consequently, CFR 23, Part 924, requires each state to develop and implement a Highway Safety Improvement Program (HSIP) with the goals of reducing the number and severity of crashes and decreasing the potential for crashes on all highways. The HSIP in each state must consist of elements of planning, implementation, and evaluation of safety programs and projects (*10*).

In 1998, TEA-21 included safety as one of the seven planning factors to be considered in the transportation planning process: (1) support the economic vitality of the metropolitan/local area, especially by enabling global competitiveness, productivity, and efficiency; (2) increase the safety and security of the transportation system for motorized and nonmotorized users; (3) increase the accessibility and mobility options available to people and for freight; (4) protect and enhance the environment, promote energy conservation, and improve quality of life; (5) enhance the integration and connectivity of the transportation system, across and between modes, for people and freight; (6) promote efficient system management and operation; and (7) emphasize the preservation of the existing transportation system.

Progress has been made to incorporate safety into the traditional transportation planning process, which may provide a model for incorporating security into the process.

As a consequence of these legislative initiatives, MPOs are required to include a safety element in their short- and long-range plans. In addition, safety must be a factor in rating projects and strategies being evaluated by MPOs for possible inclusion in their TIPs (*9*). Perhaps the same could be done for security elements, which though different in many respects, often involve similar consequences and considerations. Figure 3 provides an illustration of how safety factors have been incorporated into the transportation planning process.

Consequences of Including Safety in the Transportation Planning Process

With the formal inclusion of safety as one of seven planning factors to be considered in the transportation planning process in 1998 with the passage of TEA-21, a larger number of stakeholders have started to become involved in the transportation planning process. These stakeholder groups include the following:

- Traditional groups involved in the engineering, education, and enforcement (3-Es) programs promoting improved public safety;
- Local emergency services departments (e.g., police, fire, and rescue);
- Intermodal groups such as the Operation Lifesaver railroad grade crossing safety program and hazardous materials response teams; and
- Emerging groups such as those that have arisen in the aftermath of the September 11, 2001, terrorist attacks, such as vulnerability assessment, prevention, and response teams.

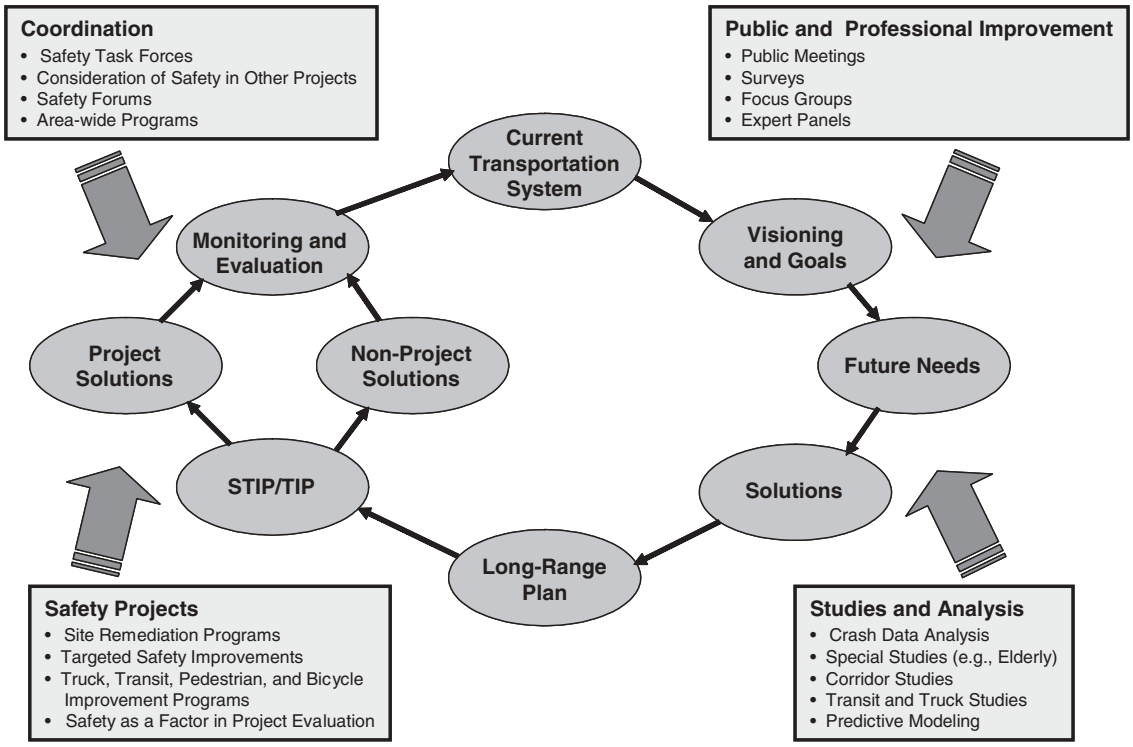


Figure 3. Overview of the transportation planning process in the context of safety (adapted from FHWA, *Citizen's Guide to Transportation Decisionmaking*, FHWA EP-01-013, 2001).

Figure 4 illustrates the relationships and safety program responsibilities among various surface transportation agencies. While airline, public transit, and intercity passenger rail services have enjoyed relatively modest fatality, injury, and property damage rates, automobiles and trucks have been associated with much higher accident rates. Society has paid the price of personal mobility with high levels of fatalities, injuries, and property damage, plus the indirect costs of lost wages, lower productivity, pain, and suffering associated with these incidents.

Over the past 20 years, there has been dramatic improvement in the relative safety of transportation modes, most noticeably for automobiles and trucks. This has been due to a number of factors:

- Imposition of higher drinking ages and graduated driving privileges for young drivers;
- Enforcement of safety belt and child restraint laws;
- Introduction of effective vehicle safety features;
- Expanded enforcement of laws prohibiting speeding, aggressive driving, and use of alcohol or drugs while driving; and
- Increased public education and awareness of driver safety matters by such groups as Operation Lifesaver and Mothers Against Drunk Drivers (MADD).

These initiatives have resulted from increased emphasis placed by federal, state, and local governments on this No. 1 killer of persons between the ages of 16 and 25. Indeed, safety has been incorporated into the transportation planning process by various methods:

- Establishing long-range safety goals,
- Developing and tracking safety-related performance measures,
- Funding crash databases,
- Implementing safety design standards, and
- Including input from safety stakeholders.

Progress is shown by the inclusion by some MPOs of formal safety elements in their TIPs. Some planning documents include specific scoring criteria for safety, such as in Houston's TIP. In a section titled "Project Selection Criteria for Candidate Projects," the program states that candidate projects for inclusion in the 2004–2006 TIP are ranked on a multipart system that includes a 100-point scoring system (constituting 30% of the total project score), with up to 25 points awarded for safety. These points are awarded based on whether a state or county project is on a designated evacuation route or based on the frequency and severity of traffic accidents in the project area (*11*).

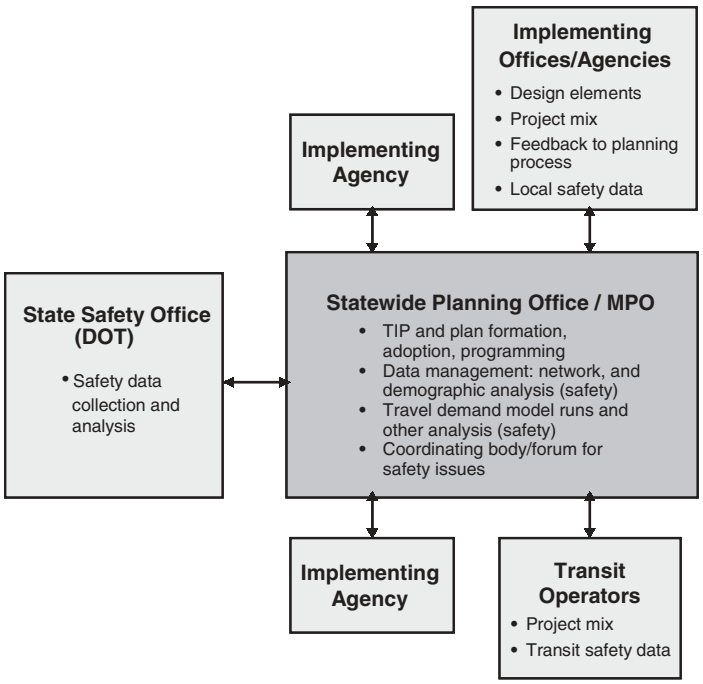


Figure 4. Transportation agency relationships and safety program responsibilities (developed by Michael Culp, FHWA, 2002).

Other regions mandate metric-driven analyses for safety considerations. For example, in New York City's most recent TIP (*12*), the following is included within the section titled "How Projects Are Chosen":

> *The NYSDOT is required to conduct Priority Investigation Location Studies (PILS) on routes for which it has responsibility. It looks at the pattern and number of vehicular and vehicular/pedestrian accidents along the routes and evaluates whether operational, geometric or environmental factors are contributing to the problem. It then recommends operational, informational or geometric improvements that will reduce future accident levels at those identified locations. NYSDOT's Traffic Engineering & Safety group then reviews volumes and recommends safety improvements in capital projects or initiated separate safety projects. Smaller operational safety projects may be done under contracts with NYCDOT who does the maintenance on the NYSDOT touring routes in New York City.*

CHAPTER 3

INCORPORATION OF SECURITY INTO THE PLANNING PROCESS

This section discusses the need for adding security to the transportation planning process and describes the limited evidence of progress in this direction as well as potential roadblocks to further and broader progress.

WHY TRANSPORTATION SECURITY IS IMPORTANT

Historically, terrorist events in the United States have been rare. Most terrorist events have occurred in Europe, the Middle East, Asia, and South America where political and religious extremists have employed terrorism to gain attention for their cause, intimidate their opponents, gain or retain political power, or undermine the stability and economic viability of the country. Most high profile transportation-related terrorist events have occurred in other countries, primarily in the aviation sector, where the number of fatalities per event and the public's sense of vulnerability are quite high. However, in terms of the frequency of terrorist events, surface transportation has been and continues to be a common target of terrorists worldwide, as shown by suicide bombings of public transit buses in Israel, the sarin attack in the Tokyo subway system, and the fire bombing of a passenger train in India.

Transportation infrastructure's vulnerability to terrorist acts can be attributed to several features. First, transportation infrastructure (stations, vehicles, and networks) serve high concentrations of people, thereby increasing the potential number of casualties. Second, transportation systems provide essential services to the public, thereby threatening their way of life. Third, transportation systems can be used as both the delivery and escape mechanisms of terrorists. These features make transportation infrastructure a target of choice for those wanting to spread fear to the widest segment of society. They also make transportation infrastructure harder to secure from terrorist actions.

According to the U.S. Department of Transportation, transportation and transportation infrastructures were targets of 42% of all international terrorist attacks in 1998. Violent acts, which do not meet the criteria for terrorism in this report, are a significant and growing concern, as well. In 1998, 1,033 violent incidents were reported against transportation, over double the number reported in 1995. As shown in Table 1, highway infrastructure represented the most frequently targeted transportation mode, with 242 incidents, including 11 terrorist events and 579 casualties. However, bus transportation produced the highest number of deaths and injuries overall.

In this country, there have been a number of cases in which terrorists have directly targeted surface transportation assets, including planned bombings of New York's George Washington Bridge, Lincoln Tunnel, and Holland Tunnel in 1993 (*13*). On November 1, 2001, the U.S. Department of Justice released a statement from the Federal Bureau of Investigation (FBI) Counterterrorism Division sent via the National Threat Warning System indicating that groups had targeted suspension bridges on the West Coast, including the Golden Gate Bridge, San Francisco Bay Bridge, Vincent Thomas Bridge at the Port of Los Angeles, and Coronado Bridge in San Diego.

Transportation assets may be (1) direct targets of terrorism and acts of extreme violence; (2) indirect targets of such acts; or (3) compromised with respect to incident response. These situations are described as follows:

- **Direct attacks.** Transit facilities have frequently been used as the target of direct attack because large numbers of persons congregate there and vehicles can more readily transport biological and chemical pathogens. Examples include the 1995 sarin attack in the Tokyo subway system, the many recent suicide bus bombings in Israeli, and the coordinated bombings of commuter trains and stations in Madrid, Spain, in 2004.

  Highway assets are more rarely targets of direct attacks than are other types of transportation facilities, because operators of passenger or freight vehicles are typically dispersed on roadways and the damage potential is fairly small per vehicle. However, highly symbolic targets such as bridges or tunnels, which may be more appealing to terrorists because they represent choke points in the transportation system, offer greater potential for fatalities and injury and have the potential to produce broader and longer-lasting systemwide impacts. Other exceptions include the following:
  - The 1993 bombing of the WTC garage was aimed at destabilizing the foundation under the WTC so that the building(s) would collapse;
  - Extensive precautions were taken to safeguard the two national political conventions held in 2004 in

TABLE 1 Worldwide violent attacks on transportation, by mode: 1998

Mode	Incidents (%)	Deaths (%)	Injuries (%)
Bus	205 (20%)	647 (39%)	1,029 (47%)
Highways	242 (24%)	579 (34%)	336 (15%)
Rail	105 (10%)	161 (10%)	607 (28%)
Maritime/Piracy	220 (21%)	105 (6%)	37 (1%)
Aviation	75 (7%)	77 (5%)	13 (1%)
Pipelines	124 (12%)	74 (5%)	154 (7%)
Bridges	22 (2%)	11 (1%)	14 (1%)
Subways/Other	40 (4%)	3 (-%)	4 (-%)
Total	1,033 (100%)	1,657 (100%)	2,194 (100%)

Source: U.S. Department of Transportation, Office of the Secretary of Transportation, Office of Intelligence and Security, *Worldwide Terrorist and Violent Criminal Attacks Against Transportation—1998* [Washington, D.C.: 1999].

downtown convention centers located above major transportation facilities; and
  - Snipers killed people at random in the Washington, D.C., metropolitan area in September and October of 2002.
- **Indirect attacks.** Highway passenger and freight infrastructure, by its ubiquitous nature, is more likely to suffer collateral damage in a terrorist attack, as are elements of the transit infrastructure in metropolitan areas. Indirect—yet equally disruptive and lethal—attacks can be considered more common threats than direct attacks on surface transportation assets. The September 11, 2001, terrorist attacks caused millions of dollars in road and transit damage, destroying stations, tunnels, supporting infrastructure, and vehicles, leaving only part of one Port Authority Trans-Hudson platform and an escalator bank beneath the WTC. This has necessitated the operation of a temporary station in the area until a new facility can be built.
- **Response capabilities.** The disruption of surface transportation modes can readily affect emergency response capabilities. Especially susceptible are choke points surrounding major metropolitan areas or across or under major bodies of water. These include bridges, tunnels, and interchanges. New York City, Washington, D.C., and San Francisco are particularly vulnerable in this regard.

Compared with bus service, fixed-guideway transit services are less capable of being redirected around damaged areas and can be more affected by terrorist events because of the concentrated nature of their route networks. Ferry services, in such cities as New York and San Francisco, provide an additional level of redundancy for fixed-guideway transit systems.

Highway systems offer greater redundancy than fixed-guideway transit systems but have more severe capacity constraints per route. Disasters—whether intentional or not—can quickly lead to gridlock conditions, preventing highways from serving as evacuation corridors and increasing the vulnerability of urban populations to chemical, biological, or radiation exposure. For example, highways surrounding Washington, D.C., were unable to accommodate vehicular traffic after the Pentagon attack, preventing the free flow of buses and emergency vehicles into or out of the area. Planning can handle some of these issues by providing alternative approaches to routing traffic and rationing available capacity. For example, a report conducted by the Volpe National Transportation Systems Center recommended that some of the problems encountered in Washington, D.C., in the aftermath of the Pentagon attack could be have been avoided by restricting the use of high-occupancy vehicle (HOV) facilities to first responders and transit vehicles (*14*). Another example is the Florida Reversible Lane System, which enables emergency transportation officials to convert major north-south highways in the state to one-way north routing to facilitate evacuation of Southern Florida residents when there is a hurricane.

In summary, the terrorist attacks of September 11, 2001, and other terrorist threats prove that the United States is not immune to terrorism, and the threat of terrorism (and surface transportation-related terrorism, in particular) is not a problem confined to the aviation industry. A history of serious, credible, direct, and indirect threats to surface transportation exists. This trend is likely to continue in the future, and it is up to transportation planners and stakeholders to anticipate and address these threats early in the planning and programming of transportation facilities. This cannot completely prevent terrorists from targeting transportation infrastructure users, but it can identify and incorporate ways to reduce the vulnerability of transportation facilities and the survivability of civilians in the development of transportation systems and networks.

In February 2003, to emphasize the importance of protecting the nation's transportation systems, the White House released *The National Strategy for the Physical Protection of Critical Infrastructures and Key Assets* (*15*). This important document provides a strategic basis for developing and implementing national strategies to protect and secure our nation's infrastructure assets, including transportation, from physical attack. The report contains these near-term security priorities:

- Planning and Resource Allocation—which includes collaborative planning involving public- and private-sector stakeholders; and
- Securing Critical Infrastructures—which includes transportation as one of eleven critical infrastructure sectors.

The document also describes the importance of protecting the nation's critical infrastructure to preserve our nation's economy and way of life.

LEGAL BACKGROUND

TEA-21 currently requires states and MPOs to carry out a planning process with an aim to increase the safety and security of the transportation system for motorized and nonmotorized users. Because of the nation's limited experience with large-scale acts of domestic terrorism, the metropolitan transportation planning process does not generally incorporate security considerations as an integral component. In certain instances, government agencies at state, regional, and local levels have begun assessing security threats to specific transportation-related physical and information infrastructure elements. Some have actually implemented integrated security technologies and procedures tailored to these threats. However these are more the exception than the rule. Most governmental bodies are focused on the operational aspects of disaster response and prevention and have developed working groups and committees to look into and coordinate intergovernmental and interjurisdictional efforts to address security concerns.

In the various bills being considered to reauthorize the Federal-Aid Highway Funding Program, Congress has put forward a number of provisions that elevate the importance of security. These include the following provisions:

- Make security a distinct factor from safety in the transportation planning process.
- Provide resources for transportation-related homeland security projects that would be identified through the regular transportation planning process, including those aimed at prevention, mitigation, response, and recovery.
- Provide resources to improve international freight security in and around key freight gateways and hubs, including intermodal and STRAHNET connectors.
- Provide resources to expedite urgent highway and public transportation security projects to address an imminent threat or to repair damage caused by a terrorist attack against the United States, including structural hardening, relocation of roads from underneath critical structures, property acquisition to create secure zones, or repairing or replacing a bridge or tunnel that has been damaged or destroyed by a terrorist attack.
- Encourage the use of monitoring systems (such as intelligent transportation systems [ITS]) to check the status or condition of key surface transportation (highway and transit) facilities.

PLANNING FOR SECURITY

Since the passage of TEA-21 and the terrorist attacks of September 11, 2001, both safety and security have become major topics for those responsible for developing and implementing transportation infrastructure programs and projects. Indeed, it is sometimes difficult to differentiate between safety and security. This increased attention can be attributed to a continuing emphasis by the U.S. DOT on safety and the public's receptiveness to programs that save lives and promote improved quality of life for users of the nation's transportation systems, whether owned and operated by the private or public sectors. It is likely there will be a continuing emphasis on safety and security by transportation stakeholders for the foreseeable future, reinforced by the expanding interest in and funding for programs promoting homeland security.

As noted in the previous section, no single agency is responsible for the transportation planning process. Several stakeholders are involved at every level of developing the transportation planning documents and implementing the goals set forth in these documents. Incorporating new priorities into a multilayered, established process not originally designed for meeting security goals is complex and requires both time and creativity. In the case of security, the following new stakeholders must be involved:

- Police and sheriff's departments;
- Fire departments and rescue squads, which typically lead incident response efforts to acts of terrorism (as the responses to the two WTC terrorist attacks demonstrated);

- Federal response agencies such as the FBI; and
- Elements of the Department of Homeland Security (DHS), such as the Federal Emergency Management Agency (FEMA), Transportation Security Administration (TSA), and U.S. Coast Guard.

Many of these organizations are accustomed to working with transportation officials and are more likely to be organized at a local or federal response level.

Typically, no single agency is responsible for transportation security. At the local level, especially within transit agencies, safety may be handled within one office. However, it is far less likely that the security of a surface transportation mode is managed by one entity and that this entity is even controlled by the transportation organization. For example, highways and transit networks traverse multiple police jurisdictions, local fire departments generally fill the incident command role after terrorist events, regional command and control centers respond to both natural and intentional disasters, and federal agencies intervene as needed and based on specific guidelines such as the crossing of state boundaries

More recently, regional transportation management centers have been established to improve traffic flow on selected highways and roadways through the application of ITSs. These centers can also facilitate incident response, from crashes to hazardous materials spills/releases, and could detect terrorist acts that occur on highways and roads monitored by these centers.

Beyond public agencies, private carriers that use surface transportation facilities typically have safety and security units to prevent and respond to major crashes and acts of theft and sabotage. However, the issue of terrorist acts is a more recent area of concern for safety and security units of most carriers, except those contract and private fleets that carry hazardous and sensitive materials (such as petroleum products, nuclear fuel, explosives, chemicals, and munitions). Special response teams are deployed by major carriers and shippers with private fleets whenever a major event involving their equipment or shipments occurs. These groups have important resources and should be integrated into transportation security planning process.

As an illustration of the complexity of the issue of transportation security, the DHS, of which the TSA is one component, was created following the terrorist attacks of September 11, 2001. The significance of this action was recognized by President George W. Bush, who called it "the most significant transformation of the U.S. government in over half-century . . . largely transforming and realigning the current confusing patchwork of government activities into a single department whose primary mission is to protect our homeland." (President George W. Bush, *The Department of Homeland Security,* DHS, June 2002.) Dozens of organizations were incorporated into DHS, including the following:

- U.S. Customs Service (Treasury),
- A portion of the Immigration and Naturalization Service and the Office for Domestic Preparedness (Justice),
- TSA (Transportation),
- FEMA,
- Strategic National Stockpile and the National Disaster Medical System (HHS),
- Nuclear Incident Response Team and chemical-biological-radiological-nuclear (CBRN) Countermeasures Programs (Energy),
- National Domestic Preparedness Office (FBI),
- Critical Infrastructure Assurance Office (Commerce),
- National Infrastructure Protection Center (FBI),
- Secret Service, and
- U.S. Coast Guard.

These are merely the agencies judged to play a major role in domestic security at the federal level. At the local level, entities become even more numerous and the interactions more complex. Managing to incorporate input from these security stakeholders is difficult—clearly the issue of planning for security is at least as challenging a task.

Possibly as a result of the sheer number of participating organizations, an examination of security, when used as a planning criterion, tends to be a specialized concern rather than an integral part of the process. Also, security tends to be mentioned more often in the context of transit improvements than in highway improvements in planning documents such as TIPs. Security improvements on transit tend to be separate infrastructure or technology elements (e.g., surveillance systems), instead of elements for the entire transportation infrastructure. Similar solutions may not be as straightforward for highways, because of issues of size, geographic dispersion, and technical complexity. Another reason may be that transit agencies must substantiate that a percentage of their federal funding is designated for security upgrades or offer a reason why this spending is unnecessary. No such requirement is in place for highway security improvements.

Indeed, transit agencies have traditionally been more directly responsible for service operations, involving their own fleet of vehicles and dedicated rights of ways (for rail systems). Highway agencies have traditionally focused on the development and maintenance of their infrastructure, leaving operational, safety, and security responsibilities up to local police and fire departments. An exception to this is the nation's toll agencies, which often have their own dedicated police forces to patrol their own tolled facilities. Yet even in these cases there has been little consideration of security matters in the development and execution of long-range capital improvement plans, even after the terrorist attacks of September 11, 2001.

As the regional planning agencies responsible for approving local area TIPs, MPOs report that they are making progress toward incorporating security into the planning process and, as a result, are taking on new responsibilities. For example, based on a 2002 survey of MPOs (*16*), 78% of MPOs reported that security concerns have changed their planning process, and nearly one-fourth of MPOs reported that security issues have increased the cost of the planning process. MPOs also reported the need to focus more on the following types of issues:

- Traffic modeling for evacuation plans
- Airport facility planning
- Emergency preparedness
- Statewide assessments of critical assets and vulnerable facilities
- Coordination with E-911 services

According to the survey, 79% of MPOs are working on emergency operations plans for their area. Examples of changes made by many MPOs include the following:

- The technical advisory committee of an MPO is working very closely with local transportation planning agencies to develop its regional emergency transportation routes.
- There is increased coordination among agencies that plan and provide transportation. For example, the seaport, airport, mass transit, and other modal agencies have enhanced their communications with one another.
- An emergency management director has been included on an MPO technical committee that is also the Intelligent Transportation (ITS) Steering Committee.
- Statewide assessment of critical assets and vulnerable facilities has been completed, including regional prioritization (by the state DOT).
- Revision of ITS architecture is underway to strengthen emergency management/incident management relationships (*16*).

SOLUTIONS

Four major categories of security incident countermeasures exist to address threats and vulnerabilities to the nation's transportation infrastructure. These four measures include prevention, protection, redundancy, and recovery.

Prevention

Prevention measures include efforts to limit access to assets that may be compromised, for example, access control systems, closed circuit television (CCTV) systems, and intrusion detection systems (such as alarmed entrances and fence-line detection systems). These measures can also include less technologically advanced solutions such as doors, fences, locks, and architectural barriers, and a system to encourage the public to report suspicious activities they observe in or near transportation facilities. Prevention measures may differ based on the type of transportation assets to be protected. For example, in the construction of bridges and tunnels, incorporating sufficient standoff distances from primary structural components is very important.

In addition to restricting access to facilities or to areas of facilities, several design techniques and technologies are available to enhance surveillance. CCTV systems, for example, serve this purpose, and most agencies use these devices in facilities, or on vehicles, or both. Further, facilities may be designed to enhance "natural surveillance" of occupant activities. Open floor plans with few obstructions and adequate lighting, for example, help to ensure that detection of criminal activity in such facilities would be high.

Protection

If prevention measures alone are not sufficient to protect an asset and it is of high enough priority, target hardening approaches may be taken. These vary by type of asset. Blast resilience may include architectural features that allow for 'venting' energy from an explosive device, for example. Retrofitting measures can be included in existing designs, and new design standards may be developed (as with seismic design standards) to ensure high vulnerability targets, such as bridges, tunnels, and intermodal facilities, are appropriately safeguarded.

Redundancy

The direct result of capital planning processes is the infrastructure system that is produced, based on the consideration of various factors contained in federal legislation, regulations, and local concerns. Among the considerations that should be included in this planning mix are the effects that layout, integration, and redundancy of transportation network components have on the effectiveness and speed of reaction to and recovery from security incidents. Redundancy can be designed into transportation infrastructure on a micro or a macro level. Structures, such as bridges, that have physical redundancies (no single-point failures) are more resilient to all but the most sophisticated attacks. Further, the redundancy of the entire transportation network must be considered, with backup capabilities in communications, routes, and information (command, control, and data) sources.

One of the best examples of the necessity of redundancy is the crash of an Air Florida 727 passenger jet into the 14th Street Bridge in Washington, D.C., during a blinding snowstorm on January 13, 1982, that killed 74 and injured 5. This disaster became further compounded by the subsequent underground collision of a Metro subway train into support columns when it backed onto a crossover near the Federal Triangle Station that killed 3 and injured 25 (*17*). In this case, two disasters and inclement weather effectively shut down the transportation system in downtown Washington, D.C., and its surrounding communities. Figure 5 shows maps of the two disaster sites, located within 1 mi of each other. Add the ingredient of a chemical or biological attack and one can only contemplate the consequences. Greater redundancy in the transportation network could be a by-product of forward thinking during the capital planning process to facilitate reaction and recovery to security incidents, which are likely to be multidimensional and multimodal.

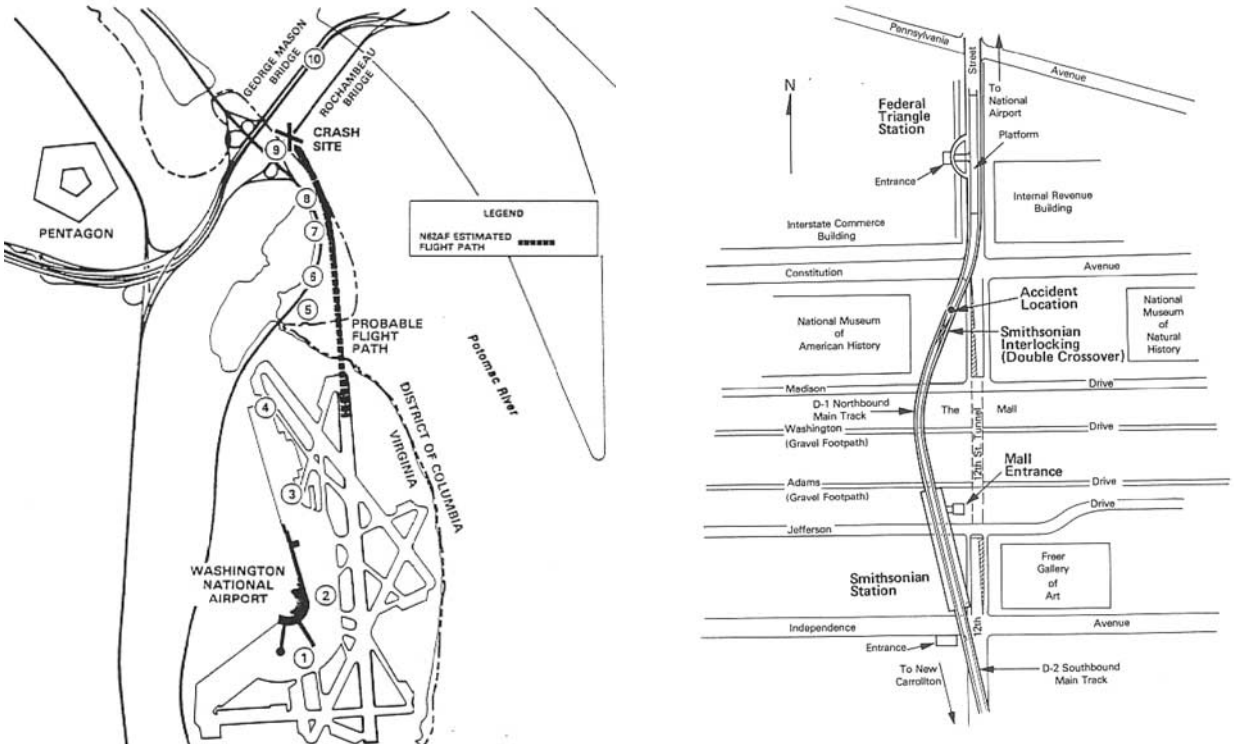


Figure 5. Map of disaster sites in Washington, D.C.—January 13, 1982 (17).

Recovery

Recovery efforts include both short-term (response) activities such as emergency notifications and first response as well as longer term activities such as restoring business continuity by providing traveler information, temporary and permanent re-routing of services, and reconstruction. Recovery plans and capabilities for executing them must be known and established, requiring both coordination among stakeholders and the infrastructure capacity to handle an evacuation. Technology, such as traffic management centers, CCTV, sensor systems, dynamic message signs, advanced traffic control systems, websites, and geographic information systems, can be applied to increase infrastructure efficiencies. When technology is an integral component of a system, redundancy and resiliency of data and information links take on added importance to the functionality of the system. These can potentially become weak links during a disaster, as the system becomes overwhelmed by the surge in data and user demands placed on the system.

Capital improvement projects that deploy ITS and improved traffic control devices have the potential to mitigate transportation security incidents. Technology-enhanced projects can address different phases of recovery, including improved communication channels to employees, first responders, and the public, and can include real-time information to support response decisionmaking. For example, after the Pentagon attack, traffic signals were adjusted to accommodate outbound commuters and inbound emergency responders (*14*). Improved data collection can also support security-related research and planning activities.

In New York City, the bi-state public traffic monitoring center, TRANSCOM, used traffic data to distribute traffic, and the George Washington Bridge's ITS capabilities effectively managed the bridge's temporary shutdown (informing traffic within 2 min of the shutdown). Highway advisory radio, dynamic message signs, and CCTV all provided public information concerning preferred traffic routings and bottlenecks to avoid (*4*). In addition, on September 11, 2001, the system diverted inbound traffic away from Manhattan in response to the disaster (with ITS infrastructure all along I-95 performing the same function) (*14*).

ISSUES WITH INCORPORATING SECURITY INTO THE PLANNING PROCESS

Each of the major types of security countermeasures noted above can be incorporated into the transportation infrastructure planning process on a regional and statewide basis to address threats from terrorists and vulnerabilities as a result of their actions. As a precursor to the terrorist attacks of September 11, 2001, TEA-21 required planning inputs regarding both safety and security. However, safety became the more recognizable element of the planning process, while the visibility of security did not keep pace. The terrorist attacks of September 11, 2001, have spurred a renewed interest in

how to introduce and incorporate security considerations and strategies into the transportation planning process.

There are a number of reasons why the incorporation of security remains a more difficult goal to attain than does that of safety. These are discussed in the following subsections.

Higher Perceived Relevance and Visibility of Safety

The causes of safety problems affecting transportation infrastructure and their solution strategies have been studied and understood far longer than domestic security threats and countermeasures. Safety is a broadly understood concept and concern, with public safety resources and programs largely provided at the local level (such as police, fire, and rescue forces). The success of various transportation safety programs (safety belt use, drunken driving enforcement, speed enforcement, safety features in vehicles and facilities) has lent considerable credibility to this issue. This is particularly evident in the area of highway safety, where long-term efforts to reduce the number of crash-related fatalities and injuries have produced dramatic results during the past 30 years.

Safety factors used to be addressed primarily in the post-planning phases of project development—for the civil engineer to design facilities to be safe, the mechanical engineer to design a safer vehicle, the traffic engineer to regulate traffic operations, the traffic officer to enforce these regulations, and the press and media to educate the public about transportation safety issues and strategies through public service announcements. In recent years, creative efforts have been made by individuals at all levels of government to raise the consciousness of transportation stakeholders to the need to consider safety earlier in the transportation program and project development process—namely, the transportation planning process.

In the past decade, safety has become a popular factor for sponsors of transportation programs and projects, due in large measure to its greater perceived relevance and immediacy to the general public. Legislators and transportation agency officials have discovered that safety is a universally popular subject that promotes project justification. As a result, there have been great strides made in the incorporation of safety into the transportation planning process. Consequently, safety has been incorporated into the traditional planning process for a longer period of time than security.

Given the legacy of success and public popularity, it is no wonder that the current leadership of the U.S. Department of Transportation and the Federal Highway Administration have placed safety at the top of their priority list for transportation funding and programs. An emphasis on safety was reflected in the U.S. Department of Transportation's original proposal for TEA-21 reauthorization, labeled SAFETEA, which also included numerous sections that specifically addressed security provisions. Gaining a similar federal emphasis on security will be an important impetus for incorporating security into the planning and delivery of surface transportation projects and services.

Misconceptions Regarding Responsibilities for Security-Related Planning among Federal, State, and Local Governments

In contrast to the emergence of safety as an important consideration by transportation planning and project delivery organizations at all levels of government, national security has been traditionally viewed as a more specialized issue for such federal agencies as the Defense Department, CIA, FBI, and Bureau of Alcohol, Tobacco, Firearms and Explosives to address. In contrast, local security has been the purview of community-based police, fire, and rescue departments. Anti-American terrorist actions that have taken place on American soil have provided the impetus to alter this allocation of security-related operational roles and responsibilities. However, translating this shift in institutional focus and responsibilities for security consideration to the transportation planning process remains a challenge. Terrorist threats have not been a major consideration for transportation planners until recently because of the infrequent occurrence of terrorist incidents involving transportation systems and facilities.

The same phenomenon confronted those responsible for protecting the nation from nuclear attack during the later years of the Cold War. Without public perception of imminent attack, those responsible for our nation's nuclear defense preparedness planning found it difficult to convince those in private industry to exert greater efforts to plan for such a threat and better protect their critical facilities and employees. It was only when the issue was reframed in terms of more imminent threats, such as hurricanes, tornadoes, floods, earthquakes, or fires in high-rise buildings, that private industry became amenable to improving their emergency preparedness capabilities and investing more resources in programs to better protect critical facilities and employees (*18*).

A general perception persists that security planning and protection remains the purview of a specialized group of agencies (particularly federal agencies) and firms (particularly defense-related firms) dealing with national security, environmental terrorism, organized crime, and/or hazardous materials. Even after the terrorist attacks of September 11, 2001, security considerations related to transportation infrastructure remain focused on emergency preparedness and response planning, not capital planning. In some cases, transportation program sponsors have simply attached the word "security" to the already popular term "safety" in defining program and process requirements for transportation planning and execution.

The lack of senior level sponsorship for security considerations in the planning and development of transportation programs and projects has left security in the shadows of safety, which remains a high priority of federal transportation agencies and a more tangible and imminent consideration for local transportation planners. As a result, security remains more of an echo than a tangible consideration on its own merits in the development of traditional transportation program plans.

Unavailability of Security Data

Safety data, in particular data on crashes (though not entirely adequate in many respects), are far more readily available than are security data. In addition, because so many crashes occur, there are defined patterns from which statistically-based conclusions can be drawn. Terrorist acts of extreme violence, which are the primary focus of this study, are occasional, statistically random events by intent, and not amenable to the same types of databased analyses as are traffic crashes, for example. Other more commonly occurring criminal acts are often not recorded by law enforcement agencies as having occurred at transportation facilities.

A recent response to this lack of data occurred in 2001, when the National Transit Database (NTD) was expanded by the FTA to collect data on acts of terrorism and extreme violence (e.g., bombings), as well as indicators of such threats (e.g., bomb threats). This data collection system may serve as a model for other surface transportation modes.

Open Accessibility of Transportation Systems

The transportation systems in this country are, by nature, open and accessible. While many safety programs focus on prevention measures through engineering or other means, prevention of terrorist or other serious events is, realistically, less feasible because of free system access. Focusing on response and recovery measures and system redundancy may be a better approach to terrorist events and acts of extreme violence than the development of prevention systems. For example, response and recovery solutions (such as widening key evacuation routes) may be prompted by the need to ease traffic congestion but may also have indirect security implications. Such efforts can have a dual role of reducing traffic congestion and responding to terrorist threats or actual events by avoiding choke points into and out of a city. Similarly, enhancing emergency response planning for local emergency events (such as for hurricanes) can have a dual role of enhancing the response to intentional acts of destruction. These programs may be equally useful as security measures, though they may not be explicitly noted as such in transportation plans.

Multitude of Metropolitan/Local Area Stakeholders

There are a large number of security stakeholders within metropolitan and more rural areas, and these entities often have highly localized responsibilities. A transit system, for example, may travel through 20 or more police jurisdictions, and the concerns of these entities may differ significantly. Security stakeholders at the local level may be somewhat new to the transportation planning process, particularly in more rural areas where transportation planning may be performed primarily at the state level. Finally, many stakeholders (such as police) are more focused on and oriented toward response measures (rather than long-range planning) in the daily execution of their jobs.

Lack of Security Performance Measures

Performance measures quantify the extent to which capital improvements (or the existing infrastructure) are meeting the needs of a region and how specific investments will affect these needs. An example of a traditional measure is mobility (average travel time). Safety is quantifiable in terms of crash data and costs of crashes (in terms of loss of life, injury, and property damage).

Security is generally more difficult to quantify. Metrics for security are not as straightforward as merely the collection of crime data. For example, lesser (non-violent) infractions such as vandalism are categorized as Part II crimes by the FBI. The destruction of traffic or rail signals can pose serious threats to the transportation system and its users. Part II data are recorded by local law enforcement agencies not by the number of incidents occurring, but by the number of arrests made. An increase in Part II crimes related to transportation could signal a potential concern, but it could also highlight that the local police department is simply doing a better job of enforcing laws or documenting these types of incidents (actual incidents may be stagnant or even decreasing in conjunction with a Part II crime level increase).

The FBI tracks eight more serious crimes (homicide, aggravated assaults, etc.), categorized as Part I offenses. These crimes typically are indicators not of the types of issues this study encompasses but of other societal issues such as the drug trade or gang violence. Terrorist threats and prevention are the focus of this study. Since the scope of terrorism is so narrowly defined, much of the best data available (from the FBI) are not entirely complete and do not coincide with the scope of this study or the overall issue of concern of infrastructure operators. For example, the FBI definition of socially or politically motivated incidents includes incidents perpetrated by environmental rights activists or Islamic fundamentalists but not incidents perpetrated by those who choose to damage the infrastructure for criminal, personal, or other motivations.

A better method for tracking performance, then, may be to monitor some measure of vulnerability of infrastructure components. For example, since September 11, 2001, many key infrastructure elements—including many bridges and tunnels as well as dozens of the largest transit systems—have undergone threat-specific vulnerability assessments. These vulnerability assessments, however, are largely qualitative. Further, the release of vulnerability information into the planning process and, thus, the public domain, would be detrimental to the vulnerability assessment process and may undermine the security of the assets.

Need to Safeguard Sensitive Information

The discussion raises yet another issue associated with security that is not a factor with other aspects of the planning process. Ensuring that security against terrorist or similar threats is maintained depends on the control of sensitive information within a small group of persons on a need-to-know basis. Determining security needs and developing countermeasures associated with transportation infrastructure involves consideration of threat information that typically requires a security clearance. In the aftermath of September 11, 2001, many transportation operators and members of state and federal transportation organizations responsible for tasked ensuring security of infrastructure have been frustrated that a lack of security clearance has prevented access to specific information regarding the nature and possibility of security threats.

The transportation planning process is built on the concept of interagency communication and coordination, free dissemination of information, and transparency to the public. However, the openness achieved in other aspects of the transportation planning process is neither possible nor desirable (and may actually be detrimental) when the goal of security against terrorism and acts of extreme violence is involved.

CHAPTER **4**

RESEARCH RESULTS

This chapter describes the results of the research performed during this effort to quantify and present the nature of progress or lack thereof in the area of integrating security considerations into the transportation planning process. This section includes a review of the transportation improvement programs for a number of metropolitan areas to identify whether and how security is being addressed in these programs. The chapter concludes with four case studies of major metropolitan areas and their specific efforts to bring security into the transportation planning process.

SUMMARY OF THE LITERATURE SEARCH

Appendix A contains references to, and in some cases summaries of, the extensive literature resources that were identified in the early fact-finding process of this research effort. Many of these reference documents were consulted in developing the findings and conclusions of this report and, where appropriate, are cited as references in the report.

The literature includes articles, papers, studies, research documents databases, and references related to the topic of this study. These documents are organized into the following categories in Appendix A:

- Documents on incorporating security into the planning process
- Similar documents on incorporating safety into the planning process
- Specific security issues, countermeasures, and investments
- Security assessment methodologies
- Transportation security threats and vulnerabilities
- Transportation planning process
- Analysis tools and databases
- Legislative information
- TIPs and STIPs
- General information relevant to security

In the development and review of this extensive reference library, several key points stand out. These include the following:

- References to incorporating security into the transportation planning process are very much prospective in nature and content, focusing on discussions of the importance of accomplishing this incorporation and suggesting initial strategies for starting the process. Current tools and databases are oriented to the post-planning functions of vulnerability assessment, prevention, damage mitigation, response, and recovery.
- In contrast, the literature on incorporating safety in the transportation planning process is more mature and definitive as a result of the head start safety has in federal transportation legislation, regulations, programs, and planning criteria.
- Numerous references exist in the areas of security issues, prevention approaches, operational countermeasures, response and recovery techniques, and threat and vulnerability assessments. Much of this information is derived from practitioners in emergency management and defense from outside the transportation establishment.
- There are many useful documents available describing the transportation planning process at the state and local levels, including tools and databases. These documents generally reveal the absence or very preliminary nature of security considerations in the planning processes for transportation infrastructure at the metropolitan/local and state levels.
- A database is growing on the topic of security resources and lessons learned, but this database is limited at this time.

Each of these factors suggest the need for a more concerted effort at all levels of government and industry to develop a consensus on what elements of security incident prevention and consequence mitigation can and should be incorporated into the traditional transportation planning process. These elements need to be part of a holistic consideration of security issues in the life-cycle development and operation of transportation infrastructure, without revealing sensitive security or vulnerability information to anyone without specific clearance.

TRANSPORTATION IMPROVEMENT PROGRAM REVIEW

To provide a baseline, TIPs for the 10 largest metropolitan areas were reviewed and assessed to determine the level of

inclusion of security as an explicit feature. TIPs were selected for review since they are updated frequently compared with other transportation planning documents and were assumed to reflect the most current progress with respect to security considerations. TIPs included are from the following 10 metropolitan areas, which ranked as the largest in terms of population, as of July 1, 2002 (*19*):

- New York, New York
- Los Angeles, California
- Chicago, Illinois
- Houston, Texas
- Philadelphia, Pennsylvania
- Phoenix, Arizona
- San Diego, California
- Dallas, Texas
- San Antonio, Texas
- Detroit, Michigan

The result of this review was the determination that, overall, very little security-related material has been included in these plans in an explicit way. This is a reflection of the newness of the issue, rather than a particular shortcoming of these agencies, which are typical in this respect among all planning agencies nationwide. Also, the fact that security is not contained in the TIP documents does not mean security is not being considered in the process. Some programs and projects may have been selected partially for their security features, but no mention of this may be in the TIP.

Safety, however, is a fairly new addition to the transportation planning process. It is generally a more explicit and often quantified element of programs and projects. This finding agrees with the findings in other recent studies (*20*). This study, conducted 7 months after the terrorist attacks of September 11, 2001, also noted little incorporation of security and little content change in the TIPs reviewed.

New York City, New York (*12*)

Security is mentioned several times within New York Metropolitan Transportation Council's (NYMTC) most recent TIP, though primarily with respect to transit rather than highway improvements. It is mentioned in broad terms and is not a defined criterion for program selection. For example the TIP states in two places the importance of security in the planning process (both with respect to transit):

> *NYC Transit's (NYCT) planned capital improvements for the 2004-2006 timeframe continue to address the fundamental long-term need to restore its infrastructure and facilities. The investments of preceding capital programs that brought categories back to good repair will be protected through normal replacement investments. In the process, NYCT has improved safety, security, reliability and convenience to unprecedented levels.*

> *NYC Transit maintains its core commitment to customer and employee safety and security. These projects include improved communication systems and facilities for police, improved station lighting and communications, reconstructed and upgraded subway ventilation plants, and installation of fire standpipes in stations and tunnels. Worker safety is enhanced at shops and depots with improvements in lighting, ventilation, and fire protection systems.*

Four programs totaling $28 million are explicitly mentioned within the TIP. Three of the four programs are designated for the Metropolitan Transportation Authority (MTA):

- A yard rehabilitation for A and B divisions (security upgrade)—$5.4 million
- An MTA systemwide security upgrade in 2005—$8 million
- An MTA systemwide security upgrade in 2006—$8 million
- Installation of security systems in 2003—$6.7 million

The TIP also gives fairly detailed criteria for the inclusion of safety issues within the program:

> *The NYSDOT is required to conduct Priority Investigation Location Studies (PILS) on routes for which it has responsibility. It looks at the pattern and number of vehicular and vehicular/pedestrian accidents along the routes and evaluates whether operational, geometric or environmental factors are contributing to the problem. It then recommends operational, informational or geometric improvements that will reduce future accident levels at those identified locations. NYSDOT's Traffic Engineering & Safety group then reviews volumes and recommends safety improvements in capital projects or initiated separate safety projects.*

More information is included in this report in New York City's metropolitan area case study.

Los Angeles, California (*21*)

Security projects are described within the Los Angeles TIP, including projects such as surveillance at a park-and-ride lot, security cameras on buses, and transit (Blue Line) safety improvements and security devices. In addition, all infrastructure assets in the TIP and STIP must consider seismic issues.

Not specifically mentioned in this document, though an important factor in earthquake-prone areas such as California, is the requirement that vulnerable structures (in particular, bridges) be designed incorporating rigorous seismic standards (Seismic Design Criteria). Though structural reactions to seismic events and the effects of terrorist incidents (e.g., explosives) are not necessarily identical, these state standards do require structural analyses that are fundamental to addressing each type of threat. In addition to new construction, California also requires a data-driven vulnerability assessment on older structures and funds topical research (*22*).

Chicago, Illinois (*23*)

Because safety set-asides exist, categorization of projects is an important component of developing programs to ensure that safety funding can be applied to related projects. For example, in Chicago's TIP, the following description is included:

> *Regarding categorization of TIP projects, it should be noted that there is no simple way to determine the amount of funding dedicated to safety. Implementers are limited to three work types per TIP project. Of the approximately ninety work types, about ten of them are explicitly safety work types. Almost all projects have multiple work types and the explicitly safety work types (such as barrier, guardrail, skid-proofing) are usually a fairly minor part of the over-all scope of the project. Even if an implementer is including guard rail, for instance, they might not list it—even if they've only used two of the three allowable work types. More importantly, the impetus for a grade separation, an intersection improvement, a new signal, or a host of other projects could be safety, but this would not be evident from the project work type. Safety is a primary consideration in the development of each implementer's program.*

The fact that no specific security set-aside exists for surface transportation programs (though transit agencies must show that they do allocate a small amount of funding to security or have no need to do so) may be the reason security is a less explicit component of many TIPs, including that of Chicago. As with safety, the lack of explicit reference to security as the impetus for a particular project does not mean that security does not play a role in the need or justification for a capital improvement.

Houston, Texas (*11*)

Safety is a formalized component of the planning process, in this case with a set of scoring criteria, while security is mentioned only to the extent that TEA-21 requires it to be considered as one of the planning factors.

In a section titled "Project Selection Criteria for Candidate Projects," the program states that candidate projects for inclusion in the 2004–2006 TIP are ranked on a multipart system that includes a 100-point scoring system (constituting 30% of the total project score), with points awarded for safety. Safety (maximum 25 points) would have factors to consider that include (a) whether the project is on a state or county designated evacuation route (*24*) and (b) the frequency and severity of traffic accidents in the project area.

Note that the location of a particular transportation asset on an evacuation route has significance not only in terms of response to natural disasters but also in responding to acts of terrorism.

In addition, the TIP designates separate categories of funding, including Safety (Category 8) for programs. A total of $13.4 million of safety funded projects was identified in the TIP, as shown in Table 2. Note that Category 8 was created by TEA-21, which provided that 10% of all STP funds apportioned to the state be dedicated to safety projects.

Philadelphia, Pennsylvania (*25*)

Security is not included as one of the major goals of Philadelphia's TIP. Mentioned are the following goals, including safety:

- Projects have a direct, significant, and positive association with the flow of goods at intermodal facilities, near manufacturing, office, or commercial locations, or along strategic corridors.
- Projects improve intermodal connectivity, National Highway System (NHS) connector routes, operating conditions for commercial vehicles, and access to economic activity centers.
- Project benefits can be expressed in the following terms:
  - Increasing safety and efficiency,
  - Spurring economic activity,
  - Creating jobs,
  - Protecting the environment and the region's quality of life, and
  - Promoting Delaware Valley Regional Planning Commission's (DVRPC's) adopted Centers and Corridors strategy.

A search of "security" projects in the current TIP yielded the results shown in Table 3.

Phoenix, Arizona (*26*)

Only the list of projects for the 2003–2007 TIP is available online. So the criteria for selection, including the use of safety and/or security criteria, are not apparent. Security is not mentioned specifically in any of the projects listed, though it may have been a factor in selection of certain projects. Overall, it appears that security is not a major factor in selecting transportation projects for Phoenix.

San Diego, California (*27*)

Safety is mentioned several times in the goals of the program, though no explicit ranking system is outlined. Safety is also mentioned in conjunction with several programs. Security is only mentioned specifically on one effort, which involved the upgrade of a bus facility, including building, site, lighting, and security upgrades.

Dallas, Texas

As with the other cities in Texas, safety is formally incorporated into the TIP, with projects funded by the 10% safety

TABLE 2 Apportioned and programmed amounts by funding category for the Houston Regional TIP: 2004–2006

Funding Category	FY 2004 Apportioned	FY 2004 Programmed	FY 2005 Apportioned	FY 2005 Programmed	FY 2006 Apportioned	FY 2006 Programmed	TOTAL Apportioned	TOTAL Programmed
1-Preventative Maintenance and Rehabilitation	$110,905,000	$312,338,661	$108,605,000	$48,074,360	$117,075,000	$31,589,105	$336,585,000	$392,002,126
2-Metropolitan Area (TMA) Corridor Projects	$344,760,826	$344,760,826	$502,863,025	$502,863,025	$409,555,607	$409,555,607	$1,257,179,458	$1,257,179,458
3-Urban Area (non-TMA) Corridor Projects							$0	$0
4-Statewide Connectivity Corridor Projects	$25,978,637	$25,978,637	$18,655,162	$18,655,162	$294,759,162	$294,759,162	$339,392,961	$339,392,961
5-Congestion Mitigation & Air Quality	$126,857,515	$126,857,515	$91,902,000	$91,862,546	$66,015,000	$66,015,500	$284,774,515	$284,735,561
6-Structures Replacement and Rehabilitation	$194,320,171	$194,320,171	$64,241,689	$64,241,689	$297,500	$297,500	$258,859,360	$258,859,360
7-STP Metropolitan Mobility/Rehabilitation	$342,765,368	$311,095,841	$65,303,000	$96,970,527	$65,966,000	$65,216,201	$474,034,368	$473,282,569
8-Safety	$11,598,100	$11,598,100	$1,844,500	$1,844,500	$0	$0	$13,442,600	$13,442,600
9-STP Transportation Enhancements 1992	$30,424,121	$30,424,121	$29,935,269	$29,935,269	$662,000	$662,000	$61,021,390	$61,021,390
10-Miscellaneous	$29,087,422	$29,087,422	$1,325,000	$1,325,000	$0	$0	$30,412,422	$30,412,422
10-Construction Landscape Programs 1992	$840,000	$840,000	$840,000	$840,000	$730,000	$730,000	$2,410,000	$2,410,000
10-State Parks and Wildlife Mangement							$0	$0
11-State District Discretionary	$57,284,000	$57,067,106	$17,207,000	$13,664,800	$26,844,000	$18,339,000	$101,335,000	$89,070,906
12-Strategic Priority 1992	$152,870,897	$152,870,897	$41,400,000	$41,400,000	$9,023,558	$9,023,558	$203,294,455	$203,294,455
TOTAL	**$1,427,692,057**	**$1,597,239,297**	**$944,121,645**	**$911,676,878**	**$990,927,827**	**$896,187,633**	**$3,362,741,529**	**$3,405,103,808**

set-aside clearly delineated, and the MPO's and state's dedication to supporting safety goals detailed. Security is not mentioned in terms of specific processes, except to reiterate that TEA-21 requires that one of the factors to be considered in the planning process is the increase of safety and security of the transportation system for motorized and non-motorized users. This TIP includes public comments, which do reference transit security, as well as approved projects, including at least one security-related project.

San Antonio, Texas (*28*)

Safety has been incorporated formally in the process used by San Antonio to program transportation funds, likely since the passage of ISTEA. While very detailed scoring techniques for safety benefits are included in San Antonio's TIP, security is not specifically mentioned in the document.

According to the TIP, projects submitted were evaluated and scored by the technical advisory committee (TAC) and MPO staff based on the following criteria, in which a scoring range of 10% to 40% is based on safety considerations based on project type, as shown in Table 4.

Detroit, Michigan (*29*)

The Southeast Michigan Council of Governments (SEMCOG) is frequently cited as an innovator in transportation planning practices, which include those focused on improving the security of infrastructure and transportation services provided within the Detroit area. The current regional TIP, which

TABLE 3 Security-related projects in Philadelphia Regional TIP: 2003–2006

AGENCY	PROJECT	TIP Program Costs ($000)					
		2003	2004	2005	2006	FY03-06	LATER
SEPTA	City Hall Station Broad Street Subway Line	$0	$0	$0	$0	$0	$47,500
SEPTA	Regional Rail Car Acquisition	$20,000	$32,718	$49,587	$89,271	$191,576	$97,924
SEPTA	SEPTA Safety and Security Improvements	$5,000	$0	$0	$0	$5,000	$0
PennDOT	Packer Ave. Marine Terminal Gate Enhance Marine Terminal, Delaware and Packer Ave.	$0	$0	$0	$0	$0	$0

encompasses Detroit, cites a number of security-related efforts underway. These include technology driven programs that have been funded to enhance levels of security. As with many localities, several of these programs are geared toward transit infrastructure.

The Greater Detroit Transit Geographic Information Systems (GIS) Project is operated and funded by SEMCOG, Detroit Department of Transportation (DDOT), Suburban Mobility Authority for Regional Transportation (SMART), Michigan Department of Transportation, and Wayne State University. Under this project, bus stop attribute information is coded into a GIS database to provide a basis for transportation planning and investment decisionmaking. Attributes include information regarding security-related passenger information systems and telephone/communications.

DDOT in particular is actively analyzing security features of bus stops including lighting, telephones, physical condition, and proximity to other facilities. DDOT is also planning to study project results in terms of crime data with respect to security-related investments. This effort is one of the only ones found in planning documents that related measurable data to investments. In contrast, safety planning has more apparent correlations, for example, relating engineering modifications to intersections and crash data.

In addition, a number of other capital investments are noted in this document, including on-board bus surveillance programs and automated vehicle locating systems.

As with many agencies, planning documentation still reflects the historical (though recent) focus on safety as opposed to security. It is interesting to note that security improvements may be less obvious, due to the use of the term *safety* to describe security-related incidents, such as criminal events extending to terrorism and extreme violence. SEMCOG is addressing both unintentional (safety) and intentional (security) incidents that affect transportation users and employees.

CASE STUDIES

A number of candidate regions were considered for the case studies, based on the following indicators:

- Local DOT/MPO agencies already incorporating security in the regional transportation planning process (New York, Washington, D.C., Portland, Oregon)
- Large metropolitan areas with significant high-profile surface transportation facilities and infrastructure (New York City/Northern New Jersey; San Francisco; Dade County, Florida; Oklahoma City)
- Regions with high-profile projects being considered in the future with strong security aspects (Route 66 outbound widening in Arlington, Virginia, San Francisco-Oakland Bay Bridge replacement)

TABLE 4 Project scoring factors by project type for San Antonio Regional TIP

STP-MM Capacity Projects
40% Congestion (existing and projected 2015)
20% Cost of project per vehicle miles of travel ($/VMT)
10% Safety Benefit
10% Transit Usage
10% Gap Completion
10% Critical Intersection
STP-MM Preservation—Rehabilitation Projects
40% Existing Pavement Conditions
20% Cost of project per vehicle miles of travel ($/VMT)
10% Safety Benefit
10% Transit Usage
10% Operational Improvement
5% Projected year 2015 vehicle miles of travel
5% Gap Completion
STP-MM Preservation—Operational Improvement Projects
40% Operational Improvements
25% Cost of project per vehicle miles of travel ($/VMT)
20% Safety Benefit
5% Transit Usage
5% Projected year 2015 vehicle miles of travel
5% Existing Pavement Condition
STP-MM Pedestrian Projects
25% Safety Benefit
20% Connectivity of the facility
20% Condition of the existing facility
20% Transit Usage and linkage
10% Cost of project per vehicle miles of travel ($/VMT)
5% Projected year 2015 traffic volumes
STP-MM Bicycle Projects
40% Increase Accessibility
40% Safety
20% Environmental Impact
Urban Street Program Projects
40% Existing Pavement Conditions
25% Cost of project per vehicle miles of travel ($/VMT)

- Areas with signature surface transportation targets (New York City, Washington, D.C., San Francisco):
  - Bridges across and tunnels under Hudson and East Rivers (New York City)
  - Metro (Washington, D.C.)
  - Golden Gate Bridge (San Francisco)
  - Skyway Bridge (Tampa, Florida)
  - Chesapeake Bay Bridge-Tunnel (Norfolk, Virginia)

From the assessment of these criteria, four metropolitan regions were selected as case studies for more intensive fact-finding and review to assess current and planned efforts to include security considerations in their transportation improvement planning processes. These four are the metropolitan areas of New York City, Washington, D.C., San Francisco-Oakland-San Jose, and Portland-Vancouver.

The case studies reflect the results of structured, exploratory, and informal interviews and documentation research. The goal of the interviews was to paint a picture, from several points of view, of the elements in place to include security in the planning process. The case studies used a questionnaire (see Appendix B) to ensure that the main analytical concerns were addressed, while leaving considerable room for interviewees to volunteer information and describe their own experiences. The structured set of questions facilitated correlation of interview findings with written documentation.

The case studies were conducted in a confidential manner with no attribution to the participants. Overall, the researchers focused on the planning process itself rather than on operational or deployment issues.

New York City Metropolitan Area Case Study

The selection of the New York City metropolitan area for a case study is an obvious choice for a number of factors. First, this was the site of the September 11, 2001, terrorist attacks on the WTC. The second is its large number of signature transportation facilities and landmarks (such as the Brooklyn Bridge, Lincoln Tunnel, Empire State Building, Chrysler Building, and Statue of Liberty). In addition, this metropolitan area covers three states and is served by one of the largest and most complex transportation networks in the world. The fourth reason is the large number of jurisdictions and agencies with responsibilities for transportation planning for this region. Many of these factors make the New York City metropolitan area unique. However, its uniqueness also makes it a likely target for terrorists as well as a laboratory for trying out new approaches to incorporating security into the transportation planning process.

Location and Transportation Infrastructure

The transportation network in the vicinity of New York City is unique in both its density and capacity to move people and goods. This infrastructure is a vital link in the commerce and cohesiveness of the area, meaning that the planning of these critical assets is essential to the robust economy of the area and its accessibility. The sheer volume of transportation usage requires that maintenance and planning for upgrades be an ongoing process such that the system can continue to meet local, regional, state, and federal policy objectives related to mobility and security goals, as well as other needs.

The region served by NYMTC includes New York City and five suburban counties in the surrounding area representing a 2,400 sq mi region in which 64% of New York State's population (12.2 million persons) resides (see Figure 6). This area encompasses 225 route mi of rail rapid transit, 477 route mi of commuter rail, 22,870 centerline mi of roads, streets, and highways, as well as several commercial airports and maritime facilities. On an average 2002 weekday, 3.1 million passenger trips were supplied on buses, 4.6 million on rail rapid transit, 550,000 on commuter rail, 128,500 on ferries, and millions more on the area's roadways (*30*).

Figure 6. New York Metropolitan Planning Council's region.

Roadways. Roadways are categorized in the region by usage and type: 235 mi of the busiest freeways and expressways make up the New York State arterial system. Of these, somewhat more than one-half are state-owned, with the rest owned by New York City or authorities. Highways with commercial traffic usage are categorized as expressways, with other highways that exclude commercial traffic called parkways. The region's coastal location (and the number of other major waterways) makes bridges an important component of the transportation infrastructure. Approximately 38 mi of the state arterial system (16% of the 235 total mi) are on bridges (*31*).

Public Transportation. The transportation infrastructure and transportation used in New York and its immediately surrounding locations is unlike any in other areas of the country. For example, the area is unique in its overwhelming reliance on public transportation. "While nearly 85% of the nation's workers need automobiles to get to their jobs, four of every five rush-hour commuters to New York City's central business district avoid traffic congestion by taking transit services, most of it operated by the Metropolitan Transportation Authority (MTA). MTA customers travel on America's largest bus fleet and on more trains than all the rest of the country's subways and commuter railroads combined. . . ." (*32*) Investment in this mode is, consequently, more of a consideration than in other communities.

MTA provides 2.4 billion passenger trips annually, providing one in every three transit trips supplied in the entire United States each year. Further, New York rail ridership makes up two-thirds of the nation's rail riders. Infrastructure related to this, the nation's largest public transportation system, includes bridges and tunnels that carry 300 million vehicles annually—more than any bridge and tunnel authority in the nation. The infrastructure supports a regional population of 14.6 million people over 5,000-sq mi, including northeastern New Jersey and southwestern Connecticut.

Other Modal Facilities and Services. International airline service is provided by the Kennedy, LaGuardia, and Newark International Airports, each operated by the Port Authority of New York and New Jersey, which also runs one of the busiest ports in the world. Amtrak provides frequent intercity passenger rail service to the region, especially along the northeast corridor.

Local Planning Process (30)

NYMTC is the MPO for the New York City region. NYMTC is responsible for developing the federally-mandated transportation documents for the region as well as providing a forum for planning processes and public input. The NYMTC comprises Nassau, Putnam, Suffolk, Rockland, and Westchester counties and New York City, and voting members include Nassau and Suffolk counties on Long Island and Putnam, Rockland, and Westchester counties in the Hudson Valley. New York City is represented through its departments of transportation and city planning. Voting members also include the New York State Department of Transportation (NYSDOT) and the MTA.

The individual voting members on the NYMTC include the following:

- Putnam County Executive
- NYSDOT Commissioner (Permanent Co-Chairperson)
- Nassau County Executive (Rotating Co-Chairperson)
- New York City Planning Commission Chairperson
- Westchester County Executive
- Rockland County Executive
- Metropolitan Transportation Authority Chairperson
- Suffolk County Executive

Non-voting members include the Port Authority of New York and New Jersey, New Jersey Transit, the North Jersey Transportation Planning Authority, the New York State Department of Environmental Conservation, the FHWA, the FTA, and the Environmental Protection Agency (EPA). In all cases, members are local elected officials as well as heads of relevant agencies (environmental or transportation) who have responsibility for planning and operating activities at these agencies.

The TIP process for the New York City area is somewhat in flux. Typically, the TIP covers 5 years. However, the NYMTC most recently developed a 3-year TIP covering 2004–2006 because of the Congressional waiver of air quality conformity granted to the New York City metropolitan area on October 1, 2002, as a result of the terrorist attacks of September 11, 2001, and the consequent changes in travel patterns and difficulty in carrying out transportation plans. The waiver releases NYMTC from its obligation to demonstrate conformation with emissions limits set by New York State's Implementation Plan for Air Quality until September 30, 2005. The New York area is a nonattainment area, and, as such, is normally required to demonstrate conformity with these standards each time it updates its regional or local TIPs.

The waiver applied the following conditions on exemption:

- NYMTC socioeconomic and transportation forecasts are to be updated to reflect changes in regional travel and development resulting from the September 11, 2001, terrorist attacks.
- NYMTC is to use the updated forecasts to complete a full update of its regional and local TIPs by October 1, 2005.
- NYMTC is to demonstrate the conformity of its new regional and local TIPs with air quality requirements by October 1, 2005.
- NYMTC cannot program new, regionally significant roadway expansion projects and it must consider new emissions reduction measures during the waiver period.

- NYMTC must maintain interagency review of all categories of improvement projects covered by the Clean Air Act, including approximate estimates of emissions impacts.

In addition, the timeframe of this document was affected by difficulties in planning given the uncertain schedule for reauthorization of TEA-21, which was originally set to expire at the same time as the previous TIP did.

Due to the waiver, NYMTC was able to develop a TIP covering 2004–2006. Improvements listed in this 2004–2006 TIP have undergone an interagency review as required in the legislation granting the conformity waiver.

State Planning Process (32)

The NYSDOT is responsible for coordinating the development of the state's transportation systems across all modes. The NYSDOT is also directly responsible for the planning, development, operation, and maintenance of its state highway system. The NYSDOT is headquartered in Albany and has 12 districts, with District 11 encompassing the New York City metropolitan region.

In compliance with federal transportation funding legislation (Title 23 [highways] and Title 49 [transit] of the U.S. Code, as amended by TEA-21), NYSDOT prepares the STIP. New York's STIP includes all federally funded (or partially federally funded) projects proposed by New York State and scheduled to begin over the next 3 years. In addition, certain nonfederally funded programs are included.

This document is updated biennially and encompasses the required 3-year listing of programs and projects. The current STIP covers the period from October 1, 2003, to September 30, 2006. The document includes programs from all regional TIPs across the state, including both highway and public transportation projects and those from metropolitan areas as well as regional locations. The 2001–2003 STIP totaled more than $7.9 billion in projects, while the new (draft) STIP contains both highway and transit projects totaling more than $10 billion (*32*).

Project Selection Process

The process for developing New York's STIP begins with the development of metropolitan and regional TIPs. In metropolitan areas, the development of the TIP is a cooperative process between the state, local governments, and local transportation providers. The process begins with a solicitation of projects from the area agencies that are eligible to sponsor federal-aid transportation projects. Estimated available federal-aid funding is compared with existing project commitments to determine the amount of funding available for new projects. The candidate projects are evaluated, and projects to be included in the TIP are selected for funding based on the evaluations, the project's eligibility for federal-aid funds, and the availability of those funds. The draft TIP is then made available for a public review, and air quality conformity determinations are undertaken in nonattainment areas. Formal approval of the TIP by the MPO members comes after these steps are completed.

In the rural, nonmetropolitan areas of the state, the regional offices solicit project proposals from their rural constituents. Different regions are using different approaches that are most appropriate for their specific region to accomplish the overall goal of involving local elected officials and the public in the planning process and of cooperatively selecting projects for inclusion in the capital program. A documentation of the process of interacting with elected officials with responsibilities for transportation in rural areas has been developed pursuant to recent regulations.

These approaches range between formal and informal processes. One region has undertaken a pilot program to determine future transportation needs in rural counties. The region is using an established transportation committee composed of local officials as a sounding board for functional classification updates and a general communication mechanism for topics such as the STIP and the department's rural planning policy. Examples of other regional approaches include meeting regularly with county highway superintendents; forming TACs; meeting with state legislators, local officials and Native Americans; holding regionwide workshops; and using interactive websites. The degree of formality varies from region to region but the ultimate goal of local involvement is attained in this manner.

The STIP is developed by inclusion of the TIPs in their entirety (as required by TEA-21) and by inclusion of the nonmetropolitan projects, developed in cooperation with local governments, from the department's highway and bridge capital program. For the STIP, only projects and phases that use federal-aid or projects of regional significance are required to be included in the STIP (*32*).

Security Considerations

The terrorist attacks of September 11, 2001, in a very real sense, underscored the need for the inclusion of security considerations in transportation planning, programs, and projects. The headquarters of the NYMTC offices were destroyed by the terrorist events perpetrated on the United States that day.

As a result of these attacks, the FHWA, jointly with the FTA, amended its regulations governing the development of transportation plans and programs for metropolitan areas to ensure that the New York City metropolitan area could proceed with its activities on a schedule consistent with the effects of these events. The changes provided the New York City metropolitan area additional time to review and update its transportation plan by waiving the regulatory requirement for a triennial plan update for the New York City metropolitan area for up to 3 years, until September 30, 2005. In addi-

tion, Congress enacted and the President signed HR 3880, which clearly expresses its intent to provide the New York City metropolitan area with relief from certain transportation conformity and metropolitan transportation planning requirements until September 30, 2005. This rule came into effect October 7, 2002 (*Federal Register*, p. 62370).

There is little security-related documentation within formal plans, planning process descriptions, or specific factors outlined by NYMTC. The most recent TIP does not include many projects that mention security as a goal. Security factors appear only a few times, generally with regard to transit-related projects. In addition, security is not defined as a criterion for project selection (let alone a quantifiable numerical weighting factor). Security, as a consideration, is generally discussed as a broad goal:

> *NYC Transit maintains its core commitment to customer and employee safety and security. These projects include improved communication systems and facilities for police, improved station lighting and communications, reconstructed and upgraded subway ventilation plants, and installation of fire standpipes in stations and tunnels. Worker safety is enhanced at shops and depots with improvements in lighting, ventilation, and fire protection systems. (33)*

References are made in other descriptions of the planning process that security needs to be addressed to receive federal approval for the TIP. As such, NYMTC's TIP is required to address fifteen planning factors included in federal requirements, including security. The transportation coordinating committees address many of these issues through the TIP and their operational programs or are beginning to address them to some degree.

The projects that address security in the TIP include those with audio-visual public address systems, a dedicated auto crime unit in the region, a corporate security program, and CCTV cameras and improved lighting. All these programs are important localized efforts, but none represents a fundamental rethinking of the transportation planning process from a security perspective.

Before September 11, 2001, certain key information and transportation assets were designed to enhance response capabilities to all kinds of hazards. These included capacity improvements that proved important in responding to the terrorist event of that day. For example, after the attack on the WTC towers, transportation management centers in Manhattan and Long Island provided communications capabilities (via local ITS systems) and additional locations for command and control functionality—assisting in coordinating response measures among local and state DOTs and law enforcement agencies. In addition, NYCDOT's transportation management center in Long Island City, Queens, has CCTV cameras focused on major arteries and controls 6,000 of the 11,000 traffic signals in NYC via computer. A third example is the interregion video network (IRVN), operated by TRANSCOM, which allows 13 traffic management centers in the New York region to share video feeds of its network. All 2,650 traffic signals in Manhattan are computerized.

Control centers geared toward general, all-hazards responses were critical investments. For example, the redundancy of control centers in the area allowed the Port Authority to switch to a backup control center in New Jersey when the NYC OEM Command Center was destroyed on September 11, 2001. New Jersey Transit and NYC Transit deployed mobile command centers. In response to the terrorist attacks of September 11, 2001, five new "help centers" are being proposed (one in each borough), staffed by city, state, and federal agencies (*14*).

On September 11, 2001, these surveillance, communications, and control capabilities enabled regional and local transportation officials to disseminate critical traffic and routing information to travelers on the region's transportation system (*14*).

Investment in other supporting infrastructure has been useful in responding to emergencies. The pre-September 11, 2001, planning process put in place other infrastructure elements that aided in recovery efforts. For example, tunnel lights and ventilation systems in the Brooklyn Battery Tunnel operated as planned in clearing the tunnel of smoke and debris. Redundant electrical generation systems in place also helped restore power at other key locations such as emergency control centers. These generators also assisted in flood prevention efforts in subway tunnels and communications networks (*14*).

Next Steps

Some first steps are ongoing to change NYMTC's transportation planning process or to begin to insert security considerations into the process. For example, there is now a security liaison to coordinate security activities at the NYDOT. Presumably, this effort will be formalized into planning activities in the future. If reauthorization places more emphasis on security, as expected, there will be a need to address this factor in the transportation planning process. However, as with most states and localities, New York's process does not address security issues separately, but in an overarching manner related to other emergency considerations in addition to security.

Though changes to the process of generating a prioritized list of transportation investment options is not fundamentally changed, what has changed since September 11, 2001, is an awareness that these kinds of investments have cross-cutting benefits and are necessary. As stated in the 2004 UPWP for the New York City metropolitan area:

> *In light of the terrorist attack of September 11, 2001, which struck at the heart of the region and produced impacts which resonate throughout NYMTC's area and beyond, the importance of an integrated regional program of planning activities has increased. New themes have emerged in the aftermath of September 11th, which will alter the approach to the*

planning program. The 2002–2004 Work Program reflects these emerging themes and changing priorities.

The emerging themes for the New York City metropolitan areas that are reflected in the 2002–2004 Work Program include assessment of impacts, transportation system security, transportation system redundancy and emergency response planning, and assessment of risk (*20*).

As a result of considerations such as this, there are a number of tangible capital investments that are under consideration for further development. In response to the September 11, 2001, terrorist attacks, localities (including New York City) are investigating how ITS systems originally developed for operational goals, can be modified to respond to security incidents. The weather monitoring system on the George Washington Bridge is an example of a location where this may be feasible. Weather information such as wind direction is important in chemical or biological attacks. Though originally implemented for traffic monitoring, CCTV monitoring can also be used to assist in evacuations (*14*).

Redundancy is an important consideration in terms of investment goals, as seen by the terrorist attacks of September 11, 2001. Redundancy and efficiency are useful investments for responding to terrorist events as well as for normal operations. Manhattan has a highly redundant and densely interconnected roadway and public transportation infrastructure elements, including local streets, major arteries, subway and surface rail, bus service, commuter rail, Amtrak, ferries, and pedestrian pathways. The options available after the terrorist attacks proved critical once major access and egress points (tunnels, bridges) were closed. Buses were able to continue to transport passengers north of Canal Street, pedestrian traffic was overwhelming, but remained an alternative for many, and partial subway service remained (*14*).

System redundancy allows a system to function even when elements of infrastructure are damaged or destroyed. In addition, redundancy is useful for normal operations and the cost of this added capability can be justified on these terms for day-to-day usage.

Portland, Oregon, Metropolitan Area Case Study

The selection of the Portland metropolitan area as one of the four case study sites is based on its strong regional focus, progressive transportation and land use planning processes, and significant deployment of advanced transportation management systems. Another factor for selecting this metropolitan area is the lack of a significant terrorist target within the region, so that the impetus for incorporating security into a successful transportation planning process can be assessed in the absence of a perceived terrorist threat.

The Portland metropolitan area is served by two MPOs because it covers areas in both Oregon and Washington states. Metro serves as the MPO on the Portland, Oregon, side of the metropolitan area while the Southwest Washington Regional Transportation Council serves as the MPO for the Vancouver, Washington, side. The following case study focuses solely on the Oregon portion of the Portland metropolitan area.

Location and Transportation Infrastructure

The Portland-Vancouver region comprises 4 counties and 25 cities in 2 states, Oregon and Washington. The region has a population of approximately 2 million and covers 462 sq mi (*34*). The three counties on the Oregon side of the Columbia River include Clackamas, Multnomah, and Washington Counties. Clark County is on the Washington State side of the Columbia River, north of Portland. Figure 7 shows the six districts of the region's MPO, Metro.

The two largest cities in this region are Portland, Oregon, and Vancouver, Washington. They straddle the Columbia River and are connected by two major bridge crossings that carry Interstates 5 and 205 over the river. In addition, regional centers on the Oregon side include Gresham, Beaverton, and Hillsboro. Portland and Gresham are separated from Beaverton and Hillsboro by the Willamette River, which runs north through the area and connects to the Columbia River, just west of Portland. The confluence of these two major waterways provided the historical basis for the settling of Portland, as its name implies.

Roadways. Out of 66,641 mi of certified public roads in Oregon, the Portland metropolitan area has 4,451 mi of state and local roads, representing 6.6% of the statewide highway system. This includes 727 mi of state/county highways and roads and 3,724 mi of city highways and roads.

There are 136 road-miles of freeways/expressways in the Portland urbanized area that carry 29 million vehicle-miles of travel each day.

In the Portland area, key north-south highways include Interstates 5, the 205 east-side by-pass, and the 405 west-side by-pass. Key east-west routes include Interstate 84, the Banfield Expressway (SR 30), and the Sunset Highway (SR 26). In addition, Highway 217 connects Interstate 5 with SR 217 in the Beaverton area (*35*). In the Vancouver area, in addition to north-south Interstates 5 and 205, the key east-west routes include the Louis and Clark Highway (Route 14) and Route 500.

Public Transportation. The Portland metropolitan area boasts a highly diversified and successful public transportation system. On the Portland side of the Columbia River, transit service is operated by the Tri-County Metropolitan Transportation District (Tri-Met), a municipal corporation established in 1969 by the city council under authority granted by the state legislature. The Tri-Met system is composed of both a light rail system and surface bus system. Systemwide ridership has increased for each of the past 15 years.

Tri-Met's light rail system (MAX) first opened in 1986. MAX operates over a 39-mi rail network that consists of

Figure 7. Portland Metro planning region and districts.

four lines. Three of the lines link the City of Portland with Gresham, Beaverton/Hillsboro, and the Portland Metropolitan Exposition Center (Expo). The fourth line links Portland Airport to the line to Gresham. MAX operates 95 vehicles and 54 stations and carries 26 million passengers annually.

Tri-Met also has a 655-vehicle bus system operating over 95 routes. The bus system has 8,100 bus stops and interconnects with MAX at 17 transit centers. Annual bus ridership totals 63 million passengers (*36*).

C-Tran is the public transit system in Clark County, Washington, serving the Vancouver area. C-Tran began service in 1981 and has 26 bus routes, 8 of which provide direct commuter service to Portland. The system has 171 vehicles, including 111 standard buses, 50 paratransit coaches, and 10 vanpool vehicles. The system serves more than 6 million passengers annually (*37*).

Other Modal Facilities and Services. Portland's other major transportation facilities are owned and operated by the Port of Portland, a regional government entity created by the Oregon state legislature in 1891. Port of Portland facilities currently include four marine terminals (the third largest marine port in the United States in terms of export volume), four airports (including the Portland Intercontinental Airport and three general aviation airports), and seven business parks. The marine terminals handled 10.6 million tons of cargo in 2002, while the Portland Intercontinental Airport had more than 322,000 operations in 2002 (*38*).

AMTRAK runs north-south along the Route 5 corridor, providing intercity rail passenger service between Seattle and Los Angeles with stops at Portland's Union Station and Vancouver Station.

Local Planning Process

Metro is the MPO for the Oregon portion of the Portland metropolitan area. Metro is the only directly elected regional government in the United States. Originally formed in 1979 by the state legislature, Metro was granted "home rule" status by the voters in the Metro region in 1992. As the designated MPO for the Portland metropolitan area, Metro is responsible for growth management, transportation, and land use planning; solid waste management; operation of the Oregon Zoo, regional parks, and green spaces programs; and technical services to local governments. Metro also operates the Oregon Convention Center, the Portland Center for the Performing Arts, and Expo.

As the federally mandated MPO designated by the Governor of Oregon, Metro is responsible for approving the expenditure of all federal transportation funds in the Portland metropolitan area. The Metro Council, consisting of seven elected members from districts throughout the region, approves transportation plans, projects, and programs recommended by the Joint Policy Advisory Committee on Transportation (JPACT). JPACT is a 17-member committee composed of elected officials and representatives of local, regional, and state transportation agencies from both sides of the Columbia River. This bi-state committee develops the transportation program and recommends the transportation project priorities for the region, with technical input provided by the Technical Policy

Alternatives Committee (TPAC). TPAC consists of technical staff from the various governments and agencies included in the JPACT, as well as the FHWA, Southwest Washington Regional Transportation Council, and six citizen representatives appointed by Metro (*39*).

Through this sequential and highly inclusive process, Metro assembles the transportation projects for inclusion in Portland's metropolitan TIP and the Congestion Management and Air Quality (CMAQ) program, based on input provided by state and local transportation agencies through 20-year local transportation system plans (TSPs). Metro also approves other transportation project funding for both highway and transit improvements as proposed in Oregon DOT's 6-year program for highway projects and Tri-Met's transit development plan for transit projects in the region. In addition, Metro's capital planning process produces the regional TSP in conformance to the requirements set forth in the Oregon Transportation Planning Rule (TPR).

Oregon's TPR includes provisions for the following:

- Preparing transportation system plans,
- Ensuring conformance with statewide planning goals,
- Determining transportation needs,
- Meeting system evaluations requirements,
- Meeting objectives for reductions in vehicle miles of travel per capita and increases in nonauto travel,
- Meeting funding requirements, and
- Developing projects.

None of the TPR provisions deals specifically with the issue of security. While Oregon's statewide planning goals include a provision for Natural Hazards and Disaster (Goal 7), the issues of terrorism or acts of extreme violence are not specifically addressed.

Every 3 years, Metro produces an update to its 20-year regional TIP, including amendments to its policies, strategies, projects, technical studies, and air quality conformity determination. This is a requirement of the federal Clean Air Act and Surface Transportation Programs according to TEA-21. The updating process is highly integrated and involves representatives from the following organizations and committees: Metro Council, TPAC, JPACT, FHWA, FTA, Oregon DOT (ODOT), Washington DOT, Oregon Department of Environmental Quality, MTAC, Tri-Met, C-Tran, Port of Portland, and cities and counties in the bi-state region.

The latest amendments to Metro's transportation policies include a greater emphasis on alternative transportation modes and services, corridor priorities, and changes to the regional transportation system map regarding reclassification of highway routes, transit service, regional freight routes, bicycle routes, and pedestrian facilities.

State Planning Process

The statewide transportation agency is the ODOT, whose headquarters is located in Salem. In compliance with federal transportation funding legislation (Title 23 [highways] and Title 49 [transit] of the U.S. Code, as amended by TEA-21), ODOT prepares the STIP. Oregon's STIP includes all federally funded (or partially federally funded) projects proposed by the State of Oregon and scheduled to begin over the next 3 years. In addition, certain nonfederally funded programs are included.

In carrying out this mandate, ODOT assembles the various metropolitan and regional TIPs into the STIP, by integrating statewide modal plans and corridor plans with the local TIPs. The statewide modal plans focus on statewide needs and policies for each transportation mode within the context of the 1992 Oregon Transportation Program Plan's philosophy, vision, and policies, and the Oregon TPR, which mandates greater integration between land use and transportation at all levels of government. The corridor plans address all modes within specific geographic corridors.

Region 1 of ODOT is the smallest and most densely populated of ODOT's five geographic districts. It encompasses all of the Metro planning area, including the City of Portland and the counties of Clackamas, Multnomah, and Washington. Region 1 works with the local jurisdictions and Metro to assemble the TIP for the Portland metropolitan area and then submits it to the Headquarters Planning Division for assembly into the STIP.

Project Selection Process

The regional TIP includes a 20-year list of highway and transit capital projects to be funded by available federal, state, and local funds, reflecting regional transportation policies. This list is derived from a larger list (designated the "preferred system") of projects. The resulting list of transportation capital projects is known as the "financially constrained" projects eligible for federal funding. These projects provide the source of projects that can be funded through the metropolitan TIP as well as Metro's Transportation Priorities process.

The development of the regional TIP follows the following sequence of steps:

- Determine funding availability from federal, state, and local sources.
- Develop an application packet for project nomination and selection criteria.
- Solicit candidate projects from local and state transportation agencies.
- Evaluate projects and rank them according to selection criteria.
- Narrow regional TIP list of projects to 150% of available funding.
- Make final project selection.
- Assess air quality conformity of projects to standards.
- Update metropolitan TIP document.

The metropolitan TIP is updated every 2 years and contains a rolling 4-year program of transportation improvement projects. The metropolitan TIP consists of the highest priority projects proposed by the cities and towns that constitute the Portland metropolitan region.

Bi-state transportation planning has been facilitated by the creation of a Bi-State Transportation Committee in 1999. This is a joint subcommittee of JPACT on the Oregon side of the border and the Southwest Washington Regional Transportation Council on the Washington side of the border (Ordinance No. 00-0869A, 2000 Regional Transportation Plan).

Security Considerations

Metro's latest regional TIP (issued in 2000), contains only one specific reference to security. This can be found in Policy Statement Number 14.2, which deals with public transportation safety and environmental impacts. The defining objective of this policy that relates to security is as follows:

> *Support efforts by the region's transit providers to improve the existing level of passenger safety and security on public transportation and reduce the number of avoidable accidents involving transit vehicles.*

While the term security is used in this policy reference, it is clear that the context is in terms of crashes and personal security onboard transit vehicles, not terrorist-caused incidents. The final policy statement of the 2000 regional TIP deals with funding for transportation safety projects. The key objective of Policy Statement Number 20.3 is as follows:

> *Place the highest priority on projects and programs that address safety-related deficiencies in the region's transportation infrastructure.*

The most recent iteration of the Metro TIP will cover the period 2004–2007 and focus on safety improvements, multimodal system expansion, and growth management that links planned land uses to the allocation of transportation project funding. At present, none of the TIP funding is likely to be allocated to projects specifically designed to address security issues. Most of the funding will likely be focused on congestion, capacity, condition, and safety improvements to the region's transportation infrastructure. To illustrate this, the 2004 Federal Update to the regional TIP, as of December 11, 2003, makes no reference to security. In addition, only 27 (2.5%) of the proposed 1,087 projects are related in any way to safety improvements.

At the state level, security considerations have begun to be addressed. For example, the Oregon DOT helped sponsor a handbook to guide planning for the "main streets" of urban communities (*40*). In this handbook, the issue of security is treated separately from safety by focusing on issues and strategies to help pedestrians "feel secure and unthreatened" by criminal activity (such as robbery, personal attacks, and vandalism). While there is no reference to terrorism or acts of extreme violence, security concerns as defined by this study, the handbook begins to address the issue of security by relating it to more imminent personal threats.

More recently and relevant to the focus of this study, the ODOT and Washington DOT have begun the process of analyzing current transportation infrastructure to identify critical transportation structures, particularly at critical nodes and along critical evacuation routes; determine the vulnerability of these critical transportation structures to terrorist attack; and develop strategies to protect critical structures through surveillance and hardening strategies designed to enhance survivability.

It is likely that certain of these capital projects will be included in the next iteration of the regional TIP for Portland as an addendum to the traditional approach to project development, submission, and consideration.

Next Steps

The progressive nature of the Portland region's governments and citizenry poses a number of challenges to efforts to incorporate security into its transportation planning processes. As one of the nation's leading metropolitan areas for regional planning, the Portland region is known for its highly interactive and coordinated plan development processes that addresses the issues of importance to its communities. This is due to the well-established, iterative process that involves representatives of all key stakeholder groups interested in transportation and land use in the region. The identification of regional issues of importance is tracked each year by annual surveys of the general public and key opinion leaders in the region. The surveys are conducted by the Institute of Portland Metropolitan Studies.

In the most recent available survey (*41*) the general public rated education, economic strength, and affordable healthcare as the top three issues, with public safety coming in fourth out of the top ten issues. In contrast, opinion leaders rated public safety as ninth out of ten critical issues. In this survey, public safety related primarily to police, fire, and rescue services, with crime and drug use prevention being the keynote concerns. Nowhere in the survey results were the terms security and terrorism used.

These results suggest the dilemma posed by the Portland metropolitan area in dealing with security issues in its transportation planning process. In the *Metropolitan Briefing Book for 2003,* a section titled "Security during a Time of Terrorism" addressed the problem directly (*42*). In this article, the author cites the confusion over the term "terrorism" and its potential for misapplication to the detriment of civil liberties as a major reason why local communities lack an agenda or clear direction over how to respond to the issues of homeland security. While recognizing the importance of addressing the threat of terrorist actions and instituting security measures to

achieve this objective in the Portland region, the article hints at the reasons one of the most sophisticated and successful metropolitan planning processes in the nation has been slow to formally addressing security issues. These include the following challenges:

- The Portland region's transportation planning process is well established and highly successful, and therefore more difficult to change where the basis for change is poorly defined and understood.
- The Portland metropolitan area is geographically distant from the sites of past terrorist incidents, particularly the terrorist attacks of September 11, 2001. This reinforces the perception that security remains primarily a federal concern and responsibility.
- More imminent concerns and threats (such as public safety relating to criminal activity, transportation crashes, and earthquakes [*43*]) are of greater concern to the general public and opinion leaders who frame these issues for action than are terrorist activities.
- The progressive nature of the citizenry and institutional leaders of the Portland area inhibits the inclination to embrace strategies and actions that are perceived to threaten civil liberties, particularly when the object of these actions is so broadly defined.

Each of these factors contribute to the difficulty of incorporating security into the traditional transportation planning process in metropolitan areas of the country that are not perceived to be targets of terrorist actions, particularly when there is no clear requirement or funding provision to do so and there is a predisposition to distrust "big government."

San Francisco-Oakland-San Jose Metropolitan Area Case Study

The selection of the San Francisco-Oakland-San Jose metropolitan area as one of the four case study sites is based on its highly diverse and multijurisdictional composition, its strong regional focus, its multimodal transportation system, its intergovernmental transportation and land use planning processes, the location of several terrorist targets within the metropolitan area (i.e., Golden Gate Bridge, Bay Area Rapid Transit (BART) system, Monster Park, and the Transamerica Pyramid building), and its preparedness for and treatment of the imminent threat of earthquakes.

Location and Transportation Infrastructure (44)

The San Francisco-Oakland-San Jose metropolitan area comprises nine counties, 7,179 sq mi, and a local population of more than 6 million (see Figure 8). The location is set in a hilly and coastal setting. Roadways and numerous bridges are constrained to corridors between hills. Redundant roadway 'grids' are not feasible as in other metropolitan areas. San Francisco represents the most densely populated component of the area and has the largest concentration of businesses. This city has long supported transit service, with a highly diverse transit system that has a relatively high (compared to the national average for similar cities) reliance on this form of transportation. Oakland is the next largest metropolitan area and also has high levels of transit usage, as does central San Jose. Other areas are largely automobile reliant.

Roadways. The area contains 18,000 mi of local streets and roads, 1,400 mi of highways, 6 public ports and 5 commercial airports, and 100 cities. The planning region also contains eight primary transit systems and other local transit systems. Transit ridership is approximately 1.5 million each weekday with a combined operating budget of more than $1 billion.

Public Transportation. Transit service consists of three primary network structures: local networks serving the more densely populated areas; long-distance commuter routes, including heavy rail, commuter rail, ferries, and express buses, to the San Francisco, Oakland, and San Jose central business districts (CBDs); and suburban feeder buses to the commuter systems. The BART system is a 95-mi heavy-rail system that serves the San Francisco and Oakland CBDs. Caltrain provides commuter rail service from areas south of San Jose to San Francisco along the peninsula.

Other Modal Facilities and Services. International airline service is provided by the San Francisco International Airport, Oakland International Airport, and San Jose International Airport. In addition, the region boasts one of the nation's largest and most active ports. Amtrak provides intercity passenger rail service to the region.

Local Planning Process (45)

The Metropolitan Transportation Commission (MTC) is designated as the agency responsible for transportation planning and coordination for the San Francisco metropolitan area. The entity was created by the California State Legislature in 1970 (California Government Code § 66500 et seq.). The MTC acts as the regional transportation planning agency (according to state requirements) and as the federally required regional MPO. It is responsible for the regional transportation plan and for prioritizing locally recommended transportation improvement projects for inclusion in this plan.

MTC is led by a 19-member panel comprised of 14 members appointed by local elected officials. Two members represent regional agencies: the Association of Bay Area Governments and the Bay Conservation and Development Commission. Three nonvoting members are appointed to represent federal and state transportation agencies and the Federal Department of Housing and Urban Development.

To meet requirements from federal regulations and to encourage consensus in developing a prioritized list of invest-

Figure 8. San Francisco Bay Area planning region.

ment programs, MTC created The Bay Area Partnership—a consortium of local, state, and federal agencies. MTC has responsibility for distributing state funds including those from the Transportation Development Act. MTC is also responsible for ensuring the efficiency of the regional transportation system, including oversight of transit operators' budgets, conduct of performance audits, and adoption of a yearly productivity/transit coordination improvement program.

Since the late 1980s, MTC has overseen a $3.5 billion capital improvement program to extend a total of six rail lines in the Bay Area, adding 40 mi to the region's rail transit network. The extensions include four BART projects, a Santa Clara Valley Transportation Authority light-rail line, and an extension of the Caltrain commuter rail system into downtown San Francisco.

State Planning Process

The statewide body responsible for the programming and allocating of funds for the construction of highway, passenger rail and transit improvements throughout California is the California Transportation Commission (CTC), a nine-member commission appointed by the governor. The CTC also advises and assists the Secretary of Business, Transportation and Housing Agency and the Legislature in formulating and evaluating state policies and plans for California's transportation programs. The CTC is also an active participant in the initiation and development of state and federal legislation that seeks to secure financial stability for the state's transportation needs.

The statewide transportation agency is the California Department of Transportation (Caltrans), which is part of the

Business, Transportation and Housing Agency. Caltrans is headquartered in Sacramento and has 12 geographic districts. District 4 encompasses the San Francisco metropolitan area.

In compliance with federal transportation funding legislation (Title 23 [highways] and Title 49 [transit] of the U.S. Code, as amended by TEA-21), the CTC biennially adopts and submits to the Legislature and the Governor the STIP. The STIP is a comprehensive listing of all major projects to be funded from specified state funding programs, including certain federal funds that flow directly to the state. As a result, many of the projects that are included in the STIP must eventually be included in the regional TIPs.

Project Selection Process (45)

STIP projects are nominated through the regional TIPs and Caltrans' Interregional Transportation Improvement Program (ITIP). The ITIP nominates projects for funding from the 25% of STIP funds dedicated to the interregional improvement program. The regions nominate projects from the 75% of funds dedicated to the regional program and subdivided by formula to county shares. Regions may reserve a portion of their current county shares for future programming, and the MTC may consequently use this freed up capacity to support advances of future shares elsewhere. The distribution of these reserves is also addressed in the regional TIPs, ITIP, and STIP, based on regional priorities and the extent to which each regional TIP includes projects that (1) implement a cost effective regional TIP, (2) complete projects included in the previous STIP, (3) implement the Transit Capital Priorities Program (TCPP), (4) leverage federal discretionary funds, and (5) match ITIP partnership projects.

To be included in the TIP, a project is considered on the basis of a number of factors including type, funding source, and the following guidelines:

- Federal Flexible Funding Policy Resolution No. 3053
- Regional Transportation Improvement Program (RTIP) Resolution No. 3404
- Transit Capital Priorities Resolution No. 3232
- STP/CMAQ Resolution No. 3216
- Regional Transit Expansion Program (RTEP) Resolution No. 3434
- Transportation for Livable Communities Resolution No. 3483

MTC adopted the current 2003 TIP January 22, 2003.

Security Considerations

California's Office of Emergency Services (OES) coordinates emergency activities among state agencies. In the early 1990s, following the Oakland Hills fire, the state mandated use of the Standardized Emergency Management System (SEMS), which provides a framework for multiagency coordination, incident command, mutual aid, and areawide operations.

MTC, Caltrans, and area transit operators also developed the Trans Response Plan (TRP), which that provides a framework for transportation providers to respond to emergencies and disasters in the Bay Area in a comprehensive and coordinated manner. The TRP is integrated with the SEMS to define multimodal response functions, responsibilities, and procedures in the event of an emergency or disaster (*46*).

In its transportation planning, the MTC has developed scores for roadway and transit safety/security (one element in selecting projects) as a multiplier of the severity of the safety/security problems and on impact value (the degree to which the proposed project would solve the problem). Project elements are stratified into high impact, medium impact, and low impact. Severity is defined based on crashes per million vehicle miles for highway projects and number of incidents reported in the National Transit Database for transit projects.

In addition to some quantifiable security considerations in project selection, there have been a number of security projects selected recently and in past years. For example, MTC has partnered with the California Highway Patrol and Caltrans to oversee installation and operation of call boxes along Bay Area freeways in conjunction with a fleet of tow trucks to administer service and remove disabled vehicles. Though this is clearly an operationally oriented effort intended to improve traffic flow, both safety and security implications are apparent.

California also maintains a critical emphasis on emergency response and an all-hazards approach to incidents that is among the best in the nation. This emphasis grew out of response to seismic events, but it is equally applicable to security or terrorist events, particularly because California employs a flexible implementation of response that is adaptable to a variety of situations. Success with this approach, particularly related to the transportation infrastructure, was apparent in response to the Northridge earthquake, which serves as a model for other states in developing a program (including capital investments) to deal with emergency incidents.

In addition, California maintains a reliance on technology to improve several aspects of the transportation system. These are often operationally oriented, but with applications to security concerns as well. MTC takes a large part in developing and implementing such programs. MTC's ITS Early Deployment Plan is defining priorities for the region's use of new technologies over the next 5 to 10 years. One early application of ITS is the Bay Area Advanced Traveler Information System, or TravInfo, which has provided the public with real-time transit, traffic, and ridesharing data since October 1996. This type of information was useful in both the New York City and Washington, D.C., metropolitan areas on September 11, 2001.

A number of security-related initiatives are included in MTC's most recent TIP, with most aimed at transit security. This is partially due to the fact that highway-related security

enhancements are often undertaken for primarily operational or safety-related reasons. Security is often a secondary factor.

Next Steps (*45*)

MTC and California are more advanced than most MPOs and states in addressing security and terrorist events and in incorporating quantifiable measures and a systemic process into transportation planning. It is clear that both MTC and Caltrans are aggressively seeking ways to improve on the current process.

California has extraordinary experience and capabilities in preventing and responding to emergencies by virtue of addressing earthquake threat and response issues and their effects on transportation infrastructure. The state has recognized that progress still needs to be made in the area of security planning and how it can be incorporated into the overall transportation system planning process and be a basic element of each transportation improvement project.

The terrorist attacks of September 11, 2001, caused the Governor of California to issue an executive order directing the State Strategic Committee on Terrorism to evaluate the potential threat of terrorist attack, review California's current state of readiness to prevent and respond to a potential attack, and establish and prioritize recommendations for prevention and response.

In response, Caltrans has worked with the California Highway Patrol and other state agencies to begin a review and assessment of security for critical transportation facilities, review of operational procedures involving the Department's Emergency Operations Centers, and evaluation of potential funding needs for security enhancements. On a continuing basis and to enhance transportation system security into the future, California and federal agencies are evaluating the following:

- The vulnerability of surface transportation systems in the state from local, statewide, and national perspectives.
- Current security technologies and procedures that can be effectively applied to the surface transportation system.
- New security technologies and processes to respond to the unique vulnerabilities of surface transportation.

The resulting evaluations will identify security technologies and processes for implementation by surface transportation system owners and operators to reduce vulnerability to attack. To date, evaluations of security risks and new procedures to address threats are underway by ports, airports, freight and passenger railroads, the Alameda Corridor, and other agencies. Security solutions will be addressed to ensure they do not unnecessarily (negatively) impact operational requirements related to these transportation systems.

In "The Executive Guide: Issues for 2002", the CTC mentioned the need for incorporating security in planning issues: "There is no question that from now on transportation system designers must integrate security concerns into their plans" (*45*).

Finally, the California Association of Councils of Governments (CalCOG) has worked aggressively with California's 16 urban regions and the state to influence formulation of the Federal-Aid Reauthorization Act. The group has sought additional funding to enhance the security of the nation's transportation infrastructure.

Washington, D.C., Metropolitan Area Case Study

The Washington, D.C., metropolitan area was chosen as a case study for a number of reasons. This area was a target of the September 11, 2001, terrorist attacks. As the nation's capital, Washington, D.C., and its metropolitan area contain many historic landmarks that help define the character and strength of our nation. These include the Capitol Building, the White House, the Pentagon, the Kennedy Center, the monuments along the mall (such as the Washington Monument and the Jefferson and Lincoln memorials), and the many museums that house the nation's legacy. The Washington, D.C., metropolitan area is home to Congress and the many federal agencies that help make the government function, including the U.S. Department of Homeland Security and the U.S. Department of Transportation.

The Washington, D.C., metropolitan area has several signature transportation facilities that support the mobility of this critical area (such as the Metro transit system, bridges across the Potomac River, Ronald Reagan Washington National and Dulles Airports, and Union Station). Like the New York City metropolitan area, the Washington, D.C., metropolitan area covers three states and many local jurisdictions. As with the New York City metropolitan area, many of these features make the Washington, D.C., metropolitan area unique. It is this uniqueness that makes it a continuing target for terrorists as well as the nerve center for developing and coordinating federal efforts to combat the threat of terrorism nationwide.

Location and Transportation Infrastructure

As shown in Figure 9, Washington, D.C., is at the center of the national capital region that includes portions of South Central Maryland and Northern Virginia. This region is home to 4.5 million residents. The metropolitan area is 3,020 sq mi and includes the following cities and counties (including all the cities and towns within these counties):

- Washington, D.C.
- Montgomery County, Maryland
- Prince George's County, Maryland
- Frederick County, Maryland
- City of Alexandria, Virginia

Figure 9. Washington D.C., metropolitan planning region.

- Arlington County, Virginia
- Fairfax County, Virginia
- Loudoun County, Virginia
- Prince William County, Virginia

Regional jurisdiction is shared by the federal government, the District of Columbia, two adjoining states, and numerous local counties, cities, and townships. This makes for a challenging effort to achieve a coordinated transportation program for the region.

Roadways. The Washington, D.C., metropolitan area is served by an interconnected network of highways, parkways, tollways, arterials, and local streets that comprise 18,735 lane-mi and serves 154 million vehicle-mi of travel each year (*47*). Major interstate roads serving the area include Interstates 66, 270, 95, 395, and 495. Major parkways include the Baltimore-Washington Parkway, George Washington Parkway, and Rock Creek Parkway. Toll facilities include the Dulles Toll Road and the Dulles Greenway. There are also seven bridge crossings of the Potomac River in the metropolitan area. The region has an extensive network of bicycle trails, which often follow abandoned rail lines and utility corridors.

Public Transportation. The Washington Metropolitan Area Transit Authority (Metro) operates a 104-mi, 5-line, 83-station rapid rail transportation system (Metrorail). Metrorail serves the District of Columbia and its three surrounding counties and the selected cities within these counties. Metrorail also

connects downtown D.C. with the Pentagon, Crystal City, Ronald Reagan Washington National Airport, and many Virginia and Maryland suburbs. Metrorail is complemented by the Metrobus system, which links neighborhoods throughout the metro area. Metrorail has 842 rail vehicles while Metrobus has 1,460 transit vehicles. In 2002, Metrorail carried 181 million passengers while Metrobus carried 148 million passengers.

The region is also served by county- and city-sponsored local bus services, including Ride-On in Montgomery County, Cue in the City of Fairfax, and Fairfax Connector in Fairfax County.

Other Modal Facilities and Services. The recently rebuilt and expanded Ronald Reagan Washington National Airport is along the Potomac River directly across from Washington, D.C. It has 44 gates and serves more than 13 million passengers annually. Dulles International Airport in Northern Virginia is being expanded and currently has approximately 120 gates. The airport carries 17 million passengers yearly. It is also the site of the recently opened National Air and Space Museum facility known as the Stephen F. Udvar-Hazy Center.

AMTRAK, the nation's intercity rail passenger service and system, is based in Washington, D.C., near the Capitol Building at Union Station, which is also served by Metrorail, Metrobus, and commuter rail services from both Maryland and Virginia.

Local Planning Process

The Metropolitan Washington Council of Governments (COG) is a regional organization of Washington area local governments that serves as the MPO for the national capital region. Founded in 1957, it comprises cities, counties, and towns surrounding and including the District of Columbia for a total of 18 member jurisdictions (District of Columbia; Maryland—Montgomery County, Prince George's County, Frederick County, City of Rockville, City of Bowie, City of College Park, City of Gaithersburg, City of Greenbelt, City of Takoma Park; Virginia—Arlington County, Fairfax County, Loudoun County, Prince William County, City of Alexandria, City of Falls Church, Fairfax City, and City of Manassas), plus area delegation members of the Maryland, Virginia, and Unites States government legislatures.

COG is an independent, nonprofit association supported by member contributions. Its policies are set by the full members, acting through its Board of Directors. COG's mission statement reflects its broad responsibilities:

> *Enhance the quality of life and competitive advantages of the Washington metropolitan region in the global economy by providing a forum for consensus building and policy-making; implementing intergovernmental policies, plans, and programs; and supporting the region as an expert information resource. (48)*

COG comprises three major line departments, including the Department of Environmental Programs (DEP), Department of Human Services, Planning and Public Safety (HSPPS), and the Department of Transportation Planning (DTP). Each of these departments includes planners, programmers, engineers, and analysts who perform technical studies and provide support to area governments in their respective areas of focus.

The Transportation Planning Board (TPB) is composed of 39 members, including elected officials and agency directors representing the composition of COG, including representatives of federal, state, and local agencies involved in transportation planning and the delivery of transportation facilities and services in the region. The TPB is responsible for approving the list of capital improvement projects that make up the region's TIP and the financially constrained long-range transportation plan (CLRP).

In 1998, the TPB produced its vision statement for guiding the transportation planning process for the Washington region (*49*). Among the eight goals of the vision policy document, the third goal states the following:

> *The Washington metropolitan region's transportation system will give priority to management, performance, maintenance, and safety of all modes and facilities.*

The safety-related objectives and strategies under this goal focused on enforcement and design strategies that dealt essentially with operational safety improvements. Given the early date of the vision document (1998), the issue of security was not mentioned in the document.

The COG TPB prepares a TIP for the Washington, D.C., metropolitan area every 6 years. The most recent TIP covers 2004–2009 and represents the staged development of the area's CLRP. The Washington, D.C., area's TIP reflects the TPB's vision statement and the goals and objectives of its policy element and conforms to applicable federal regulations governing metropolitan planning (Title 23 [highways] and Title 49 [transit] of the U.S. Code). The TIP development process reflects applicable federal transportation funding legislation and metropolitan planning regulations dealing with funding availability, fiscal responsibility, mobility and congestion, accessibility of persons with disabilities, safety, and air quality issues. These regulations are based on the latest 6-year federal transportation funding authorization law, TEA-21, which was established in 1998 (3 years before the terrorist attacks of September 11, 2001).

While TEA-21 recognized the importance of safety and security as one of the key elements of the transportation planning process, the emphasis was clearly on the issue of safety. Security related to terrorist attacks was not anticipated in 1998 when TEA-21 was established. With little change in funding programs under TEA-21, the metropolitan planning process regarding the selection and prioritization of transportation infrastructure projects has remained essentially unchanged from 1998.

State Planning Process

The Washington, D.C., metropolitan area is served by three statewide transportation agencies:

- District Department of Transportation (DDOT), whose headquarters is located in Washington, D.C.
- Maryland Department of Transportation (MDOT), with seven districts and a headquarters near the Baltimore-Washington Airport in Hanover County. MDOT serves the Washington, D.C., metropolitan area through Districts 3 and 7.
- Virginia Department of Transportation (VDOT), with nine districts and a headquarters in Richmond, Virginia. VDOT serves the Washington, D.C., metropolitan area through its Northern Virginia district in Fairfax County.

In compliance with federal transportation funding legislation, (Title 23 [highways] and Title 49 [transit] of the U.S. Code, as amended by TEA-21), each of these state transportation agencies prepares its STIP. Each STIP includes all federally funded (or partially federally funded) projects proposed by Washington, D.C., and the states of Maryland and Virginia, respectively, that are scheduled to begin over the next 3 years. In addition, certain nonfederally funded programs are included. Each state's STIP includes all of the TIPs approved by that state's MPOs and rural planning organizations. This includes the portion of the Washington, D.C., area TIP that pertains to that state's transportation systems.

Project Selection Process

The final COG TIP consists of a prioritized list of transportation capital projects for the region, based on inputs provided by the local, state, and federal transportation agencies representing the jurisdictions constituting and/or supporting COG. It represents the results of both state and local efforts to identify and prioritize improvement projects, based largely on the categories of available funding as defined by the latest 6-year surface transportation funding authorization bill.

The TPB's TIP programs the advancement of projects through the obligation of federal funds. Once its funds have been obligated, a project is removed from the TIP and placed into the capital improvement program (CIP). Program projects under the National Highway System and Bridge and Interstate Maintenance programs of TEA-21 are selected by each state in cooperation with the TPB from the approved TIP; transit, CMAQ, and Surface Transportation Program projects of TEA-21 are selected by the TPB in consultation with the states from the approved TIP.

Security Considerations

Since the terrorist attacks of September 11, 2001, COG has played a strong role in mobilizing resources to address the issues of emergency preparedness, coordination, and response regarding future public safety challenges. This included the prompt formation in October 2001 of a task force on homeland security and emergency response for the national capital area, consisting of local elected officials in the region, business and community officials, transportation officials, state emergency management agency officials, and federal agency officials (including FEMA, Office of Personnel Management, FBI, General Services Administration, EPA, U.S. Corps of Engineers, etc.). The mission of the task force was to "To enhance regional preparedness and insure a coordinated regional response to future public safety challenges."

To fulfill its mission, the task force established six working groups that focused on the following functions:

- Transportation
- Public Safety and Emergency Management
- Water and Energy Infrastructure
- Waste and Debris Management
- Public Health
- Communications

The task force produced the regional emergency coordination plan (RECP) (*50*), which was issued on September 11, 2002. The RECP provides guidance to COG members and state and federal agencies, the private sector, volunteer organizations, and academic institutions seeking to collaborate in planning, communication, information sharing, and coordination of activities before, during, and after a regional incident or emergency. A regional emergency evacuation transportation coordination plan was also developed as an annex to the RECP.

It is important to note that the combined efforts by these various groups has been directed at emergencies and disasters of all kinds that impact the region, including natural hazards, human-induced hazards, and terrorism. Emergency preparedness and response efforts for the Washington, D.C., metropolitan area are much more inclusive in their definition of emergencies and disasters, including the focus of this study: terrorist attacks.

The operational focus of these groups on regional preparedness and responsiveness to emergency events has not yet translated into the transportation planning process or the development of long-range CIPs for the region's transportation networks. Instead, the emphasis has been on real-time communication, coordination, and readiness for incidents and emergencies before, during, and after such events.

Even after the terrorist attacks of September 11, 2001, the anthrax exposures several months later, and the sniper attacks in September and October 2002, COG's latest TIP remains little changed from earlier versions that lacked specific consideration of terrorist threats in the development and selection of transportation projects. As a result, most of the projects included in the latest TIP for the Washington, D.C., metropolitan area are for highway widening, reconstruction, rehabilitation, and interchanges; transit system improvements; and HOV lane construction.

While the capital planning process remains essentially the same, member jurisdictions have added several projects with

a security focus, including projects aimed at keeping traffic moving and evacuation routes open through such measures as the following:

- Improved traffic signalization,
- Expanded video monitoring of traffic locations (through the application of ITS),
- Improved bridge and tunnel perimeter barrier protection and monitoring, and
- Established policies to address interjurisdictional requests for street closures and barrier installation.

Local governments have coordinated efforts to designate evacuation routes and develop evacuation plans. Despite these developments, the emphasis of capital planning efforts in the Washington, D.C., metropolitan area continues to be on short-term projects that focus on improving emergency response capabilities and keeping traffic and transit routes open.

One notable exception to this tendency is the announcement in fall 2003 that Governor Warner of Virginia would support a study of adding a third lane to westbound Interstate 66, between the Potomac River and the I-495 Beltway. Since its inception, this portion of I-66 in Northern Virginia has been limited to two lanes in each direction. This limitation resulted from a compromise reached by the U.S. DOT, Virginia DOT, and the County of Arlington, through which most of this segment of I-66 runs. The possible widening of I-66 inside the Beltway appears to be in response to concerns about the capacity of the highway network in Northern Virginia to handle traffic volumes resulting from an evacuation of Washington, D.C., such as that following a terrorist attack or an act of extreme violence. That is why Governor Warner limited his proposal to adding only one lane in the westerly direction of I-66.

As a major capital improvement initiative, Governor Warner's announcement demonstrates the kind of impact that security considerations might have on the transportation capital planning process. In this case, the initiative is coming from the head of the Commonwealth of Virginia (as opposed to the usual route of local community initiatives). How this initiative will find its way into COG's transportation planning process will provide an interesting example of how metropolitan areas incorporate security considerations into their transportation planning processes.

Next Steps

The Washington, D.C., metropolitan area has taken a number of positive steps to mobilize and coordinate resources to prevent, mitigate, and respond to terrorist incidents. These include COG's development of a public safety policy committee and a national capital RECP. In addition, COG helped develop the planning guidance for the health system response to a bioevent in the national capital region. These organizations and documents are important strategies to improve communication, coordination, and information sharing aspects of dealing with terrorist incidents once they have occurred, including crisis and consequence management. This current focus on emergency preparedness planning is an understandable next step in the development of strategies and resources to help both public and private organizations work together and share information on the state of preparedness to effectively respond to terrorist actions. However, current security planning considerations need to go beyond short-term operational functions and be incorporated into the long-term planning processes that influence the prioritization and development of transportation infrastructure across the Washington, D.C., metropolitan area.

The RECP also defined requirements for a new regional incident communication and coordination system (RICCS), under the authority of the chief administrative officers committee. RICCS will include a regional incident tracking system and an incident impact assessment system. These are positive steps to apply technology to the challenges of homeland security enhancements. The incident impact assessment system should be considered as a means to assist regional planners involved in the formulation of future transportation improvement plans by taking into consideration the possible impacts of terrorist attacks on the regional transportation system and ways to mitigate or prevent these attacks through prudent facility design, hardening, and integration with other protection protocols (such as ITS devices).

COG also needs to encourage state and local jurisdictions in the Washington, D.C., metropolitan area to include transportation projects that promote both safety and security, since strategies that improve one tend to improve the other. Designating funding for these particular kinds of projects would greatly encourage this.

The nation's capital is in an excellent position to experiment with a wide variety of strategies aimed at improving the nation's protection from terrorist attacks. It has the vulnerability of being the nation's capital, the diversity of transportation infrastructure, the complexity of multiple jurisdictions, and the experience with past terrorist attacks. Given its proximity to the issues' major advocates and supporting agencies (the President, Congress, Defense Department, U.S. DOT, and Homeland Security Department), the Washington, D.C., metropolitan area is ideally situated to pursue federal, state, and private sector funding to encourage the incorporation of security concerns into its transportation planning process as a pilot program. This would permit quick results to be demonstrated and lessons learned for broader application through more traditional authorization and obligation processes. Given the maturity of Washington, D.C.'s transportation infrastructure, this would also serve as a possible remedy for replacing or renewing critical transportation infrastructure with facilities that are better protected and hardened to discourage terrorist actions and facilitate quick response and possible evacuation should an attack occur.

CHAPTER 5

CONCLUSIONS

This chapter presents the conclusions of this study regarding the incorporation of security in the metropolitan/local and statewide transportation planning processes. The following findings and recommendations address the current state of the transportation planning process and suggest what may be needed to encourage a more aggressive planning process that considers security as a comparable element of this process. The conclusions contain the challenges and opportunities to move this process forward.

KEY FINDINGS

- The framework for transportation planning at the metropolitan/local and statewide levels, as defined by federal funding legislation, includes security as one of the key elements of this process, linked to safety. However, the definitions of security and safety are not clearly established in federal guidance on planning. These precise definitions need to be established within the metropolitan or state planning processes.
- The many metropolitan/local and state transportation planning efforts and plans (TIPs and STIPs) reviewed during this study reflect a growing consideration of such factors as safety, congestion management, economic development, neighborhood preservation, public involvement, social justice, sustainability, historic preservation, smart growth, and funding. In contrast, security considerations in metropolitan/local transportation planning are slowly evolving and are most evident in projects involving operational systems and equipment, particularly ITS for highway networks and video monitoring and surveillance systems for public transit facilities and vehicles.
- Safety has been a factor in developing metropolitan/local and statewide transportation plans for almost 40 years, with public recognition of safety issues, the effectiveness of recent safety-enhancement efforts at the state and local levels, and emphasis and funding placed on this issue in federal funding legislation.
- Security is not yet a major factor in the transportation infrastructure concept-development or planning phases for most metropolitan/local areas, except as it relates to personal or property security from criminal activity (personal attacks, vandalism, graffiti, etc.).
- Where security considerations have been included in metropolitan/local transportation planning, the cost of the planning process has increased as a result of the increase in technical considerations and number of stakeholders that must be involved in the process.
- Security enhancement as a major consideration for transportation infrastructure is more recent, sporadic, and intangible to the public and many public agencies at the state and local levels of government, including those responsible for long-term transportation infrastructure planning. The public also perceives national security as essentially a federal responsibility.
- Considering security in planning for transportation infrastructure has been deferred by the initial emphasis placed on operations-related considerations, such as emergency preparedness, mitigation, and response in the aftermath of the terrorist attacks of September 11, 2001, as reflected by the federal government's program and funding initiatives to date.
- Changes to local transportation planning processes to address additional issue areas are difficult unless there is local interest, a sense of responsibility, and institutional commitment. Making changes can be greatly facilitated by the provision of additional dedicated federal funding to support these efforts, since metropolitan/local and state transportation agencies worry about diverting available funds from projects already judged as high priority using established criteria. In the absence of local interest, dedicated federal funding can promote a national objective of enhanced homeland security.
- The longer the time span between terrorist attacks, the less likely that the transportation planning process will be significantly changed over the long-term due to the potential of a terrorist attack, as demonstrated by the Portland metropolitan area case study.
- Where changes in the transportation planning process are made (as in San Francisco), the likely implications include the following:
  - Greater interagency coordination and communication in plan development, including emergency response agencies;
  - Changes in facility location, design, operations, and justification to promote increased prevention, protection, redundancy, and recovery;

  - Increased redundancy in the regional multimodal transportation system through increased capacity, alternative modes, and network connectivity; and
  - Changes in program goals, databases, analytical tools and systems, decisionmaking processes, organizational arrangements, and spending priorities (between capital and operating, short-term and long-term, and security and the many other transportation prioritization criteria).
- Key limiting factors to be considered when seeking to incorporate security into the transportation planning process include the following:
  - Uncertainty regarding what is security and how it might affect the local region,
  - Higher perceived relevance and visibility of safety,
  - Unavailability of security data,
  - Open accessibility of transportation systems,
  - Multitude of metropolitan/local area stakeholders,
  - Lack of security performance measures, and
  - Need to safeguard sensitive information.

  This last point runs contrary to the openness of the transportation planning processes in this country. It will be a major challenge for transportation planning agencies to retain a collaborative and transparent planning process while protecting security-sensitive information and selected products of the planning process.
- A number of local factors emerged from the four case studies that appear to significantly influence how metropolitan/local planning processes are likely to change to accommodate the nation's heightened sensitivity to security issues and threats. These factors include the following:
  - The history of emergencies in a region, particularly terrorist attacks (New York City) and natural disasters (San Francisco) promotes including protection and prevention projects in TIPs/STIPs and promotes greater intergovernmental and interagency coordination and communication mechanisms.
  - The development of federal transportation planning requirements in distinguishing security as a component of safety and linking security considerations to federal funding eligibility for TIP/STIP approved projects will provide a strong impetus for incorporating security in the transportation planning process.
  - The relative proximity of the region to places where terrorist attacks have occurred (New York City and Washington, D.C.) or where likely terrorist targets are located (San Francisco) affects the degree to which security considerations are included in the local planning processes.
  - The core values of the regional population have a significant bearing on whether the region's planning processes will take a broad (Portland) or strict (Washington, D.C.) interpretation of federal regulations regarding the incorporation of security in the region's transportation planning process. The interpretation is affected by the proximity of the region to the source of these regulations and the ideological orientation of the local populace and decisionmakers.
  - The extent to which the local transportation planning process is considered to be highly successful and a best practice example from a local perspective can reduce the potential for changing the process to accommodate issues perceived to be less relevant to the region (Portland).
  - The linkage of security preparedness with emergency preparedness related to more imminent disasters (earthquakes, tornadoes, hurricanes, floods, and high-rise fires) provides a stronger impetus for incorporating security into metropolitan/local transportation planning processes (San Francisco and Portland).
  - The multiplicity of jurisdictions in a metropolitan area poses a significant challenge to developing unified and integrated security preparedness capabilities, which include infrastructure planning for prevention and protection and operational coordination of response and recovery. MPOs were established to aid this process and have been given increasing responsibilities and authority over regional planning and transportation project approval. The more successful and respected the local MPO, the more effective are its planning processes, which will ultimately impact the region's ability to successfully incorporate security into its transportation planning processes.

RECOMMENDATIONS

- A more concerted effort needs to occur at all levels of government and industry within a state or metropolitan area to develop a consensus on what elements of security incident prevention and consequence mitigation can and should be incorporated into each state and metropolitan area's transportation planning processes. Instead of promulgating national standards, this effort needs to be part of a holistic approach to statewide or area-specific security issues that arise during the life-cycle development and operation of transportation infrastructure. The results should be based on the perceived level of threat, importance and vulnerability of area-specific transportation assets, availability of resources, and institutional environment. All this should be done without revealing sensitive security threat or vulnerability information, unless specific clearance is obtained.
- The incorporation of safety into the traditional transportation planning process is a useful model for encouraging consideration of security issues as well. Linking the two elements is a first step. However, the nature of security issues and the strategies to address them need to be incorporated as distinct elements for developing both TIPs and STIPs.

- MPOs should plan and support modifications to facilities and operations that provide long-term recovery after an attack, such as providing traveler information, temporary and permanent re-routing of services, and reconstruction. MPOs are well positioned to incorporate long-term strategies to help prevent and facilitate recovery from security incidents.
- Security needs to be an on-going consideration by all levels of the government and the private sector needs to be included in transportation planning processes, in terms of facility features, operations, and management. Key actions that MPOs can take in response to potential security threats and incidents include providing improved facility designs that prevent large scale destruction and surveillance, monitoring, and sensing technologies to deter terrorists (*51*).
- Key security elements for incorporation in the transportation planning process include the following:
  - Security definition;
  - Relationship to public health and safety, as well as to private productivity and continuity;
  - Goal development;
  - Transportation asset identification;
  - Security risk assessment, including potential bottlenecks or choke points, by transportation asset;
  - Probability assessment of incident attempt by transportation asset;
  - Vulnerability assessment by transportation asset;
  - Damage assessment (including direct and indirect, short-term and long-term) by transportation asset;
  - Risk/consequence trade-off analysis of potential strategies, based on the probability of terrorist attacks occurring, the severity of the consequences of such attacks, and the impact value of proposed strategies for mitigating the likelihood and consequences of terrorist attacks;
  - Coordinated planning and prioritization of security-enhancement projects, both short-term and long-term; and
  - Project funding and programming, with involvement of both public and private sector stakeholders.
- To ensure appropriate consideration of security in the metropolitan/local and statewide transportation planning processes, the following elements are needed:
  - Recognition of security as a specific component of the process to preserve the reliability, robustness, and resiliency of the transportation infrastructure system and maintain essential services to preserve a sense of confidence in the transportation system and the capability/resiliency of the region to survive terrorist attacks and continue to function effectively.
  - Linkage of security to other major disaster threats that are more apparent and imminent to improve the support for security projects and leverage their cost-effectiveness.
  - Involvement and input from all stakeholders in the transportation planning process, including those with security responsibilities.
  - Establishment of security goals and performance measures and standards to track the effectiveness of capital projects that promote improved security from terrorist attack and other major disasters, such as earthquakes, landslides, flooding, tornadoes, hurricanes, and high-rise fires.
  - Development and integration of information systems and analytical tools to determine transportation infrastructure vulnerability, assess the risk of attack, develop effective countermeasures (both design and operations-related); and prioritize alternative projects for providing a more secure transportation system within resource limits. Such projects may include the following:
    - Providing network and multimodal redundancies, particularly at known choke points such as bridges, tunnels, major interchanges, and major intermodal terminals, to facilitate the free movement of goods and people in the event of critical link closures due to a terrorist attack.
    - Adding corridor capacity (such as the Route 66 example described in the Washington, D.C., metropolitan area case study).
    - Increasing movement of emergency vehicles and accessibility to medical facilities.
    - Providing countermeasures to protect critical assets, such as intermodal facilities, bridges, tunnels, and so forth.
    - Expanding ITS applications such as surveillance and information dissemination.
    - Sizing the public transit fleet to accommodate emergency evacuation and provide contingency movement during potential fuel shortages.
    - Providing traffic control centers and related facilities to enable communication and coordination between transportation and emergency services providers (*4*).
  - Development of decisionmaker understanding and sensitivity to security issues associated with transportation infrastructure and planning staff capabilities and resources to incorporate security considerations into the transportation planning process in a meaningful way (*52*).
  - Federal, state, and regional agencies must determine the level of resources, both financial and human, to be devoted to security considerations in developing and implementing transportation infrastructure planning and delivery. This determination should be based on a careful assessment of the following:
    - Extent of critical transportation assets within the region and their susceptibility to attack;

  - Probability that a successful attack will be launched against the region's critical transportation assets;
  - Direct and indirect consequences of losing critical transportation assets on the regional and state economy;
  - Availability of dedicated funding to address the most critical projects to safeguard critical transportation assets, provide alternative capacity, and protect the economic vitality of the region from terrorist attack (*4*).
- Promotion of security considerations in the transportation planning process should follow the guidelines set out by the report of the President's commission on protecting critical infrastructure assets, which states the following:

States should further facilitate coordinated planning and preparedness for critical infrastructure and key asset protection, applying unified criteria for determining criticality, prioritizing protection investments, and exercising preparedness within their jurisdictions. (15)

CONCLUSIONS

This study has sought to identify (1) the status of state and metropolitan/local area transportation planning processes relative to the consideration of security issues and incorporation of security enhancement strategies and (2) the best practices among key states and metropolitan/local areas to incorporate security into the transportation planning process. What the study found is that security has not yet been effectively incorporated into the transportation planning process of major state and metropolitan/local areas as it relates to transportation infrastructure, despite the availability of numerous technical resources available from federal agencies, as noted in the introduction to this report. Limited efforts have been made to include ITS-related items related to the highway mode and surveillance and monitoring equipment related to the public transit mode. However, the current status of security planning for transportation infrastructure at the state and metropolitan/local area level is undeveloped, because of confusion over what is security, the distinction between security and safety, the recent nature of this issue, the indefinable and unexpected nature of terrorist threats, the absence of funding specifically dedicated for security-enhancement projects, and the perceived competition for funding from other critical transportation program and project needs.

With very limited progress having been made to include security in the transportation planning process to date, too few examples were identified to form the basis for determining best practices at this time. However, most metropolitan/local planning organizations are seeking greater guidance to define security issues, concerns, and strategies; identify specific funding for security-enhancement projects; and obtain technical support to better understand and advance the process. They are also suggesting that the very nature of the long-term transportation planning process requires a number of years to develop and change, geared to the 6-year cycle of federal transportation funding programs. Another concern is the conflict between the openness of the state and metropolitan/local area transportation planning process and the need to keep confidential certain sensitive results of the process when security issues are included.

When taken together, these factors suggest it will be a long and varied process to include security in the state and metropolitan/local transportation planning process in any meaningful way, and there will be a significant cost to achieve widespread compliance. The Administration's proposed reauthorization bill (SAFETEA) addresses many of the issues and needs identified by this study. Whatever final form the approved reauthorization bill takes will likely provide significant guidance and funding authorization to greatly encourage security-specific planning, programs, and projects at the local and state levels.

There are numerous federal documents and tools available to metropolitan/local and state transportation planning agencies to make their transportation planning programs more security-enabled. However, there is little evidence that these available resources are known to or used by state or metropolitan/local planning agencies in their transportation planning processes. Using these and other tools is important to having state and metropolitan/local planning organizations incorporate security considerations in their TIP-development processes. Certainly federal support, guidance, and funding will greatly facilitate the local adoption and adapting of best practice processes and tools from other types of organizations more experienced with security-related capital planning to achieve security-enhanced metropolitan/local transportation systems.

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APPENDIX A
ANNOTATED BIBLIOGRAPHY

This appendix contains various publications and studies relating to transportation planning and how security and safety are considered. Additional publications focus on specific aspects of security prevention and response functions, including threat and vulnerability assessments, investment in countermeasures, applicable databases and tools, and relevant legislative information.

The bibliography is organized into the following 11 categories:

- Documents on incorporating security into the planning process
- Similar documents on incorporating safety into the planning process
- Specific security issues, countermeasures, and investments
- Security assessment methodologies
- Transportation security threats and vulnerabilities
- Transportation planning process
- Analysis tools and databases
- Legislative information
- TIPs and STIPs
- General information relevant to security

Documents on Incorporating Security into the Planning Process

Baird, Malcolm. *National Emphasis of Security: Implications for State and Local Policy,* Vanderbilt University, 2002.

The author discusses how new criteria may be needed for the planning and design processes to accommodate a new emphasis on security. Discussed are issues of potential change to the planning process including the current composition of stakeholders (to include a heavier component of law enforcement agencies, fire services, other emergency responders), the need for modified design objectives (e.g., to emphasize goals such as redundancy rather than operational 'efficiency' and stressing access management rather than wholly open systems), planning for emergency response, and legislative implications.

Federal Emergency Management Agency, Industrial Emergency Preparedness Division. *Marketing Strategies to Motivate Industry to Develop and Implement Integrated Emergency Preparedness Plans,* Peat, Marwick, Mitchell & Co. Washington, D.C., September 25, 1985.

This early study on emergency preparedness planning focuses on the issues and strategies for prompting private industry to establish emergency preparedness plans as part of an active approach to ensure the safety and continued productivity of corporate facilities and employees. Building on a series of direct interviews with industry leaders across several industry categories and associations, the report explores marketing approaches to encourage greater emergency preparedness efforts by industry. The study concludes that the most effective way to get industry to expand its emergency preparedness plans and capabilities is to frame the threat scenarios in terms of more relevant disaster-producing events, such as hurricanes, tornadoes, earthquakes, high-rise fires, floods, and blizzards.

Federal Highway Administration and the American Association of State Highway and Transportation Officials. *Recommendations for Bridge and Tunnel Security*. Prepared by the Blue Ribbon Panel on Bridge and Tunnel Security, Washington, D.C., September 2003.

This document discusses the threat posed by terrorist attacks to the regions and communities served by critical bridges and tunnels, including the direct and indirect costs of a successful attack, such as replacement costs and economic costs to the region. The document presents a number of findings to support recommendations for action that are institutional, fiscal, and technical in nature.

Meyer, Michael. *The Role of Metropolitan Planning Organizations in Preparing for Security Incidents and Transportation Response*, Georgia Institute of Technology, Atlanta, GA, 2002.

Meyer describes the key role that MPOs can play in promoting coordinated planning in anticipation of unexpected events or natural disasters and providing a centralized location of information on transportation system conditions and local/national responses that might be useful in an emergency. This white paper raises other issues that should be considered by MPO officials in addressing security in the planning process.

Polzin, Steven E. *Security Considerations in Transportation Planning: A White Paper*, Southeastern Transportation Center, University of Tennessee, 2002.

The implications of enhanced security concerns on transportation planning activities are explored. The paper describes how the recent, heightened focus on security likely will impact transportation goals, planning processes, databases, analytical tools, and organizational structures.

President's Commission on Critical Infrastructure Protection (PCCIP). *The National Strategy for the Protection of Critical Infrastructures and Key Assets.* Washington, D.C., February 2003.

This document provides a strategic basis for developing and implementing national strategies to protect and secure our nation's critical infrastructure assets from physical

attack. The document provides a mission statement, goals, objectives, and guiding principles for strategies aimed at securing the nation's infrastructure assets, including transportation. The document also provides a structure for these efforts, including roles and responsibilities and major initiatives involving both the public and private sectors.

Wegmann, Frederick J. and Everett, Jerry. *The Role of Security in the Surface Transportation Programming Process*, Southeastern Transportation Center, University of Tennessee, 2002.

This paper discusses the role of security in the MPO transportation planning process and current activities related to security in planning and the practices of a number of MPOs throughout the country. Included is an assessment of the differences in security-related planning activities in the pre- and post-September 11, 2001, environments.

Similar Documents on Incorporating Safety into the Planning Process

Federal Highway Administration. *Considering Safety in the Transportation Planning Process,* U.S. Department of Transportation, Washington, D.C., 2002.

This report examines the integration of safety into the transportation planning process. The multimodal planning process is outlined, emphasizing the areas in which safety can be considered. Also discussed are legislative background, stakeholders, the role of safety as part of the transportation planning process at state and metropolitan planning levels, sources of funding, and institutional challenges.

Transportation Research Board/National Research Council. *Transportation Research Circular E-C025: Safety-Conscious Planning*, Washington, D.C., January 2001.

This circular presents results from an initial workshop to define the major issues associated with the implementation of the Transportation Equity Act for the 21st Century (TEA-21) requirement to include safety and security as criteria in the transportation planning process.

Transportation Research Board/National Research Council. *Transportation Research Circular E-C041: Supporting the Establishment of Safe Transportation Networks,* Washington, D.C., July 2002.

This circular builds on Circular E-C025, which presents results of a workshop on safety conscious planning. Additional workshops were held by six states. This circular reports on the process and outcomes from those forums and a toolkit for use by states to organize and conduct safety-conscious planning forums statewide or within regions/districts of a state.

Specific Security Issues, Countermeasures, and Investments

Federal Transit Administration. *Case Study of Transit Security on Bus Systems*. U.S. Department of Transportation. Cambridge, MA: Research and Special Programs Administration. John A. Volpe National Transportation Systems Center. (Pub. No. FTA-MA-90-7001-94-1), 1996.

This case study examines measures taken by Los Angeles, Detroit, Seattle, and Pittsburgh transit systems to combat crime and violence on their systems. Includes data from respective law enforcement agencies.

Maryland's Reaction and Response to the Events of September 11th—A Case Study, retrieved September 5, 2003, from http://security.transportation.org/community/security/doc/MD911Final.pdf

This document outlines the ways in which the terrorist attacks of September 11, 2001, affected Maryland's transportation infrastructure and assets and how well the system responded to these attacks. Some of the material has a direct bearing on incorporating security in the planning process, such as that each administration within MDOT is doing a capital facilities security review, looking at its capital program to see what can be done, including, but not limited to, what is more high-tech and sustainable. This effort may include anything from better reinforced building materials to minimize damage, to the use of CHART, ITS, and CCTV for better security and monitoring to prevent terrorism.

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Morgan, Daniel F. and Abramson, H. Norman. Improving Surface Transportation Security through Research and Development. *TR News,* No. 211, November–December 2000.

Morgan and Abramson discuss ways in which research and development efforts can improve security. Criteria for prioritizing R&D efforts are offered as well as recommended research topics.

Needle, Jerome A. and Cobb, Renée M., J.D. *TCRP Synthesis of Highway Practice 21: Improving Transit Security.* TRB, National Research Council, Washington, D.C., 1997.

This synthesis offers information on a variety of approaches to improving transit security. The nature and extent of transit crime, effective strategies to combat problem situations, and case studies of specific control practices deemed successful by transit agency professionals (with no distinctions drawn between bus and rail modes) are discussed.

Pearce, Vincent. *Securing the Roads: U.S. Actions to Enhance Surface Transportation Security*, Transportation Technology International, 2002.

Pearce discusses the post-September 11, 2001, efforts to assess the state of security of travel on the nation's roadways and to improve existing levels of security. Multimodal efforts and interagency communications are described as are partnerships with other stakeholders, such as the private sector, academia, and industry associations. Progress is described.

Pearce, Vincent. "Surface Transportation Security Lessons Learned from 9/11," *ITE Journal*, Vol. 72 (9), September 2002.

This article provides an overview of the findings of two case studies initiated after the terrorist attacks of September 11, 2001.

Pietryzyk, Mike and Turner, Patricia. *The Role of Transportation Management Centers (TMCs) in Homeland Security*, University of South Florida, 2002.

This document describes the role of Transportation Management Centers (TMCs) in restoring and maintaining transportation services during a transportation emergency as well as providing a communications hub and centralized control point for all security and emergency response activities. The role of the Virginia Transportation Management Center in the aftermath of the terrorist attack on the Pentagon is used as an example.

Summary of Lessons Learned from Pentagon Attack, retrieved September 5, 2003, from http://security.transportation.org/community/security/doc/VDOTLessonsLearned.pdf

This document is similar in scope to "*Maryland's Reaction and Response to the Events of September 11th—A Case Study*," also included in this bibliography, in that it describes the capability of the Virginia transportation infrastructure, assets, and staff to respond to the terrorist attacks of September 11, 2001. Shortcomings are discussed.

United States General Accounting Office. *Transportation Security: Federal Action Needed to Help Address Security Challenges,* Washington, D.C., 2003.

This document discusses key stakeholders and their roles in protecting the nation's transportation infrastructure, including recommendations.

Volpe National Transportation Systems Center. *Effects of Catastrophic Events on Transportation System Management and Operations: Cross Cutting Study*, Cambridge, MA, January 2003.

This report documents the actions taken by transportation agencies in response to catastrophic events as an overall effort to examine the impacts of different types of events on transportation system facilities and services. The findings and conclusions documented in this report are a result of the creation of a detailed chronology of events, a literature search, and interviews of key personnel involved in transportation operations decisionmaking for New York City, terrorist attack September 11, 2001; Washington, D.C., terrorist attack September 11, 2001; Baltimore, Maryland, rail tunnel fire July 18, 2001; Northridge, California, earthquake January 17, 1994.

Zycher, Benjamin, *A Preliminary Benefit/Cost Framework for Counterterrorism Public Expenditures,* Rand, 2003.

This report examines a number of public finance issues related to large public expenditures for counterterrorism policies, including derivation of rough estimates of the aggregate benefits and costs of such an effort. The analysis approach in this report should provide a framework for benefit/cost analysis of particular policies and thus for construction of rough but reasonable ranking among the myriad potential actions decisionmakers might consider. The study should be of interest to analysts and policymakers involved in allocating resources in the wake of the September 11, 2001, terrorist attacks.

Security Assessment Methodologies

Balog, John N., Schwarz, Anne N., and Doyle, Bernard C. *Transit System Security Program Planning Guide*, Federal Transit Administration. U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe, National Transportation Systems Center. (Pub. No. FTA-MA-90-7001-94-1), 1996.

This document discusses the necessary aspects of security plans that when completed should provide a complete program for system security, assessment, and preparedness. It outlines activities to assist transit systems in the development, implementation, and maintenance of security plans and programs.

National Research Council. *Improving Surface Transportation Security: A Research and Development Strategy*, Washington D.C: National Academy Press, 1999.

O'Neil, Daniel J. Statewide Critical Infrastructure Protection: New Mexico's Model, *TR News,* No. 211, November–December 2002.

Programs to protect statewide, regional, and local infrastructure are necessary to complement and adapt federal initiatives. New Mexico provides a pioneering example.

Transportation Security Threats and Vulnerabilities

American Association of State Highway and Transportation Officials' Security Task Force. *A Guide to Highway Vulnerability Assessment for Critical Asset Identification and Protection,* National Cooperative Highway Research Program Project 20-07/Task 151B, 2002.

Blue Ribbon Panel on Bridge and Tunnel Security, *Recommendations for Bridge and Tunnel Security*, American Association of State Highway and Transportation Officials, Transportation Security Task Force, September 2003.

Chatterjee, Arun, *Security Issues Involving Intermodal Freight Terminals*, University of Tennessee.

This paper covers security-related issues of freight transportation in the United States. The focus, however, is on terrorism that uses the intermodal freight transportation system. Of particular interest is how terrorists from other countries can use international marine containers to cause destruction in the United States.

Federal Bureau of Investigation, *Terrorism in the United States*, U.S. Department of Justice, 1999.

This paper provides a summary of terrorism-related activity in 1999 and a broad overview of U.S.-based terrorism during the past three decades. It discusses notable cases, trends, emerging threats, and the development of the FBI response to terrorism during the past 30 years. The document includes a summary of terrorist incidents in the United States during the past decade and provides background information on currently designated foreign terrorist organizations and terrorist renditions (1987–1999).

Flynn, Stephen E. Transportation Security: Agenda for the 21st Century, *TR News*, No. 211, November–December 2000.

Criminals plan to exploit and terrorists plot to disrupt the U.S. transportation system. Because both activities are escalating, transportation security must become a national priority, according to this author. The solution requires global initiatives that complement concerns about cost and competitiveness.

General Accounting Office, *Coordination Needed in Selecting and Implementing Infrastructure Vulnerability Assessments.* Washington, D.C., 2002.

This document describes infrastructure planning in the post-September 11, 2001, environment.

Hoffman, B. and Hoffman, D. K. The Rand-St. Andrews Chronology of International Terrorist Incidents, 1998.

For the purposes of The Rand-St. Andrews Chronology of Terrorism, terrorism is defined by the nature of the act, not by the identity of the perpetrators or the nature of the cause. Terrorism is violence, or the threat of violence, calculated to create an atmosphere of fear and alarm. These acts are designed to coerce others into actions they would otherwise not undertake or refrain from taking actions that they desired to take. Incidents in this chronology are concerned with international violence, defined here as incidents in which terrorists go abroad to strike their targets, select victims or targets that have connections with a foreign state, or create international incidents by attacking airline passengers, personnel, and equipment. Although the chronology focuses on international terrorism, it is recognized that domestic political violence is often related and overlaps. Tactics in this chronology include kidnapping, bombing, and attacks on installations.

Jenkins, Brian. *Saving City Lifelines: Lessons Learned in the 9-11 Terrorist Attack*s, U.S. Department of Transportation, September 2003.

Details of transportation lessons learned in the post-September 11, 2001, environment are contained in this document.

Jenkins, Brian. *Selected Terrorist Threats and Attacks Against L\Railways, Subway, and Train Stations,* Kroll-O'Gara Company, September 1997.

This document contains a chronology of terrorist events.

Jenkins, Brian Michael and Gersten, Larry. *Protecting Public Surface Transportation Against Terrorism and Serious Crime: Continuing Research on Best Security Practices*, MTI Report 01-07, September 2001.

This report presents a chronology of terrorist threats including four case studies: the 1995 saran attack on Tokyo's subways, the United Kingdom's response to the IRA's terrorist campaign against British surface transportation, and security at the Bay Area Rapid Transit District and the Santa Clara Valley Transit Authority.

National Infrastructure Protection Center, *Risk Management: An Essential Guide to Protecting Critical Assets*, U.S. Department of Homeland Security, November 2002.

As organizations increase security measures and attempt to identify vulnerabilities in critical assets, many are looking for a mechanism to ensure an efficient investment of resources to counter physical and cyber threats. This paper describes a risk management model that assesses assets, threats, and vulnerabilities and incorporates a continuous assessment feature, allowing organizations to tailor their risk management to current situations and to assess future risks.

Norman Y. Mineta International Institute for Surface Transportation Policy Studies. *Terrorism in Surface Transportation: A Symposium*, College of Business, San Jose State University, 1996.

The symposium broadly covered security issues as they related to terrorism, including an overview of major terrorist incidents and responsibilities of local, state, and federal authorities before, during, and after terrorist events.

Transportation Research Board and National Research Council. *Global Intermodal Freight: State of Readiness for the 21st Century: Report of a Conference*. February 23–26, 2000; Long Beach, California, 2001.

In February 2000, TRB hosted one in a series of intermodal conferences. The goal of this conference was to assess the current state of readiness of the intermodal freight system from the perspective of the government, military, and private sectors. Issues relating to transportation system security were addressed in plenary sessions and were the focus of the following two panel sessions.

Kozel, Scott M. 14th Street Bridge, the Air Florida Crash, and Subway Disaster. www.roadstothefuture.com, 1997 and updated 2002.

This article describes the combined effects of several transportation disasters that occurred in the center of Washington, D.C., in 1982, involving air, transit, and auto facilities.

Srinivasan, Karthik. *Transportation Network Vulnerability Assessment,* Vanderbilt University.

This white paper calls for the development of systematic measures and methods to (1) assess the vulnerability of existing infrastructure, (2) prevent the occurrence of disruptive attacks (where possible), (3) reduce the consequence of attacks if they occur, (4) develop and organize a body of knowledge on security threats, impacts, and control decisions, (5) increase the awareness of experts and users of the system alike on security issues, and (6) integrate security considerations as an integral part of the network planning, design, and operational efforts.

Transportation Planning Process

Association of Metropolitan Planning Organizations. *Information on Noteworthy Metropolitan Planning Organization (MPO) Practices: Cooperative Revenue Forecasting and Annual Listings of Obligated Projects*, Prepared for Metropolitan Capacity Building Program under a grant from the U.S. Department of Transportation, November 2001.

Metros. Association of Metropolitan Planning Organizations, *AMPO Security Survey*. Washington, D.C., June 2002.

Seventy-eight percent of MPOs surveyed indicated that security concerns have caused changes in their metropolitan transportation planning process. MPOs indicated that they see a growing role for their involvement in traffic modeling for evacuation plans, airport facility planning, emergency preparedness, statewide assessments of critical assets and vulnerable facilities, and coordination with E-911 services which need to be addressed after September 11, 2001. The report and database are intended to provide insights and references for state planning stakeholders as they develop future plans that are increasingly informative and useful for decisionmaking.

Federal Highway Administration, *Examples of Statewide Transportation Planning Practices.* Washington, D.C., 1999.

This document presents some innovative and unique planning approaches used by a number of states that may be of interest and benefit to other states.

Federal Highway Administration, Federal Transit Administration, *Federal Certification of the MPO (TMA) Planning Process*, Washington, D.C., April 28, 1994.

Federal Highway Administration. *Financing the Statewide Plan: A Guidebook.* Washington, D.C., 1999.

State requirements for a financial component of the long-range planning process have been much less stringent than those for MPOs. Questions have arisen, such as why should state DOTs develop a thorough financial planning process as part of their long-range plans? What should they contain? What strategies are there to bridge the ubiquitous gap between projected revenues and perceived needs? What are the pitfalls and success factors planners developing statewide, multimodal, long-range transportation plans should consider? The guidebook is designed to help answer these questions.

Federal Highway Administration, Federal Transit Administration, *Guidance on Major Investment Studies*, Washington, D.C., August 19, 1994.

Federal Highway Administration, Federal Transit Administration, *A Guide to Metropolitan Planning Under ISTEA: How the Pieces Fit Together*, FHWA-PD-95-031, Washington, D.C., July 1995.

The document describes how transportation professionals and decisionmakers can fully realize ISTEA's potential and provides information and assistance on how to fit the planning elements of ISTEA together to meet both local needs and national priorities. This report is the result of a comprehensive review of statewide plans available at the time of the review. The review also produced a database with detailed information on major characteristics of the statewide plans. The research addresses how individual states approach a series of important transportation planning themes in their plans to identify national planning trends from this analysis and to highlight noteworthy practices. The noteworthy practice sections of the report provide short case studies of innovative approaches by individual states. The report and database are intended to provide insights and references for state planning stakeholders as they develop future plans that are increasingly informative and useful for decisionmaking.

Federal Transit Administration, Federal Highway Administration, *Innovative Financing Handbook*, FHWA-PD-95-024. Washington, D.C., 1995.

Federal Highway Administration, Federal Transit Administration. *Innovations in Public Involvement for Transportation Planning*, FHWA-PD-94-021, Washington, D.C., January 1994.

Federal Highway Administration, *Rebuilding America: Partnership for Investment*, FHWA-PL-95-023. Washington, D.C., December 1994.

Federal Highway Administration, Federal Transit Administration, *Statewide Transportation Planning Practices*, FHWA-PD-95-018. Washington, D.C., January 1995.

Metropolitan Capacity Building Program. *The Metropolitan Transportation Planning Process: Key Issues, A Briefing Notebook for Metropolitan Planning Organization Board Members.* U.S. Department of Transportation, Washington, D.C., November 2001.

This notebook provides state and local officials, planning board members, and transportation service providers with an overview of transportation planning. This notebook provides a basic understanding of the key concepts, along with references for additional information. Part I describes transportation planning and its relationship to decisionmaking. Part II presents short descriptions of important policy and planning topics.

U.S. Department of Transportation, *A Guide to Metropolitan Transportation Planning Under ISTEA—How the Pieces Fit Together.* Washington, D.C., 1994.

Analysis Tools and Databases

Cooney, N. A. *Development of an Automated Security Incident Reporting System (SIRS) for Bus Transit*. Report No. DOT-TSC-UMTA-86-13, 1986.

The SIRS is designed to provide up-to-the-date security data to dispatchers, security officers, and police. Information is gathered and entered into the system and the system provides data and information that can be readily used in determining frequency of crime and other statistically relevant information.

Legislative Information

23 U.S.C. 134(f)(1)(A-G) and (23 U.S.C. 135(c)(1)(A-G); 49 U.S.C. 5303(a)(1)(A-G):

The metropolitan (and statewide) transportation planning process for a metropolitan area (or state) under this section shall provide for consideration of projects and strategies that will meet seven specific criteria, including those that "increase the safety and security if the transportation system for motorized and non-motorized users."

23 U.S.C. 134 (g)(2)(B) and (23 U.S.C. 134(h)(1)(B); 49 U.S.C. 5303(a)(1) and (f)(1)(E) and 49 U.S.C. 5304(a)(2)):

This requires that for the purpose of developing the long-range transportation plan, the MPO and state shall cooperatively develop estimates of funds that will be available to support plan implementation. For the purpose of developing the transportation improvement program, the MPO, public transit agency, and state shall cooperatively develop estimates of funds that are reasonably expected to be available to support program implementation.

23 U.S.C. 134(g)(4) and (h)(4) and (23 U.S.C. 134(e)(3)(A) and (f)(1)(C); 49 U.S.C. 5303(f)(4) and 49 U.S.C. 5303(a)(1))

This regulation requires that before approving a long-range transportation plan, each MPO shall provide citizens, affected public agencies, representatives of transportation agency employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transit, and other interested parties with a reasonable opportunity to comment on the long-range transportation plan, in a manner that the Secretary deems appropriate.

23 U.S.C. 134(i)(5)(D):

In making certification determinations under this paragraph, the Secretary shall provide for public involvement appropriate to the metropolitan area under review.

23 U.S.C. 134(h)(7)(B); 49 U.S.C. 5303(c)(5)(B):

This document contains the requirement that an annual list of projects for which federal funds have been obligated in the preceding year shall be published or otherwise made available by the MPO for public review. The list shall be consistent with the categories identified in the transportation improvement program.

23 U.S.C. 135 (c)(1), (e)(2)(B), (f)(1)(B)(ii)(I) and (II), (f)(3)(A) and (B); 49 U.S.C. 5323(1):

This document states that with respect to each nonmetropolitan area, the long-range transportation plan shall be developed in consultation with affected local officials with responsibility for transportation. With respect to each nonmetropolitan area in the state, the program shall be developed in consultation with affected local officials with responsibility for transportation.

23 U.S.C. 135(f)(4); 49 U.S.C. 5323(1):

This section states that a transportation improvement program developed under this subsection shall be reviewed and, on a finding that the planning process through which the program was developed is consistent with this section, section 134, and sections 5303 through 5305 of title 49, approved not less frequently than biennially by the Secretary.

Federal Highway Administration, Federal Transit Administration. Management and Monitoring Systems; Proposed Rule, *Federal Register*, Title 23 Code of Federal Regulations, Part 500, et al., Title 49, Code of Federal Regulations, Part 614, Washington, D.C., March 2, 1993.

Federal Highway Administration, Federal Transit Administration. Statewide Planning; Metropolitan Planning; Rule, *Federal Register,* Title 23, Code of Federal Regulations, Part 450, Title 49, Code of Federal Regulations, Part 613, Washington, D.C., October 28, 1993.

Public Law 105-85, Sec. 1308:

This law mandates that the Secretary shall eliminate the major investment study as set forth in Section 450.318 of Title 23 Code of Federal Regulations, as a separate requirement, and promulgate regulations to integrate such requirement, as appropriate, as part of the analyses required to be undertaken pursuant to the planning provisions of Title 23, United States Code, and Chapter 53 of Title 49, United States Code, and the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) for federal-aid highway and transit projects. The scope of the applicability of such regulations shall be no broader than the scope of such section.

The Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003. Section-by-Section Analysis.

This document contains a detailed explanation of the current SAFETEA legislation.

TIPs and STIPs

2002 Regional Transportation Improvement Program, San Diego Association of Governments, June 2002.

Baltimore Metropolitan Council. *2002–2006 Baltimore Metropolitan Council TIP*, Baltimore, Maryland, 2001.

Delaware Valley Regional Planning Commission, *DVRPC FY 2003 Transportation Improvement Program for New Jersey (FY 2003–2005) and Pennsylvania (FY 2003–2006) Final Version*, October 2002.

Fiscal Year 2002/03–2007/08 Regional Transportation Improvement Program, Southern California Association of Governments, Los Angeles, CA, August 2002.

Houston-Galveston Transportation Management Area. *2002 Metropolitan Transportation Plan,* Houston, TX, February 2000.

Houston-Galveston Area Council for the Houston-Galveston Transportation Management Area, *2004–2006 Transportation Improvement Program*, June 27, 2003.

Hurricane Contingency Planning Guide produced by the Texas Department of Public Safety (DPS), Austin, TX, updated April 1994.

This guide identifies hurricane evacuation routes for Texas coastal communities.

Maricopa Association of Governments, *FY 2003–2007 TIP Highway Projects*, Phoenix, AZ.

Miami Urbanized Area Metropolitan Planning Organization. *Dade County Transportation Improvement Program Fiscal Years 2001–2002 to 2005–2006*, Miami, FL, 2001.

New York Metropolitan Transportation Council, *Draft Transportation Improvement Program FFY 2004–2006.* New York City, NY, 2003.

New York State Department of Transportation, *Statewide Transportation Improvement Program (Draft) Summary for Federal Fiscal Years October 1, 2003–September 30, 2006*, New York State Department of Transportation, Albany, NY, 2003.

The STIP summary outlines the procedures and priorities used to develop a detailed list of transportation improvement projects over a 3-year period.

North Central Texas Council of Governments, *2002–2004 Transportation Improvement Program*. Fort Worth, TX, 2002.

Oregon Department of Transportation, Planning Section, Statewide Mobility Unit. *1998 Oregon Highway Plan*, Salem, Oregon, 1998.

San Antonio-Bexar County Metropolitan Area, *FY 2004–2006 Transportation Improvement Program,* San Antonio—Bexar County MPO, Approved April 28, 2003.

Transportation Improvement Program for Northeastern Illinois, FY 2004—FY 2009, Draft for Public Comment, Chicago Area Transportation Study, Chicago, IL, August 2003.

U.S. Department of Transportation. *Review of the Transportation Planning Process in the Portland, Oregon Metropolitan Area*, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center, Cambridge, MA, November 1994—RSPA/VNTSC-SS-TM392-07.

General Information Relevant to Security

Improving Regional Transportation Planning for Catastrophic Events (FHWA), Volpe Center, http://www.volpe.dot.gov/infosrc/highlts/02/julyaug/d_focus.html.

This website contains emergency planning assistance for transportation.

National Transportation Statistics 2002, Bureau of Transportation Statistics, Washington, D.C. January 2003.

U.S. Census Bureau, Public Information Office, http://www.census.gov/Press-Release/www/2003/cb03106.html#table2.

This website contains data on the 10 most populated cities.

APPENDIX B

INTERVIEW GUIDE

NAME
TITLE
UNIT
LOCATION
PHONE NUMBER
E-MAIL NUMBER:
DATE:

1. Is your agency involved in the development of short- and/or long-range capital transportation plans for the region?
   No: _____ Yes: _____ If yes, briefly describe your agency's responsibilities.

2. Which other agencies or groups are directly involved in the development of the region's transportation improvement plan (TIP)? Indicate their name, roles, and responsibilities:

Name	Role	Responsibilities

3. Which other agencies or groups are directly involved in the development of the state transportation improvement plan (STIP)?

Name	Role	Responsibilities

4. Have there been any changes to the transportation planning process as a result of 9/11 to incorporate security considerations into the process, where security is defined as ***political acts of extreme violence and destruction (terrorist acts)***?
   No: _____ Yes: _____ If yes, briefly describe the changes that have been made to the key phases/elements of the process in terms of the following attributes:

   a. Nature of change

   b. Responsibility for activity

   c. Timing for activity (step(s) in the process)

   d. New methods and systems used

   e. Impetus for changes

5. Lessons learned:
    a. What worked?
    b. What did not work?
    c. How did you measure the success of procedure changes?
    d. What specific problems were encountered?
    e. How are/were problems addressed/resolved?

6. Next steps/developments:

7. Expected results:

8. Implications:
    a. Effects on organizational mission and responsibilities
    b. Effects on policies and practices
    c. Effects on interagency communication and coordination
    d. What the future holds

9. Other comments:

Abbreviations used without definitions in TRB publications:

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ITE	Institute of Transportation Engineers
NCHRP	National Cooperative Highway Research Program
NCTRP	National Cooperative Transit Research and Development Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
SAE	Society of Automotive Engineers
TCRP	Transit Cooperative Research Program
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation