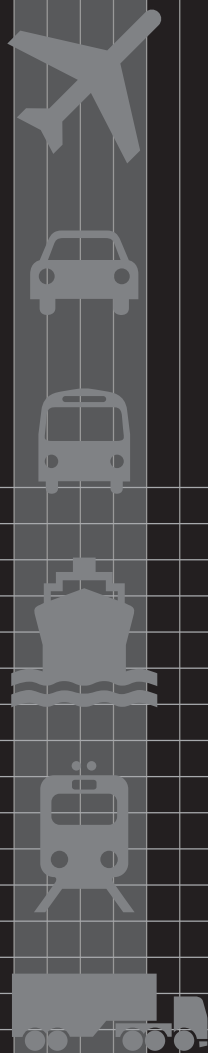


2001 FIELD VISITS



Security Redefines the Agenda

The Transportation Research Board's 2001 Field Visit Program

At the start of 2001, state departments of transportation (DOTs) and other transportation organizations were focusing on the performance-based delivery of services to augment the traditional role of implementing projects. As the year ended, the events of September 11 emphatically brought to the fore issues involving the security of transportation systems.

Specialists in the Transportation Research Board's Technical Activities Division identify current concerns and learn about activities in the transportation community. The TRB Annual Meeting, Board-sponsored conferences and workshops, standing committee meetings and communications, publications, and contact with thousands of organizations and individuals provide TRB staff with information from the public and private sectors on all modes of transportation.

A major source of this information is the annual field visit program—TRB staff meet on site with representatives of each state department of transportation and also with representatives of universities, transit and other modal agencies, and industry. The objectives of the field visit program are to

- ◆ *Learn about the problems organizations are facing and supply pertinent information from states, industry, or educational institutions to help solve these problems;*
- ◆ *Learn about research in progress or in planning and exchange information on similar efforts, preventing duplication;*
- ◆ *Identify new methods and procedures that also might apply elsewhere;*
- ◆ *Identify innovative or experimental work not widely published but deserving attention;*
- ◆ *Describe TRB's range of services to new staff at the transportation agencies that support TRB; and*
- ◆ *Identify potential candidates for TRB committees.*

Through the 2001 field visits and information from other sources, the TRB Technical Activities Division staff identified issues, concerns, and recent program changes in transportation.

Performance-Based Transportation

Transportation organizations around the country are relying on performance measures that can be used effectively in decision making. The focus has changed from the more conventional “inputs” and “outputs” to “outcomes” that connect with customers. A TRB conference in November 2000 stressed that performance measures must be understandable not only to transportation organizations, but also to customers.

Agencies are reaching out to customers—in particular, the traveling public, the private sector, and elected officials. Several DOTs have hired public relations firms to improve communication with customers. Some states are using market research to monitor progress and also to inform and educate the public.

The Kentucky Transportation Cabinet, for example, has hired marketing firms; assigned public information officers to each district; held barbecues; and sponsored booths at fairs, malls, and other public attractions. New technology—the Internet, visualization software, and new survey techniques—also may help to engage the public in transportation decision making.

Most jurisdictions are implementing their own performance measures voluntarily. However, state DOTs are concerned that the federal government may use performance measures to compare state or local agencies and to allocate funds.

Performance-based management that considers outcomes has applications to many areas under the purview of transportation organizations. In the area of transportation and the environment, the concept of “environmental stewardship” is gaining acceptance—that is, a transportation agency should act as a steward striving to improve the environment. Many state DOTs that formerly attempted to minimize a project’s potentially negative impact on the environment—focusing on inputs—now are focusing on outcomes by enhancing the environment as opportunities arise. Several agencies have noted that environmental stewardship involves changes in maintenance activities and have expressed the need for sharing best management practices.

One of many conference proceedings published by TRB in the past year, *Conference Proceedings 26: Performance Measures to Improve Transportation Systems and Agency Operations* reports on TRB’s meeting in Irvine, California, in fall 2000.



To address increased workloads with limited in-house staff, more states have shifted quality control to contractors or have adopted construction warranties with performance-based specifications. Michigan may extend its 5-year warranties to 10 years by allowing contractors to control more of the design parameters. New Mexico is requiring warranties for project corridors. Indiana also is evaluating performance-related specifications.

States are using instrumentation to monitor the geotechnical performance of transportation projects. In maintenance operations, agencies have used management systems for more than 30 years to track personnel, equipment, and materials costs. Recent improvements have incorporated such data as asset condition, customer complaints and survey results, workload plans and forecasts, and outcomes measurements and evaluations.

States are relying on standard business decision analyses to determine the cost of downtime and to avoid unnecessary expenditures in fleet management. Several agencies realized cost savings by partnering on equipment purchases, and others have noted improvements in productivity through performance specifications and ergonomically designed equipment.

Participants in the National Dialogue on Transportation Operations, coordinated by the Federal Highway Administration (FHWA), agree that federal, state, and local agencies must optimize system performance to “meet or exceed customer expectations.” Active management of the transportation system is necessary to ensure public safety, security, and system reliability.

Interest in the development and use of performance measures to present the results of operations activities and to communicate these results to decision makers and the public is increasing dramatically. Performance measures can be applied to focus programs, compare projects, communicate results, and improve customer understanding and awareness of operations. In January 2002, TRB published *Conference Proceedings 26: Performance Measures to Improve Transportation Systems and Agency Operations*, which reports the state of the art and the practice.¹

Transportation Security

The tragic events of September 11, 2001, have made system security one of the highest priorities of transportation agencies. Florida DOT has charged maintenance crews to observe and report any suspicious activities observed during daily rounds. Washington State DOT has distributed a brochure

¹ The book is available for purchase (www.TRB.org/trb/bookstore/) and is posted on the TRB website (www.TRB.org).

Washington State Department of Transportation's *Eyes and Ears* of WSDOT brochure outlines employees' role in security of transportation facilities.

Incident Log	Other Notes / Details
<p>Date: _____</p> <p>Time: _____ AM PM</p> <p>Is it a: <input type="checkbox"/> Device <input type="checkbox"/> Activity <input type="checkbox"/> Threat</p> <p>Location: _____</p> <p>Description: _____</p>	<p>Who did you report the incident to: _____</p> <p>Called 9-1-1 at: _____ AM PM</p> <p>Supervisor's name: _____</p> <p>Supervisor's phone: _____</p>

There are four things to be on the watch for:

- Suspicious Devices
- Suspicious Activities
- Threats
- Suspicious Mail

Treat every suspicious device, activity or threat as a potentially real until appropriate actions have been taken to eliminate the threat or uncertainty.

Our priorities are:

- Minimize the risk of injury to the public, WSDOT employees and staff.
- Protect the infrastructure and support facilities.
- Restore safe customer services as soon as possible.

In all cases, you should immediately:

- Call 9-1-1 and provide all the relevant information.
- Call your supervisor between 8 a.m. and 5 p.m.. If personal contact can't be made, or the time is after 5 p.m., or before 8 a.m., call the number below:

Olympic, Southwest Regions, and Headquarters 253-536-6216

All other regions and Aviation 206-440-4490

Ferries 206-515-3456

If you discover a suspicious device:

- Immediately turn off your cell phone or radio transmitting equipment and move at least 300 feet from the device.
- Then, call 9-1-1 and WSDOT.
- Don't touch or move the item. Keep the area clear, attempt to identify the owner.
- Take appropriate action to protect the traveling public, fellow employees and support personnel from being exposed to potential danger.

If you suspect suspicious activities:

- Call 9-1-1 with details of the activity, people, equipment or vehicles involved. (See the Incident Log on the back.)

If you receive a phone threat:

If you receive a threatening phone call, try to record as many details as possible. Speak in a calm voice. Ask the caller to repeat the message. Ask for more details on timing and location. Pay attention to background noises.

If it is a bomb threat, ask:

Where is it? _____

What it looks like? _____

When it will explode? _____

What will make it explode? _____

How to deactivate it? _____

Who put it there? _____

If you receive suspicious mail:

If you receive a suspect parcel, do not open or probe. Handle as little as possible. Don't shake it. Keep it isolated.

Indicators:

- Something you are not expecting.
- Has no return address.
- Is addressed to the wrong person, or to no name, but a title.
- Has oily stains.


Unknown Contents/Powder

If you open something with a strange powder inside, immediately call 9-1-1, your supervisor and the County Health Department. Isolate it and don't let anyone else handle it. If someone else does handle it, record who they are. All people who touched it should wash their hands thoroughly and immediately.

As employees of WSDOT, we have very important roles in protecting the security of key infrastructure and facilities, including highways and bridges, the ferry system and airports.

Many of you have asked how to best approach these roles. The simple answer is to continue to do your everyday job with diligence and special attention to your surroundings. You know what is normal and what is out of place. Keeping your eyes and ears open and taking appropriate action if you see anything suspicious is our best role.

Douglas B. MacDonald
Douglas B. MacDonald
Secretary of Transportation



outlining employees' role as the *Eyes and Ears* of WSDOT. The brochure emphasizes employees' role in the security of key facilities, advising, "Continue to do your everyday job with diligence and special attention to your surroundings. [Keep] your eyes and ears open and [take] appropriate action if you see anything suspicious...."

Transportation planners in particular are struggling to understand how the September 11 attack will change procedures. Possible effects include changes in long-distance trip mode choices, the need for redundancy in transportation alternatives, and the increased importance of travel demand management.

The September 11 attacks created uncertainties for the aviation industry. Insurance premiums for war and passenger liability could increase 15-fold and 8-fold, respectively. Even a major federal aid package cannot offset the unprecedented damage and losses. It is difficult to predict the long-term impacts, but the industry is in financial straits, and predictions are that one or two major carriers may fail.

Public agencies are taking a different look at the role and responsibilities of traffic operations. The traffic engineer's goal of ensuring the safe and efficient movement of people and goods now has a different context. Many transportation leaders have

suggested that traffic operations should be part of a coordinated public safety and homeland security effort. Some have recommended that the public safety community should assume a greater role in highway system operations. Emergency preparedness and homeland security have become strategic issues that will influence transportation operations and incident management programs.

Mobility and safety have been two fundamental tenets of transit. Now the effect of security—a subset of safety—on mobility and transit is apparent. In New York City and Washington, D.C., transit employees acted heroically and provided leadership on September 11. Port Authority Trans Hudson (PATH) and New York City Transit (NYCT) staff responded quickly and appropriately, preventing more deaths and injuries.

Within days after the attacks, TRB created a website on transportation security,² assembling much of the extensive information generated and published on the topic by TRB and the National Academies in recent years. Also included are links to related websites that offer discussions of issues, actions that can be taken, guidance, and training

² www4.TRB.org/trb/homepage.nsf/web/security/.



In response to the terrorist attacks in September, TRB created a website on transportation security.

opportunities. Sponsored by the TRB Task Force on Critical Infrastructure Protection, the website provides examples of good practices in general transportation, aviation, and marine and surface transportation.

In November, TRB and the American Association of State Highway and Transportation Officials (AASHTO) surveyed state DOTs on security readiness and issues. The results were released at the January 2002 TRB Annual Meeting.

States Visit TRB

TRB staff visited the states, but state representatives also came to TRB in 2001. Representatives from more than 40 state departments of transportation convened May 9–11, in Washington, D.C., to share information and provide advice on a range of activities. State representatives have served as the link between TRB and state DOTs since 1924.

After a briefing on current TRB activities, the representatives formed discussion groups, generating recommendations to TRB on

- ◆ Enhancing communications between TRB and state DOTs;
- ◆ Optimizing state visits for DOTs and TRB;
- ◆ Developing and delivering publications that are useful and timely to the state DOTs;
- ◆ Ensuring that committees address issues of most concern to state DOTs; and
- ◆ Identifying new products and services of value to state DOTs.

The recommendations are on the agenda for the updated TRB strategic plan and for the TRB Technical Activities Quality Improvement Program.

Institutional Issues

Management and Administration

Asset Management

From 1956 to 1992, the United States made huge investments in new highway and urban rail system infrastructure. The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) sought to reorient national transportation program priorities to preserve the investment and to operate the system.

ISTEA mandated that state DOTs and metropolitan planning organizations (MPOs) establish asset management systems for highways, bridges, and transit facilities and equipment. Although most states agreed in principle about the need for transportation asset preservation, the federal mandate was not popular, and eventually Congress repealed the management systems requirement.

However, transportation asset management has resurfaced as an issue. AASHTO, which represents highway and transportation departments in the 50 states, has created a Task Force on Asset Management, chaired by John Craig, Director of the Nebraska Department of Roads. The task force drafted a strategic plan for transportation asset management, adopted by the AASHTO Board of Directors in December 2000. This plan's goal is to "champion concepts and practices that integrate transportation investment decisions regarding operation, preservation, and improvement of transportation systems for member agencies."

This mission views assets as more than physical infrastructure and may include system operations, human assets, and data systems. The task force was instrumental in initiating a National Cooperative Highway Research Program (NCHRP) project, Asset Management Guidance for Transportation Agencies.³

In a parallel development, FHWA created an Office of Asset Management during a 1998 reorganization to provide leadership and expertise in the systematic management of highway infrastructure assets. The office has three key responsibilities, indicative of a shift from a command-and-control approach to partnership with the implementing agencies:

- ◆ Provide asset management principles for highway program administration;
- ◆ Develop asset management policies for pavement, bridge, and system preservation; and
- ◆ Partner with AASHTO, other FHWA offices, and other organizations to conduct nationwide programs.

³ NCHRP Project 20-24(11).



TRB state representatives from more than 40 state departments of transportation gathered at the Board in Washington, D.C., in May 2001 to recommend ways for TRB services to remain on target.

A third, parallel activity is under way at TRB. The Task Force on Asset Management, chaired by Tim Lomax of the Texas Transportation Institute, will focus on asset management from the perspective of research needs and international and private industry practices.

Some states—for example, New York, Michigan, and Montana—have made significant progress in developing sophisticated asset management systems. In California, the DOT is rolling out the Integrated Maintenance Management System (IMMS), which will facilitate investment decisions among different elements of the transportation system. California also is tying the IMMS to the Governmental Accounting Standards Board (GASB) Statement 34 procedures.

GASB 34

State and local transportation agencies are grappling with GASB Statement 34, a new requirement for state DOT asset management. GASB is an independent group that establishes financial accounting standards for state and local governments. There is no legal requirement that governments must follow the standards, but most do, to demonstrate to outside auditors and others that generally accepted accounting practices are followed in the financial management of public funds.

GASB 34 requires a full annual accounting of capital assets including infrastructure and information on depreciation. The original GASB 34 was rewritten to offer an alternative to depreciation, called the “modified approach,” which allows results from an accepted asset management system that reports the condition of the infrastructure and the cost of maintenance to the state-set standards. If the infrastruc-

ture condition falls below the standard, the state or local government must revert to the depreciation method for financial statements.

Since the transportation system is the principal infrastructure that states and many local governments own, DOTs must bear the brunt of complying with GASB 34. The new reporting requirements take effect for fiscal years ending after June 15, 2002.

State DOTs are developing a variety of responses. Some regard GASB 34 as unnecessary and burdensome and will do the minimum necessary to comply. Others see the requirement as an opportunity to improve asset management systems and create links to financial management and budgeting. Many are scrambling to determine the historic costs of highways and bridges.

An AASHTO-sponsored workshop in spring 2001 found that about half the state DOTs intend to use the depreciation method initially, although some said they may migrate to the modified approach. The other half will adopt the modified approach and report asset conditions. Many are counting on their bridge and pavement management systems to provide much of the needed information. FHWA and the GASB staff are encouraging state DOTs to adopt the modified approach.

An oddity of GASB 34 is that depreciation is the stricter, fallback standard. However, financial depreciation of long-lived assets such as highways provides little useful information about the condition or about the funds needed to ensure maintenance. The private sector uses asset depreciation for two purposes: (a) tax advantages, and (b) matching investments with income from investments within the proper time frame. Neither of these applies to government. Therefore GASB 34 compliance will provide more useful information only with the modified approach reporting infrastructure condition.

To assist state DOTs with GASB 34, NCHRP has initiated a \$325,000 project, Review of DOT Compliance with GASB 34.⁴ In spring 2002 a consultant will

- ◆ Survey state DOTs about compliance with GASB 34;
- ◆ Analyze and catalog the different approaches; and
- ◆ Assess the impact of GASB 34 on transportation finance and management of transportation assets.

Planning

Rural Transportation Issues

Rural areas now are contending with a complex, regulated environment. For example, air quality regula-

⁴ NCHRP Project 19-04.

tions historically have focused on urban areas, but the implementation of the 8-hour standard means that a large number of rural areas must perform conformity analyses. This raises several problems, including institutional responsibility for the analysis and the method of estimating emissions in rural areas that do not have travel demand models.

Rural areas also are grappling with land use, growth, and economic development issues and are reacting in diverse ways. Some rural areas are striving to control or guide development to preserve valued characteristics. But research and experience in rural growth management is scarce. Other rural areas seek economic development, employment, and an improved tax base, and need information about the transportation investments that can help. The issues of planning for freight traffic (described below) are even more critical and difficult for rural areas to handle.

Rural officials and residents want to influence transportation decisions. TEA-21 required a study and report to Congress on the effectiveness of local officials' participation in state transportation planning and programming. The report is now complete, and state and local officials are examining their roles in transportation planning.

Debate continues over specifying and formalizing the consultation process. AASHTO has opposed the one-size-fits-all approach, maintaining that each state should design its own process. The consultation process is difficult for rural areas that often have small staffs and no one dedicated to planning. To play a larger role in transportation decisions, many rural areas must hire and train planning staff.

Project Planning and Development

Transportation agencies at all levels face increasingly complex project planning and development processes. One source of complication—but in the opinion of many an improvement in decision making—is an emphasis on involving the public and resource agencies, such as those responsible for historic preservation and environmental affairs. Transportation agencies are working to connect with the public early in the planning process, but must resolve such challenges as getting the word out effectively, engaging the public throughout the long planning process, overcoming language barriers, and guiding meetings to consensus.

Some states have made extraordinary efforts; for example, the Kentucky Transportation Cabinet has hired marketing firms, appointed public information officers in each district, held barbecues, and sponsored booths at fairs, shopping malls, and other public gathering places. New technology—such as the

Internet, visualization software, and new survey techniques—may help to engage the public in transportation decision making.

Transportation agencies also are contacting and coordinating with resource agencies early in the planning process, to focus efforts on alternatives that avoid sensitive issues. Some transportation agencies are funding positions in resource agencies to guarantee the availability of staff to participate in planning transportation projects.

Performance Measures

Transportation agencies are adopting performance measures for nearly every aspect of transportation and every program stage to assist in policy development, planning, programming, construction, operation, and maintenance.

The planning process incorporates performance measures to increase accountability and effectiveness, to improve communication with the public, and to monitor improvement. Steve Pickrell and Lance Neumann have defined performance-based planning as “the use of performance measures to influence agency decisions—particularly policy and resource allocation decisions.... [It is a] systematic and ongoing process that must be integrated into an agency's... planning, management, and decision making....”

Jurisdictions voluntarily are implementing performance measures for their own use. Federal agencies have considered using performance measures to compare state or local agencies and possibly to make funding decisions; however, state and local agencies are concerned about this application. Ongoing reauthorization discussions will raise and clarify the issue.



Transportation agencies are increasing efforts to engage the public in decision making and planning; for example, by providing information at state fair exhibits and shopping malls.



The doubling of truck traffic in Kentucky in the last 10 years has generated support for research to improve freight forecasts and truck movement.

Planning for Freight

An increase in freight traffic and the increasing importance of global market competition has focused the attention of the planning community on freight. For example, the Kentucky Transportation Cabinet has seen a doubling in truck traffic in the last 10 years and has supported research to improve freight forecasts and the movement of trucks across the state.

Forecasting freight flows at the state and regional levels historically has taken a back seat to passenger travel forecasting. To improve freight forecasts, transportation planners across the country are increasing contact with private-sector freight transport customers and shippers. Planners are studying the freight movement decision process and the factors that affect demand.

Multistate Jurisdictional Corridors

The Transportation Equity Act for the 21st Century (TEA-21) established the National Corridor Planning and Development Program and the Coordinated Border Infrastructure Program to develop multi-jurisdictional alliances or coalitions. The coalitions study transportation issues that cross state and national borders and encourage collaboration on solutions. Coalitions operate on a volunteer basis, tying the level of commitment directly to the benefits received.

Examples of coalitions include the I-95 Corridor Coalition, the Route to the Plains, and the Latin American Trade and Transportation Study. Coalitions have helped to

- ◆ Develop compatible tools;
- ◆ Forecast and plan for large-scale changes in transportation demand—such as increases in Latin American trade; and
- ◆ Identify and develop large-scale transportation projects that cross jurisdictions—such as the proposed I-69 corridor and the Midwest Regional Rail Initiative.

TRB cosponsored the National Forum on Challenges with Multistate-Jurisdictional Transportation Issues in June 2001. The forum briefed executive and legislative decision makers on corridor options. Seven case studies focused on lessons learned through the coalitions. Conference participants recognized that the creation of funding mechanisms for these new organizations would prove controversial.

Planning for Elderly Population Growth

The Bureau of the Census forecasts that by 2010 the population 60 years of age and older will be increasing at a rate three and-a-half times that of the total population. Constituting 16.5 percent of the population in 1995, the segment will grow to 24.6 percent by 2025. An increase in the number of persons with disabilities is expected to accompany the increase in the older population. The two trends will have profound effects on transportation system use.

Providing transportation services for the elderly will require increases in transit and paratransit services; in Kentucky, for example, approximately 50 percent of transit riders now are over 60 years old. The cost of providing services for the elderly and disabled will be tied to community design and the availability of alternatives to the automobile. For



Trends affecting transportation include growth of the elderly and disabled populations and the resultant need for expanded transit and paratransit services.



Warsaw, Poland, was site of TRB-sponsored TRANSED 2001: The 9th International Conference on Mobility and Transport for Elderly and Disabled People, in July 2001.

example, suburban and rural communities that have limited transit or that require long trips to retail and service establishments will face higher costs per capita than central cities in serving the elderly. Planners are examining the land use and transportation system designs that can allow the older population to maintain residence; planners also must consider the needs of older drivers and pedestrians.

TRB sponsored TRANSED 2001: The 9th International Conference on Mobility and Transport for Elderly and Disabled People, in Warsaw, Poland, in July 2001. The conference attracted transportation professionals from around the world to discuss the provision of safe, independent transportation for all. The program sessions afforded opportunities to exchange knowledge and experience in policies, technical approaches, and organizational processes to provide transportation options for people with limited mobility.

Planning Data

New transportation planning models and other planning tools in development require new and additional data. The models and tools must respond to the complex questions posed to transportation planning officials. Land use forecasting models, for example, must quantify and forecast the relationship between transportation and land use, which requires more detailed data for extended periods. TRANSIMS and other travel demand forecasting models that include microsimulation can respond to air quality forecasting and intelligent transportation systems (ITS) planning questions; however, microsimulation relies on highly detailed network information as well as additional data to perform sophisticated analyses.

These data needs are emerging as funding for data collection and analysis is being reduced. New tools

that could improve data collection and analysis—like the Geographic Information Systems Innovative Survey—require staffing and funding.

In addition, the 2000 Census long form, which produced data used extensively by transportation planners, probably will be replaced by the American Community Survey, a continuous data collection program. The transportation planning community will need to develop new analytical techniques to use these data in long-range transportation tools, environmental justice analyses, and project analyses.

Security in Long-Range Planning

Transportation planners are struggling to understand the changes stemming from the September 11 terrorist attacks. Possible effects include changes in mode choices for long-distance trips, the need for redundancy in transportation alternatives, and the increased importance of travel demand management. Planners will be working to address these issues.

Environment

Streamlining

Many state DOT staff assert that efforts to streamline the environmental review process are not progressing and may be adding complications. Many of the complaints that the environmental process is delaying transportation projects are anecdotal, and a systematic study is needed to determine the problem.

A recent study by NCHRP and AASHTO, *Environmental Streamlining: A Report on Delays Associated with the Categorical Exclusion and Environmental Assessment Processes* (October 2000),⁵ focused on categorical exclusions (CEs) and environmental assessments (EAs), the most common classes of review. CEs and EAs involve the lowest level of environmental impacts but are perceived as delaying project development.

The study surveyed state DOTs about CEs, EAs, and causes of delay; 33 responded, reporting that 98 percent of projects require only CEs and EAs, and only 2 percent need Environmental Impact Statements. CE preparation caused some delay for 63 percent of respondents, and 81 percent reported delay associated with EAs.

The average delay for both categories tripled the length of the projects. The environmental compliance requirements that most commonly contribute to delays are Sections 4f, dealing with public lands and historic resources; 106, covering historic and cultural resources; and 404, for wetlands. The study concluded that “the results...demonstrate that despite a growing focus on highway project types

⁵ NCHRP Project 20-7.

that intrinsically generate fewer environmental impacts, federal environmental review requirements can frequently add delay to...project development.”

The study did not look at the internal causes of the holdups in environmental review. The environmental office of one large state DOT examined all projects flagged for delays in environmental review and found that most of the problems were from design changes made after review had begun, necessitating subsequent review. In a streamlining effort, the state has ordered a lockdown on design changes after the start of environmental review.

Environmental Stewardship

A new approach to the interaction between transportation and environment adopts the concept of stewardship. Previous approaches assumed that the transportation system created unintended, negative impacts on the environment—such as air pollution, noise, destruction of wetlands, and the division of communities; transportation agencies worked to minimize and possibly mitigate these impacts—for example, with noise barriers or wetlands replacement.

The new approach views the transportation agency as a steward of the environment, responsible for preservation and improvement. DOTs may have to change their internal culture, expanding from engineering project delivery to include enhancing the environment. This shift should introduce a less adversarial relationship between the state DOTs and environmental permitting agencies, as well as a more positive relationship with the public. Most state governors portray themselves as friends of the environment; the stewardship approach aligns the DOT with these aspirations.

Some dismiss the stewardship approach as a public relations gimmick, yet DOTs have made substantive environmental improvements through such actions as creating parkland, preserving historic buildings, restoring streams, and installing new municipal sewer lines and water mains. Context-sensitive design is a good example of the stewardship approach, striving for a product in harmony with the surrounding community or countryside, fulfilling community goals, and improving the area for residents.

New York State DOT has been a leader in the stewardship movement; staffer Gary McVoy, with Mark Sengenberger and Elizabeth Novak, published a seminal paper, “New Paradigm for State Department of Transportation Environmental Initiatives,” in TRB’s journal.⁶ The 2001 TRB Annual Meeting

included a half-day workshop on environmental stewardship, and the 2002 program featured a full-day workshop.

Aviation

Major Airlines

One year ago, the airline industry was contending with many challenges, including the squeeze of rapidly rising demand and slowly increasing capacity; rising fuel and labor costs were concerns. The system was both fragile and complex. A fickle economy exposed the fragile balance, and by spring 2001 the airlines were bracing for a bad year—declining business, rising personnel costs, and labor disputes bleakened prospects for early recovery. Learning from the downturn a decade ago, airlines quickly cut overhead, parking older, less efficient aircraft and instituting layoffs.

The September 11 attacks left the industry with an even more uncertain future. Insurance premiums for war and passenger liability could increase 15-fold and 8-fold, respectively. Even with a major federal aid package, the damages and losses are unprecedented. The long-term impact of these events is difficult to predict, but some analysts describe the industry as near financial collapse, and predictions are that one or two major carriers will fail.

Regional Airlines

Before September 11, the lack of airport capacity, the threat of congestion pricing, and labor issues—such as increasing wages and poor labor relations—were the primary issues for regional airlines. Now the priorities are increased security and increased insurance and credit costs, as well as the need for restoring passenger confidence and passenger loads. Increased loads are important for independent regionals and for those that code-share with major airlines. Regionals depend on business activity and reflect the overall state of the economy.

Current priorities for airlines include heightening security and controlling insurance and credit costs, as well as restoring passenger confidence and recovering passenger loads.



⁶ In *Transportation Research Record: Journal of the Transportation Research Board*, No. 1702, pp. 92–96.

General and Business Aviation

General aviation (GA) is asking itself—and the government—many questions. Topping the list are questions about access to airspace and airports and about security needs and requirements at GA airports. Will trends lead to mandatory avionics equipment for GA aircraft—for example, Mode S transponders, enhanced ground proximity warning and flight management systems, the newest automatic dependent surveillance and Instrument Flight Rules equipment, and others? Will system delays—including regulatory demands, such as filing flight plans 24 hours in advance—become a greater problem for business aviation?

Aircraft shipments declined during the first half of 2001; what will happen now? Student pilot starts had been declining, and the possibility of increased cost and diminished accessibility of flight training could depress that market further. Business aviation may need to respond to increased demand as security and the need for personal contact with current and prospective customers become driving forces.

At the political level, the GA-business community has become aware of the need to communicate to decision makers GA's essential role in the health and development of the "aviation ecosystem." At the economic level, unanswered questions range from how the entry of commercial airlines may affect the growth of fractional ownership to how and where the emerging class of microjets will fit into the airspace system.

State Aviation

In coordination and cooperation with the industry, state aviation departments are working to increase security and safety, not only at commercial but also at GA facilities. Maintaining adequate aviation

budgets in each state is a priority, to meet local and national aviation user and airport development needs.

Planning is under way for reauthorization of the Aviation Investment and Reform Act for the 21st Century (AIR-21) with attention to obtaining the necessary levels of aviation funding in 2002 transportation appropriations. Two objectives are to maintain or increase funding for the Airport Improvement Program (AIP) and to protect air service to small communities by funding the AIR-21 Small Community Air Service Program in 2002.

Additional goals include maintaining adequate funds for the Emergency Air Services program and proceeding with Global Positioning System (GPS), Wide Area Augmentation System (WAAS), and Local Area Augmentation System (LAAS) implementation, while evaluating potential vulnerabilities in these technologies. Three other goals include working with the Federal Aviation Administration to add a tenth state to the State Block Grant Program; demonstrating the importance of land use compatibility around airports; and protecting runway approaches against obstructions.

The Small Aircraft Transportation System concept has generated interest. Some states are supportive, but others await additional information, including the results of a National Research Council–TRB study.⁷

Airports

The economic slowdown has brought airports some respite from the race to match capacity with demand; however, long-term projections show inadequate capacity in many areas. The outcome will hinge on

⁷ Special Report 263: *Future Flight: A Review of the Small Aircraft Transportation System Concept* (forthcoming).



Long-term projections continue to show inadequate capacity in many airports.

decision makers. A short-term outlook—or the inadequate availability of funding—could mean long-term shortages; however, the longer view holds that the economic downturn is an opportunity to minimize gaps between capacity and demand by pressing for capacity enhancements now.

Manufacturers

To counter Airbus's commitment to develop the 500–800 seat A-380, Boeing is producing the Sonic Cruiser, projected to increase cruise speed by 10 percent. Both companies are making major gambles. After September 11, Boeing estimated a 2002 sales decline of 100-plus aircraft and layoffs of 20,000 to 30,000 within 15 months. Industrywide estimates project up to 100,000 layoffs, as engine makers and other suppliers respond to reductions in deliveries and in flying hours.

In summary, the aviation industry is in a state of flux; the many conflicting variables render the outcomes unpredictable. Nonetheless, despite current problems, optimism remains high in the industry.

Highways Highway Design

Some states handle highway design in-house; others send the majority of the work to consultants. The trend is to outsource design work to the private sector, often causing—or caused by—agency staff reductions. However, states are concerned about quality control of consultants' work. Some have emphasized design-build projects, but legal restrictions in some states may prevent the arrangement.

Context-Sensitive Design

States are applying "context-sensitive design" principles, but questions remain. Context-sensitive design focuses on the community context in designing a facility; early and continuous involvement of stakeholders is key.

Several states are seeking relaxation of strict standards in the AASHTO "Green Book," especially for lower-volume roadways; other states, however, are not comfortable with relaxing the standards, preferring to adhere to recognized values, considering legal accountability. States need assurance—either the Green Book standards are valid, tested, and should be applied strictly, or there is a reasonable basis from a safety standpoint for the narrower pavements, shorter sight distances, and steeper grades as advocated by the proponents of flexibility.

Pavement Design

In pavement design, the emphasis is on rehabilitation. The states' pavement management systems provide



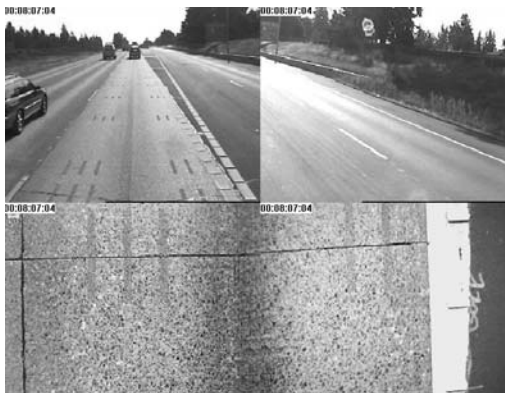
Kentucky applies context-sensitive design, which focuses on community context in designing facilities, to build roads and bridges, as in this historic town center.

data not only for calibration of analytical tools but also for improved prediction of pavement performance.

As part of its Integrated Maintenance Management Program, Virginia DOT started using pavement management software in June 1999 to develop paving schedules for interstate, primary, and secondary roads. A specialized van equipped with high-speed video cameras, road sensors, computers, and satellite referencing capabilities collects field data; a fully functioning system will be in place by 2002.



Washington State DOT uses automated data collection van (left) that travels at highway speeds collecting video images of the pavement surface (three samples below), as well as measurements of pavement rutting, wear, and smoothness.





Field visits brought TRB Technical Activities staff to first-hand inspections of such complex transportation projects as the “Big Dig” in Boston, Massachusetts, which includes bridges, tunnels, and several modes.

Washington State’s Pavement Management System takes digital photos of roadways every four feet in the summer and fall. Virginia, Texas, and Maryland are among the states developing life-cycle cost analysis for the selection of flexible or rigid pavements. Wisconsin is comparing concrete and asphalt shoulders and the effect on mainline pavements. States are looking forward to the 2002 revision of the AASHTO Guide for Design of Pavement Structures.⁸

Bridge Design

In bridge design, states continue to adopt the load and resistance factor design (LRFD) specifications, developed under an NCHRP project and endorsed by AASHTO’s Highway Subcommittee on Bridges and Structures.⁹ However, many states need upgraded computer software to apply the LRFD specifications. There is some concern also about the application of LRFD to geotechnical problems—such as structure foundations—and about the many rules of thumb formerly used in structure design but not included in the LRFD specifications.

Highway Materials and Construction

Highway construction—mostly reconstruction, rehabilitation and resurfacing—is a major activity in

many states. For example, the Arkansas State Highway and Transportation Department is in the second year of a five-year program to rehabilitate a major part of its Interstate system; in the third year an estimated 300 miles could be in some stage of construction. Grant Anticipation Revenue Vehicle bonds are funding the program.

To handle large workloads with limited staff, more states have begun to shift quality control to contractors or to expand the use of construction warranties. Michigan is considering an extension of warranties from 5 to 10 years by allowing contractors more control over design parameters. New Mexico is using warranties on project corridors. One state, Indiana, is evaluating performance-related specifications; one project is completed, and another is planned for this year.

Approximately half of the states have evaluated the design-build contracting technique under FHWA’s Special Experimental Project No. 14 (SEP-14). Arizona and Florida have used this technique most frequently. FHWA is developing regulations for design-build contracting as mandated by TEA-21; the regulations will list FHWA’s criteria and procedures for approving the use of design-build contracts.

According to a federal regulation,¹⁰ all quality control and quality assurance personnel on National

⁸ NCHRP Project 1-37.

⁹ NCHRP Project 12-33.

¹⁰ C.E.R. 637.

Highway System projects must be trained and qualified. Various state and regional training and certification groups and others from the transportation construction industry are collaborating on nationwide training initiatives through the Transportation Curriculum Coordination Council.

With high traffic volumes, rapid construction remains a concern. Three NCHRP projects and one Synthesis address the issue:

- ◆ Avoiding Delays During the Construction Phase of Highway Projects, nearing completion;¹¹
- ◆ Guidelines for Selecting Strategies for Rehabilitating Rigid Pavements Subjected to High Traffic Volumes;¹²
- ◆ Durability of Early-Opening-to-Traffic Portland Cement Concrete for Pavement Rehabilitation;¹³ and
- ◆ NCHRP Synthesis of Highway Practice 293: Reducing and Mitigating the Impacts of Lane Occupancy During Construction and Maintenance.¹⁴

In addition to rapid construction, states are concerned about extending the durability of constructed infrastructure. Most states consider the Superpave asphalt mix design procedure—a subject of several ongoing research projects—a way to improve the service life of asphalt pavements. High-performance concrete is also gaining state acceptance for structures and pavements.

Soils, Geology, and Foundations

State DOTs are turning attention to the geotechnical aspects of the design-build approach. Experience varies from none or limited for most states to extensive for a few, and the lessons learned by these few DOTs is of great interest to all. Utah DOT has identified the key elements for a successful project:

- ◆ A well-prepared request for proposal,
- ◆ A thorough and conscientious process to select the design-build team, and
- ◆ Conscientious follow-through with a qualified geotechnical oversight engineer.

Many areas in the United States have soft ground conditions, which require improvement before construction. A promising technique under investigation in several states is deep soil mixing, a system of chemical stabilization. The research objectives are to improve understanding of the technique, establish quality assurance and quality control, and develop specifications.

¹¹ NCHRP Project 20-24(12).

¹² NCHRP Project 10-50A.

¹³ NCHRP Project 18-04B.

¹⁴ Available for purchase, www.TRB.org/trb/bookstore/.



STEVEN BARTLETT, UNIVERSITY OF UTAH

Interstate 15 reconstruction by Utah DOT includes nearly completed geofoam embankment with vertical face (top) and lime cement stabilized soil; (below) lime cement column rig.



STEVEN BARTLETT, UNIVERSITY OF UTAH

The premature deterioration of concrete blocks in retaining walls, observed in some states, has raised questions about durability. A national pooled-fund study will determine the cause of the deterioration and recommend tests and specifications.

Experience-sharing and the development of hazard- and risk-assessment systems are addressing the problem of landslides along transportation corridors. Geofoam is a new lightweight material being considered for repair of unstable slopes, along with waste rubber tire and wood fiber. A final report of the pooled-fund study to develop a design guideline for

rockfall catchment areas was scheduled for release at the end of 2001. Practitioners with extensive experience in landslides provided input to the project, under the lead of Oregon DOT.

Most states favor new technologies, such as cone penetrometer tests (CPTs), to characterize subsurface conditions. However, usability depends on local and regional geological conditions. States with predominantly igneous and metamorphic rocks or glacial tills are not well suited for CPT technology. Some states are using instruments to monitor the geotechnical performance of transportation projects—for example, inclinometers for slopes, settlement plates for fill material settlement, piezometers for pore water pressure during embankment construction, and strain gages and load cells for soil nails.

Since aggregate is the predominant constituent of concrete and asphalt mixes for pavements, the affect of aggregate characters on pavement performance is a subject of practical interest. AASHTO has funded several national research projects on the topic; several states also have undertaken related studies. The Micro-Deval test to determine the abrasion resistance or durability of coarse and fine aggregate has potential as an alternative to the Los Angeles abrasion test and the sulfate soundness test. However, experience with the device is limited; most efforts related to the Micro-Deval device appear to be investigative, with a primary focus on the test's suitability for characterizing aggregate.

Highway Maintenance

Among the most frequently cited issues in transportation maintenance are changes in maintenance management systems; the effectiveness of maintenance contracts; the safety of the traveling public and roadway workers; workforce recruitment, training, and retention; advances in winter services; pavement preservation; decision analyses for fleet management; and environmental considerations.

Maintenance Management Systems

Transportation agencies have used maintenance management systems for more than 30 years to track personnel, equipment, and material costs associated with maintenance operations. Recent improvements have incorporated asset condition, customer input from complaint and survey systems, workload planning and forecasting, and measuring and evaluating outcomes.

Changes in maintenance management technologies and procedures include the use of laptop and handheld computers for more efficient data entry, GPS location information for infrastructure inventory and work activities, and statistical sampling with



Real-time display in New Jersey promotes safety for travelers, as well as roadway workers.

a quality assurance program to verify levels of service (LOS) within and across jurisdictions.

Maintenance Contracts

Managed outsourcing and area contracts are the primary types of maintenance agreements. With managed outsourcing—the predominant contracting method—the DOT identifies when and where work is to be performed.

Many agencies, on the other hand, are using area contracts, typically multiyear, lump-sum agreements covering most of the maintenance activities in one or more geographic areas or on a given roadway. The contractor is responsible for determining when maintenance is necessary to maintain a specific LOS; agency personnel verify compliance by statistical sampling within a quality assurance program. Several agencies have expressed the need for the maintenance community to share information on the effectiveness of the various types of contracts, including warranties, penalties, snow and ice specifications, and emergency contracting guidelines.

Work Zone Safety

The safety of the traveling public and roadway workers remains paramount for transportation organizations. Safety improvement efforts include vehicle detection and information display technologies, which provide real-time decision information to drivers in work zones; technologies and procedures to improve safety in nighttime operations; and truck-mounted attenuators (portable crash cushions).

The National Work Zone Safety Information Clearinghouse, a cooperative partnership of the

American Road and Transportation Builders Association and the Texas Transportation Institute, posts a website with information on work zone safety.¹⁵ Ways to reduce worker exposure to roadway hazards include improving the efficiency and effectiveness of maintenance operations to reduce time on the roadway and performing maintenance activities on temporarily closed roadway sections.

Personnel

Workforce recruitment, training, and retention continue to challenge many agencies. Some are hiring trainees, training to develop skills, and then promoting to entry-level positions. Maintenance of ITS installations is an area of growing need. One agency is developing online instructional technologies to offer courses to a geographically dispersed workforce. Several agencies report large numbers of vacancies and difficulty retaining qualified personnel at pay rates sometimes 25 percent below those for similar positions in other organizations.

Winter Services

Agencies are adopting the total storm management approach to winter services, including Road Weather Information Systems (RWIS), which report road conditions to the public via the Internet and at rest areas; temperature measurement devices on supervisors' vehicles; service patrol routes that take advantage of the characteristics of anti-icing material and procedures; automated anti-icing spray systems on selected roadway sections and bridge decks; and automatic bridge deck heating systems. The improved procedures, materials, and equipment under a total storm management approach can translate into savings in lives, property, and expenses and can minimize environmental impacts.

One agency has developed a Winter Cost Index based on traction measurements from observed conditions and on the time needed to restore bare pavement after the end of each event; the index matches closely with winter expenses. The index communicates cost information and helps in allocating funds to field units.

Pavement Preservation

Pavement preservation programs are working to reduce the number of deficient pavements, extend the useful life of pavements, and provide consistent and adequate funding for preservation. Improved pavement condition at lower cost is the result of applying the right treatment at the right time. A successful transition from a reactive to a preventive pavement

maintenance program requires ongoing educational efforts and support from all stakeholders, including DOT management, legislators, roadway users, adjacent land owners, and the contracting industry.

Fleet Management

Fleet management systems should incorporate standard business decision analysis to determine the cost of downtime and to perform cost avoidance analyses. Several agencies saved on equipment purchases by partnering, and several increased use of performance specifications and ergonomic features on equipment to improve productivity. Regional equipment expositions with manufacturers and agency employees displaying products and inventions are effective ways of educating and sharing information within the maintenance community.

Environmental Issues

Work continues on integrating environmental considerations into maintenance operations and activities, including winter services, pavement sweepings and marking materials, facility design, vehicle and equipment maintenance, alternative fuel programs, stormwater runoff, and environmental awareness training. Several agencies reported changes in maintenance activities as a result of implementing environmental stewardship and have expressed the need for developing and sharing best management practices.

Highway Operations

Security

Public agencies are taking a new and different look at the role and responsibilities of traffic operations. The goal of assuring the safe and efficient movement of people and goods has gained a different context since September 11. Many have suggested that the Public Safety and Homeland Security office should coordinate traffic operations. Some recommend that the public safety community should assume a greater role in operating the highway system. Nonetheless, emergency preparedness and homeland security have become strategic issues that will influence transportation operations.

However, cooperative relationships among many of the essential players in transportation safety and security were already in place before September 11. Most major urban areas—more than 50 throughout the United States—have implemented regional programs for incident management, a planned and coordinated process to detect and remove highway traffic disruptions and restore capacity as safely and as quickly as possible. The institutional relationships established for these incident management programs can provide a starting point for coordinating and developing mul-

¹⁵ wzsafety.tamu.edu/.



tidisciplinary and interagency network operations and emergency services. (FHWA, AASHTO, and TRB are cosponsoring a Workshop on Incident Management, in March 2002 in Irvine, California, to focus on the roles of emergency services, public safety, and transportation operations agencies.¹⁶)

System Data

Accurate, real-time, systemwide transportation information is a critical component for operations in safety and security. Without real-time traffic data, system operators and travelers are unable to make informed decisions. Travelers need to decide on travel mode and route, and traffic managers need to evaluate system performance, determine incident location, make effective decisions on diverting traffic, and implement major evacuations.

However, real-time transportation data are not generally available for most highways. Progress has been limited in deploying the "infostructure." According to recent studies, approximately 20 percent of the nation's urban freeways and less than 10 percent of urban arterial roadways have been instrumented for real-time data collection, and implementation plans indicate that less than half of the urban freeway system will be instrumented by 2010.

Congestion

Although the focus for operations may be on emergency preparedness and homeland security, highway congestion remains a daily occurrence in all large metropolitan areas—a source of frustration and agitation for millions of commuters and travelers. Once an urban problem, congestion affects all areas of the country. In 1981, 25 percent of urban highways were classified as congested; by the mid 1990s the proportion had risen to more than 45 percent with more than 4 billion hours lost to delays in the top 70 metropolitan areas each year.

The Texas Transportation Institute has reported that the length of the combined morning and evening peak travel periods has doubled, from less than three hours in 1982 to almost six hours today. The time Americans spend in traffic has increased 236 percent since 1982 and the average annual delay per person has climbed from 11 hours in 1982 to 36 hours. The estimated nationwide cost of traffic congestion in time lost and fuel consumed totals \$78 billion per year. Traffic congestion affects millions as well as the economy.

Environmental, land use, political, and budget constraints hamper the traditional solution, capacity expansion. Building new roads alone will not lead the way out. Many transportation leaders are encour-



Congestion, once only an urban problem, continues to affect all areas of the country.

aging agencies to emphasize also the efficient and effective management of the roadway network.

Management and Research Agenda

The nation has invested significantly in capital improvements to the transportation infrastructure, but the processes, personnel, and equipment for operating the system have not received comparable funding increases. The results are inadequate numbers of personnel, deficient training, and insufficient equipment to manage and operate the highway system.

FHWA, AASHTO, the Institute of Transportation Engineers (ITE), TRB, and other highway-related organizations and constituencies have initiated a National Dialogue on Transportation Operations (NDTO) to stimulate leadership and support for operations. NDTO focuses on the need for more efficient management of the highway system, holding that a critical mission of federal, state, and local agencies should be to optimize system performance to "meet or exceed customer expectations." Active management can ensure public safety, security, and transportation system reliability.

TRB, U.S. DOT, AASHTO, ITE, and other organizations have developed a strategic national research agenda for operations and mobility, identifying major research theme areas:¹⁷

- ◆ Customers, customer expectations, and customer needs;
- ◆ Maximizing efficiency and minimizing congestion;
- ◆ Information needs and requirements;

¹⁷ The final report is posted on TRB's website (www.TRB.org/).

¹⁶ www.TRB.org/trb/meetings/.

- ◆ Transportation safety;
- ◆ Environmental impacts;
- ◆ Intermodal interfaces and efficiency; and
- ◆ Crosscutting issues.

The development and use of performance measures to quantify operations activities and to communicate the results to decision makers and the public can help to focus programs, compare projects, explain results, and improve customer understanding and awareness of the role of operations. *NCHRP Report 446: A Guidebook for Performance-Based Transportation Planning*¹⁸ includes a comprehensive list of performance measures that U.S. transportation agencies have used, broken down into eight categories: accessibility, mobility, economic development, quality of life, environmental and resource conservation, safety, operational efficiency, and system condition and performance. The report also describes how to use performance measures in developing a transportation program.

Other Issues

Ramp metering to improve freeway flow by controlling access during congestion has been used in the United States since the early 1960s. However, in response to driver complaints, Minneapolis–St. Paul, Minnesota, recently turned off ramp meters to allow a state DOT evaluation. The Minnesota DOT field data analysis indicates that ramp metering is efficient and cost-effective and improves safety, performance, and air quality on the metered freeways. However, the study notes that the goal of moving freeway traffic efficiently must be balanced against public concerns about queue length at ramp meters.¹⁹

Road rage and aggressive drivers are terms that have entered our language to describe driver dissatisfaction with congestion and delays. The media, politicians, and highway agency personnel use the terms regularly to refer to driver behavior in accidents or altercations. Public agencies are implementing countermeasures, including enforcement that targets aggressive drivers and roadway design modifications that calm traffic.

Photo enforcement against red-light running also has been a frequent news topic as communities have set up cameras to detect and record violations. Many citizen and safety groups consider the cameras an effective deterrent that improves intersection safety. However, recent court decisions and political and citizen opponents have noted that in some cases

communities overlooked engineering solutions before installing cameras.

Traffic calming also is gaining popularity in the United States, typically using a variety of physical features within the roadway to slow drivers and encourage acceptable behavior. Features commonly installed include speed humps, chicanes, chokers, and small traffic circles. Advocates frequently cite improved safety and quality of life in residential areas; yet opponents raise concerns about increased response times for emergency vehicles, hindrances to snow removal, and potential liability.

Used extensively in other nations, the modern designed roundabout successfully has replaced signalized intersections and diamond interchanges in several areas of the United States. When properly designed, roundabouts have effectively reduced delays and improved safety.

The rolling blackouts that affected many west-coast states in summer 2001 provided an incentive for rapid deployment of light-emitting diode (LED) traffic-signal lamp technology. Public agencies are installing LED devices to conserve energy and reduce life-cycle costs. The principal benefits are the reduced power consumption and improved durability from solid-state design. In addition, the flexibility of LEDs allows alternative design of traffic control devices—for instance, some communities have implemented pedestrian signals incorporating a countdown timer to indicate to pedestrians the amount of time left in the crossing phase.

In November 2001, TRB released the interactive CD-ROM edition of the *Highway Capacity Manual* (HCM 2000). A companion to the book or a stand-alone, the CD-ROM offers the complete text and exhibits of both the metric and U.S. customary versions of the printed book with the addition of step-by-step tutorials, narrated example problems, explanatory videos, navigation tools, and hyperlinks between sections of the manual.²⁰

Highway Safety

The highway and traffic safety arena has produced good news and bad news. The bad news is a slight increase in fatalities (41,800 in 2000 vs. 41,611 in 1999) on the nation's roads. For the first time in many years, the number of vehicle miles traveled decreased by .1 percent; as a result, the vehicle death rate per hundred million vehicle miles hovers around 1.55. The good news is a slight decrease in injuries, from

¹⁸ To order via the Internet: www.TRB.org/trb/bookstore/.

¹⁹ The Twin Cities Metro Area Ramp Meter Study Final Report is available on the Minnesota DOT website (www.dot.state.mn.us/rampmeterstudy/reports.html/).

²⁰ The CD-ROM requires Microsoft Windows. For more information about HCM 2000 and the HCM 2000 CD-ROM, visit the TRB Electronic Bookstore (www.TRB.org/trb/bookstore/) or contact the TRB Business Office (202-334-3213; email TRBSales@nas.edu).

120 to 119 per hundred million vehicle miles (3,236,000 vs. 3,219,000).

The other good news is an increase in seat belt use nationwide, from 70 to 73 percent. However, seat belt use varies by state, with percentages ranging from the high 40s to high 80s. All levels of government and private safety organizations are providing a needed emphasis on infant and child booster seats.

Nonmotorized Modes

Pedestrian and bicycle safety issues are garnering attention. Almost 12 percent of highway system fatalities involve pedestrians; safer pedestrian facilities and operations are needed.

Facing congestion and mobility problems, states and local communities are providing walking and biking facilities; the hope is that people will find these more convenient, enjoyable, and healthy to use than automobiles. Planning agencies are increasing involvement in balancing transportation with nonmotorized modes; for example, New York MPOs sponsored the Creating Walkable Communities Conference.

Also contributing to the attention are concerns about personal health—inactivity and obesity are public health concerns for adults and children, and walking and bicycling can provide transportation and health benefits. With the convergence of these motivations, states and communities are fostering pedestrian and bicycle modes for improved transportation safety, more sustainable communities, and personal health. An NCHRP project recently completed a Guide for the Planning, Design, and Operation of Pedestrian Facilities,²¹ to complement the AASHTO guide for bicycle facilities; the guidelines comply with forthcoming access requirements.

In addition to these nonmotorized transportation improvements, local communities often must improve the safety of streets before citizens consider getting out of their cars. Albuquerque's Safe Streets program has demonstrated improvements in traffic safety, as well as



Safe Streets program in Albuquerque, New Mexico, addresses issues of crime and safety.

a decline in crime against persons and property. The program focused enforcement on the most visible indicators that “no one cares about traffic safety,” by adding saturation patrols, follow-up patrols, freeway speed enforcement, and sobriety checkpoints. The five-year period before the program had experienced a

51 percent increase in crashes; the program brought a 12 percent decline in crashes. The severity of crashes was reduced even more dramatically, with 18 percent fewer injury crashes and 34 percent fewer fatal crashes.

Impaired Drivers

The zero tolerance concept was evaluated for blood alcohol concentration (BAC) in youth in four states. Maine reduced the permissible BAC level from .02 to .00; nighttime single vehicle injury (NSVI) involving drivers under 21 years of age declined 36 percent. Oregon raised the age for .00 BAC from 18 to 21; the result was a 40 percent reduction in NSVI crashes. Florida and Texas recorded changes of up to 5 percent. Increased enforcement of the laws may reduce these kinds of crashes further.

The cost of the crashes resulting from driving while impaired—mainly from alcohol—is rarely appreciated. The National Highway Traffic Safety Administration has produced and made available on its website state fact sheets listing costs attributed to alcohol-related crashes in each state.²²

The national fact sheet shows, for example, that alcohol is a factor in 35 percent of U.S. crashes and that the cost of these crashes was \$110 billion in 1998—\$40 billion in actual monetary costs and \$70 billion in quality-of-life losses. Other people, governments, and organizations—not the drinking driver—paid \$51 billion of that total cost. Of the \$127 billion in U.S. auto insurance payments, 16 percent go to settle claims from alcohol-related crashes. Clearly, strengthening legislation and programs to reduce drinking-and-driving crashes will reap cost benefits.

Helmet Laws

As states repeal motorcycle helmet laws, injuries and fatalities to riders without helmets have mounted at the highest rate. Several evaluations—most recently in Texas and Arkansas—have demonstrated the safety and cost benefits of legislating helmet use. After repeal of the law, helmet use rates fell from more than 97 percent in both states to 66 percent in Texas and 52 percent in Arkansas. Head injuries increased from the 18 to 20 percent range in Arkansas to 23 to 31 percent. Fatalities increased 31 percent in Texas and 21 percent in Arkansas, confirming the conclusion of the 1991 General Accounting Office report that “under universal helmet laws, more states experienced 20 to 40 percent lower fatality rates than during periods without laws or under limited laws.”

²¹ NCHRP Project 20-07 (Task 105); AASHTO is publishing the guide (www.transportation.org/).

²² www.nhtsa.dot.gov/injury/alcohol/facts.htm/.

Break-out session during the Florida Safety Conscious Planning Forum.



Analysis and Planning

Pennsylvania introduced the practice of analyzing corridors for safety problems 12 years ago, and FHWA has developed and published manuals for conducting corridor analyses and safety programs. Oregon adopted the corridor approach 10 years ago and reports success, identifying 14 corridors for crash data analysis and developing multidisciplinary approaches to increasing safety. The state publicly designated the corridors through the media and on-road signage. All the corridors experienced reduced crash rates. For example, one route had

recorded 13 fatalities in the 16 months before the program, but no fatalities in the 4 years afterward.

Six states—Tennessee, Maryland, Texas, Florida, Oregon, and Michigan—conducted one- or two-day Safety Conscious Planning Forums to develop statewide action plans for adopting safety and security criteria in transportation planning, in compliance with a TEA-21 mandate. The forums convened state safety professionals—from the DOT, motor carriers, and governor's highway safety office—with DOT and MPO transportation planners. Each workshop issued a report on the proceedings and the action steps identified; a summary report and toolkit based on the six forums will be available in early 2002 as an electronic TRB Circular.²³

Marine and Intermodal Ports and Waterways

The Marine Transportation System (MTS) initiative has received increasing support from U.S. DOT Secretary Norman Y. Mineta. The nation's ports and waterways also have garnered the attention of the U.S. Congress, with several legislative proposals and hearings, particularly on port security and congestion. Much discussed and debated is the need for a Sea-21 program for the U.S. marine transportation system infrastructure, similar to TEA-21 and AIR-21 for land and air transportation, respectively.

Port Security

Although port security was receiving attention before the events of September 11, the industry and the public are concerned about the vulnerabilities and threats facing the nation's ports and waterways. Florida has



Oregon's truck safety corridor has led to a decrease in the number of crashes.

²³ www.TRB.org (click on Online Documents, then click on Circulars).

accelerated funding for enhanced security at 14 deep-water ports. A recently enacted state law requires the ports to implement security plans and meet basic standards for facility security, employee training, and personnel screening.

Ports throughout the country are working with federal agencies and local authorities to assess vulnerabilities and to coordinate plans and procedures to reduce threats to and from landside and waterside operations. Law enforcement agencies at all levels, with support from the National Guard and a new sea marshal program, face a formidable task—combating the terrorist threat while dealing with other responsibilities ranging from preventing cargo crime and drug trafficking to promoting marine and environmental safety.

Accommodating Trade Growth

With trade volumes projected to double or triple in the next 20 years, highways and rail systems will be



Port of Palm Beach security measures include use of fingerprinting badge systems and (below) identification of truckers.



Construction on Doremus Bridge in New Jersey is part of Port Authority of New York and New Jersey's infrastructure improvement project to speed the flow of freight.

strained and many ports will have to accommodate ever-larger ships and an increasing volume of traffic. Projects such as the Alameda Corridor in Southern California; the FAST Corridor in the Seattle-Tacoma, Washington, area; and the Portway project in New Jersey are among the major infrastructure projects under way to speed the flow of freight to and from major ports.

To relieve surface congestion, coastwise and inland waterway alternatives are receiving consideration as environmentally safe, fuel-efficient, and often less expensive options. The Coastwise Coalition is promoting services to detour the congested I-95 corridor. Ports are looking for technological solutions to make intermodal connections more efficient—reducing wait times for truckers, increasing productivity and throughput, enhancing safety, and allowing information to flow seamlessly from one system to another.

Waterside infrastructure improvements are accommodating growth. Replacement of the navigation lock on the Industrial Canal in New Orleans, Louisiana, has begun. The lock now accommodates only the smallest ships, and barge operators encounter long delays.

In Alaska, the Port of Anchorage is undertaking a \$10 million dredging project to improve access to its terminals, particularly for container traffic. Barge operators, together with the Alaska Railroad, are investing in improvements for handling commodities such as bulk chemicals, heavy equipment, and steel pipe.

The Port Authority of New York and New Jersey (PANYNJ), which expects cargo volumes to double in the next decade, has embarked on a multibillion dollar project to dredge harbor channels to 50 feet. The U.S. Army Corps of Engineers has proposed deepening the main channel of the Delaware River to 45 feet, which would benefit the Delaware River port com-

plex, particularly the Port of Wilmington, a major economic generator for the state. The Great Lakes Region is debating investment in widening and deepening Seaway locks and channels, modernizing the infrastructure, and upgrading port facilities on the Great Lakes–Seaway System, to accommodate larger ships and attract new services.

Controversy over enlarging the locks on the Upper Mississippi River–Illinois Waterway led the Department of the Army to request a National Research Council review.²⁴ If river traffic continues to increase, so will congestion; the result will be higher shipping costs and less ability to compete in world markets. However, lock extensions are a major investment with environmental consequences; more work remains before the final decisions.

Port Initiatives

Gulf Region developments include a proposed ship-barge transfer facility to be built near the mouth of the Mississippi River by a private company, and the proposed Millennium Port, which Louisiana hopes will capture a greater share of Latin American trade.

Alabama offers a corporate income tax credit to spur investment in port facilities. This complements the “Amendment One” funding package of \$100 million earmarked for revitalizing the Alabama State Docks at Mobile, including a new metals cargo terminal, upgrades of rail track and interchanges, and a new container terminal.

In Florida, the Port of Tampa has opened a new container terminal, part of a three-year capital improvement program that includes cruise facilities and improvements to bulk and cold storage facilities. Port Manatee is the staging area for a major underwater pipeline project, which will produce revenues to support expansion of the cargo facilities.

Complementing the PANYNJ dredging project are plans to expand and relocate rail facilities and services, as well as build a new intermodal facility. The agency is implementing the Port Inland Distribution Network to move containers quickly out of port facilities via barge or rail to regional distribution centers, then by truck to the final destinations.

The North Carolina State Ports Authority (NCSPA) has entered into a joint venture with a private firm for a new grain facility to handle import and export cargo. NCSPA has issued “special user” bonds to finance the facility.

At the Port of Savannah, Georgia, the first phase of the James D. Mason Intermodal Cargo Transport Facility (ICTF) opened in June, able to handle three



Port of Savannah, Georgia, includes the James D. Mason Intermodal Cargo Transport Facility, which currently is able to handle three unit trains per week and will expand to five.

unit trains per week. One of several facilities that the Georgia Ports Authority is developing, ICTF will handle five unit trains per week when completed.

On the West Coast, the Port of Oakland, California, has embarked on its Vision 2000 for major infrastructure projects, including the 150-acre Joint Intermodal Terminal (JIT) on former Navy property. The JIT will consolidate rail traffic and provide direct, near-dock, mainline access for the Union Pacific and Burlington Northern.

The Ports of Seattle and Tacoma also are focusing on intermodal connections. The Port of Seattle has formed a Cargo Terminals Group to explore ways to



Vision 2000 program at Port of Oakland, California, includes newly completed Hanjin Terminal; facilities currently under construction include 150-acre container facility, 88-acre Joint Intermodal Terminal, and 110-acre Union Pacific Railroad rail terminal.

²⁴ *Inland Navigation System Planning: The Upper Mississippi River–Illinois Waterway*. www.nap.edu/catalog/10072.html.



Virtual coordination center manages traffic using array of communication technologies at Intermodal Yard at Port of Tacoma, Washington.

improve service to customers and integrate cargo services. To manage train traffic in and out of the port, Tacoma has set up a virtual coordination center using an array of communications technology.

Several ports throughout the country—particularly smaller ports—are creating niche opportunities for specialized-product and smaller carriers. For example, the Port of Everett, Washington, serves a carrier that transports oversized containers of aircraft components between Japan and the United States.

Container Overload

Empty freight containers—the result of trade imbalances between the United States and partners in Asia and Europe—are an increasing problem at ports and inland points and are contributing to freight congestion. PANYNJ estimates that almost two containers enter the port for every one shipped out. Once emptied, containers often go into storage; containers can be seen stacked eight high at one facility in an industrial area near the New Jersey Turnpike.

Ordinances to limit the size and height of facilities close to residential areas or in areas where land is becoming desirable for other uses—and therefore more expensive—are common. Containers from Charleston, South Carolina, are moved to North Charleston, and stacked high opposite residential neighborhoods for miles, increasing concern about safety hazards.

An ordinance proposed in Chicago last year would have restricted the way containers are stacked and would have imposed regulations and licensing fees on intermodal yards. In response, the intermodal industry worked with the community to develop a compromise.

The Virginia Port Authority, with the cooperation of marine terminals, has implemented an “empty container benchmark.” However, the problem of how

and where to store empty containers is likely to increase as fast as solutions can be found.

Information Technology

Ports are investing in information technology; for example, the Jacksonville (Florida) Port Authority is spending \$7 million on an information technology master plan to collect and share information on terminal operations with its tenants. PANYNJ has launched FIRST (Freight Information Real-Time System for Transport), an online information sharing program for port users.

Efforts also are under way to provide mariners with critical up-to-date information on tide, current, and weather conditions through the Physical Oceanographic Real-Time System (PORTS), developed by the National Oceanic and Atmospheric Administration. The Maritime Exchange and Delaware River Port Authority are among the most recent to agree to fund and operate PORTS, strengthening the Delaware River and Bay region for ocean shipping technology and automation.

Ferry Transportation

On September 11, ferries and other marine craft—such as dinner boats, tugboats, and small private vessels—played a major role in evacuating people from lower Manhattan. Ferries once again proved to be vital components in emergency response. N.Y. Waterways ferries served as waterborne ambulances, carrying injured firefighters across the Hudson River. (Another vessel, Navy hospital ship *USNS Comfort*, berthed in lower Manhattan to provide short-term lodging and services for police, fire fighters, and disaster recovery personnel.)

This past year, funding requests to the Ferry Boat Discretionary (FBD) Program—created under ISTEA and continued under TEA-21—far exceeded the

funds available. In FY 2001, 22 states and Puerto Rico submitted proposals for 53 projects with a total price tag of \$75.6 million—but only \$14.7 million in discretionary funding was available.

Among the states receiving funds were Rhode Island, which implemented high-speed ferry services between Providence and Newport; and Georgia, which combined FBD funds with other federal, state, and local sources to launch a water taxi service between Savannah and Hutchinson Island. The Erie–Western Pennsylvania Port Authority received \$3 million in state funds for construction of a new cruise and ferry terminal on the Erie Bayfront, facilitating plans for a passenger-and-automobile ferry to Canada.

Illinois has received a new ferry to cross the Illinois River between Grafton and Brussels Township in Calhoun County. Moved by a towboat, the ferry barge can carry 24 cars, as well as two legal-highway-limit trailer rigs or the equivalent.

The St. Johns Ferry, which crosses the St. Johns River between Mayport and Fort George Island, Florida, experienced a revival through privatization and \$8 million in Florida DOT and federal funding. The service saves 44 miles on a round-trip in city traffic, enhances tourism, and is convenient for commuters.

In other markets, new high-speed ferries are competing with traditional ferry services. In Rhode Island, the high-speed vessels move passengers to Block Island in half the time of traditional ferries. In California, high-speed vessels cut the transit time between Long Beach and Catalina Island to less than one hour. Fast ferries also are serving routes in Massachusetts and in New York between Long Island and Wall Street.

Other states receiving FBD funds for projects ranging from new vessels to terminals and landing ramps include Alabama, Connecticut, Delaware, Hawaii, Iowa, Kentucky, Maine, Michigan, Missouri, Montana, North Carolina, Ohio, Oregon, Texas, Utah, Virginia, Washington, West Virginia, and Wisconsin.

Freight Intermodalism

In February 2000, TRB hosted a national conference on Global Intermodal Freight: State of Readiness for the 21st Century in Long Beach, California. Participants assessed how far the nation has come in addressing the findings and recommendations of the National Commission on Intermodal Transportation. U.S. DOT highlighted its various agencies' efforts to improve intermodal connections. Shippers presented needs and requirements, and carriers discussed service and facility advances; state and local agencies showcased projects and initiatives, focusing on public–

private partnerships and financing options.²⁵ A tour of the Alameda Corridor route, as well as waterside tours of the Ports of Los Angeles and Long Beach, offered first-hand evidence of the intermodal connections needed for efficient freight and passenger movement.

Intermodal connections for freight range from road and rail access routes to state-of-the-art cargo-handling equipment and communications technology to maximize throughput and minimize transloading times and costs. Landside infrastructure planning and investments must ensure that access to ports, waterways, and airports is sufficient to sustain current and projected traffic and operations for freight as well as passengers.



State and local agencies have undertaken many intermodal projects, some in partnership with the private sector. In July 2000, New Jersey broke ground on the Portway International–Intermodal Corridor program to improve freight movement at the airport-seaport complex in Newark and Elizabeth.

In Houston, Burlington Northern and Santa Fe Railway Co. (BNSF) has introduced new direct intermodal container service to Barbour's Cut Terminal. With support from the Houston–Galveston Area Council and Texas DOT, the Houston Port Authority used matching funds to build the facility, which will reduce truck emissions and congestion.

In Pennsylvania, Norfolk Southern has opened the new Rutherford Intermodal Terminal near Harrisburg. Originally a Reading Railroad switching yard,

Portway International–Intermodal corridor in Newark and Elizabeth, New Jersey.

²⁵ *Conference Proceedings 25: Global Intermodal Freight: State of Readiness for the 21st Century.* www.TRB.org/trb/bookstore/.

the facility is at the junction of six routes and will serve intermodal traffic to and from the north and south—primarily domestic freight—as well as from the east and west—primarily Asian imports on the land-bridge route across the United States.

In Illinois, a portion of the Joliet Arsenal was transferred from the U.S. Army for the development of the Deer Run Industrial Park. Adjacent to the park, BNSF plans to build a full-service intermodal terminal, container railyard, and automotive facility. Illinois DOT will provide an estimated \$50 million to upgrade area roads, bridges, and other components for the project.

Another former military facility, Rickenbacker International Airport in Columbus, Ohio, is adding two new cargo facilities to expand its role as an international distribution center. In Denver, Colorado, backers are promoting the Transport Project at Front Range Airport, which offers access to Union Pacific rail lines and interstate truck routes—a multimodal project similar to the Alliance project near Dallas, Texas.

Many state and local officials recognize the need for cooperation, coordination, timely decision making, and action to improve transportation system efficiency; ensuring an integrated multimodal transportation system to meet the needs of users and the expectations of the public is a shared responsibility.

E-Commerce

E-commerce poses challenges for public-sector planners and decision makers, military transportation and logistics personnel, and the commercial freight transportation and logistics sectors. In the public and private sectors, as well as the military, demand is increasing for fast, reliable tracking of freight shipments across all transport modes.

Real-time information on shipments from origin to destination, both domestically and internationally, is essential to the new logistics and to market

competitiveness. The impact of e-commerce on personal travel also demands attention from public sector planning officials.

Rail

Economics

Class I freight railroads set volume records for ton-miles, tonnage, and intermodal traffic in 2000. Class I ton-miles rose by 2.3 percent to 1.47 trillion, up from 1.43 trillion in 1999. Rail tons reached 1.74 billion, up from 1.72 billion in 1999, as increases in coal, primary metal products, and metallic ores (among other commodity groups) more than offset declines in farm and lumber products. U.S. railroads hauled 9.2 million intermodal trailers and containers in 2000. Intermodal traffic now accounts for approximately 20 percent of Class I revenue, second only to coal.

Despite traffic gains in 2000, railroads faced financial challenges. Class I freight revenue rose to \$33.1 billion in 2000—a 1.2 percent increase, but less than the growth in tonnage and the rate of inflation. Moreover, even though railroads continued to increase efficiency in 2000 (fuel efficiency, locomotive and employee productivity, and traffic density all showed gains), traffic growth and cost increases caused the railroads to incur record operating expenses.

Diesel fuel prices were the source of a substantial portion of the cost increases in 2000. Overall, the average price per gallon of railroad fuel rose from 55 cents in 1999 to 87 cents in 2000, a 58 percent increase that added \$1.2 billion to annual expenses. Class I railroads consume about 3.7 billion gallons of diesel fuel per year.

The increased expenses drove Class I net income down from \$3.0 billion in 1999 to \$2.5 billion in 2000. Overall revenue per ton mile (a useful surrogate for rail rates) continued its two-decade decline, falling to 2.26 cents. Since deregulation in 1981, revenue per ton-mile has fallen by 29 percent in current dollars and by 59 percent in inflation-adjusted terms, saving rail customers billions of dollars per year.

The service requirements of rail customers are increasingly stringent. Railroads have added new services and enhancements such as on-time guarantees, express carload service for perishables, and rapid run-through service that avoids congested rail yards. Most major railroads also offer comprehensive web-based car ordering, car tracing, pricing, and billing capabilities.

Freight Rail

Freight railroading is capital intensive. Unlike other transportation modes, railroads operate almost exclusively on privately owned rights-of-way, and massive expenditures are needed to maintain plant and equipment, upgrade facilities, and expand capacity. Class I



U.S. Customs uses electronic systems to process cargo, aircraft, and other vessels entering and exiting the United States.



Despite decreasing levels of rail traffic in most commodity categories, coal traffic rose more than 5 percent in 2001.

capital expenditures, which totaled \$6.1 billion in 2000, typically account for some 20 percent of industry revenues, far more than in other industries—in the manufacturing sector, for example, capital expenditures account for less than 4 percent of revenues. In addition, railroads spend \$11 billion to \$12 billion per year on repair and maintenance of infrastructure and equipment.

The economic slowdown—especially in the manufacturing sector—affected freight railroad traffic in 2001. In the first nine months, traffic levels were down in most commodity categories, with significant declines in metallic ores and metals (reflecting the severe downturn in the U.S. steel sector), motor vehicles and equipment, and chemicals. Coal traffic, however, rose more than 5 percent; the most important commodity carried by U.S. freight railroads, coal accounted for some 44 percent of rail tonnage and 21 percent of rail revenue in 2000.

Passenger Rail

In 2000, freight railroads continued to work cooperatively with passenger rail authorities on using freight-owned track to extend passenger rail service. Freight railroads recognize the public benefits of passenger service and have accommodated shared-track operations under mutually beneficial agreements.

Many states and groups of states are improving passenger rail services—including commuter, inter-

city, and incremental high-speed services. Most operate on or are planned for freight-owned lines; however, a constitutional amendment in Florida calls for an intrastate high-speed rail system on dedicated lines. In 2001, the Florida legislature created a High-Speed Rail Authority to plan and develop the system.

Virginia's plans for high-speed rail service between Richmond and Washington, D.C., would use a freight line with the addition of a third mainline track in an incremental program over the next 6 to 10 years. Under the Midwest Regional Rail Initiative nine states are updating an implementation plan for a 3,000-mile high-speed rail system, with Chicago as the hub. California is investing in rail infrastructure and rolling stock for its incremental high-speed rail program. Similarly, Washington State has invested in passenger train equipment to extend service to the Cascade Corridor in partnership with Oregon, Amtrak, and the freight railroads.

Supporting state efforts to improve intercity passenger rail, the Federal Railroad Administration is engaged in projects to develop a nonelectric locomotive, improve train control systems, and develop technologies to reduce grade-crossing hazards. Amtrak's high-speed Acela Express service has contributed to increases in ridership in the Northeast Corridor. Nonetheless, Amtrak faces financial challenges systemwide; pending legislation may offer some relief.

To preserve rail service for many communities and to stimulate economic development, many states are investing in shortline and regional freight railroads to act as feeders to Class I carriers. For example, Pennsylvania DOT awarded \$7 million for 42 projects throughout the state that include construction, maintenance, repair, and rehabilitation of rail lines, rail sidings, and grade crossings. Many states have grant and loan programs for similar purposes.

Transit

Transit flourished in 2001, with significant improvements in ridership, service, equipment, technology, research, and funding. Until September 11, the two fundamental tenets of transit had been mobility and safety. Now the need for security—as a subset of safety—daily affects mobility and the provision of transit.

September 11 Repercussions

In New York City and Washington, D.C., transit employees acted heroically and provided leadership on September 11. PATH rerouted or stopped trains heading to the World Trade Center (WTC) from New Jersey. Several trains already at the WTC or nearby were moved quickly away to New Jersey. This crisis decision making saved many lives.



Utah's TRAX University line—which opened in December 2001—provided service to the 2002 Olympic Games in Salt Lake City

NYCT must cope with damaged tunnels, stations, and infrastructure on the WTC No. 1 and No. 9 subway lines, which must be rebuilt. Quick decision making rerouted trains and bus service away from the WTC area, and within days the rest of Manhattan was moving again.

On September 11, Metrorail in Washington, D.C., evacuated downtown workers expeditiously, as soon as the magnitude of the terrorist threat became clear. Since then, transit providers nationwide have operated with uncertainty—learning to expect the unexpected. Major transit systems have experienced hoaxes, copycat scares, and jittery, fearful riders. Almost every event requires serious treatment, disrupting service and possibly calling for hazardous materials response teams. Solidifying the transit infrastructure and increasing the level of security may require budget reallocation.

Ridership

The good news for transit before September 11 included an overall transit ridership increase of 2.93 percent as of the second quarter of 2001. Ridership on heavy rail, bus, and demand response vehicles increased 4.87 percent, 1.87 percent, and 7.99 percent, respectively. Although TEA-21 expires September 30, 2003, established funding levels are expected to be renewed or raised.

Bus Rapid Transit

Bus transit is undergoing a renaissance in service, equipment, fuels, and technology. Demonstrations of bus rapid transit (BRT)—an express form of service on exclusive rights-of-way or on arterials with signal preemption—are under way through the Federal Transit Administration (FTA) in Boston, Massachusetts; Charlotte, North Carolina; Cleveland, Ohio; Dulles Corridor, Virginia; Eugene, Oregon; Hartford, Connecticut; Honolulu, Hawaii; Miami, Florida; San Juan, Puerto Rico; and Santa Clara, California. Other

cities are participating in the FTA program by demonstrating aspects of BRT: Albany, New York; Chicago, Illinois; Los Angeles, California; Louisville, Kentucky; Montgomery County, Maryland; Alameda and Contra Costa, California; and Pittsburgh, Pennsylvania.

The TRB Committee on Bus Transit Systems (A1E01) conducted a Conference on Bus Rapid Transit in Pittsburgh, August 12–14, 2001, cosponsored by FTA, the American Public Transportation Association, and the Port Authority of Allegheny County. New bus equipment, alternative fuels, passenger information systems, and ITS technology offer improvements in service reliability, customer service, and safety. Pittsburgh is testing ITS collision avoidance systems for its buses.

Rail Transit

Rail transit is changing too. Heavy rail systems are rehabilitating infrastructure and expanding in some areas; Boston, Chicago, and New York are making infrastructure improvements to older parts of the systems. Commuter rail expansion is under consideration in Chicago and Northern Indiana and in Los Angeles, San Diego, and San Francisco, California. New service has been approved for the North Star route in Minneapolis, Minnesota, and South Florida is double-tracking—adding a second track and upgrading—along 44 miles.

Light rail transit (LRT) is maturing even as new services start up. The Dallas, Texas, system has grown rapidly and loaned vehicles to Salt Lake City, Utah, for the 2002 Winter Olympics. Salt Lake City's East-West Connection line opened for the event. Cordless LRT vehicles—using either diesel or electric technology—will debut on the Camden-Trenton, New Jersey line. New starts are under way in Minneapolis (Hiawatha Line); Houston, Texas; and Phoenix, Arizona.

Other Issues

More communities are addressing difficult planning and investment choices: light rail, BRT, or high-occupancy vehicle facility? Transit must grapple with a variety of questions, such as how to coordinate transit with the school bus fleet; what fuel propulsion technologies to choose; and how to improve service for disabled riders under the Americans with Disabilities Act.

The aging population requires more paratransit, nonfixed route services, and rural public and intercity bus transportation. Getting workers to jobs also entails targeted transit services. But many transit employees are retiring in the next five years, and many agencies will confront these decisions—and the pressing issues of security—with fewer staff and less institutional knowledge and memory.



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