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Local and Regional Stakeholder Involvement in Highway Research

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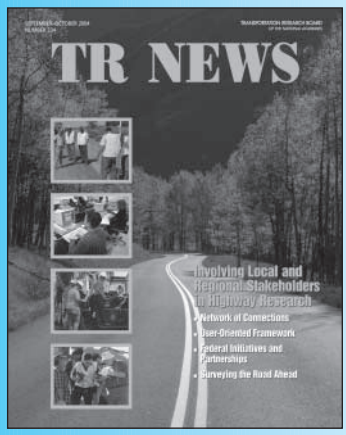

Cover: Demonstration projects, online classes and information systems, early implementation of new technologies, and road shows (shown in cover insets) are among the outreach techniques and strategies to involve local and regional transportation agency staff and other stakeholders effectively in research and development projects.

TR NEWS

features articles on innovative and timely research and development activities in all modes of transportation. Brief news items of interest to the transportation community are also included, along with profiles of transportation professionals, meeting announcements, summaries of new publications, and news of Transportation Research Board activities.

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ALSO IN THIS ISSUE:

COMING NEXT ISSUE

A meander on the San Joaquin River near Modesto, California, passes near a levee that protects farmland.

What can today's transportation visionaries learn from the flaws and proofs of past visions of transportation's future? A feature article in the November–December 2004 *TR News* offers some clues that may stimulate, sharpen, and test productive visions. Other features present a methodology to predict stream meanders that can affect transportation infrastructure; share practical insights into management and leadership; explore the federal role in improving the Marine Transportation System; and more.

INTRODUCTION

Local and Regional Stakes in Highway Research

Who Is Involved and How? What Works Best?

E. DEAN CARLSON




The Research and Technology Coordinating Committee (RTCC) provides continuing guidance to the Federal Highway Administration (FHWA) on highway research and technology (R&T) opportunities. Convened by the Transportation Research Board (TRB) of the National Academies and funded by FHWA, the committee addresses a variety of topics, some at the request of FHWA and others selected by the committee.

In April 2003 the RTCC hosted a Symposium on Highway R&T at the National Academies' Keck Center in Washington, D.C. Stakeholder involvement in highway research programs was a much discussed topic. In TRB Special Report 261, *The Federal Role in Highway Research and Technology*, published in 2002, the RTCC had recommended that FHWA's R&T program "be more responsive to and influenced by the major stakeholders in highway innovation." Several symposium participants observed that more could be done to engage local and regional transportation agencies as stakeholders in the development of research programs. The committee decided to examine this issue more closely.

In several follow-on meetings, the RTCC reviewed background papers, organized panel discussions with representatives of national associations for local and regional transportation agencies, with state department of transportation (DOT) research managers, and with directors of Local Technical Assistance Program centers. The committee also relied on responses to a questionnaire sent to members of several national associations and gathered information from discussions with FHWA research managers, state DOT representatives, and local and regional transportation agency practitioners.

Stakeholder involvement can range from informal, ad hoc activities to formal meetings and programs. With a shared sense of public purpose, participants work toward common goals to bridge traditional, institutional, functional, and technical boundaries. Needs, priorities, and conditions, however, vary from region to region, as do the roles, responsibilities, size, and resources of transportation agencies. Communities have different concerns, ranging from traffic throughput to traffic calming to the effects of urban sprawl and economic development.

From a local perspective, state agencies sometimes appear insensitive. State officials in turn may find that representatives of local entities do not speak with one voice, so that needs are difficult to define. Other challenges include changeovers in administrations and in elected and appointed officials; the lack of champions for innovation in many agencies; differences in organizational cultures; obsolete technologies; and legacy systems.

The value of highway research is in the results—in the implementation of research products that improve performance or reduce costs, or both. Local and regional transportation agency involvement in research programs is important if innovation aims at widespread implementation. Involvement may include participation in field tests of products and systems, membership on the research advisory team, or analyzing the research-based improvements. All of these activities would benefit the research project and assist in implementation.

The articles in this issue provide background on a topic that is important to the nation's highway R&T enterprise but that has not been examined thoroughly. The authors describe what is being done but recognize that what works best is not yet known. Local and regional transportation agencies are key contributors in the continued, efficient functioning of our surface transportation system. Therefore, involving them as partners is necessary as the R&T enterprise identifies, undertakes, tests, and implements innovative transportation technologies. Many mechanisms are in place to include these partners in the enterprise, and program success depends on increased participation.

The committee recognizes former Chair C. Michael Walton, University of Texas at Austin, for encouraging pursuit of this topic and for his leadership in many of the discussions that have influenced and informed the articles included here.

The author is Director, Carlson Associates, Topeka, Kansas, Chair of RTCC, and Past Chair, TRB Executive Committee.

EDITOR'S NOTE: Appreciation is expressed to Walter Diewald, Senior Program Officer, TRB Division of Studies and Information Services, and study director for the RTCC, for his efforts in developing this issue of *TR News*.

Highways and Byways to Stakeholder Involvement

Establishing a Network of Connections to Highway Research

WALTER DIEWALD

The author is Senior Program Officer, TRB Division of Studies and Information Services.

Involving local and regional transportation agencies and practitioners in highway research encounters two immediate challenges: the large numbers of agencies and practitioners; and the variety of agency types and sizes. Nevertheless, the active involvement of agencies and practitioners is important because agencies and practitioners implement transportation technologies and innovations. Involvement enables stakeholders to influence research program development at any of several stages.

In the United States, a multilevel system of federal, state, and local governments and agencies manages transportation. More than 39,000 government units exercise transportation responsibilities (Table 1, facing page).

Local and Regional

Local transportation agencies—at the county, city, town, and township levels—provide transportation infrastructure and, sometimes, transit services. Regional agencies include metropolitan planning organizations (MPOs), regional councils, and councils of governments responsible for specific transportation activities and planning. Regional agencies often are responsible for meeting state and federal regulations for transportation and environmental planning for metropolitan or other large geographic areas.

Local and regional transportation agencies differ in budgets and sources of funding, in responsibilities, and in staff size and expertise. These variations reflect the jurisdictions' land area, population and population density, relationship to the state government, natural resources, key industries, and transportation modes.

The extent of responsibility that local and regional agencies have for the highway system depends on the state, as well as on other factors, such as urbanization, road taxes, geography, weather, and economic base. On average, a state DOT is responsible for approximately 20 percent of the highways within its borders (Table 1); the range extends from 6 percent in New Jersey to 92 percent in West Virginia (*1*).

Some large counties have a public works or transportation department with traffic engineering, planning, and construction and maintenance divisions similar to those of state departments of transportation (DOTs). Many small and less populated counties, cities, towns, and townships have a single department with wide-ranging responsibilities, but limited resources and a small staff.

Local and regional agency staff have different levels of familiarity with highway R&T programs, with Federal Highway Administration (FHWA) and state DOT specialists, with technical assistance and information programs—such as the Local Technical Assistance Program (LTAP)—and with the services offered by technical and professional associations. For technical advice and information, local agencies and practitioners may rely on other agencies—at the state, larger county, and urban levels—and on consultants.

Attracting Input

In recent years, several of the nation's highway research programs have sought stakeholder input from local and regional agencies and practitioners. For example, the National Highway R&T Partnership—initiated by FHWA, the American Association of State Highway and Transportation Officials (AASHTO), and TRB in 1998 to identify highway R&T needs—provided opportunities for involving the entire highway stakeholder community. The partnership attracted hundreds of individuals from the federal, state, regional, and local levels, and from more than 170 organizations.

Five ad hoc working groups—covering safety; infrastructure renewal; operations and mobility; policy analysis, planning, and systems monitoring; and planning and environment—met several times in an 18-

month period to prepare comprehensive lists of research needs. The TRB website posted working documents and draft reports for comment, providing additional opportunities for participation.

Another example is the Surface Transportation Environmental Cooperative Research Program Advisory Board, a TRB committee requested by Congress to assess the need for a program and the research topics a program would address. Board members represented the spectrum of the transportation and environmental communities: academia, state DOTs, state environmental protection agencies, MPOs, transit agencies, environmental groups, and industry.

The board identified research needs through several mechanisms, including a public request, a conference, commissioned papers, and documentation of the research conducted in the 5 years since the previous national conference. Participants represented local and regional stakeholder groups, as well as national technical and professional associations.

Local and regional stakeholders can play key roles in research programs through individual participation or through organizations, such as technical or professional associations. Most members of national technical and professional associations work for either local or regional transportation agencies or for the private-sector entities that support them. The box on page 6 lists a sampling of these associations.

State Strategies

Local and regional stakeholder involvement in state DOT research programs reflects the different ways that states manage highway systems. For example, a state that is responsible for all or nearly all of its highways tends to address many research topics related to local issues; often the local or regional practitioners are state DOT employees.

According to members of AASHTO's Research Advisory Committee (RAC), several states conduct research for local agencies, particularly for transit and planning agencies. State-funded university research in several states also addresses local and regional issues.

Many state DOTs conduct an annual solicitation for research ideas from many sources, including local and regional agencies, MPOs, and LTAP centers. In several states, a local agency representative is a member of the DOT research advisory board that selects topics for funding. Many also tap local and regional practitioners for research project panels, particularly for topics that converge with local interests.

Direct Local Control

Two highway research programs are designed to meet local highway needs and are under the direct control of local agencies, which allocate the resources and establish research priorities: the Minnesota Local Road Research Board (LRRB) and the Iowa Highway Research Board (IHRB).

TABLE 1 Highway Miles and Expenditures Classified by Administrative Responsibility

Administration	Number of Agencies	Highway Miles (% of total) for Which Responsible	2001 Expenditures for Highways (% of total) by Expending Agency ($ millions)
Federal agency	5	121,531 (3)	1,913 (1)
State agency	52	775,579 (20)	81,803 (63)
County agency	3,034[a]	1,781,686 (45)	NA
Town and township	16,506[a]	1,215,656 (31)[b,c]	NA
Municipal	19,431[a]	—[c]	46,184 (36)
Other jurisdictions[d]	—	68,823 (2)	NA
Total	39,028	3,963,275	129,900[e]

NOTE: NA = not available.

SOURCES: U.S. Department of Commerce (2002); FHWA (2002).

[a] In addition to the agencies listed in the table, there are 537 regional councils and 334 metropolitan planning organizations.

[b] Estimates based on census data.

[c] Municipal mileage is combined with town and township mileage.

[d] Includes state park, state toll, and other state agencies; other local agencies; and roadways not identified by ownership.

[e] Differences due to funds placed in reserve.

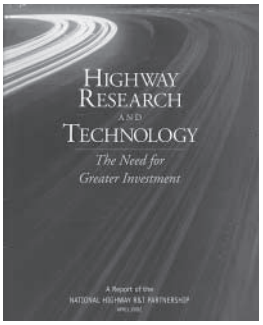
Minnesota: Sponsoring Projects

The state legislature established the Minnesota LRRB in 1959 to address local highway agency research needs. The board has programmatic control over an annual budget that derives from one-half of 1 percent of state highway funds for local systems—about $2.3 million in 2003. The LRRB has sponsored more than 150 projects on a variety of topics, including materials and methods for constructing and maintaining pavement; drainage systems and other utilities under the pavement; management of the roadside environment; and bridge construction and maintenance.

The LRRB has 10 members: 1 city public works director, 1 city engineer, 3 county engineers, the director of the University of Minnesota Center for Transportation Studies (UMCTS); and 3 staff members from Minnesota DOT. County and city engineers submit research topics, and the LRRB selects and approves topics and prepares requests for proposals.

Minnesota DOT provides the administrative support and technical assistance for the program. Researchers from Minnesota DOT, universities, and consulting firms conduct the research, and the LRRB monitors research progress.

A Research Implementation Committee (RIC) transfers the research findings into practical applications. RIC informs engineers and others about new



The National Highway R&T Partnership enabled individuals from the federal, state, regional, and local levels, and from more than 170 organizations to provide input on research needs for safety; infrastructure renewal; operations and mobility; policy analysis, planning, and systems monitoring; and planning and environment.

The Circuit Training and Assistance Program (CTAP) van distributes transportation research and innovations to local agency practitioners throughout Minnesota. CTAP receives a portion of its funding from the Minnesota Local Road Research Board (LRRB).

developments through a variety of methods, including slide presentations, videos, reports, pamphlets, seminars, workshops, field demonstrations, CD-ROMs, and site visits. RIC consists of four county engineers; one city engineer; one city public works director; four Minnesota DOT staff members; and a representative from UMCTS.

Iowa: Setting Priorities

The Iowa legislature established the IHRB in 1949 to advise Iowa DOT on research. The local highway research program now has an annual budget of $2 million. Project funds come from three sources: the Iowa primary road fund, the state's farm-to-market fund, or the state's street research fund, depending on which road system will benefit.

The board has 15 members: 7 county engineers and 2 city engineers; 4 Iowa DOT engineers; 1 representative from Iowa State University; and 1 from the University of Iowa. The Iowa DOT division director appoints the members to 3-year terms; Iowa DOT administers the research program.

Local and regional agencies submit research project ideas, and the IHRB establishes priorities and submits recommendations to Iowa DOT for approval. Projects benefitting more than one road system are jointly funded; projects that benefit the state system are eligible for state funds.

State Initiatives

Oregon's transportation advisory committees provide opportunities for stakeholders to get involved in state DOT activities, including research and development (see box, page 8). Indiana and Washington DOTs also have established programs that connect with stakeholders.

Indiana's Stakeholder Ties

Some state DOTs have longstanding ties with local and regional agencies. Through the Indiana Joint Transportation Research Program (JTRP), a 70-year-old partnership with Purdue University, Indiana DOT sponsors the Purdue Road School, an annual conference that dates back to 1914. The conference attracts more than 1,500 local and state officials, agency practitioners, consultants, and suppliers to exchange information and ideas related to research results and needs.

Like JTRP, the Indiana LTAP center is located on the Purdue University campus. The center provides technical assistance to county, city, and town officials through training programs, workshops, and seminars at the university and other in-state sites, as well as through newsletters and technical bulletins. The Indiana LTAP manager monitors and disseminates JTRP research on topics of interest to local and regional agencies. The LTAP center advisory board consists of four association representatives; five county commis-

Sample Associations Representing Local and Regional Agencies and Practitioners

American Concrete Pavement Association
American Planning Association
American Public Transportation Association
American Public Works Association
America WALKS
Association of Metropolitan Planning Organizations
Community Transportation Association of America
Institute of Transportation Engineers
International City–County Management Association
National Asphalt Pavement Association
National Association of City Transportation Officials
National Association of Counties
National Association of County Engineers
National Association of Development Organizations
National Association of Regional Councils
National Association of Towns and Townships
National League of Cities
Public Technology, Inc.
Surface Transportation Policy Project
U. S. Conference of Mayors

The LRRB has sponsored several traffic calming studies that have provided strategies for the design of urban road projects.

sioners; four town officials and managers; eight ex officio representatives from industry and local associations; four university representatives; and one representative from Indiana DOT.

Washington CRAB

Local agencies interact with state DOTs and state research programs through organizations that administer state road funds for county highway agencies, especially when counties are responsible for the local road system. For example, the Washington state legislature created the County Road Administration Board (CRAB) in 1965 to oversee the state's 39 county road departments. CRAB's mission is to preserve and enhance the transportation infrastructure of Washington counties by providing standards of practice, administration of funding programs, leadership, and progressive and professional technical services.

The board is funded from a portion of the counties' fuel tax and from a small portion of two grant programs. CRAB performs research, prepares technical reports, presents testimony, and is custodian of the county road log, a database for more than 40,000 miles of roads. The research focuses on statutory and regulatory issues that affect county road and public works departments.

In 1985 the state legislature asked CRAB to distribute the counties' portion of the state motor vehicle fuel tax. The formula for the distribution of fuel tax revenues is updated biennially to reflect changes in population, costs, and mileage.

CRAB is governed by a nine-member board—six county commissioners or county council members and three county engineers—appointed by the board of directors of the Washington State Association of Counties. Meeting quarterly, CRAB establishes and maintains a document, *Standards of Good Practice*, to guide and ensure consistency and professional management in Washington county road departments. These standards are based on state standards and specifications.

CRAB works with the Washington Association of County Engineers and the Washington State Association of Counties on transportation-related issues. Through these indirect connections, county road agencies can interact directly with the state DOT. As the primary representative of the county agencies, CRAB can approach the state DOT whenever local topics emerge—including topics for research.

Expanding Opportunities

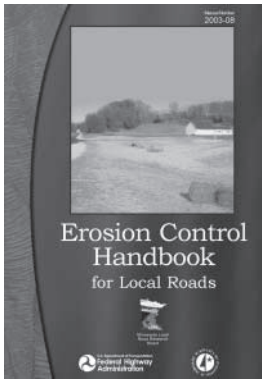
These examples illustrate ways that many DOTs connect with local and regional agencies and practitioners. The examples also offer techniques for soliciting and exchanging information and technical advice through these connections.

Although these connections are oriented to transportation program and technology transfer activities, some offer more direct mechanisms for involvement in research programs—for instance, through direct oversight of highway research programs and through membership on advisory boards of state DOT research programs. Some formal connections have yet to be exploited for research program stakeholder involvement—such as membership on LTAP center advisory boards.

Several informal settings also serve to connect local and regional stakeholders to research program managers and researchers, but with little or no expectation of research program involvement. Nevertheless, some of these mechanisms offer opportunities.

The list of opportunities presented is not exhaustive, and the effectiveness of many of the techniques has not yet been determined (see Table 2, page 9). The suggested approaches stem from discussions with RAC members, representatives of the LTAP

City and county engineers volunteer to serve on the Minnesota LRRB board and committees. John Rodeberg (*left*), city engineer for Hutchinson, chairs the LRRB Outreach Committee and serves on the board, and Tom Colbert (*right*), city engineer for Eagan, is chair of the LRRB Board. Here, they are participating in a tour of the lift bridge in Duluth, during a joint quarterly meeting of the LRRB and the Research Implementation Committee.



The *Erosion Control Handbook for Local Roads* offers guidelines and methods for erosion control practices on low-volume roads. The LRRB provided funds for this project, and LRRB members served on the project's technical advisory panel.

Oregon's Organized Outreach to Stakeholders

Oregon's structure of advisory committees for transportation illustrates the potential for involving local and regional stakeholders in highway research programs. For example, the Local Officials Advisory Committee provides input to the Oregon Transportation Commission (OTC) on policy and funding for the state transportation system. The committee consists of 12 elected and appointed local government officials selected by the Association of Oregon Counties and the League of Oregon Cities—6 county representatives and 6 city representatives.

In addition, the Oregon Department of Transportation (DOT) has 10 advisory committees on various transportation topics. Each has broad representation from stakeholders—primarily through associations that represent interested and affected groups. For example, the Oregon Bicycle and Pedestrian Advisory Committee advises Oregon DOT on the regulation of bicycle and pedestrian traffic and on the location and establishment of bikeways and walkways. The committee meets quarterly around the state to listen to the views and concerns of interested citizens, local officials, and Oregon DOT regional staff. The eight committee members, appointed by the governor to serve four-year terms, include a local government staff member employed in land-use planning; a representative of an environmental advocacy group; a bicycle shop owner; a member designated by the Oregon Recreation Trails Advisory Council; a member under the age of 21; and three members-at-large.

Other committees address drunk and drug-impaired driving; freight transportation; the Historic Columbia River Parkway; passenger rail; public transit; stakeholders in the State Transportation Improvement Program (STIP) process; and traffic control devices.

Like other states, the Oregon LTAP center has an advisory committee, including three county representatives, four city representatives, one member from the Association of Oregon Counties, one member from the U.S. Forest Service, and two from the Bureau of Land Management.

In 1996 OTC expanded opportunities for local citizen involvement in Oregon DOT's decision making. OTC authorized 11 regional advisory commissions to address regional and local transportation issues that affect the state system. Their primary role is to provide advice on the development of the STIP, which schedules transportation projects. Because these advisory groups interact with other local organizations dealing with transportation-related issues, they also have the potential to address research needs.

The Oregon Bicycle and Pedestrian Advisory Committee (OBPAC) holds a public meeting in Depoe Bay to listen to the concerns of interested citizens, local officials, and Oregon Department of Transportation regional staff.

centers, and staff of many of the associations listed in the box on page 6. A recent study of stakeholder involvement in agricultural research outlines some additional approaches that may be instructive and applicable (see box, page 10).

Responding to Challenges

Stakeholder involvement in research programs faces substantial challenges (2):

◆ *Making contact, generating interest, and getting a response.* Respondents to a questionnaire sent out by the Research and Technology Coordinating Committee noted that connecting with local and regional agencies and practitioners through professional and technical associations and through LTAP centers is more likely to generate a response than a cold call or a letter. Local agencies often are struggling to keep up with assignments and with day-to-day concerns and therefore are more likely to be interested in information and technical assistance aimed at new or persistent problems than in identifying research needs.

◆ *Time and resources.* Getting sufficient information about local problems and translating the data into a statement of research needs can be difficult, time consuming, and expensive. Nevertheless, costs can decrease over time as information is exchanged, as agencies and practitioners find ways to interact more efficiently, and as evidence develops to support the value of exchanging information.

◆ *Continuity.* Staff turnover can affect institutional memory and interest, especially when the replacements are less familiar with the activity or are unable to participate at the established technical level. Maintaining continuity—in terms of people, effort, issues, and participation—is a challenge, particularly with volunteers.

◆ *Variations among agencies and practices.* Transportation agencies and practitioners differ, and problems vary from locality to locality. Inquiries on specific issues therefore must be focused to maintain interest and produce a useful exchange of information.

◆ *Communication among practitioners and researchers.* Even when practitioners and researchers talk about the same topics or problems, their needs, interests, and purposes may differ, hampering effective communication. Other barriers are the different types, sizes, and kinds of agencies; jurisdictional and functional boundaries; past interactions that were not productive; funding limitations; agency priorities; and the agency's technology choices. Although the local agency representatives may not be as technically astute as the researchers, the agency representatives are often more knowledgeable about the political and budgetary issues that affect implementation.

◆ *Technology preferences.* Operating agencies prefer proven technologies. Agencies, consultants, and contractors often rely on state DOT standards and specifications for guidance. These agencies, however, understand the limitations of some standards and specifications in meeting their needs.

◆ *Feedback.* Agencies and practitioners want their contribution to research program development to make a difference. When they are asked to participate, they expect feedback indicating that their views have been considered. Failure to provide feedback can damage the relationship.

TABLE 2 Mechanisms for Research Program Involvement

Road show	A conference, sometimes repeated in several locations, that disseminates information about new processes, materials, and techniques. Researchers can exchange information and interact directly with practitioners and can solicit information on current problems and research needs.
Questionnaire	A call for response via paper, fax, or e-mail. Response rate often is low, but responses tend to be detailed.
Open meeting	Workshops, open houses, listening sessions, and joint planning and prioritization meetings—often part of other meetings—that provide opportunity for open and voluntary exchanges of ideas.
Advisory boards, working groups, task forces, or technical councils	Established groups concerned with research and technology transfer. For example, Local Technical Assistance Program (LTAP) center advisory boards include representatives of local and regional agencies. A technical task force of a national association representing local or regional agencies or practitioners could provide information about problem areas and research needs.
Secondary contacts	Organizations such as LTAP centers or professional or technical organizations that can solicit and compile information on problem areas and research needs from constituent target groups.
Websites	Internet postings via FHWA, LTAP centers, and technical and professional associations can solicit problem areas and research suggestions.
Annual meetings	Organizational programs and gatherings offer opportunity to solicit information about problem areas and research suggestions from representatives of states, counties, municipalities, regional councils, towns, county engineers, transit operators, and others.

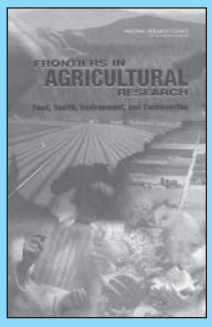
◆ *Reliance on others for information and technical assistance.* Because resources are limited, local and regional agencies often rely on other state, regional, and local agencies and on other sources—including colleagues, professional and technical organizations, LTAP centers, and industry representatives—for information and technical assistance. Contact with these sources is often informal, and the purpose is to find solutions to immediate problems.

References

1. Highway Statistics. Federal Highway Adminstration, 2002.
2. Brach, A. *Stakeholder Involvement in FHWA's Research and Technology Program.* Prepared for the Research and Technology Coordinating Committee, TRB, Washington, D.C., May 2002.

Agricultural Research Taps into the Grass Roots

A recent National Research Council (NRC) report on stakeholder involvement in the research program of the U.S. Department of Agriculture (USDA) offers some models for highway research programs.* Like highway research and technology, agricultural research and technology transfer have a long history of federal support. Federal funding for agricultural research began in 1862, and federal legislation launched the Cooperative State Research, Education, and Extension Service in 1887. The USDA research budget today is approximately $2.1 billion.



Many crosscutting, complementary, and contradictory forces are shaping priorities and resource allocations for agricultural research and education, the NRC study notes. Federal funding includes congressional earmarks for projects, facilities, instruments, and other academic or research-related items. USDA strives for stakeholder input into priority-setting at all levels, through quality assurance mechanisms—such as external peer review of proposals and of ongoing and completed research—to improve the scientific quality of all research activities.

USDA defines stakeholders as the customers, clients, or constituents of agricultural research—the people and organizations using or affected by the research activities. Historically, the most visible stakeholders of agricultural research have been producers, processors, and commodity groups. With changes in perceptions, the scope of agricultural research now includes public health and nutrition, environmental stewardship, and the social and economic well-being of rural communities.

This has expanded the range of stakeholders, and the new stakeholders have their own ideas and insights for research endeavors. Involving all stakeholders increases the challenge of combining diverse concerns into a cohesive, feasible research program.

USDA uses several mechanisms to integrate stakeholder input into the research process, including formally appointed, national advisory boards and cooperative extension, county-level meetings. The agency recognizes the value of informal working relationships between scientists and users of research findings. Issues have arisen about how to ensure balanced input and how to translate overwhelming amounts of information and diverse perspectives into focused research priorities.

An advisory board draws members from 30 constituencies identified in legislation. Other mechanisms include public workshops and listening sessions; state-level stakeholder input from field offices and universities; stakeholder participation in research and extension grants; informal or ad hoc communications between USDA research offices and USDA regulatory and program offices; and program office staff serving as full-time liaisons at research offices.

In addition, USDA uses solicitations through the *Federal Register*; targeted requests to underrepresented constituencies; informal contacts at scientific and professional meetings, science forums, and user workshops; and communication with other federal agencies, user organizations, trade organizations, peer reviewers, and panel managers. Many contract and agency researchers have informal networks for their own stakeholder input.

The NRC study committee recommended convening a national summit every 2 to 3 years to engage USDA researchers and a broad representation of stakeholders at the local, national, and regional levels. The summit would assess national research needs and apprise stakeholders of how their input is being used in decision making.

A preparatory series of open workshops is under consideration, to be conducted by USDA research offices at local, state, and regional levels. The workshops would tap the national network of cooperative extension and other mechanisms at all levels to develop information on research needs. The NRC study committee also suggested using the Internet to solicit input from stakeholders and to disseminate summit results to stakeholders and the research community.

**Frontiers in Agricultural Research: Food, Health, Environment, and Communities.* National Academies Press, Washington, D.C., 2003. (To order or to view online, www.nap.edu/.)

A Framework for Stakeholder Involvement

Managing Research with a Focus on Users

ANN M. BRACH

The author is Senior Program Officer, TRB Division of Studies and Information Services, and from 1999 to 2001 served as Study Director for the National Research Council–appointed Committee for a Study for a Future Strategic Highway Research Program.

What are some considerations for engaging stakeholders in transportation research programs? A general framework for engagement was developed for the Research and Technology Coordinating Committee (RTCC), a specially appointed TRB committee that advises the Federal Highway Administration.

The framework draws on the practices and experiences of several federal agencies, as well as on research programs sponsored by state departments of transportation (DOT) and by industry (see box, page 15). For the framework, a stakeholder is defined as a person or group with a stake or an interest in transportation research and technology (R&T) programs.

Demo of aggregate recovery from foreslope during Motorgrader Operator Training in South Dakota.

Involvement implies that stakeholders are given opportunities to shape the research program. Through appropriate involvement, stakeholders can contribute by

- Helping to define research problems and suggesting projects to address the problems;
- Ensuring the relevance of the research;
- Maintaining the focus of the research;
- Providing quality control by reviewing proposals and ongoing research;
- Evaluating the research results;
- Briefing potential implementers; and
- Developing support for the research program.

The framework coordinates four elements: the type of stakeholder, the purpose of the research program, the stage of the research management process, and the mechanisms for stakeholder involvement. By identifying the most effective roles for different stakeholders at various stages of the research management process, the framework suggests the appropriate mechanisms for involvement (Table 1, page 12).

Stakeholders

The framework distinguishes four types of stakeholders:

- *Sponsors* pay for the research and are responsible for the research program. Sponsors typically are concerned with the program's content and management—choosing the most beneficial research projects, managing the resources, and delivering high-quality results.
- *Scientific and technical experts* conduct the research, as well as the peer review of research proposals, ongoing research, and research results for scientific and technical excellence.
- *Users* implement the research results and may include government agencies, private-sector firms, standards-setting groups, and private citizens.

TABLE 1 Framework for Stakeholder Involvement

Lead Stakeholder Type	*Stage of Research Management Process*	*Purpose of Research Program*		
		To expand the knowledge base and develop human capital.	*To improve operations in the short term.*	*To develop opportunities for the future.*
Sponsor	1. Identify desired goals or outcomes 2. Identify research opportunities 3. Prioritize research goals 4. Allocate research funds 5. Develop problem statements (or requests for proposals, if extramural)	Periodic one-time panels or workshops to provide input at the highest levels of Stages 1 through 5.	Standing committees with full range of stakeholders for major program areas to oversee the process. Subcommittees or panels to give input on specific programs and projects.	Special standing committee of experts and users with vision and an appreciation of longer-term investment. Periodic one-time panels or workshops for input on opportunities in specific areas.
	6. Choose researchers (if extramural)	Expert panels to review and evaluate the research.	Ad hoc program or project panels involving experts (for scientific review) and users (for relevance review). May be the same as subcommittees used in Stages 1 through 5.	Ad hoc expert panels for the duration of a project or one-time panels brought in at specific points for grant awards, review, and evaluation.
Scientific and Technical Experts	7. Review quality of ongoing research 8. Evaluate and interpret research results			
Users	9. Implement research results 10. Provide feedback on effectiveness of implemented results	Periodic one-time mechanisms to review results and provide feedback in early stages.	Panels may continue into these stages, with emphasis on user input, but particular mechanisms depend on research results and type of research product.	No special mechanism. The standing committee would receive input from experts and use it to program future activities or to pass on results to short-term programs.

◆ *Affected parties* are any others who are likely to experience an effect of the research, even if they do not pay for it, conduct it, or directly use the results. For example, highway contractors may be affected by research that changes road-building practices by shifting the economics of paving materials; environmental groups are interested in research about air quality models or about incentives to use alternative fuels or other transportation modes.

Local and regional agencies with transportation responsibilities are the potential users of transportation research results. As users, they implement a new technology or analytical method. However, they also may play other roles—for example, technical experts from local and regional agencies may serve as peer reviewers for research projects.

Local agencies may be affected by research results implemented by others. For instance, the market for paving material may shift due to innovations adopted by the state DOT; or environmental analysis procedures developed by federal agencies may influence local transportation plans; or the trend to larger vehicles may affect decisions about roadway safety.

Program Purposes

Three research program purposes were identified for the framework:

◆ *To expand the knowledge base and develop human capital.* This type of program is oriented to research and training, not to solving specific practical problems.

◆ *To improve operations in the short term.* Sometimes referred to as problem-solving research, this characterizes many mission-oriented research programs in the public or private sector.

◆ *To develop opportunities for the future.* This research aims at practical or mission needs and opportunities that are in the future, not immediate.

Although local and regional stakeholders may have an interest in all three purposes, improving operations in the short term is likely their strongest interest. This type of research may rely on problem solving and analysis; develop specific tools, technologies, or methods; or supply documentation for policies, guidelines, regulations, and consensus standards. The overriding objective is to implement effective solutions—this makes the involvement of users important.

Stages in the Process

The research management process was divided into 10 stages, sorted into three groups according to the type of stakeholder expected to play the strongest role. The 10 stages refer to research management and therefore do not include the conduct of research by scientific or technical experts.

The first group of stages encompasses the initial or programming phase: (1) identify desired goals or outcomes; (2) identify research opportunities; (3) prioritize research goals; (4) allocate research funds; and (5) develop problem statements or requests for proposals if the research is extramural. These stages usually are guided by the sponsor, who is paying for the program and who is accountable for the conduct and outcome of the research.

The next step—(6) choose researchers for extramural research programs—usually is carried out by the sponsor, but the advice of technical and scientific experts often has a determining influence. This step therefore may be included with the sponsor tasks or in the second group, which involves tasks generally performed by scientific and technical experts: (7) review the quality of ongoing research and (8) evaluate and interpret the research results.

The third group involves two stages: (9) implement research results and (10) provide feedback on the effectiveness of the implementation. If Stages 9 and 10 are carried out, it is by users.

The stages are not exclusionary—all stakeholders have roles at each stage. The incentives, interests, and specific talents of each type of stakeholder, however, will be most effective at the stages indicated.

Involvement Mechanisms

Research managers rely on four types of mechanisms for involving stakeholders:

◆ *Informal networks.* Networks of technical and scientific peers, sometimes including users or customers, are developed through professional societies, scientific meetings, and other gatherings. Examples in the field of transportation include committees of the American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers, and TRB. Local and regional transportation agencies can look to the American Public Works Association, the Association of Metropolitan Planning Organizations, the National Association of County Engineers, and others to develop informal networks.

Local chapter meetings of national associations may offer key opportunities for engaging stakeholders in highway research.

These networks are informal because their influence on specific research programs depends on who talks to whom and on how the participants translate the information into research priorities or projects. Contacts may reinforce a research priority, suggest a new research focus, or lead to a change in approach. Sometimes an informal network stimulates a cooperative venture that leverages resources or expands the scope or scale of an effort.

◆ *Formal mechanisms with open or unspecified involvement.* Formal mechanisms gain broad input, for example through release of a research plan for public comment or through the establishment of a website for input or for interactive dialogue with stakeholders. Federal agencies and national organizations often use these mechanisms to reach a nationwide audience. In principle, anyone may provide input through these mechanisms.

◆ *Formal mechanisms with specific stakeholders over a period of time.* Formal groups, such as committees, panels, or boards, can be established to provide input into a research program. The membership may extend over a period of time to provide more than a snapshot of the program. Research institutes often rely on formal groups, as do the cooperative research programs administered by TRB. The groups, which may include representatives of the sponsoring organizations, often function as advisory boards to determine priorities and funding.

TABLE 2 Advantages and Disadvantages of Stakeholder Involvement Mechanisms

Mechanism	*Advantages*	*Disadvantages*
Informal Networks	• Can use meetings or other communication opportunities to save time, costs, and administrative effort. • Can be fluid and flexible. • Usually content-rich instead of process-oriented. • Can include frank communication of negative results or sensitive information not easily revealed publicly or in written documents.	• Tend to be highly technical; may not easily involve users or other stakeholders. • Can become closed or overly traditional. • Difficult to identify and track for accountability.
Formal Mechanisms with Open or Unspecified Involvement	• Can be open and broad-based. • Can save time and administrative and travel costs.	• Can produce a large amount of unstructured input. • Difficulty targeting critical stakeholders. • Possible bias in the use of web-based approaches because of unequal access or lack of facility with the technology. • Restricted to material that individuals are willing to put in writing for a public forum. • Lack of face-to-face communication or group dialogue; temporally dispersed.
Formal Mechanisms with Specific Stakeholders over a Period of Time	• Able to target specific stakeholders and provide predetermined representation. • Can be structured to provide input at the time and in the format desired. • Facilitates stakeholder familiarity with a program over time. • Can provide face-to-face communication. • Provides for accountability through formal reports.	• Can be time-consuming to organize. • Can involve meeting and travel expenses. • May not be flexible because of long lead times to plan and prepare for meetings. • May become too formal or exclusive. • Must meet requirements of the Federal Advisory Committee Act (for federal agencies).
One-Time Formal Mechanisms with Specific Stakeholders	• Allows stakeholders to be targeted while enabling broader involvement because of the groups' changing makeup. • Can provide face-to-face communication, as well as written reports. • Can tailor scale, scope, and timing to changing needs and available resources without disrupting an established process.	• Does not provide for follow-up and accountability. • Requires educating new groups. • May be preempted or postponed in favor of more urgent activities because of the lack of a regular schedule and procedures (which provide discipline for standing committees).

◆ *One-time formal mechanisms with specific stakeholders.* Groups of specific, invited individuals may be assembled on a one-time basis. This approach includes focus groups, meetings, and workshops convened for a specific purpose.

Table 2 shows some of the advantages and disadvantages of each of these stakeholder involvement mechanisms.

User Scenario

The framework presents two scenarios for involving local and regional transportation agencies in transportation research programs—the user scenario and the sponsor scenario. The user scenario is the more common of the two—local and regional agencies are primarily in the user role in research programs sponsored by federal agencies and state DOTs, universities, and the private sector.

Rosenbloom and coauthors note that this scenario is dominated by a top-down flow of information (see article, page 22). Local and regional agencies typically are the recipients of research results through training, manuals, and specifications. Their involvement in the research management process occurs at Stage 9, implementation of the research results, with some participation in Stage 10, providing feedback on effectiveness.

The framework indicates that users have the strongest role in these two stages. Nonetheless, as Rosenbloom and coauthors observe, the feedback mechanisms—or bottom-up information flows—are weak, limiting the ability of local and regional stakeholders to shape research programs.

Ideally, user involvement should occur at all stages. Local and regional involvement during Stages 1 through 5, when research needs and priorities are established, can increase the relevance of the research to the stakeholders. Local and regional agencies also can participate as technical experts—their expertise during Stages 6 through 8 can keep the research focused on local and regional needs and can provide

insight on how to tailor research results to local and regional contexts. This involvement, in turn, will improve the ability of regional and local stakeholders to implement the research results.

Limitations on time, money, and personnel, however, can prevent participation by local and regional agencies. This starts a vicious cycle: the resources are not devoted to involvement, so the program does not gain relevance to local and regional stakeholders; then, because the research is not relevant, the potential stakeholders are not willing to expend resources on involvement.

Sponsor Scenario

Resource limitations on both sides can initiate a cycle of nonparticipation. Sponsors are accountable for meeting the primary stakeholders' needs, which may not be the same as those of local and regional stakeholders. The second scenario—the sponsor scenario—avoids this problem by casting local or regional agencies as sponsors of the research program.

This scenario, however, is rare. The Minnesota Local Road Research Board and the Iowa Highway Research Board are two examples (see article, page 4). These cooperative efforts involve state and local officials, as well as university and private-sector representatives, but local transportation officials—such as county engineers and city directors of streets—drive the research programs. As research program sponsors—who therefore have ownership—local and regional stakeholders can influence priorities, budgets, and programming; as users, they can tailor the program to their needs.

Local and regional transportation agencies face many of the same types of issues as state and federal agencies, but in a different context. For example, local and regional agencies are responsible for residential roads and streets, which may have direct impact on local communities and businesses.

Moreover, other infrastructure or public works responsibilities demand the attention of local and regional agencies or may require consideration for research along with transportation concerns. Local and regional agencies typically have limited financial, technological, and human resources, and many of their research needs may focus on specific, practical problem-solving or on the testing and evaluation of new products.

The user-sponsor's sense of ownership is likely to translate into successful implementation of the research results. When the same people use the results, provide feedback, and develop the research program, the program can be easily adjusted to meet stakeholders' needs.

Another benefit of the user-sponsor role is that the hands-on involvement trains stakeholders in the nature, benefits, and processes of research. Through sponsorship, local and regional transportation professionals actively identify problems and learn to articulate the problems into researchable issues. They interact with technically oriented colleagues and other experts who perform and review research projects. This professional capacity building can make local and regional transportation agencies more interested in participating in research programs sponsored by others and can promote interaction among programs at federal, state, and local levels.

Sponsorship of a research program, of course, requires funding. With the budgetary limitations that most jurisdictions face, the most feasible way to begin may be through a partnership of several local and regional agencies with state or federal agencies or a university. Modest contributions from partners could jump-start a small research program, which could grow as experience and benefits are gained.

Sources for the Framework

The framework developed for the Research and Technology Coordinating Committee drew on stakeholder involvement mechanisms used by the following agencies and initiatives:

- National Institute of Standards and Technology,
- National Cancer Institute of the National Institutes of Health,
- National Science Foundation,
- Agricultural Research Service of the Department of Agriculture,
- Electric Power Research Institute,
- Health Effects Institute,
- Construction Industry Institute,
- National Cooperative Highway Research Program,
- National Highway Research and Technology Partnership,
- National Operations Dialogue,
- Technical Activities Division of the Transportation Research Board, and
- The Transportation Research Board Committee for a Study for a Future Strategic Highway Research Program.

The framework study is documented in a paper by A. Brach, "A Taxonomy for Stakeholder Involvement in Public-Sector Transportation Research and Technology Programs," *Public Works Management and Policy* (in press).

Innovative equipment and techniques are demonstrated to participants in the regional LTAP-sponsored Roadway Management Conference.

Sponsor Outreach

Sponsors can determine the level and effectiveness of stakeholder involvement, although they may not be able to overcome all of the resource-related constraints of local and regional agencies. Sponsors can improve communication with local and regional professionals and can increase the motivation for involvement.

Building strong relationships with stakeholders requires two-way communication. Research sponsors may start by reaching out to national and state associations of county engineers or metropolitan planning organizations. Attending meetings of these associations can provide the opportunity to engage local and regional professionals from around the country or the state and to learn about their issues. The next step may be to visit sites and gain direct acquaintance with local needs.

These steps provide some first-hand knowledge and begin to build a bridge between different cultures—whether federal, state, regional, local, rural, or urban. Local and regional representatives will be more likely to get involved in research programs that demonstrate genuine understanding of their needs and that present the opportunity to address these needs. The sponsor should provide a clear avenue for input and show that the input has influence on the direction of the program.

State and federal research programs may embed local and regional needs in other issues, so that the relevance of the research may not be apparent to local and regional representatives. Sponsors therefore need to demonstrate and clarify how their programs address local needs.

Working closely with local and regional experts during the research phase will ensure relevance. Additional research may be needed to address specific concerns, and research contracts should be structured to make this possible. During and after the conduct of research, sponsors should work closely with leaders and technical experts in local and regional agencies to identify methods for effective implementation of the research results, such as demonstration projects, training, and road shows.

Successful Involvement

A successful approach to the involvement of local and regional stakeholders in transportation research programs will exhibit several characteristics:

- *Transparency*. The process should be well defined and the steps should be communicated clearly, so that stakeholders are aware of when and how they may influence the research program.
- *Formality and informality*. Some formal procedures are necessary for accountability, but opportunities for informal input broaden participation.
- *Experts and users*. Input from stakeholders who are scientific or technical experts and users contributes to the technical quality and to the relevance of the research.
- *Tangible product*. A tangible product, such as a plan, a report, or a road map, should document the process and the outcomes of stakeholder involvement.
- *Follow-up*. The effects of stakeholder involvement on the research program and its results should be documented.
- *Appropriate scale*. The process should reflect the size of the research program and the degree of influence that various stakeholders can expect. A small or heavily earmarked program may warrant a smaller investment in stakeholder involvement than a program that is large or that has significant discretionary funding. An effort must be made to develop reasonable expectations for all parties.

Gaining Focus

Effective stakeholder involvement requires communication, time, money, and planning. Above all, the institutional culture must have a clear focus on the purposes of the research, on the stakeholder groups, and on stakeholder interests and potential contributions.

The framework provides managers of transportation research programs with a tool to gain this focus. The framework can assist managers in thinking about how to improve involvement by local and regional transportation agencies. Local and regional agencies can use the framework to design research programs with strong ownership from their constituencies.

Instituting Programs for Stakeholder Outreach

Federal Highway Administration Initiatives for Local-Level Involvement in Research and Technology

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Highway research has yielded advances and innovations that have contributed to improvements in all aspects of the highway system, including longer-lasting pavements, structurally sound bridges, and advanced traffic systems. Transportation managers rely more and more on technology and innovation to meet the challenges of increasing demands, competing needs, limited resources, and greater expectations.

The necessary technologies and innovations only can be developed and deployed through the careful consideration and coordination of a well-defined research and technology (R&T) program. The Federal Highway Administration (FHWA) has worked closely with its many partners and stakeholders in highway R&T to develop innovative technologies that save lives, time, and money. FHWA also works with its partners and stakeholders to improve its R&T program and to deploy technology and innovation more effectively.

FHWA supports transportation innovation in several ways. As a convener, the agency brings the R&T community together to define priorities and future directions. As an advocate for innovation, the agency assists in implementation, tracks the benefits, and ensures that key decision makers and stakeholders know and understand the benefits. In addition, FHWA assumes a leadership role in vital national research areas that require large investments or that have a scope too broad for other programs.

The agency has benefited from engaging regional and local partners and stakeholders in the R&T process. Regional and local jurisdictions own and

The Federal Highway Administration's (FHWA) Freight Professional Development program instructs staff of state departments of transportation and metropolitan planning organizations on how to address the growth in freight flows. The program offers computer training on site or via the web.

Sign installation and maintenance are activities that FHWA is promoting at the local level to enhance roadway safety.

maintain 76 percent of the highway miles in the United States—paved and unpaved, in rural and urban settings (*1*). Regional and local involvement, therefore, is critical to meeting future transportation challenges, as indicated by the following examples and by the description of the Local Technical Assistance Program (see box, page 19).

Training to Move Freight

Steadily increasing freight traffic throughout the United States—rail, truck, marine, and air cargo—is straining the transportation network, exacerbating the growth in passenger traffic. From 1998 through 2020, domestic freight volumes are projected to increase by 67 percent (*2*).

Accommodating the increase in freight traffic depends on the skills of the people who build, maintain, and operate the transportation system. Educating and training the workforce are of paramount importance in improving freight transportation productivity, safety, and security.

In 2003, FHWA launched the Freight Professional Development (FPD) program to assist staff at state DOTs and metropolitan planning organizations (MPOs) in gaining the skills and knowledge to address the growth in freight flows. The goal is to assist local and regional planners in considering freight infrastructure and operational improvements during the transportation development process, to improve mobility, economic growth, and global connectivity. The program will engage the academic community to integrate freight issues into transportation planning courses and other academic programs.

"Enhancing the freight knowledge and skills of transportation professionals is critical in bridging the knowledge gap between public- and private-sector business processes," observes Scott Johnson, transportation specialist, FHWA Office of Freight Management and Operations. "Designing and delivering a professional development program on multimodal freight in a collaborative and inclusive environment will help."

Johnson's office is working with the FHWA Office of Planning, Environment, and Realty to deploy the initial elements of a program. "Already our customers and partners can't seem to get enough of the training and technical assistance resources now available," he reports.

The FPD program's objectives are to

- Enhance the freight-related skills and knowledge of transportation planners and other professionals,
- Foster intermodal approaches to advance freight productivity and security,
- Engage private-sector stakeholders in project development, and
- Improve freight planning and decision making at the state and MPO levels.

The program offers training, education, a resource library, and technical assistance. The training is packaged in courses, workshops, conferences, and seminars; some are offered via the web, so that participants' costs and time away from the office are minimal.

Input from private-sector stakeholders, as well as from state DOT and MPO partners, has contributed to the development of the program. The FWHA Office of Freight Management and Operations, in partnership with the Office of Planning, Environment, and Realty and the Resource Center's Technical Service Team on Planning, hosted workshops to gain insights and perspectives from representatives of various entities, including the American Association of State Highway and Transportation Officials (AASHTO), the Association of Metropolitan Planning Organizations, the American Association of Port Authorities, the American Transportation Research Institute, the Federal Railroad Administration, state DOTs, and MPOs.

The FPD program serves as the foundation for U.S. DOT efforts to engage the academic community in issues involving the movement of goods. U.S. DOT is partnering with academic institutions to integrate policy and program information on multimodal public freight transportation into related courses and degree programs.

The resource library consists of an Internet database of freight-related information, including state-of-

Assisting Locally, Benefiting Nationally

Across the United States, 38,000 local agencies—for small and large cities, rural and urban counties, and tribal governments—maintain nearly 3 million miles of roads, including approximately 29,000 bridges. The Local Technical Assistance Program (LTAP) and Tribal Technical Assistance Program (TTAP) operate centers to help these agencies tap into new technology, information, and training, to operate more efficiently and safely. The programs move innovative transportation technologies out of the laboratory, off the shelf, and into the hands of the people who maintain local streets and roads.

LTAP centers provide workshops, road shows, demonstrations, computer training, distance learning, conference seminars, and courses in the field and in classrooms. LTAP centers stage more than 5,000 training events for more than 135,000 participants annually. Each LTAP center customizes the training for the specific, local needs of the participants.

LTAP newsletters and publications deliver key transportation resources to local agencies, including technical information, research updates, legislative and regulatory news, and training opportunities. Each year,

American Indian participants listen to session on rural roads drainage during the 6th National TTAP Conference in Albuquerque, New Mexico, in February 2004.

LTAP libraries respond to nearly 150,000 requests for manuals, reports, videos, and CD-ROMs. In addition, the centers provide direct technical information, problem solving, and referrals in response to more than 35,000 inquiries annually.

New LTAP initiatives include the Roads Scholar program, a training curriculum to advance professionals in their careers; and the Safety Circuit Riders pilot program, which sends skilled professionals to local agencies to conduct safety training workshops.

FHWA started LTAP in 1982 to help improve the skills and knowledge of local transportation

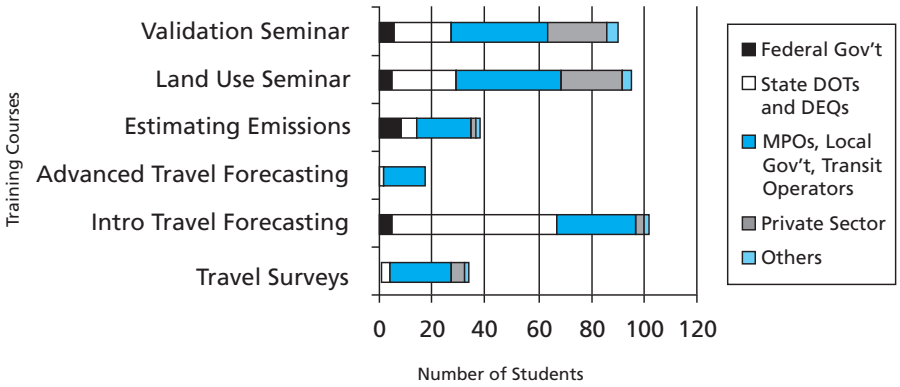
Kentucky Local Technical Assistance Program Center conducts a Roads Scholar session on drainage.

providers through training, technical assistance, and technology transfer. LTAP includes a network of 51 centers in every state and Puerto Rico, plus 7 regional TTAP centers serving tribal governments.

FHWA provides the centers with annual grant funding, which is matched or exceeded by funding from the state DOTs, universities, and center initiatives. More than two-thirds of the centers are housed at universities, and state DOTs sponsor the others. The program meets the growing demand for its services through innovative partnerships, customized delivery, and additional support.

In recent years, LTAP has established agreements with the American Association of State Highway and Transportation Officials (AASHTO), the American Public Works Association, and the National Association of County Engineers, to work together to strengthen the skills and knowledge of state and local public agency providers. In addition, many LTAP centers have integrated their services into other transportation education efforts, such as the curricula of four-year universities and two-year programs, as well as the continuing education offered by trade associations.

"LTAP is an effective network for implementing technologies that solve problems," comments John Horsley, Executive Director of AASHTO. "State and local transportation agencies must keep strong lines of communication to conduct their business effectively. LTAP plays an important role in maintaining open lines of communication."



Student breakdown of Travel Model Improvement Program and National Highway Institute seminars and courses shows high enrollment by metropolitan planning organizations, local governments, and transit operators.

the-art practices from a variety of sources—such as U.S. DOT, state DOTs, MPOs, regional councils, professional associations, and the academic community. The monthly "Talking Freight" seminar series, offered through web conferencing, provides a flexible, no-fee way for professionals to broaden knowledge and develop skills.

The Freight Planning Peer Exchange offers a forum for information sharing via e-mail, with more than 550 public- and private-sector subscribers.[1] The Freight Peer-to-Peer Program includes a database of freight experts who provide guidance to new practitioners, as well as seasoned veterans. The program also offers travel assistance to support the peer exchange.

"FHWA's Freight Professional Development Program provides the kind of information and education that state and local planners have needed since the passage of the Transportation Equity Act for the 21st Century," notes Erik L. Johnson, Statewide Transportation Planner at Virginia DOT. "Transportation planners with expertise in freight are scarce. Also, few public transportation decision makers recognize the importance of maintaining the flow of goods through freight-focused transportation planning and champion that cause. The FPD program will have long-term benefits in raising the awareness of public officials about the needs of freight transportation users."

[1] http://listserv.utk.edu/archives/fhwafp.html

Grader provides a smoother gravel surface to increase safety on rural low-volume road. FHWA is working with partners to increase local-level adoption of affordable, practical safety measures.

Charting Paths of Travel

The Travel Model Improvement Program (TMIP)—jointly funded by FHWA, the Federal Transit Administration, the Office of the Secretary of Transportation, and the Environmental Protection Agency—provides local and regional agencies with tools for travel demand forecasting and air quality analysis, for all modes of travel. TMIP started about 10 years ago as a research program, gradually turning its focus to deployment and technology implementation. The program delivers assistance and training in new and improved technologies, as well as quality assurance for the processes.

"We look at what the demand for travel is, how many people want to go from A to B, and what method of transportation they take," reports Frederick W. Ducca, Travel Model Team Leader, FHWA Office of Interstate and Border Planning. "We then translate that into how many cars there are and which sections of the roadways they want to use. We need to know what the patterns are going to look like 5 and 10 years from now."

Within FHWA, TMIP works with the Transportation Planning and Capacity Building Program, to enhance the capabilities of state, regional, and local transportation staffs to meet planning needs. MPOs and state DOTs are viewed as direct clients. The partnership makes data available to the general public on the Internet[2] and offers training programs for state DOTs and other entities.

Plans are under way to expand the scope of TMIP to support other techniques, such as collecting data about where people live and work, activity patterns, and land use forecasting. For example, TMIP also may contribute to environmental impact assessments by providing travel forecasting data. The tools and data can be used for safety, security, and emergency event analysis.

State DOTs have benefited from the training, workshops, seminars, and peer reviews provided by TMIP. "TMIP has been valuable to the California Department of Transportation [Caltrans], both in providing a forum for the exchange of ideas and in providing training opportunities," states Charles Chenu, Senior Transportation Planner, Caltrans. "In particular, the recent TMIP Model Validation and Calibration seminar gave many participants the first opportunity to learn these skills, which is often overlooked in the rush to complete projects."

[2] www.mcb.fhwa.dot.gov

Focusing on Safety

Coordination, communication, and cooperation continue to grow steadily between the FHWA Office of Safety and partners such as the Institute of Transportation Engineers, the American Traffic Safety Services Association, the National Association of Towns and Townships, the National Association of County Engineers, the American Public Works Association, and the American Road and Transportation Builders Association. Collective ideas, resources, and efforts are focusing on saving lives and reducing injuries on U.S. streets and highways. The partners provide valuable insights to FHWA in developing, refining, and implementing safety programs.

Office of Safety staff regularly meet with representatives of these organizations to exchange information on current and needed safety practices, procedures, and products. The goal is to share initiatives and lessons learned, so that emerging safety products can be timely, effective, and useful.

Successful initiatives and lessons that arise in one jurisdiction can be applied or adapted by others. Minnesota DOT's "Research Library" website,[3] for example, offers access to transportation research and publications, so that county engineers and others can learn more about new technologies that may help to solve specific problems. Mendocino County, California, is conducting a two-day showcase of safety technologies; the county has instituted a low-cost project to reduce the number of traffic-related fatalities and injuries on rural roads.[4]

Another example of extended information sharing is the Safety Circuit Rider Program (see box, page 19). The Office of Safety, together with the Office of Professional Development and the Federal Lands Highway Division, is funding four pilot programs that will be housed in a Local Technical Assistance Program and Tribal Technical Assistance Program center.

The 1-year pilot program will send out knowledgeable staff to provide advice, technical assistance, and training on best practices for reducing traffic crashes on two-lane roadways and local roads. The training and technical assistance will include such topics as safety audits of local roadways, reliable data collection techniques, low-cost safety measures, and other programs to reduce fatalities involving roadway departures, intersections, and pedestrians.

"Our approach is to plan and develop with the end user in mind," says Rudolph Umbs, Chief Highway Safety Engineer at FHWA. "We want to develop, share, and deliver products, practices, and procedures that are needed, usable, and effective."

[3] www.dot.state.mn.us/reslib.html

[4] http://pdshowcase.org

Visible Research

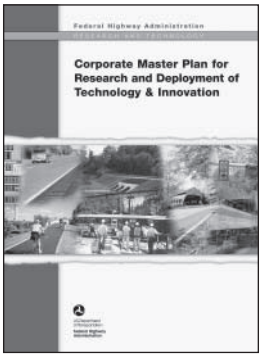
"We recognize the need to ensure that our research is more visible," says Dennis Judycki, FHWA's Associate Administrator for Research, Development, and Technology. "Our corporate goal is to communicate what our research and technology program is, and ultimately, to ensure that we work effectively with our partners and stakeholders to deploy technology and innovations."

FHWA has developed the *Corporate Master Plan for Research and Deployment of Technology and Innovation*, which comprises 26 commitments, framed around 7 guiding principles (3). One principle is to involve stakeholders throughout the R&T process.

Under the master plan, the R&T Leadership Team is responsible for improving agency-wide business related to research and to the deployment of technology and innovation. The team works closely with stakeholders.

"The corporate master plan emphasizes stakeholder input throughout the process, and it emphasizes implementation," comments Joe Toole, FHWA's Associate Administrator for Professional and Corporate Development. "Stakeholder input helps us understand local needs and address those needs with a coordinated approach. The highway community only needs one research agenda—with limited budgets, we can't afford duplication of effort. Ideally, all of our work should be integrated. The corporate master plan will help create a framework for that synergy between FHWA and stakeholders."

FHWA is addressing opportunities to engage local, regional, and other stakeholders for input into the R&T program. The extent of stakeholder involvement may vary from project to project; nonetheless, from agenda setting to merit review and performance evaluation, FHWA will be looking to involve stakeholders at all levels directly in technology research and implementation, recognizing that state, regional, and local stakeholders ultimately are responsible for implementation.



FHWA's *Corporate Master Plan* promotes the involvement of stakeholders throughout the research and technology process.

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Toward Local and Regional Involvement in Highway Research

Staking Out the Starting Point and the Road Ahead

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At the April 2003 Symposium on Highway Research and Technology, sponsored by the Research and Technology Coordinating Committee (RTCC), several participants cited the need to increase local and regional agency stakeholder involvement in highway research programs. The committee previously had urged the Federal Highway Administration (FHWA) to expand efforts to involve stakeholders in research programs, but little specific information was available on the issues associated with local and regional agency stakeholder involvement. The committee decided therefore to learn more about the extent of local and regional agency involvement in highway research programs and to determine if improvements were needed.

The committee engaged in several activities. Two panels on stakeholder involvement generated wide-ranging discussions (see box, page 26). A questionnaire was sent to local and regional highway agencies

Gene Wilson instructs participants at Montana Local Technical Assistance Program's annual Safety Congress.

and practitioners through several associations—including the National Association of County Engineers, the Institute of Transportation Engineers, the American Public Works Association, the National Association of Regional Councils, the Association of Metropolitan Planning Organizations, and Public Technology, Inc.

RTCC also reviewed information on state highway research programs provided by members of the Research Advisory Committee of the American Association of State Highway and Transportation Officials and on Local Technical Assistance Program (LTAP) activities from LTAP center directors. In addition, FHWA provided material about federal research activities, and FHWA staff participated in many of the discussions, sharing experience and expertise.

The committee's findings about practices in several highway research programs are presented here, along with several opportunities for increasing local and regional agency stakeholder involvement. Although the findings may be useful for research program managers, no single formula applies to all programs. Because of the many variations in local and state agencies and in research programs, those responsible for each program must determine what works best for the stakeholders and for the research topics.

Fragmented Structure

The highway system is organized and delivered in a fragmented way by more than 39,000 public agencies—with a wide range of political, regulatory, and administrative characteristics, as well as differences in size, budgets, and staff capabilities. This poses a challenge to research program managers trying to engage stakeholders in highway research programs.

Although local and regional agencies own, operate, and maintain the majority of the highway network, only a few agencies are responsible for research to meet their technical and operational needs. Because of limited financial and staff resources, most local and regional agencies rely on state and federal agencies for technical assistance, as well as for procurement procedures, design specifications, and safety and environmental guidelines.

As a result, local agency interest in research is often limited, and local agencies often are slow to adopt new technologies. Yet in one instance, a local agency addressing the poor performance of its pavement became an early adopter of the Superpave® technology (see box).

Technology Transfer Parallels

The innovation process in highway agencies traditionally has focused on technology transfer, technical assistance, and information dissemination. The Inter-

The Federal Highway Administration, TRB, and the American Association of State Highway and Transportation Officials have worked with Local Technical Assistance Program centers, universities, the asphalt industry, paving contractors, and local agency representatives to promote the benefits of Superpave® for local agencies.

Local Lessons from Superpave Implementation

Developed through the Strategic Highway Research Program, Superpave® is an asphalt mix design method that employs a system for grading asphalt cements and that analyzes volumes of aggregates, air voids, and asphalt cement to create a mixture. In the past 10 years, by adopting Superpave as the standard, most states have realized long-term cost savings and advantages in roadway performance.

Many local agencies also are converting to Superpave, because many follow state specifications for pavements. Superpave has altered paving equipment, placement techniques, aggregate production, asphalt binder specifications, testing equipment, methods at asphalt plants, and paving operations, and has affected agencies, suppliers, manufacturers, and consultants. Superpave now dominates the asphalt pavement market.

To meet local agency needs and to overcome the impression that Superpave is designed specifically for Interstate highways and other high-volume roads, the Federal Highway Administration, TRB, and the American Association of State Highway and Transportation Officials are working with the Local Technical Assistance Program centers, universities, the asphalt industry, paving contractors, and local agency representatives to prepare information, guidelines for design, training, and curricula.

The transition by state departments of transportation (DOTs) to Superpave also required similar activities. The education and training are convincing local agencies that the performance benefits and longer life of the pavement outweigh the initial cost increase.

Although most local agencies are reluctant to change, one adopted Superpave while the mix was in development. In the early 1990s, the Albuquerque, New Mexico, Department of Public Works (DPW) addressed the problem of poor pavement performance. Persuaded by information from the Asphalt Institute and pavement researchers, DPW decided to try out Superpave.

Working with the local paving industry, DPW used several street maintenance contracts to assess the effectiveness of Superpave and found the results superior to conventional pavements. An agreement with New Mexico DOT allowed DPW to try its own specifications on pavements built with federal and state funds. After this successful experience as an early implementer of Superpave technology, DPW is assisting other local agencies with advice, information, and technical guidance on implementation projects.

state Highway System introduced many new technologies; in the early years of the program, state departments of transportation (DOTs) relied on the federal highway research program for innovations. With the evolution and growth of state highway research through the State Planning and Research (SP&R) program and the National Cooperative Highway Research Program (NCHRP), state DOTs became more directly involved in research (see box).

Nevertheless, technology transfer (T^2) remains a key element in both federal and state highway research programs, with activities oriented to introducing and implementing a technology. In contrast, private-sector T^2 focuses on developing products, methods, and techniques to establish or strengthen a competitive position (*1*). Highway research programs tend to emphasize the transmission of information and technologies from the research programs to the practitioners, with little attention given to conveying information about research needs and ideas from local stakeholders and practitioners to research program managers.

The panel discussions confirmed similarities in challenges for T^2 and for stakeholder involvement with local and regional agencies. With T^2 activities, some of the challenges stem from public agencies' accountability for the safety, health, and well-being of the population. Codes, regulations, standards, and specifications support this accountability and affect the design, construction, operation, and decommissioning of public works.

Attitudes Toward Research

Reliance on standards and specifications—and a day-to-day focus on operational concerns—creates a risk-averse environment within local and regional agencies, limiting the search for innovative solutions. As a result, the agencies are oriented toward problem solving, with little interest in research or in defining research needs.

The challenges underscore a fundamental issue—the need for effective communications. Participants at the RTCC research symposium considered how well highway research programs are doing in stakeholder involvement and how to engage stakeholders more effectively. Discussion groups on major research topic areas cited the need for improving communications among research programs, researchers, research managers, and implementing agencies, as well as between researchers and state and local decision makers.

The panelists and the questionnaire respondents indicated that local and regional agencies interpret research broadly to include such topics as assessing policy options, identifying and evaluating best practices, describing implementation strategies, and clarifying regulatory guidelines. This confirmed the committee's finding in previous attempts to categorize highway R&T program activities.

In its initial report on highway research programs, the committee noted that state DOT research programs sometimes investigate local or site-specific problems, such as premature pavement or drainage failures. These kinds of activities are consultative, but may lead to new research projects or to T^2 activities (*2*). Some state research programs perform routine acceptance tests on products and materials—technical work that is not research but part of the innovation process.

Outreach Efforts

The panelists representing state research and T^2 programs reported that mechanisms are in place for including local stakeholders in many activities. In most cases, these processes are top-down—that is, state agencies transfer the information to local and regional agencies through training programs, workshops, annual conferences, innovation showcases, face-to-face encounters, and other means.

Several panelists noted that some state agencies send circuit riders to dispense information and assistance on an as-needed basis throughout a region. A long-time feature of rural water associations, circuit

Research Resources Sponsored by States

Beginning with the Highway Act of 1921, Congress has authorized states to use a portion of their highway appropriations for surveys, plans, engineering investigations, and research. With the Surface Transportation Act of 1992, however, this became a requirement—the states must apply to research one-quarter of the State Planning and Research (SP&R) program funds, which in turn represent 2 percent of total highway appropriations. In 2003 the SP&R research funds totaled approximately $125 million.

The National Cooperative Highway Research Program (NCHRP) is a pooled-fund program established in 1962, not long after construction began on the Interstate Highway System. States were encountering similar problems and agreed to pool funds to address the problems through immediate research, avoiding duplication of effort. Each state contributes to the program, is involved in problem identification and project selection, and has opportunities to nominate technical specialists to project review panels. NCHRP funding for 2003 was approximately $30 million.

TTAP's National Tribal Transportation Conference equipment rodeo includes competition to sharpen and develop skills.

riders have proved effective in other small, widely dispersed, rural systems.

Other panelists reported on formal and informal ways for local and regional stakeholders to provide information on research and training needs from the bottom up. States use advisory committees, research forums, annual stakeholder surveys, and awards programs to solicit research and training requests. Participants include elected and appointed officials, as well as agency employees.

A common theme was the continuing challenge of engaging local stakeholders and research end-users in T^2 activities; involvement is much more likely when training or technical assistance is the topic. Some panelists suggested that engaging stakeholders to identify research needs or to participate in research oversight panels would entail similar challenges.

One of the exceptions noted in the panel discussion is the Minnesota Local Road Research Board program, which receives dedicated state funding to address local road issues and has little difficulty in engaging local and regional stakeholders. In conversations with TRB staff, representatives of the Iowa Highway Research Board—the only other dedicated local highway research program—indicated that local and regional agency stakeholders take an active role in identifying research needs and monitoring research progress. These examples suggest that ownership strengthens stakeholder ties to the program, especially when the stakeholders can benefit directly from their contributions (see article, page 4).

Federal and State Links

The state DOT and T^2 panelists, however, maintained that they have strong ties to local and regional stakeholders and are able to understand stakeholder needs through many formal and informal opportunities for interaction and communication. An assessment of how well these ties work in identifying research needs was not possible; however, the association representatives and the responses to the committee's questionnaire confirmed that local stakeholders in small, mostly rural, agencies need information and technical assistance that is highly focused and easily digested.

Federal aid highway program responsibilities link FHWA's division offices directly to state DOTs, but the links to local and regional agencies are fewer. According to panelists, however, some division offices provide technical assistance directly to local and regional agencies and seek information on research needs. Nevertheless, the division offices are unlikely to play a consistent role, because of their overall responsibilities, staff limitations, and the large number of local and regional agencies.

Panelists did not favor a formal federal program of research stakeholder involvement. Because of the differences in organization, operation, and need within each state, a one-size-fits-all approach would not be effective. Instead, many panelists favored continuing federal support for the full range of T^2 activities—especially the LTAP center program—noting that the investment is effective and that federal responsibility is appropriate.

Several panelists identified a need for champions to introduce new technologies in user agencies, echoing a recommendation in the RTCC's 1999 report on T^2 strategies (3). Local stakeholders and end-users, however, are not risk takers and prefer to adopt technologies proved in similar conditions. With limited financial and staff resources, local stakeholders often need incentives, technical assistance, and specialized training before adopting an innovation.

RTCC Sessions on Stakeholder Involvement: Panelists

November 10, 2003, Session

Phil Caruso, *Institute of Transportation Engineers*
Tony Giancola, *National Association of County Engineers*
Carol Estes, *American Public Works Association*
Bob Hicks, *Public Technology, Inc.*
Alex Taft, *Association of Metropolitan Planning Organizations*

March 8, 2004, Session

Gary Allen, *Virginia Transportation Research Council*
Dave Huft, *South Dakota Department of Transportation*
Dave Johnson, *Minnesota Department of Transportation*
Barnie Jones, *Oregon Department of Transportation and Local Technical Assistance Program*
Larry Klepner, *Delaware Local Technical Assistance Program*
Bill Pogash, *Pennsylvania Department of Transportation*
Ed Stellfox, *Maryland Local Technical Assistance Program*

Strategic Partnering

Local and regional stakeholders—elected and appointed officials as well as agency staff—may not be specialists in technology and innovation, but they are likely to be knowledgeable about local politics and budget processes. These considerations may be critical when new technologies not only hold the promise of improving performance or achieving long-term savings but also have higher initial costs and uncertain future benefits.

Early engagement in the innovation process helps these stakeholders gain familiarity with the technology, understand the benefits, and make informed choices. Public officials unfamiliar with the potential or uncertain about the merits are reluctant to accept or adopt an innovative technology.

Panelists suggested that the private sector, technical and professional organizations, and industry-related groups could play a larger role in many phases of research and T^2 programs. More partnering between these groups and highway agencies in areas of common interest and need could leverage limited resources and benefit all. Often such partnerships encounter legal, procurement, institutional, and other impediments, but growing experience in public–private and public–public partnering could suggest new ways to overcome the barriers.

Adapting Models

Research programs in other fields that have many local stakeholders may reveal alternative methods for disseminating research products and for obtaining suggestions for research from local and regional agencies. For example, a recent study by the National Academies (see box, page 10) described how the U.S. Department of Agriculture (USDA) involves a diverse set of stakeholders as the scope of agriculture expands to include public health and nutrition, environmental stewardship, and the social and economic well-being of rural communities (*4*).

Like the stakeholders in highway research programs, USDA's new stakeholders bring unique ideas and insights to the endeavor. USDA is employing a combination of mechanisms to document these ideas and insights, including formal advisory committees, regional workshops, local listening sessions, and *Federal Register* calls for comment. These and other mechanisms used by agencies and organizations with diverse stakeholders could provide highway research programs with additional approaches to stakeholder involvement.

Summary of Findings

Following are summaries of the committee's findings about recruiting and engaging local and regional agency stakeholder involvement in highway research programs:

- Responsibility and decision making for local surface transportation systems varies from state to state and within local and regional transportation agencies. Some state DOTs are responsible for the entire state road system; in other states, local agencies for counties, municipalities, townships, and other jurisdictions have responsibility for portions of the state road network. Transportation planning in metropolitan areas is largely the responsibility of regional organizations. As a result, no individual or group of local or regional agencies emerges as the typical source for identifying and recruiting research program stakeholders.
- LTAP centers—one in each state and Puerto Rico, plus six Tribal Technical Assistance Program centers, jointly funded by FHWA and the state DOTs[1]—are a focal point for information, T^2, and technical assistance to local and regional transportation agencies. The effectiveness of LTAP centers as sources of information about local agency problems—particularly for research program managers—has yet to be explored.
- Advisory boards of some state DOT research programs and of each LTAP center include repre-

[1] In 2003 states could receive up to $140,000 in LTAP funds on a one-to-one matching basis. The American Public Works Association, under contract to FHWA, provides a clearinghouse for information and materials for the LTAP centers and maintains the LTAP website, www.ltapt2.org.

sentatives of local and regional agencies and their associations, and sometimes highway contractors and consultants. These representatives provide the LTAP centers with a unique and direct opportunity to identify and assess the research needs of the agencies within each state.

◆ Many technical, professional, and trade associations have topic-specific technical councils, task forces, and other subgroups that provide useful input directly and indirectly to federal and state DOT highway research programs. Their contributions often reflect local, regional, and state issues. These groups benefit from local and regional stakeholder input and could promote additional involvement.

◆ No single process, technique, or combination will produce stakeholder involvement for every area of research, every agency or group of agencies, or each phase of the innovation process. Stakeholder involvement requires a range of techniques, including road shows or consultation tours; paper or electronic questionnaires; workshops, open houses, and joint planning sessions; contacts through professional or technical organizations; advisory boards, working groups, task forces, or technical councils; and dedicated websites. Therefore each major research program area should develop and implement a stakeholder involvement process tailored to its needs.

◆ Communication—the exchange of ideas and information between people and organizations, as well as making contact, generating interest, and interacting—is a key challenge to research program stakeholder involvement. The experiences of technical, professional, and trade associations and of the LTAP centers in communicating with members and customers via websites, e-mail, e-mail discussion groups, and electronic newsletters can be instructive for improving and expanding communications with stakeholders.

◆ FHWA is preparing research road maps—descriptions of ongoing and planned research program activities, including timetables—that can assist in the local and regional stakeholder involvement process (5). Research road maps provide research managers and researchers, potential users, technical peers, and others with a plan of action and a mechanism for reporting research outcomes. Preparing a research road map is difficult and time consuming, but necessary. Regular updates are easier and provide a focus for communication between research managers and stakeholders.

Practical Research for Local Practitioners

In conjunction with the Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO), TRB conducts many activities to address the needs of local and regional stakeholders in highway research.

Every four years, with guidance from a National Research Council–appointed committee, TRB organizes an international conference on low-volume roads, which are a major responsibility for many local and regional transportation agencies. In addition to FHWA, conference sponsors have included the U.S. Forest Service, the U.S. Department of Agriculture's Office of Transportation, the U.S. Army Corps of Engineers, and the Department of Interior's Bureau of Indian Affairs. Representatives from 28 nations attended the Eighth Low-Volume Roads Conference in 2003, and the 96 technical papers are available in the two-volume *Transportation Research Record: Journal of the Transportation Research Board, No. 1819*.

Several National Cooperative Highway Research Program (NCHRP) projects—funded by the state departments of transportation (DOTs)—have addressed specific needs of local and regional highway agencies. The recently published NCHRP Synthesis 321, *Roadway Safety Tools for Local Agencies,* presents tools and programs to improve road and street safety. Prepared with the assistance of local agency staff, the synthesis is designed to help practitioners at varying levels of experience to develop appropriate and effective highway safety measures.

NCHRP Report 500, *Guidance for Implementation of the AASHTO Strategic Highway Safety Plan,* consists of a multivolume series of guides on implementing highway safety improvements. An effort is under way to consolidate the information in each volume into a format targeted to local and regional agencies, with easy-to-use tools for dealing with particular types of crashes (e.g., run-off-road) or with unsafe driving behavior (e.g., aggressive driving).

Panelists in the symposia sponsored by the Research and Technology Coordinating Committee also advanced the principle that information intended for local and regional agencies should be presented in an easily comprehended format. The communication of information and guidance should be tailored to the limited time and resources of local agencies, several panelists noted.

As sponsors of cooperative research, state DOTs have placed a representative from the National Association of County Engineers on the panel that selects NCHRP projects each year. The appointment recognizes the role of county and local agency engineers in implementing many of the program's research results.

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3. *Special Report 256: Managing Technology Transfer: A Strategy for the Federal Highway Administration.* TRB, National Research Council, Washington, D.C., 1999.
4. *Frontiers in Agricultural Research: Food, Health, Environment, and Communities.* National Research Council, National Academies Press, Washington, D.C., 2003.
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TRB SPECIAL REPORT

Measuring Personal Travel and Goods Movement

A Review of the Bureau of Transportation Statistics' Surveys

JILL WILSON

In the late 1980s, a strategic planning initiative concluded that the transportation data available to the U.S. Department of Transportation (DOT) had major gaps and deficiencies for policy making. The report to the Office of the Secretary noted that the data did not readily support cross-modal, systemwide analyses; that definitions and quality standards varied; and that nationwide data on household travel and on the shipment of goods across modes were out of date (*1*–*2*).

The 1991 Intermodal Surface Transportation Efficiency Act established the Bureau of Transportation Statistics (BTS) within U.S. DOT, as a focal point for the activities necessary to provide high-quality, systemwide transportation data for policy making, planning, and research. The purpose of BTS was to bring greater coordination and comparability to transportation data, to improve quality standards, and to fill gaps in the data.

The Transportation Equity Act for the 21st Century (TEA-21) authorized BTS at an annual funding level of $31 million for 1998 through 2003. In 2001, with reauthorization of TEA-21 impending, BTS asked the National Academies to review the agency's current survey programs in light of (*a*) transportation data needs for policy planning and research and (*b*)

PHOTO: PORT OF LOS ANGELES

The Commodity Flow Survey, conducted by the Bureau of Transportation Statistics and the Census Bureau, is the only federal government data source for comprehensive information on freight flows—an essential tool for public- and private-sector decision makers. (Above, multimodal terminal in Port of Los Angeles.)

the characteristics and functions of an effective statistical agency. In response, the Transportation Research Board and the Committee on National Statistics of the National Academies established a 12-member study committee with expertise in transportation policy and planning, transportation data, and survey methods and statistics (see box, page 31).

The committee reviewed BTS's three major surveys—the National Household Travel Survey (NHTS), the Commodity Flow Survey (CFS), and the Omnibus Survey Program—and issued a letter report on each, providing guidance on approaches for improving future versions. The committee's final report, published as *TRB Special Report 277: Measuring Personal Travel and Goods Movement: A Review of the Bureau of Transportation Statistics' Surveys,* addresses major themes identified in the reviews of the surveys and offers crosscutting guidance on the BTS portfolio of transportation surveys.

Flagship Surveys

BTS's statistics support transportation decision making by all levels of government and by transportation-related associations, private businesses, and consumers. Many of these statistics derive from the agency's flagship surveys—the NHTS and the CFS. These major, multiyear survey programs, with budgets of $10 million to $15 million, serve a broad constituency of organizations and individuals interested in transportation and provide essential data that are not available from other sources.

NHTS

The NHTS is a personal travel survey conducted by BTS, the Federal Highway Administration, and their contractors. Aside from the information on journey-to-work trips reported in the Decennial Census and the American Community Survey, the NHTS is the only national source of information on the typical travel of U.S. residents. The survey provides data on the type and amount of travel; the use of various modes; the time and miles spent traveling for various purposes; ownership and use of the vehicle fleet; and relationships among household composition, life stage, and travel.

The 2001 NHTS data were collected by telephone interviews in two stages. A recruitment interview obtained demographic information and rosters of household members and vehicles. Map and diary packages then were mailed to recruited households to keep track of their travel. The subsequent data-gathering interview obtained information on household travel on a preassigned travel day, as well as on longer-distance travel over a 28-day period.

CFS

The CFS provides information on the flow of goods by mode of transport within the United States. The survey, conducted by BTS and the Census Bureau, gathers data on shipments of goods from a sample of business establishments in selected industries—mining, manufacturing, wholesale trade, and some retail establishments.

Data are provided on tons, miles, ton-miles, value, shipment distance, commodity, and weight. The survey covers all major modes of freight transportation—air, motor carrier, rail, water, and pipeline, as well as intermodal combinations. Despite gaps in shipment and industry coverage, the CFS is the only federal government data source that recognizes the need for comprehensive information on freight flows.

The CFS has been conducted three times—in 1993, 1997, and 2002. For all three editions, data were collected by mail. Survey questionnaires were sent to a sample of establishments drawn from the Census Bureau's Business Register. Respondents reported total outbound shipments and information about the value, weight, commodity, domestic destination or port of exit, and mode or modes of transport for a sample.

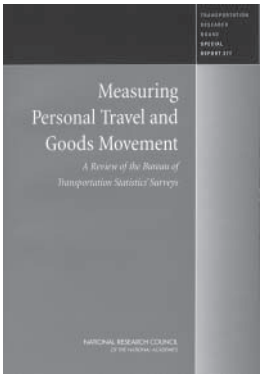
The flagship surveys are essential to BTS's mission of providing statistical information to support transportation decision making. Therefore, the committee's analyses and recommendations focused on opportunities for BTS to improve the two major surveys.

Responding to Users' Needs

To develop cost-effective, high-quality surveys that are responsive to the needs of data users, BTS must communicate effectively with its customers. With a better understanding of the types of questions and analytical problems that users address, BTS could increase the relevance of the data products. Moreover, a dialogue about the agency's development and design of the surveys would allow users to suggest improvements in data concepts, methods, and products.

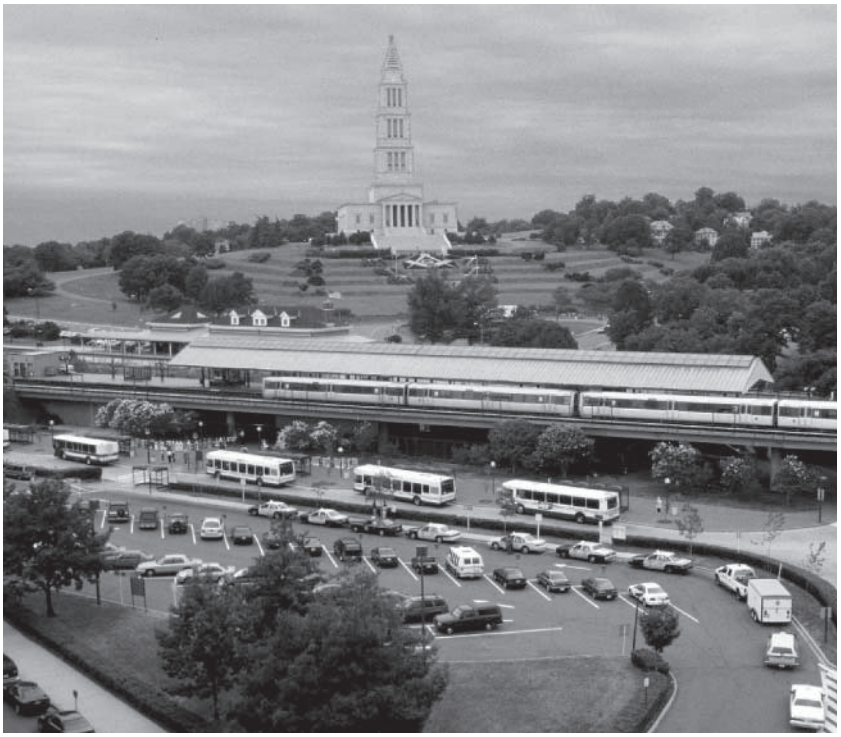
In general, however, BTS's outreach activities for communicating with users of its personal travel and freight surveys have been sporadic. Some initiatives, such as the 1999 conference on the then-proposed NHTS, have been valuable in facilitating discussions of specific issues.[1] Nevertheless, the agency does not have a rigorous, systematic strategy for interacting regularly with its customers.

[1] The 1999 conference, Personal Travel: The Long and Short of It, addressed issues associated with merging the Nationwide Personal Transportation Survey and the American Travel Survey to form the NHTS. Papers from the conference are available on the web in TRB Transportation Research Circular E-C026, http://gulliver.trb.org/publications/circulars/ec026/ec026.pdf



TRB Special Report 277, *Measuring Personal Travel and Goods Movement: A Review of the Bureau of Transportation Statistics' Surveys,* is available from TRB. View the book online, www.TRB.org/publications/sr/sr277.pdf.

PHOTO: WMATA.



The National Household Travel Survey focuses on the typical travel of U.S. residents, including type and amount of travel and use of various modes. (Above, Metrorail station in Alexandria, Virginia, is a personal travel nexus of light rail, buses, automobiles, cycles, and pedestrians.)

BTS's efforts to develop the flagship surveys are complicated by a lack of clearly defined survey objectives. For example, the development of a cost-effective sampling design for the CFS requires a decision about whether the survey should provide data on state-to-state flows in addition to national flows. For transportation surveys in general, parameters such as sample size must be determined on a rational, statistical basis that reflects user requirements for reliable data at specified levels of geographic detail.

Without clear objectives, the statistical foundation to inform the quality, quantity, and cost trade-offs in the survey design is lacking, and the survey scope may be ambiguous. As a result, the available resources may not be used effectively to meet the needs of data users.

Institutional Issues

From a user's perspective, stability is important for the NHTS and the CFS. Users rely on the regular, periodic release of the data products, and expect that the quality and content at the least will match those of preceding surveys. Nonetheless, variations in budgets, along with changes in survey ownership, have threatened to undermine the stability and quality of the flagship personal travel and freight surveys.

Budget variations have led to irregularity in survey frequency and to reductions in sample size. Irregular frequency limits the ability to measure trends, and the reduced sample is likely to have adverse effects on the usability of the data.

Both flagship surveys now are funded and conducted by BTS in conjunction with survey partners.[2] BTS depends on the institutional memory of these partners to provide continuity and to build on experience with previous surveys.

Ensuring the stability and quality of major national surveys such as the NHTS and the CFS requires long-term planning and technical development, as well as a clear and timely commitment by the survey partners to provide the necessary funding. Considering the importance of the flagship surveys to a range of data users, the committee believes that measures are necessary to prevent a repeat of what happened in 2002, when delays in funding eliminated most opportunities to improve the CFS and almost resulted in cancellation.

The purpose of BTS's portfolio of survey programs is to provide transportation data products that meet customer needs, are relevant to policy and investment decisions affecting transportation, and are appropriate to a federal statistical agency. The development of the CFS and the NHTS should be guided not only by statistical considerations but also by a broad understanding of the nation's transportation system and by a sensitivity to related policy issues.

The reviews of the survey programs led the committee to conclude that BTS lacks the balance of expertise to guide the development of data products for informing transportation decision making. A better understanding of transportation issues could have produced a better survey design and better implementation decisions. For example, the reduced budget for the 2002 CFS led to halving the sample size to 50,000. More informed insights into the uses of freight flow data and into the need for reliable data at specific levels of geographic detail could have highlighted the importance of seeking additional funds or investigating creative ways to maintain the sample size at the 1997 level.

Survey Methods

The continuing provision of useful, high-quality survey products requires researching and implementing more effective survey methods. Because of social and technological changes, survey methods that yielded good data 15 or 20 years ago may no longer yield satisfactory results.

[2] The NHTS is funded by BTS, the Federal Highway Administration (FHWA), and the National Highway Traffic Safety Administration, and is conducted by BTS, FHWA, and their contractors. The CFS is funded and conducted by BTS and the Census Bureau.

For example, with consumers deflecting telemarketing calls and with the number of cell-phone-only households growing, the effectiveness of many telephone surveys is reduced. The 41 percent response rate for the 2001 NHTS raises concern because of the potential for significant nonresponse bias in the results.

At the same time, technical developments may offer opportunities for more cost-effective data collection—an important benefit as BTS seeks to fulfill users' data needs despite the pressures on survey budgets. For example, the 2002 CFS data were collected by mail, but the Census Bureau investigated electronic reporting as part of the 2002 Economic Census and plans to provide the option of a web-based questionnaire for the 2007 CFS. This approach can reduce data entry costs, as well as improve data quality through automated editing, which assists respondents in completing the questionnaire.

As a relatively new statistical agency, BTS does not have a tradition of research into survey methods. Nonetheless, many of the methodological issues the agency faces in developing the NHTS and the CFS are common for surveys, and much of the extensive technical literature on survey methodology is pertinent. By leveraging findings on survey methods, BTS can focus its limited research budget on solving particular survey problems and investigating topics specific to transportation surveys.

According to the committee, improvements in the effectiveness of BTS's survey methods could enhance the quality and usefulness of the data products in five main topic areas:

- Response rates for household travel surveys,
- Data collection,
- Sample design,
- Questionnaire development and testing, and
- Data dissemination.

Recommendations

Recommendations 1 through 7 identify actions BTS could take to make the flagship surveys more effective in meeting the needs of a wide range of data users.

1. BTS should continue to conduct and enhance the NHTS and the CFS, its flagship surveys on personal travel and goods movement in the United States.

2. BTS, together with its CFS and NHTS partners, should establish a formal process for (a) eliciting and responding to the needs of the community of data users on a regular basis and (b) consulting these users about key decisions affecting future surveys.

3. BTS should use clear and explicit survey objectives (e.g., scope and scale), developed in conjunction with its survey partners and users, to inform the design and implementation of future editions of the NHTS and the CFS.

4. BTS should establish institutional procedures and long-term financial plans that help ensure the stability and quality of its flagship personal travel and freight surveys.

5. BTS should work with its survey partners to establish a clear understanding of respective roles and to define clear lines of organization and management.

6. BTS should enhance and maintain the transportation expertise of its staff to achieve a balance between statistical and transportation knowledge.

7. BTS should address technical problems associated with its major surveys by making those problems a focus of its applied research program.

Committee to Review the Bureau of Transportation Statistics' Survey Programs

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The author, Senior Program Officer in TRB's Division of Studies and Information Services, served as Study Director for this project.

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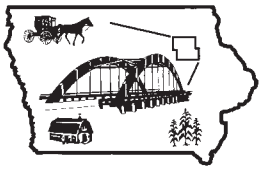

BRIDGE ENGINEERING CENTER

Railroad Flatcars for Low-Volume Bridges

Iowa Counties Adopt Low-Cost Structures

B. P. KEIERLEBER, J. WITT, T. J. WIPF, AND F. W. KLAIBER

Two Iowa countries have adopted a technique that incorporates railroad flatcars in low-volume bridge superstructures.

Keierleber is Buchanan County Engineer, Independence, Iowa; Witt is Winnebago County Engineer, Forest City, Iowa; and Wipf and Klaiber are with the Bridge Engineering Center, Iowa State University, Ames.

A safe and efficient transportation system is essential to the nation's economy. Low-volume roads and bridges carry a substantial portion of the system's traffic and enable the local transportation of goods and services.

Problem

Iowa has the sixth largest number of bridges in the nation. Approximately 81 percent of the 25,000 bridges in Iowa are on secondary roads and are the responsibility of the counties. The state ranks 30th in population, however, which limits the tax base. As a result, Iowa county engineers have insufficient funds to address all of the problems that arise with low-volume bridges.

Solution

To provide Iowa county engineers with low-cost bridges, the Bridge Engineering Center at Iowa State University investigated the feasibility of using railroad flatcars as the superstructure for bridges on low-volume roads. Several characteristics make flatcars desirable for bridge superstructures: flatcars are easy to install, can be used on current or new abutments, are available in various lengths, and are relatively inexpensive.

A feasibility study indicated that properly designed flatcar bridges are capable of supporting Iowa legal loads. To test the constructability, adequacy, and relative economy, two flatcar demonstration bridges were designed and constructed—one in Buchanan County and the other in Winnebago County.

The Buchanan County bridge was constructed as a single span of three adjacent 56-foot-long flatcars supported at each end by reinforced concrete abutments. Reinforced concrete in the substructure allowed for an integral abutment at one end of the bridge and an expansion joint at the other end.

Reinforced concrete beams served as longitudinal connections between the adjacent flatcars and distributed the live loads. A model of this connection beam was tested in the laboratory for flexure and torsion before installation in the field. Guardrails and an asphalt milling driving surface completed the bridge.

The Winnebago County bridge incorporated three 89-foot-long flatcars side by side. Preliminary calculations, however, indicated that the flatcars were not adequate as 89-foot simple spans. Therefore, new steel-capped piers were placed to support the flatcars at the bolsters—that is, where the wheels had been

Testing of Winnebago County Bridge before connecting adjacent flatcars.

located—and abutments supported the flatcars at the ends. The resulting structure consisted of a 66-foot main span with two 10-foot end spans.

The longitudinal connections between the adjacent flatcars, however, were not adequate to support significant loads. As a result, transverse, recycled timber planks were used to distribute live loads effectively across all three flatcars. A gravel driving surface was placed on top of the timber planks, and a guardrail system was installed to complete the bridge.

Strain and deflection data from field tests validated the bridge behavior predicted by the analytical models of each bridge. The engineered flatcar bridges have low live-load stresses and deflections that are below the limits set in the bridge design specifications of the American Association of State Highway and Transportation Officials.

In the Buchanan County and Winnebago County flatcar bridges, the maximum live load plus dead load stresses in the girders were 12,700 and 16,700 pounds per square inch, respectively. The field tests demonstrated that flatcar bridges can support Iowa legal loads.

Application

In the past 3 years, Buchanan County has replaced five bridges with railroad flatcar structures. When possible, the county applies federal bridge replacement funds and uses salvaged materials in the replacement of bridges.

Benefits

Like many other states, Iowa has bridge problems. Research on the use of railroad flatcars has helped Iowa counties address some of the problems. Counties can purchase railcars for a fraction of the cost of steel beams and decking materials.

Winnebago County constructed the 89-foot by 27-foot railroad flatcar bridge at a cost of less than $30 per square foot—a substantial savings from the nearly $70 per square foot for a standard concrete slab bridge in Iowa. The savings for the six flatcar bridges constructed to date exceed the cost of the research.

The Winnebago County bridge is esthetically pleasing and has tested and performed satisfactorily. The project exemplifies the dividends of research for states, cities, and counties.

Criteria now have been established for the selection of structurally adequate flatcars for bridge projects. In addition, design recommendations were developed to simplify the calculation of live-load distribution in the bridges.

The results of this research show that proper flatcar selection, construction, and engineering make flatcar bridges a viable, economical replacement bridge system. A flatcar bridge requires less construction time—approximately one-half to two-thirds the time required to construct a similar-sized slab bridge—and at approximately one-half the cost of a slab bridge.

Completed Winnebago County Bridge.

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EDITOR'S NOTE: Appreciation is expressed to David Beal, Transportation Research Board, for his efforts in developing this article.

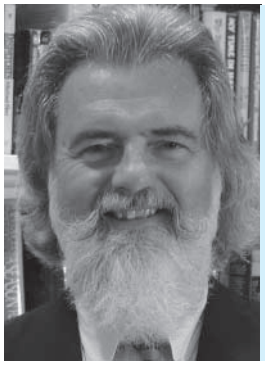
Suggestions for "Research Pays Off" topics are welcome. Contact G. P. Jayaprakash, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001 (telephone 202-334-2952, e-mail gjayaprakash@nas.edu).

Jon E. Burkhardt

Westat

Jon E. Burkhardt is a pioneer in improving access to transportation services for persons with special needs, including the elderly, the disabled, and the working poor. In his 37-year career, Burkhardt has helped to enhance transportation coordination and to shape policy and legislation through his expertise in program evaluation, impact analysis, planning, survey research, and technical assistance. His research projects have addressed topics in housing, neighborhood quality, highway construction, antipoverty programs, health programs, driver safety, and transportation access.

"For too long, we've taken the 'if we build it, they will come' approach to all modes of transportation," Burkhardt contends. "While that may work for as much as 90 percent of the potential clientele, the 10 percent who are left out become severely disadvantaged by their inability to access all the components of modern society. We need to ensure that transportation facilitates, rather than obstructs, the independence that people want and need, because it is more cost-effective for people to be in charge of their lives."



"We need to ensure that transportation facilitates the independence that people want and need."

Burkhardt received a master's degree in city planning from the Massachusetts Institute of Technology (MIT) in 1967, completing his thesis on the mobility of the urban poor. He joined RMC Research Corporation in Bethesda, Maryland, and directed studies on social impacts, access to services, and program evaluation. Soon after, he wrote a winning proposal to study mobility issues facing poor people in rural areas and began a career-long focus on improving services for the transportation disadvantaged.

In 1975, Burkhardt and Armando Lago left RMC to found Ecosometrics, Incorporated, a Bethesda-based research firm that was a leader in specialized transportation planning and analysis until it was purchased in 2000 by Westat, a statistical research and program evaluation corporation headquartered in Rockville, Maryland. With the merger, Burkhardt shelved the office management obligations he had held as Ecosometrics' vice president from 1975 to1995 and as president from 1995 to 1999 to focus on research.

As Senior Study Director with Westat, Burkhardt has concentrated on the needs of seniors and others with special transportation needs by examining their mobility options, measuring the outcomes of service programs, and providing transportation plans for states and localities. He is currently directing a project exploring key transportation coordination issues for the Administration on Aging (AoA), a division in the U.S. Department of Health and Human Services (HHS). The project will develop technical assistance materials that will provide up-to-the-minute information to state and local transportation decision makers for implementing greater levels of transportation coordination in the national aging services network. In 2002 and 2003, he presented testimony to Congress on the economic benefits of coordination and on mobility improvements for America's seniors.

"Regarding caregiving tasks, a key finding is that relatively modest levels of assistance—like the kind of help provided by AoA-sponsored programs—greatly increase the ability of private individuals to care for their loved ones without undue stress," he observes.

Burkhardt also helped improve service programs during his work with Ecosometrics. Over a 14-year period, he adapted and applied the Older Americans Status and Needs Assessment Questionnaire in several localities. In one case, local administrators and political leaders in a Maryland county made immediate and substantial transportation program changes for elderly residents from the results of the surveys.

As the author or lead author of hundreds of research reports, Burkhardt has an interest in the dissemination of research findings. In 1998, he led a highly acclaimed study, Mobility and Independence: Changes and Challenges for Older Drivers, under contract to HHS and the National Highway Traffic Safety Administration.

Burkhardt was the lead author on the nearly 4-year joint HHS–U.S. Department of Transportation effort to produce *Planning Guidelines for Coordinated State and Local Specialized Transportation Services* (2000). Other recently completed works include Transit Cooperative Research Program (TCRP) Report 101, *Toolkit for Rural Community Coordinated Services* (2004); TCRP Report 91, *Economic Benefits of Coordinating Human Service Transportation and Transit Services* (2003); and TCRP Report 82, *Improving Public Transit Options for Older Persons* (2002).

But Burkhardt's involvement with TRB goes beyond the authorship of TCRP reports. He has attended all but one TRB Annual Meeting since 1967, when he participated in an MIT student group presentation on integrated, evolutionary transportation systems for urban areas. Burkhardt is a founding member of the Accessible Transportation and Mobility Committee and the Rural Public and Intercity Bus Transportation Committee, for which he currently serves as chair. In 1980, he received the Pyke Johnson Award as author of the outstanding paper in transportation systems planning and administration, "Residential Dislocation: Costs and Consequences."

"TRB's great strength is that it provides an overall community for many specialized areas of interest, and we achieve much greater progress when we work as a community," Burkhardt states.

Forrest M. Council

University of North Carolina

Forrest M. Council has conducted research into improving the safety of highway drivers, their vehicles, and the roadways. It is work he considers critically important because of the stakes involved—lives and injuries—and because of the limited amount of money dedicated to developing and implementing strategies for safety.

"Unlike road or bridge construction projects, where the public and political bodies depend on the engineer for unique knowledge, many people are sure they know how to solve safety problems," Council observes. "The safety researcher often is in the position of telling people—including legislators and other policy makers—why their pet idea will not work, based on past research, so that safety funds will not be wasted."

In a career spanning 35 years with the University of North Carolina (UNC) Highway Safety Research Center (HSRC),

"A safety researcher must tell people why their pet idea will not work based on past research."

Council has directed projects ranging from motor vehicle injury among specific subpopulations to the identification and strengthening of research methods in roadway safety, which included the development of the Federal Highway Administration's (FHWA) *Accident Research Manual*.

For more than half of his career, Council has served as HSRC's director, deputy director, or interim director. His responsibilities have included the oversight of 25 to 40 projects each year, management of a staff of 30 to 50 employees, budgetary oversight, short- and long-term planning activities, and the acquisition of funding, from proposal preparation to oversight. He was director of the center from 1993 until his retirement in 1999, when he accepted his current position as senior research scientist, to focus on research.

Early in his career, Council conducted research on passenger safety, studying such topics as occupant restraints, child safety seats, and drinking and driving. He then turned his attention to vehicle safety by examining large trucks and the association between vehicle crash-test results and real-world crashes. In the past 15 years, Council has dedicated much of his time to directing the planning, development, and implementation of FHWA's Highway Safety Information System—a nine-state database that captures accident, traffic, and roadway inventory variables for use in FHWA internal and contract research activities.

In the mid-1990s, he coauthored two award-winning research papers that analyzed relationships between accident rates and roadway or median widths. Published in the *Transportation Research Record*, "Association of Median Width and Highway Accident Rates" (1993) and "Accident Relationships of Roadway Widths on Low-Volume Roads" (1994) gained TRB's D. Grant Mickle Award in 1994 and 1995 for the best paper in the area of operation, safety, and maintenance. Council has authored more than 80 articles and reports in publications for TRB, the American Association of State Highway and Transportation Officials, and FHWA, among others.

Council attended North Carolina State University for undergraduate and postgraduate studies. He received a master's degree in 1969 and a doctorate in 1992 in civil engineering, with a traffic engineering specialty and a minor in statistics. In addition to work with HSRC, Council is Adjunct Associate Professor in the Department of Health and Behavior and Health Education and Adjunct Assistant Professor in the Department of City and Regional Planning at UNC–Chapel Hill. He also conducts safety research for BMI-SG, a transportation engineering firm in Vienna, Virginia.

His research activities have led to appointments to several committees and boards. He has served on the board of directors, editorial board, and as chair of the Scientific Program Committee of the Association for the Advancement of Automotive Medicine. He has chaired the FHWA Review Panel on Future Safety Research Needs, along with the TRB Committee on Methodology for Evaluating Highway Improvements and the Committee for the Review of the Federal Motor Carrier Safety Administration's Large Truck Crash Causation Study.

Council has served as a member of several advisory panels for TRB, the National Cooperative Highway Research Program, and the U.S. Department of Transportation that have focused on highway safety research. A highlight for him was a 6-year membership on the TRB Research and Technology Coordinating Committee, which provided an opportunity to interface with researchers and practitioners from fields beyond highway safety.

Council notes that advances in research methods have improved safety research and even have disproved earlier research findings that were considered facts. He is participating in the development of FHWA's Interactive Highway Safety Model, a software program to estimate the number of crashes that will result from changing one possible roadway design to another. The tool will be incorporated into computer-assisted design programs so that a design engineer can receive feedback on safety consequences as well as on cut and fill, cost, and other parameters.

Council advises young researchers to be aware of how the data they are analyzing were collected. He also warns them against "actively advocating for their research programs, because advocacy can affect credibility and produce personal bias."

Iowa State's Mobile Concrete Research Lab enables researchers to perform tests in the field.

Mobile Lab Conducts Concrete Research

The Center for Portland Cement Concrete (PCC) Pavement Technology at Iowa State University has opened a new state-of-the-art Mobile Concrete Research Lab for high-tech concrete testing in the field. Iowa State researchers will use the mobile lab to test samples of plastic concrete during the most critical phase—the first hour—and after the concrete has hardened, to ensure that pavement will last.

"For years I've heard about how laboratory results don't match those in the field," notes Tom Cackler, PCC Center Director. "The lab brings sophisticated testing equipment right to the construction site."

The trailer lab is outfitted with $100,000 of equipment that can perform a comprehensive suite of tests on concrete and concrete materials. The lab includes a weather station, wireless computer with Global Positioning System and data analysis software, sieves to determine coarse and fine aggregate gradations, a microwave oven to determine water-to-cement ratios, penetrometer to test mortar set time, core drill and concrete saw, curing tank, calorimeters to determine the heat signature of mortar and concrete, a 250,000-pound-capacity compression tester to measure compressive and flexural strength development, and an air void analyzer (AVA) to measure the volume and size distribution of tiny air bubbles in concrete.

AVA results, however, can be skewed if wind buffets the trailer. PCC Center engineers, therefore, designed a two-square-foot trapdoor so that the base of the AVA can rest on the ground without touching the trailer.

The first assignment of the lab, which opened in July, was to test the shadow demonstration construction projects for the 16-state Federal Highway Administration (FHWA) pooled-fund study, Material and Construction Optimization for the Prevention of Premature Pavement Distress in Portland Cement Concrete Pavements. The research will produce a manual of practical tests to evaluate concrete properties and provide guidance for troubleshooting.

The American Concrete Pavement Association, state paving associations, and Iowa State University contributed $250,000 to fund the mobile lab.

For more information about the lab, visit www.pcccenter.iastate.edu/research/mobilelab.cfm.

Washington State Ferries Switch to Cleaner Fuels

Washington State Ferries (WSF) is switching its entire fleet to low sulfur diesel fuel by the end of the year. The ferry system also has initiated a trial of ultralow sulfur diesel and biodiesel on two ferry routes. The clean fuel initiatives are expected to improve air quality by reducing the amount of pollutants released in emissions.

"The ferry system is far ahead of other marine fleet operators in addressing diesel emissions," states John Iani, Administrator of the Region 10 Office of the U.S. Environmental Protection Agency (EPA). "We hope they will serve as an example to the rest of the nation."

Compared with other ferry fuels, low sulfur diesel reduces sulfur dioxide emissions by 412 tons, or 90 percent, and particulate matter by 75 tons, 30 percent. The switch to low sulfur fuel will cost WSF less than a penny more per gallon, a total of about $150,000 a year for the entire fleet.

In summer, WSF began conducting a year-long test of ultralow sulfur diesel on the *M/V Elwha* and biodiesel on ferries that operate the "triangle route" between Fauntleroy, Southworth, and Vashon Island near Seattle. The trial runs will help WSF determine the feasibility of converting other vessels in the fleet to cleaner-burning fuels. The sulfur content of ultralow sulfur diesel ranges from 15 to 30 parts per million, compared with about 350 parts per million in low sulfur fuel and 3,500 parts per million in other fuels.

The second pilot project blends 20 percent of biodiesel—a renewable fuel made from virgin or recycled vegetable oils, animal fats, or recycled restaurant greases—with 80 percent of low sulfur petroleum fuel. This mix, called B20, will reduce emissions of particulates and some toxins and is less expensive than 100 percent biodiesel.

The Clean Air Agency and the EPA Region 10 Office are helping to fund the ultralow sulfur diesel test. Seattle City Light will fund the additional cost of the biodiesel test.

For more information, go to www.wsdot.wa.gov/ferries/environment/fuel/.

Washington State Ferries crew member performs emissions testing on the *M/V Rhododendron*. The entire fleet has switched to cleaner diesel or biodiesel fuels to reduce sulfur dioxide emissions.

Transportation Projects Increase Use of Scrap Tires

Stockpiled scrap tires are gaining use in the construction of asphalt roads and highway embankments, according to the Rubber Manufacturers Association (RMA) biennial report, *U.S. Scrap Tire Markets 2003*, released this summer. These scrap tire applications, along with other transportation-related uses in bridge abutments and rail line beds, have reduced stockpiles of scrap tires by nearly 75 percent since 1990. More than 80 percent of the 290 million tires scrapped in 2003 went to an end-use market, compared with just 11 percent of 223 million in 1990.

Ground rubber applications, such as rubber-modified asphalts, consumed more than 28 million tires in 2003, according to the report. Ground rubber in road paving can increase durability, through use in the asphalt rubber binder, seal coat, cap seal spray or joint and crack sealant, or as an aggregate substitution. California, Arizona, Florida, and South Carolina already use a significant amount of rubber-modified asphalt, and Nebraska, Tennessee, Texas, and New Mexico have completed single applications.

"Any large-scale increase in the use of rubber-modified asphalt depends on the willingness of a state department of transportation to accept national test results and begin its own state and local-level programs," RMA noted in the report.

RMA also cited a 41 percent growth in the use of tire shreds in civil engineering projects since 2001. Among the leading applications is tire-derived aggregate (TDA), scrap tires processed to form highway embankments for on and off ramps. In Maine and Minnesota, TDA has become a routine solution for highway embankments constructed on weak, compressible soils, because the tire shreds are lighter than conventional soils and often cheaper than alternative materials.

The new Sabattus, Maine, interchange constructed by the Maine Turnpike Authority in the summer of 2003 used nearly 2 million passenger tire equivalents, processed into TDA, to form the embankment core. California, Pennsylvania, North Carolina, Vermont, and Virginia also have used tire shreds for embankment projects.

Colorado DOT rehabilitated runways at Glenwood Springs Municipal Airport by laying rubber-modified asphalt incorporating 5,000 scrap tires, which reduces community tire disposal problems and may save money on airport pavement rehabilitation.

Meanwhile, Maine, Vermont, and Quebec have used tire shreds to create 6- to 12-inch thick layers of insulation under roads, to keep subgrade soils from freezing throughout the winter. The report found that the high permeability of tire shreds allows excess water to drain from beneath the roads, preventing damage to the road surfaces.

RMA reports that several construction projects have used tire shreds as backfill for walls and bridge abutments. The weight of the tire shreds produces lower horizontal pressure on the wall, allowing thinner, less expensive walls. In addition, tire shreds drain well and provide thermal insulation, eliminating problems with water and frost buildup behind the walls, the report found.

TDA also was used to form vibration damping layers beneath the rail for the new light-rail transit line in San Jose, California. Placed beneath the stone ballast, the TDA reduced vibrations that travel through the ground to adjoining residences and businesses.

To read the full report, go to www.rma.org/getfile.cfm?ID=489&type=publication.

INTERNATIONAL NEWS

Hands-Free Cell Phones Not Safer

Talking on a hands-free mobile phone while driving is not safer than using a handheld phone, according to a recently released report, *Mobile Telephone Simulator Study* by the Swedish National Road and Transport Research Institute (VTI). Researchers concluded that drivers pay less attention to driving while engaged in a telephone conversation, whether using a hands-free or handheld mobile phone.

Test subjects conducted phone conversations, dialed numbers, and read text messages while operating VTI's driving simulator. The report notes that as the phone task became more complex, a "tunnel effect" occurred: the test drivers spent more time searching the central visual area and less time looking at mirrors and instruments. One author concluded that inexperienced drivers paid less attention to the central task of driving and for longer periods when operating the phone than experienced drivers did.

The study found that it is less safe to dial than to talk on a mobile phone. Drivers attempted to compensate for handling the mobile phone by slowing down; however, they had difficulty driving without deviating from a straight course. According to the report, test subjects believed their driving performance was better when using a hands-free phone instead of a handheld one.

To read the report, go to www.vti.se/pdf/reports/M969A.pdf.

Elizabeth Paris, Tax Counsel for the U.S. Senate Finance Committee, and Dawn Levy, Cassidy & Associates, discuss finance provisions in surface transportation legislation during a public meeting of the TRB committee in June.

Committee Examines Fuel Tax Alternatives

The Committee for the Study of the Long-Term Viability of Fuel Taxes for Transportation Finance held its third public meeting in late June at the National Academies' Keck Center, en route to releasing its report on fuel tax alternatives next year. The study will examine the current practices and trends in the finance of roads and public transit and will evaluate options for a long-term transition to alternative finance arrangements from the present system, which relies heavily on fuel taxes. The goals of the study are to

- Assess future revenue-generating prospects of the gas tax, considering developments in fuel prices, automotive technology, and environmental and energy regulations;
- Examine developments in transportation finance policies of federal, state, and local governments;
- Assess implications of finance trends for the performance of the transportation system and whether benefits could be attained through reform;
- Identify alternatives to the present finance scheme and the criteria by which they should be judged—alternatives may include long-term prospects for road pricing and for privatization, as well as immediate measures aimed at reinforcing positive features of the present scheme; and
- Identify institutional and technical obstacles that may hinder needed finance reforms and recommend a transition strategy to new finance arrangements if reform appears necessary.

Joint Summer Meeting Covers Diverse Topics

TRB conducted its 2004 Joint Summer Meeting of the Planning, Economics, Environmental, Finance, Freight, and Management Committees on July 25–27 in Park City, Utah. More than 30 committees met, including several transit and data committees participating for the first time. Subcommittees, task forces, and sections also convened, as did the executive boards of the Policy and Organization, Planning and Environment, and Freight Systems Groups. Total attendance was nearly 300.

Major topics covered in plenary and concurrent sessions reflected the wide range of interests among

SAFETY IDEAS—Medhi Ahmadian (*standing*), Professor of Mechanical Engineering at Virginia Polytechnic and State University, discussed the safety effects of the design of driver seats in large commercial trucks and buses, during the Safety Innovations Deserving Exploratory Analysis (IDEA) Committee meeting in July in Washington, D.C. TRB Senior Program Officer Harvey Berlin (*right*) and committee members offered comments on Ahmadian's air-inflated seat cushion prototype, which adds support to driver seats. The design is intended to reduce fatigue for truck and bus drivers, improving safety.

The Safety IDEA program promotes innovative approaches to improving railroad, intercity bus, and truck safety by supporting applied research and prototype testing in vehicle enhancements, operator performance and alertness, operational practices, and hazard reduction. The Federal Motor Carrier Safety Administration and the Federal Railroad Administration provide funding for the program, to support innovations to further the U.S. Department of Transportation's goals for reducing fatalities and injuries.

For further information, see the IDEA website at www.TRB.org/idea.

the groups and committees. The meeting has expanded as a forum for discussion of crosscutting issues from the disciplines represented.

The opening plenary session on revenue challenges and options drew the largest audience. The session provided federal and state views and ideas about alternative funding sources for the future. Other sessions covered customer relationships with public agencies; the economics of safety; vision planning in a fiscally constrained environment; safety in transportation planning; public- and private-sector views of strategic planning for freight transportation; the financing of highway and rail freight improvements; approaches to value pricing for managed lanes; high-occupancy toll lanes as congestion-management or transportation-financing tools; Minnesota's "Towards Zero Deaths" initiative; and the impacts on trade from U.S.–Ontario border constraints.

Technical Activities Updates: Policy and Organization, Planning and Environment Groups

Following are highlights of the activities of 2 of the 11 Groups in TRB's Technical Activities Division.

Policy and Organization: Sustainability and Road Pricing

Group Chair: Katherine Turnbull, Texas Transportation Institute, Texas A&M University

Conference Discusses Sustainability in Transportation Planning

The Committee for the Symposium on Introducing Sustainability into Surface Transportation Planning, under the auspices of the National Research Council (NRC), conducted a conference on Integrating Sustainability into the Transportation Planning and Policy Process, July 11–13 in Baltimore. Invited participants focused on sustainability and technology, the role of institutions in implementing sustainability tools, sustainability from a policy perspective, and how sustainability affects individual and group behavior.

A volume of conference proceedings will document the presentations and discussions and will reflect committee conclusions and recommendations for the implementation of sustainable practices into the transportation planning and policy process. The proceedings will be available on the TRB website in 2005, after review.

David Greene, Oak Ridge National Laboratory, chaired the committee that organized the conference, which was sponsored by the Federal Highway Administration and the Environmental Protection Agency. The TRB Task Force on Transportation and Sustainability recommended the conference as part of its annual assessment of research needs in its area.

Symposium Examines Road Pricing Strategies

An International Symposium on Road Pricing, held in Key Biscayne, Florida, November 2003, explored U.S. and international applications of road pricing strategies in different governmental and socioeconomic settings. Participants focused on the rationale and motivation for implementing pricing, the factors that affect the political and public acceptance of pricing strategies, the use of pricing revenues, and the outcomes of current projects.

The symposium was well-timed—the first short-term evaluation of London's pricing scheme was released before the meeting. Individuals involved in the implementation and analysis of the London scheme attended the symposium and briefed participants. The conference proceedings, committee conclusions, and recommendations are currently under review and will be available soon on the TRB website.

Steve Heminger, of the San Francisco Bay Area Metropolitan Transportation Commission, chaired the NRC committee that conducted the symposium, which received support from the Florida Department of Transportation, the Federal Highway Administration, and the Organization for Economic Cooperation and Development. The symposium was originally proposed by the Transportation and Economic Development Committee, the Transportation Economics Committee, the Taxation and Finance Committee, the Joint Subcommittee on Pricing, and the Subcommittee on Pricing Outreach.

Planning and Environment: Outreach

Group Chair: Neil Pedersen, Maryland State Highway Administration

The Planning and Environment Group is exploring crosscutting issues and is increasing outreach efforts, recognizing that planning and environment topics affect—or are affected by—every other group in the TRB Technical Activities Division. The Ecology and Transportation Task Force, for example, held a summer meeting with the Environmental Analysis Committee and a subcommittee of the Guided Intercity Transportation Committee. The task force also is planning the biennial International Conference on Ecology and Transportation, in collaboration with other groups, including the Federal Highway Administration, the U.S. Forest Service, the American Association of State Highway and Transportation Officials, and the Humane Society.

The Transportation System Policy, Planning, and Process Section met recently to plan sessions for the 2005 Annual Meeting and beyond. The sessions will cover topics critically important to the seven committees in the section. Several Planning and Environment Group committees, along with representatives from other TRB groups, are assembling a 2005 Annual Meeting session on environmental management systems.

COOPERATIVE RESEARCH PROGRAMS NEWS

Identifying Fuel Tax Evasion to Improve Enforcement

States use tax revenues generated from motor fuel sales to support their transportation systems.

Motor fuel tax funds must be collected, remitted, and credited to the appropriate state highway accounts. Yet allegations of significant evasion of the taxes persist, and the extent and cause of the losses are not fully understood.

To receive their motor fuel taxes in full, states must develop and implement effective enforcement measures. The origin and extent of fuel tax evasion must be determined, therefore, to enable evaluation of appropriate and effective enforcement options.

Battelle Memorial Institute, Pacific Northwest Division, has been awarded a $400,000, 20-month contract [National Cooperative Highway Research Program (NCHRP) Project 19-06, FY 2005] to develop and demonstrate a methodology for identifying and quantifying state fuel tax evasion. This project will provide states with the information necessary for estimating and addressing motor fuel sales tax evasion, so that states can develop and evaluate potential solutions and enforcement options.

For further information, contact Martine Micozzi, TRB (telephone 202-334-3972, e-mail mmicozzi@nas.edu).

Software to Record Impact on Environment

The Transportation Equity Act for the 21st Century requires state departments of transportation, metropolitan planning organizations, and other transportation agencies to reduce the environmental impacts from transportation projects and programs. Transportation decision makers, planners, and practitioners need a comprehensive, integrated software system to collect, organize, and manage environmental data that support technical and policy decisions.

Cambridge Systematics, Inc., has been awarded a $400,000 contract [NCHRP Project 25-23 (02), FY 2005] to design, test, and demonstrate a prototype software program that provides environmental information management to support decisions in long-range planning, priority programming, project development, operations, and maintenance. The firm will apply results from the first phase of the NHCRP project, Environmental Information Management and Decision Support System for Transportation.

For further information, contact Martine Micozzi, TRB (telephone 202-334-3972, e-mail mmicozzi@nas.edu).

Warning Lights for Roadway Equipment

Equipment for construction, maintenance, utility work, and other similar activities operates on all types of roadways, day and night, and in all weather conditions. To improve motorist and work crew safety, equipment must be visible and recognizable. Amber warning lights on equipment alert motorists to potentially hazardous situations. Other color lights help motorists see the equipment—these include combinations of amber, blue, and white lights and other visual warning devices, such as lighted bars, lighted arrow sticks, strobes, light-emitting diodes, and alternating flashers.

The lighting schemes for roadway operations equipment, however, may have evolved without adequate consideration of the impact on motorist awareness and response. Moreover, widely accepted guidelines for selecting warning lights on roadway operations equipment are not readily available. Research is needed to develop guidelines for various types of equipment, weather conditions, day- and night-time operations, color of the vehicle, and other relevant factors.

Virginia Polytechnic Institute and State University, Blacksburg, has received a $300,000, 27-month contract (NCHRP Project 13-2, FY 2004) to develop guidelines for the selection and application of warning lights to improve the recognition of roadway operations equipment. These guidelines will help transportation agency personnel in selecting and procuring lights that will enhance motorist awareness.

For further information contact Amir N. Hanna, TRB (telephone 202-334-1892, e-mail ahanna@nas.edu).

Design and Construction with Self-Consolidating Concrete

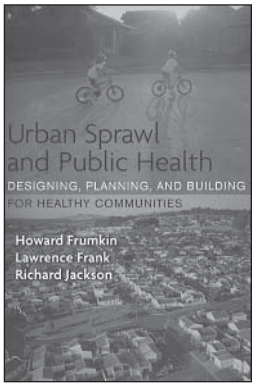
Self-consolidating concrete (SCC) is a specially proportioned hydraulic cement concrete that can flow easily into forms and around reinforcement and prestressing steel without segregation. For the manufacture of precast, prestressed bridge elements, this type of concrete provides the benefits of an increased rate of production, increased safety, reduced labor needs, and lower noise levels at manufacturing plants. Despite the benefits and widespread application in Japan and Europe, SCC has had limited use in the United States because of concerns that its workability, strength development, creep and shrinkage properties, and durability may affect the structural integrity of a bridge.

Research is needed to address the factors that significantly influence the design, constructability, and performance of precast, prestressed bridge elements manufactured with SCC and to develop guidelines for the use of SCC in these applications. University of Sherbrooke of Quebec, Canada, has been awarded a $449,904, 36-month contract (NCHRP Project 18-12, FY 2004) to develop guidelines for the use of SCC in precast, prestressed concrete bridge elements, and to recommend relevant changes to the American Association of State Highway and Transportation Officials' Load and Resistance Factor Design specifications.

For further information contact Amir N. Hanna, TRB (telephone 202-334-1892, e-mail ahanna@nas.edu).

Urban Sprawl and Public Health: Designing, Planning, and Building for Healthy Communities

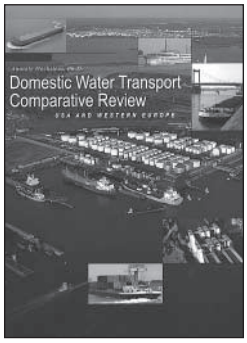
Howard Frumkin, Lawrence Frank, and Richard Jackson. Island Press. Washington, D.C.: 2004; 338 pp.; $60 hardcover, 1-55963-912-1; $30 paperback 1-55963-305-0.



The authors examine the direct and indirect impacts of urban sprawl on human health and well-being and discuss the possibilities for improving public health through alternative approaches to design, land use, and transportation. In their assessment of urban planning, architecture, transportation, community design, and public health, the authors summarize evidence linking adverse health outcomes with sprawling development and outline the challenges of developing policy that promotes and protects public health.

Domestic Water Transport Comparative Review: USA and Western Europe

Anatoly Hochstein. National Ports and Waterways Institute. New Orleans, Louisiana: 2003; 60 pp.; free.



The author discusses major differences in water transportation policy in the United States and Western Europe. He analyzes worldwide trends, the characteristics of inland water transport, policy directions, environmental considerations, policy implementation, and research programs.

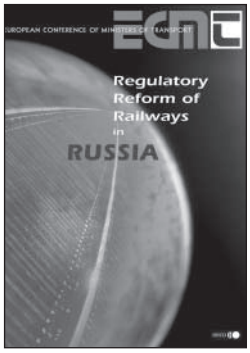
The Handbook of Road Safety Measures

Edited by Rune Elvik, Ann Border Mysen, and Truls Vaa. Elsevier Science Ltd. 2004; 700 pp.; $155 hardcover; 0-08-044091-6.

The handbook contains more than 100 road safety measures that involve highway engineering, traffic control, vehicle design, driver training, public information campaigns, and public enforcement. Elvik, a member of the TRB Committee on Safety, Data Analysis, and Evaluation; Mysen; and Vaa, a TRB affiliate, edited the volume, which contains more than 1,700 road safety evaluation studies summarized in the book.

Regulatory Reform of Railways in Russia

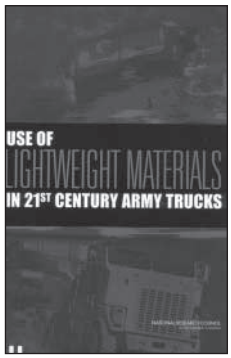
Organisation for Economic Co-operation and Development. Paris, France: 2004; 179 pp.; $53; 92-821-2309-X.



In this report, some of the world's leading experts in rail regulation examine the restructuring of the railway sector in Russia, including tariff reform and the introduction of competition. The work builds on the experience of other member countries represented by the European Conference of Ministers of Transport. Relevant aspects of regulation in Germany, Italy, the United Kingdom, and the European Union are summarized in appendices.

Use of Lightweight Materials in 21st Century Army Trucks

National Research Council. Washington, D.C.: 2003; 112 pp; $26.75 paperback; 0-309-08869-0.



The high fuel consumption of the U.S. Army's truck fleet has taken a financial and logistical toll and limits agility. The National Materials Advisory Board in the Division on Engineering and Physical Sciences produced this report to identify opportunities for research and development on lightweight materials for structural components that are achievable over short, medium, and longer time frames. Programs to retrofit or remanufacture older trucks also are discussed, as are ways to track the age and condition of vehicles and to improve the process of soliciting and procuring bids. The study was sponsored by the U.S. Army Tank-Automotive and Armaments Command.

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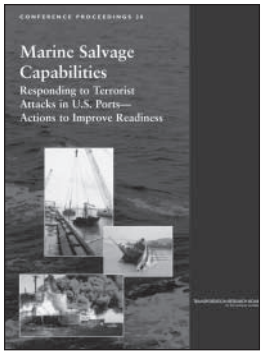
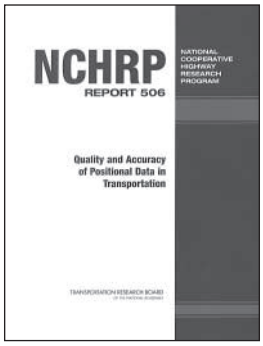
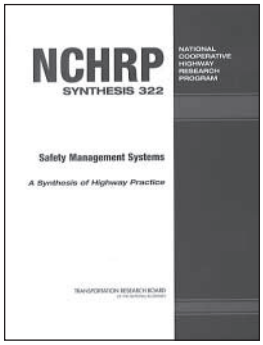






Marine Salvage Capabilities: Responding to Terrorist Attacks in U.S. Ports—Actions to Improve Readiness
Conference Proceedings 30
Are U.S. marine salvage capabilities adequate to respond to terrorist attacks on U.S. seaports? The U.S. Navy increasingly has helped the U.S. Coast Guard maintain homeland security, but since 1994 the number of vessels available for marine salvage has declined, and funding has decreased steadily. Drawing on information from a two-day workshop, the authoring committee suggests ways to remedy deficiencies.

2004; 38 pp.; TRB affiliates, $21.75; nonaffiliates, $29. Subscriber category: operations and safety (IV) and marine transportation (IX).

Quality and Accuracy of Positional Data in Transportation
NCHRP Report 506
This report presents guidance on the use of positional or spatial data in geographic information systems (GIS) for transportation applications. Essential information is provided for practitioners who need to account for the level of precision in GIS-based transportation decision tools.

2003; 98 pp. and CD-ROM; TRB affiliates: $15.50; nonaffiliates: $31. Subscriber category: planning and administration (IA); highway and facility design (IIA).

Guide for Customer-Driven Benchmarking of Maintenance Activities
NCHRP Report 511
Described are ways to evaluate and improve an agency's performance through customer-driven benchmarking, the process of identifying, evaluating, and implementing best practices by comparing the performance of other agencies. Includes *A Primer: Customer-Driven Benchmarking for Highway Maintenance.*

2004; 271 pp. and primer brochure; TRB affiliates, $22.50; nonaffiliates, $30. Subscriber category: planning and administration (IA); maintenance (IIIC).

Accelerated Pavement Testing: Data Guidelines
NCHRP Report 512
Accelerated pavement testing should ensure proper interpretation of data and facilitate use of the data by other agencies. The report promotes the compatibility of data produced by testing at different facilities and provides a means for addressing a common concern—reducing duplication of research efforts.

2003; 47 pp.; TRB affiliates, $14.25; nonaffiliates, $19. Subscriber category: pavement design, management, and performance (IIB); materials and construction (IIIB).

Simple Performance Tester for Superpave Mix Design: First-Article Development and Evaluation
NCHRP Report 513
Research findings are reviewed for developing a practical and economical simple performance tester for routine Superpave® mix design and for characterizing hot-mix asphalt materials in pavement structural design. This phase of the project evaluated first-article simple performance testers from two different manufacturers and found that both units met the requirements of the performance-based purchase specification.

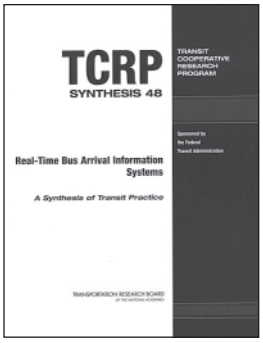
2003; 240 pp.; TRB affiliates, $18; nonaffiliates, $24. Subscriber category: materials and construction (IIIB).

Safety Management Systems
NCHRP Synthesis 322
This report documents the state of the practice for safety management systems (SMS), which assist decision makers in selecting effective strategies for improving the efficiency and safety of transportation systems. An effective SMS addresses the driver, road environment, and vehicle through broad-based prevention and mitigation strategies for engineering, enforcement, education, and emergency services, and it emphasizes cooperation, coordination, and communication among state agencies to improve data collection and analysis.

2003; 42 pp., TRB affiliates, $10.50; nonaffiliates, $14. Subscriber categories: highway operations, capacity, and traffic control (IVA); safety and human performance (IVB).

Recruiting and Retaining Individuals in State Transportation Agencies
NCHRP Synthesis 323
This synthesis reviews recruitment and retention practices and implementation techniques used by state departments of transportation. Effective and less effective programs and practices are identified, and factors affecting recruitment (e.g., unemployment levels and retirement) and retention (e.g., stability, loyalty, and benefits) are discussed.

2003; 59 pp., TRB affiliates, $11.25; nonaffiliates, $15. Subscriber category: planning and administration (IA).



Prefabricated Bridge Elements and Systems to Limit Traffic Disruption During Construction
NCHRP Synthesis 324
Research findings are assessed on the use of prefabricated elements and systems to limit traffic disruption during construction, rehabilitation, widening, or replacement of bridges. Topics examined include system design effort, on-site construction time and cost, closure time, and environmental impact. Practices for railroad bridges, as well as international use of new and innovative prefabricated systems, are covered.

2003; 48 pp., TRB affiliates, $11.25; nonaffiliates, $15. Subscriber categories: bridges, other structures, hydraulics and hydrology (IIC); highway operations, capacity, and traffic control (IVA).

Real-Time Bus Arrival Information Systems
TCRP Synthesis 48
With the deployment of automatic vehicle location (AVL) systems in the late 1980s and 1990s, the transit industry found a better way to monitor and control operations. Agencies soon recognized that data from an AVL system could provide customers with real-time predictions of bus arrivals.

Presenting the state of the practice in real-time bus arrival systems, this synthesis focuses on six key elements: bus system characteristics; real-time bus arrival system characteristics; system prediction, accuracy, and reliability; costs; customer and media reactions; and institutional and organizational issues associated with the system.

2003; 61 pp.; TRB affiliates, $11.25; nonaffiliates, $15. Subscriber category: public transit (VI).

Yield to Bus: State of the Practice
TCRP Synthesis 49
To minimize the impact of bus stops on traffic and to increase passenger safety, traffic engineers generally have encouraged the use of out-of-the-traffic-lane bus stops. With increases in traffic volumes, however, buses are having difficulty merging into traffic and continuing along their routes.

The practices of yield-to-bus (YTB) programs in the four states of California, Florida, Oregon, and Washington, and in British Columbia are investigated in this synthesis. The study covers the legislative processes and history leading to YTB programs; the implementation of YTB programs at transit agencies, including public awareness and education campaigns, employee awareness and training, and the design and location of yield displays on buses; and transit agency experiences with YTB programs, including transit and traffic operational issues, institutional issues, and public acceptance.

2003; 78 pp.; TRB affiliates, $12; nonaffiliates, $16. Subscriber category: Public Transit (VI).

Transportation Planning and Analysis 2003
Transportation Research Record 1858
Research papers examine the development of a new toll mode-choice in Florida, operational performance and decision models for arterial bus lanes, and parking choice models for special events. The impact of e-shopping on personal travel behavior in the Netherlands and the impact of growing public involvement in transportation decision making in Japan are discussed.

2003; 157 pp.; TRB affiliates, $36; nonaffiliates, $48. Subscriber category: planning and administration (IA).

Sustainability and Environmental Concerns in Transportation 2003
Transportation Research Record 1859
Highlighted are Florida's efforts to implement more efficient transportation planning and environmental review, along with the results of state investigation into the effectiveness of in situ noise barriers. Also examined is the Houston QuickRide project that allows two-person carpools to use a high-occupancy vehicle lane during peak periods for a fee.

2003; 116 pp.; TRB affiliates, $33; nonaffiliates, $44. Subscriber category: energy and environment (IB).

Pavement Assessment, Monitoring, and Evaluation 2003
Transportation Research Record 1860
This three-part volume assembles papers on pavement strengths and deformation characteristics, pavement monitoring, and pavement surface properties. Case studies in using the asphalt pavement layer condition assessment program, implementation of automated network-level crack detection processes in Maryland, and the current practice of portland cement concrete pavement texturing are highlighted.

2003; 193 pp.; TRB affiliates, $37.50; nonaffiliates, $50. Subscriber category: pavement design, management, and performance (IIB).

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TRB Meetings
2004

November

16–17 7th Marine Transportation System Research and Technology Coordination Conference
Washington, D.C.
Joedy Cambridge

18–20 Conference for Research on Women's Transportation Issues
Chicago, Illinois
Elaine King, Kimberly Fisher

December

1–3 Conference on Managing Travel for Planned Special Events*
New Orleans, Louisiana

2005

January

9–13 TRB 84th Annual Meeting
Washington, D.C.
Mark Norman, Linda Karson

March

Future Truck and Bus Safety Research Opportunities Conference
Washington, D.C.
Richard Pain

April

24–28 2005 Transportation Planning Applications Conference
Portland, Oregon
Kimberly Fisher

May

1–4 10th International American Society of Civil Engineers Conference on Automated People Movers: Moving to Mainstream*
Orlando, Florida

8–11 International Workshop on Life-Cycle Cost Analysis and Design of Civil Infrastructure Systems*
Cocoa Beach, Florida
Stephen Maher

11–13 Census Data for Transportation Planning: Preparing for the Future
Irvine, California
Tom Palmerlee

22–25 National Roundabout Conference
Vail, Colorado
Richard Pain

June

20–24 7th International Symposium on Utilization of High Strength–High Performance Concrete*
Washington, D.C.
Frederick Hejl

27–30 3rd International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design*
Rockport, Maine
Richard Pain

29–July 2 3rd International Symposium on Highway Geometric Design
Chicago, Illinois
Richard Cunard

July

11–13 Symposium on Stormwater Management for Highways
Florida
Stephen Maher

17–20 6th International Bridge Engineering Conference
Boston, Massachusetts
Stephen Maher

August

13–18 8th International Conference on Concrete Pavements*
Colorado Springs, Colorado

Additional information on TRB conferences and workshops, including calls for abstracts, registration and hotel information, lists of cosponsors, and links to conference websites, is available online (www.TRB.org/trb/calendar). Registration and hotel information usually is available 2 to 3 months in advance. For information, contact the individual listed at 202-334-2934, fax 202-334-2003, or e-mail lkarson@nas.edu/. Meeting listings without TRB staff contacts have direct links from the TRB calendar web page.

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INFORMATION FOR CONTRIBUTORS TO

TR NEWS

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FEATURES are timely articles of interest to transportation professionals, including administrators, planners, researchers, and practitioners in government, academia, and industry. Articles are encouraged on innovations and state-of-the-art practices pertaining to transportation research and development in all modes (highways and bridges, public transit, aviation, rail, and others, such as pipelines, bicycles, pedestrians, etc.) and in all subject areas (planning and administration, design, materials and construction, facility maintenance, traffic control, safety, geology, law, environmental concerns, energy, etc.). Manuscripts should be no longer than 3,000 to 4,000 words (12 to 16 double-spaced, typewritten pages), summarized briefly but thoroughly by an abstract of approximately 60 words. Authors should also provide appropriate and professionally drawn line drawings, charts, or tables, and glossy, black-and-white, high-quality photographs with corresponding captions. Prospective authors are encouraged to submit a summary or outline of a proposed article for preliminary review.

RESEARCH PAYS OFF highlights research projects, studies, demonstrations, and improved methods or processes that provide innovative, cost-effective solutions to important transportation-related problems in all modes, whether they pertain to improved transport of people and goods or provision of better facilities and equipment that permits such transport. Articles should describe cases in which the application of project findings has resulted in benefits to transportation agencies or to the public, or in which substantial benefits are expected. Articles (approximately 750 to 1,000 words) should delineate the problem, research, and benefits, and be accompanied by one or two illustrations that may help readers better understand the article.

NEWS BRIEFS are short (100- to 750-word) items of interest and usually are not attributed to an author. They may be either text or photographic or a combination of both. Line drawings, charts, or tables may be used where appropriate. Articles may be related to construction, administration, planning, design, operations, maintenance, research, legal matters, or applications of special interest. Articles involving brand names or names of manufacturers may be determined to be inappropriate; however, no endorsement by TRB is implied when such information is used. Foreign news articles should describe projects or methods that have universal instead of local application.

POINT OF VIEW is an occasional series of authored opinions on current transportation issues. Articles (1,000 to 2,000 words) may be submitted with appropriate, high-quality illustrations, and are subject to review and editing. Readers are also invited to submit comments on published points of view.

CALENDAR covers (*a*) TRB-sponsored conferences, workshops, and symposia, and (*b*) functions sponsored by other agencies of interest to readers. Because of the lead time required for publication and the 2-month interval between issues, notices of meetings should be submitted at least 4 to 6 months before the event. Due to space limitations, these notices will only appear once.

BOOKSHELF announces publications in the transportation field. Abstracts (100 to 200 words) should include title, author, publisher, address at which publication may be obtained, number of pages, and price. Publishers are invited to submit copies of new publications for announcement, and, on occasion, guest reviews or discussions will be invited.

LETTERS provide readers with the opportunity to comment on the information and views expressed in published articles, TRB activities, or transportation matters in general. All letters must be signed and contain constructive comments. Letters may be edited for style and space considerations.

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