



## TR News March-April 2009: Equity Issues in Financing Transportation

### DETAILS

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# TR NEWS

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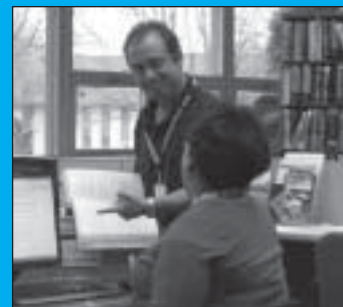
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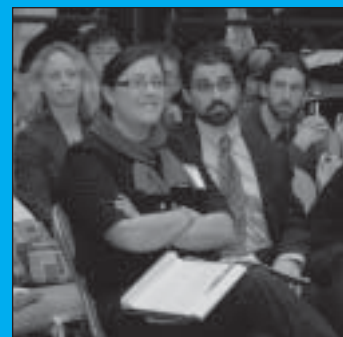
Library services in state departments of transportation and other organizations play a significant role in disseminating new technologies and research findings, leading to improvements in public safety, in freight and passenger movement, and in use of government resources, the authors note. Increased investments are needed to establish and coordinate transportation knowledge management at the federal and state levels.

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# 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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As the nation's capital prepared for the historic inauguration of the 44th U.S. President, nearly 10,000 transportation researchers and officials arrived from throughout the United States and abroad to contribute to, learn from, build on, and participate in the more than 600 sessions, workshops, and events at the TRB 88th Annual Meeting, January 11–15, showcasing research initiatives, results, and applications benefiting all modes.

## 35 NEW TRB SPECIAL REPORT Implementing the Results of the Second Strategic Highway Research Program: Saving Lives, Reducing Congestion, Improving Quality of Life

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Congress authorized the second Strategic Highway Research Program to address pressing concerns about highway transportation and requested a report by early 2009 about promising results from the research and how these results could be implemented. TRB Special Report 296 traces the early program results and outlines steps for implementation to gain the promised benefits in highway safety, renewal, reliability, and capacity.

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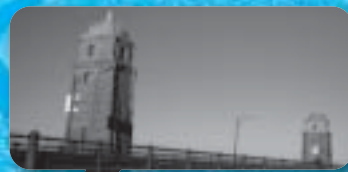
The May–June TR News focuses on transportation and the environment, with the goal of “making it better than before.” Authors from committees in TRB's Environment and Energy Section examine such topics as transportation and environmental sustainability, successes and emerging challenges in air quality management, transportation ecology and wildlife passages, public outreach on the noise impacts from transportation projects, transportation and historic preservation, and more.



California mule deer using wildlife passage to cross below traffic on I-15.

PHOTO: S. ZAHNER, CALTRANS

# The Equity Implications of Financing the Nation's Surface Transportation System



SANDRA ROSENBLOOM

*The author is Professor of Planning, University of Arizona, Tucson, and is a member of the TRB Executive Committee. This article is based on her report synthesizing and commenting on the issues raised at the Executive Committee's policy session on this topic in January 2008.*

**F**inancing the nation's surface transportation infrastructure has never been a more difficult or contentious political issue than it is today. At the federal level, traditional sources of funds—most notably gas taxes—will be insufficient to respond to needs for new infrastructure and for the operation and maintenance of highways and public transit systems. At the local level, in what Goldman and Wachs have called a “quiet revolution” (1), governments have struggled to develop new and different ways of financing transportation.

## New Financing Approaches

Many of the newer financing options under consideration at the federal, state, or local levels involve new taxing and debt instruments, direct charges for transportation services formerly provided free to users, and an active role for private entrepreneurs in the construction and operation of transportation facilities.

To complicate matters, other major policy objectives—such as making the surface transportation system more efficient and effective—are interwoven

with the objective of maintaining sufficient and reliable revenue sources. Many analysts believe that travelers should be charged for creating such burdens as excessive demands for new capacity or for the environmental, health, and congestion costs imposed on other system users and on society.

Users can be charged, for example, by pricing the use of new facilities, by imposing higher fees for traveling on a congested highway, or by taxing cars that are less fuel-efficient. But rarely do all system objectives fully complement one another; more commonly, they conflict. This happens with another major policy objective—creating a fair and equitable transportation system.

On the revenue side, new financing approaches—including the involvement of the private sector—raise questions about whether certain groups will bear a disproportionate share of the burden of paying for transportation services, or if low-income households will be priced out of the transportation system by road tolling and highway user fees.

On the expenditure—or service delivery—side,



Martin Wachs, Director of Transportation, Space, and Technology at the Rand Corporation, noted that among transportation professionals, equity often yields to efficiency and effectiveness.

According to one researcher, traditional transit financing is “mildly progressive,” because the poor use public transit more than the rich do.

questions arise over the equity implications of decisions about transportation infrastructure and operations. These range from concerns that highway expansion has disadvantaged public transit to challenges that new rail systems, which largely serve middle- and higher-income travelers, disadvantage bus services, which serve mostly lower-income travelers.

### Expert Perspectives

Recognizing the complex and interconnected equity issues involved in transportation financing, particularly with newer financing strategies such as public-private partnerships, the Transportation Research Board (TRB) invited four transportation financing experts with diverse perspectives to make presentations to the TRB Executive Committee at the January 2008 Annual Meeting in Washington, D.C.: Jeffrey Buxbaum, Principal of Cambridge Systematics; Martin Wachs, Director of Transportation, Space, and Technology at the Rand Corporation; Peter Rickershauser, Vice President, Network Development, BNSF Railway Company; and Robert Poole, Jr., Director of Transportation Studies, Reason Foundation.

Wachs noted that among transportation professionals, equity often yields to efficiency and effectiveness, even though equity concerns are at the center of public and political debates. At the same time, transportation professionals often see equity challenges as one-dimensional—as the negative impacts of pricing or taxing strategies on poor people. Similarly, it is often assumed that any inequity in highway financing schemes can be handled by funding mass transit services.

Equity, however, is a multidimensional concept, difficult to define, evaluate, or create. This is evident by considering first how economists have tended to

view equity concerns and the newer ways these concerns are being viewed today; and second, by sketching out different definitions of equity and the perspectives they offer on the implications of older and newer strategies for financing surface transportation.

### Evaluating Equity

Economists usually are concerned with distributional impacts—the ultimate incidence, or burden on household income, that a financing mechanism creates. Economists traditionally have focused therefore on the effect that paying taxes or fees has on a household’s income. If a tax takes a greater share of the income of the poor than of the rich, it is regressive; if a tax takes a greater share of the income of the rich, it is progressive. These descriptive labels, however, often have a normative connotation—many taxing policies aim for progressive outcomes and avoid or ameliorate regressive outcomes.

#### Balanced-Budget Incidence

Increasingly, economists and policy analysts are seeking what is called balanced-budget incidence—balancing the impact of revenue collection with the impact of the expenditures made with those funds. The intent is to calculate net costs or benefits to households—although taxes and fees are direct reductions in household income, the assumption is that most government benefits act as indirect additions to the household income of the recipients.

For example, Pucher’s early work on transit financing concluded that traditional ways of paying for public transit were regressive (2, 3). He found, however, that ultimately the financing and delivery system in its entirety was mildly progressive, because the poor used public transit much more than the rich did. He concluded that incidence was sensitive to local service patterns and to the mix of the funding sources that finance public transit. He suggested ways to develop progressive transit policies, largely by expanding transit services for poorer people.

#### Comparative Incidence

Policy analysts increasingly are abandoning isolated analyses of the distributional impact of a tax or fee. In response to controversial policy questions such as road pricing, they are considering the comparative or relative incidence of different ways of financing the same thing. For example, user fees may be regressive—whether evaluated traditionally or in a balanced way—yet they may be less regressive than other ways to finance transportation services, such as sales taxes (4).

A related question, not much studied, is the



extent to which providing a transportation improvement—regardless of its financing—is more equitable than not providing the improvement because of a lack of money. Poole made a similar comment in his presentation.

Expanded highway facilities or less-congested travel options, for example, may have a disproportionately positive effect on poor people or on those with special needs. Some evidence indicates that women in all income groups are more frequent users of the California high-occupancy toll lanes because of severe time constraints in juggling domestic and employment responsibilities. The poor who are not drivers may be helped by expanded highway toll facilities that give priority to public transit or to car-pools; for example, Hispanics are more likely to car-pool to work than others and may find that such facilities substantially improve their commutes. Not surprisingly, questions of balanced budget and comparative incidence have become more topical in the transportation financing debates of the past decade, particularly in addressing different kinds of user fees.

#### **Other Major Equity Issues**

More than 25 separate definitions of equity have been identified in the vast literature on infrastructure finance and service delivery (5–7). All of these concepts or definitions share one overarching characteristic—if adopted, they would advance some interests at the expense of others and give the advantage to some rights or values over others. In the policy debates about transportation financing, these conflicts in focus and objectives are profound.

#### **Traditional Equity Concerns**

The most traditional equity standards are benefits received and ability to pay. Both are centuries-old concepts. Benefits received—sometimes called market-based equity—is the core of the traditional approach to highway financing. The excise tax on gas, tires, and batteries was designed to be an easy proxy for a toll or user fee; the more travelers use the highway system, the more gas and tires and batteries they buy and the more taxes they pay.

The ability-to-pay principle assumes that those who can pay more should pay more. Although not the basis of the gas tax, this standard is the basis of many other taxes, most notably income and property taxes. These two equity principles can conflict; under the current system of federal and state transportation financing, poor people are likely to pay more of their income than the rich do for the privilege of using the nation's highways.

Whether gas taxes are equitable or not, several trends have undermined their viability as proxies for



user fees—for example, owners of cars that are more fuel-efficient or that use alternative fuels pay less because fewer taxed products are consumed. Thus many analysts believe that gas taxes will not be sufficient for current and future needs.

Moreover, the benefits-received approach to financing transportation facilities raises some serious analytical problems—for example, what benefits should a traveler pay for? For which costs should a traveler be charged? What if the value of the benefits received is not equal to the costs? Should a highway user pay a fair share of the construction costs, the operating costs, the costs imposed on other motorists in congested traffic, the health costs imposed on other people through environmental pollution, or the costs of cleaning up the environmental pollution?

Fuel-efficient cars may cause as much destruction to the highway and to parts of the environment as gas guzzlers do; regardless of the size or weight of the car or if the car is environmentally friendly, all drivers impose more costs on the system during congested or peak periods. A fee set high enough to cover costs—however the costs are defined—may price too many people out of the system; alternatively, the costs may be too low to change behavior in the desired ways. One financing scheme or set of charges clearly may not meet all policy objectives.

The United States is likely to move beyond gas

Some evidence indicates that women in all income groups are more frequent users of the California high-occupancy toll lanes because of severe time constraints in juggling domestic and employment responsibilities.



Robert Poole, Jr., Director of Transportation Studies, Reason Foundation, commented that providing a transportation improvement may be more equitable than not providing it because of a lack of funds.

The excise tax on gas, tires, and batteries was designed as a proxy for a toll or user fee; the more travelers use the highway system, the more gas, tires, and batteries they buy and the more taxes they pay.



taxes in the coming decade at the federal and state levels and already has made the transition at the local level. To what extent, then, should a benefits-received standard continue to be applied in lieu of an ability-to-pay standard as new financing schemes are developed? Is it equitable to charge lower-income people the same price for the benefits they receive from the highway system, or for the costs they create for the system?

If people are charged more—or at all—for traveling by car at a congested time, is the assumption that all people have equal freedom to live and work in transit-rich areas or to avoid automobile travel or peak-period travel? How many poor workers can choose their hours of employment or even their home or job locations?

Many analysts believe that gas taxes will not be sufficient for current and future needs.



If they cannot make these choices, they may be unable to use either alternatives to the car or non-tolled highways. They may have to pay more for their use of the roadways, either relatively or absolutely, than wealthier travelers who have the flexibility to choose their homes or travel modes or hours of travel—or to pay the charge.

## Additional Equity Definitions

In addition to the historical or traditional definitions of equity, other definitions have captured the public imagination or are beginning to emerge in discussions about financing, such as modal equity, inter-jurisdictional equity, and intergenerational equity.

### *Modal Equity*

Modal equity is an important but controversial concept, usually raised in the context of the unfair financial advantage said to be given to highways over transit now and in the past.

Yet in some ways, federal funding gives a substantial advantage to public transit, with a per capita subsidy that is higher in both absolute and relative terms. That is, highway users pay a substantially larger percentage of the costs of highway service than transit users pay of transit system costs—nevertheless, many highway users are also poor, and many transit users are not.

Moreover, most economists would argue that transit systems have no rights—only people have rights. The other definitions of equity would measure people's rights to more or improved transit service; therefore fashioning a new equity definition may not be necessary—although the concept receives substantial traction in policy debates.

### *Intramodal Equity*

Intramodal equity is concerned with the distribution of funds between various transit services, as well as among different highway users—whether in terms of benefits received or income distribution. Urban highway users are commonly thought to subsidize rural users, and off-peak users to subsidize peak travelers. In general, this is true for public transit users also—central city transit riders subsidize suburban riders, especially in communities with flat fares, and off-peak transit users generally subsidize peak-period users.

The intramodal equity issues in public transit related to expenditures for rail versus those for buses, however, may be more significant. The average subsidy to a rail passenger is substantially higher than the average subsidy to a bus passenger, sometimes by many orders of magnitude—mostly because of the higher capital costs (8). For example, a 1992 study



found that the average subsidy per bus trip in Los Angeles was \$1.17, but the average subsidy for a rail commuter was more than \$21 per trip (9).

All data show that bus riders are much more likely to be poor, minority, and female, while rail riders are much more likely to be wealthy, white, and male (10–13). Subsidizing transit service may have other goals, such as encouraging choice riders to use public transit; this example, however, suggests that the equity impacts of transit funding strategies are not clear-cut or obvious.

That some transit expenditures and services provide few or no services for the poor or disadvantaged is important in any discussion of transportation financing equity. The questions go beyond the comparative equity of decisions about transit infrastructure and service. Because analysts often argue that regressivity in highway financing strategies can be offset by transit expenditures, understanding the conditions in which that holds true is fundamental.

Providing additional transit services addresses regressivity in highway financing only if and when the transit services are geared to, and used by, those who are affected unfairly by highway financing techniques, whether road tolls, higher general sales taxes, or another financing tool. A commuter who must pay tolls but has no viable option for commuting via transit is not helped if the increased transit services do not reach his or her community or employment location or operate during the hours he or she works. Many people in the United States live in low-density suburban areas—highway financing strategies that use public transit to offset inequities may not extend a viable transit option to the majority of travelers.

#### **Interjurisdictional Equity**

These equity discussions hint at another important

dimension of service equity—where travelers live—something that is arguably as important as how much money they make (14). As Buxbaum noted, geographic equity is important in assessing financing schemes in general and public–private partnerships in particular.

Transportation raises questions about the spatial distribution of costs and benefits, including inter-jurisdictional equity. Because the tax bases of jurisdictions differ, people living close to one another in otherwise similar communities may have different levels of highway and transit service. The differences, moreover, may not be in proportion to differences in the taxes they pay.

For example, a jurisdiction with substantial commercial or industrial properties may have lower household property taxes than a neighboring city but still generate more resources to spend on highways, cycling facilities, pedestrian amenities, public transit services, and paratransit systems. Conversely, people living in communities with limited tax bases may have higher absolute tax burdens, even if they are poorer, while receiving fewer transportation services and lower-quality facilities.

#### **Intergenerational Equity**

Intergenerational equity is the idea that one generation should not be burdened or advantaged unfairly by the actions of another generation; this concept is central to discussions of infrastructure debt. Borrowing to build a long-lived facility—such as a highway or light rail system—is often defended on the grounds that if current users paid the full price of building the facilities, they would be leaving a free gift to future generations.

Paying off debt over the useful life of a facility spreads the cost over generations of users. A problem

Regardless of the size or weight of the car or if the car is environmentally friendly, all drivers impose more costs on the system during congested or peak periods.

Jeffrey Buxbaum, Principal of Cambridge Systematics, Inc., noted that geographic equity is important in assessing financing schemes in general and public–private partnerships in particular.





The average subsidy to a rail passenger is substantially higher than the average subsidy to a bus passenger, mostly because of the higher capital costs.



can arise, however, if the debt is not soundly capitalized, or if the expected sources of revenue to pay off the original debt do not materialize. Then current or future taxpayers may be hit with substantial debt, far in excess of any benefits they are receiving.

In the past, many state and local government long-term debts were repaid with general revenue, such as property and sales taxes—that is, they were general obligation bonds. Today, however, more than two-thirds of state and local government long-term debt is in the form of revenue bonds, which are to be repaid with anticipated future revenue, such as tolls or fares.

The growing use of public-private partnerships and innovative highway financing techniques based on predictions of the ridership or use of proposed facilities may become a crucial equity issue. The security behind revenue bonds is anticipated revenue; if that revenue does not materialize, bond holders technically have no recourse. Instead, the cities and states that issued the bonds often step in to rescue the revenue bonds, creating additional burdens for future generations of taxpayers. Future generations therefore may be forced to assume a larger share of the costs of financing a facility than is fair, given their use of the facility.

What happens to the facility if future revenues prove insufficient to cover operating costs, as well as debt service? A 2006 TRB study of toll roads financed with bonds found that almost all had overestimated use, often by huge margins (15). Even years after the issue of the bonds, the annual trip projections—frequently modified downward in response to actual travel demand—were still off the mark (16). There-

fore the potential impact on intergenerational equity should be questioned for any financing mechanism based on revenue projections.

What is crucial is not the type of debt instrument but how the debt is repaid. Bonds repaid with general revenue—often with property and general sales taxes—have different equity implications from those repaid only with dedicated sales taxes, and yet different implications from those repaid only with user fees or congestion charges. In short, the equity of various ways of covering debt service—many of which are similar—should be discussed first; and then the focus can turn to any attributes of the various debt instruments that create differences in who pays, how much, when, and how often, or in the levels of service provided.

### Public-Private Partnerships

Another key focus of the financing debates is the involvement of the entrepreneurial sector in public-private partnerships. All of the presenters at the TRB Executive Committee session spent time on these issues. Although complicated and sometimes seemingly new, most of these partnerships depend on specific financing techniques that can be analyzed in the same way as any other financing techniques. That is, instead of assuming major equity differences between private and public toll roads or high-occupancy toll lanes or concession schemes, the underlying financing tools should be evaluated.

Road tolls imposed by a private entity, for example, look to the user exactly like road tolls imposed by the public sector. The operator of the toll facilities—the public sector, the private sector, or a pub-

lic-private partnership—makes a difference in equity only if ownership and operational differences affect the magnitude of the tolls imposed, the users on whom they would be levied, or the level of service provided.

Rickershauser reiterated a longstanding argument that the private sector should play a greater role because of the ability to make operational decisions more quickly and more responsively to customer needs and to find innovative and cost-effective ways of delivering services. But critics argue that private ownership or operation creates equity concerns, because the private sector may be able to increase fares more easily than the public sector, or it may do so in ways that are less than transparent, or it may diminish levels of service, or maintenance, or safety to meet profit expectations. These are contentious issues that go far beyond questions of equity.

## Research Needs

Understanding and evaluating the equity of alternative means of financing the nation's surface transportation system are challenges at all levels of government. To address these issues, research is needed to

- ◆ Identify, synthesize, and evaluate what is known about the incidence—that is, the impact on household income—and other equity impacts of current and alternative financing strategies by level of government and by mode;

- ◆ Identify, synthesize, and evaluate what is known about the incidence and other equity impacts of infrastructure and service delivery patterns by level of government and by mode;

- ◆ Suggest alternative financing or policy initiatives to achieve the same objectives with fewer equity implications or to redress the unintended equity impacts of otherwise promising financing or policy approaches; and

- ◆ Identify additional research needed to address unexplored or unanswered questions about key equity issues in the funding, planning, construction, maintenance, and operation of the nation's surface transportation system.

The TRB Executive Committee decided that more time and effort were needed to understand the complexity of equity issues in financing the nation's surface transportation system. The Executive Committee proposed the creation of a National Research Council-appointed Committee on Equity Implications of Alternative Transportation Finance Mechanisms. Chaired by Joseph L. Schofer of Northwestern University, the committee began its work in late 2008.

## References

1. Goldman, T., and M. Wachs. A Quiet Revolution in Transportation Finance: The Rise of Local Option Transportation Taxes. *Transportation Quarterly*, 57 (1): 19–32 (2003).
2. Pucher, J. Equity in Transit Financing. *Journal of the American Institute of Planners*, 47 (4): 387–407 (1981).
3. Pucher, J., and I. Hirschman. Distribution of Transit Tax Burden in Five U.S. Metropolitan Areas. *Transportation*, 11: 3–28 (1982).
4. Schweitzer, L., and Taylor, B. D. Just Pricing: The Distributional Effects of Congestion Pricing and Sales Taxes. *Transportation: Planning, Policy, Research, Practice*, 35 (6): 797–812 (2008).
5. Duthie, J., K. Cervenka, and S. T. Waller. Environmental Justice Analysis: Challenges for Metropolitan Planning. In *Transportation Research Record: Journal of the Transportation Research Board*, No. 2013, Transportation Research Board of the National Academies, Washington, D.C., 2008, pp. 8–12.
6. Lucy, W. Equity and Planning for Local Services. *Journal of the American Institute of Planners*, 44 (1): 447–457 (1981).
7. Lucy, W. Equity Planning for Infrastructure: Applications. In *Public Infrastructure Planning and Management* (J. M. Stein, ed.), Sage Publications, 1988.
8. Ward, B. *Case Studies in Environmental Justice and Public Transit: Title VI Reporting*. University of South Florida, Florida Department of Transportation, 2005.
9. Garcia, R. Mean Streets: Transportation Equity Improves Social Justice, Economic Vitality, and Environmental Quality. *Forum for Applied Research and Public Policy*, 2000.
10. Mann, E. Confronting Transit Racism in Los Angeles. In *Just Transportation: Dismantling Race and Class Barriers in Mobility* (R. D. Bullard and G. Johnson, eds.), New Society Publishers, Gabriola Island, British Columbia, Canada, 1997.
11. Sanchez, T. W., R. Stolz, and J. S. Ma. *Moving to Equity; Addressing the Inequitable Effects of Transportation Projects on Minorities*. Joint report of the Center for Community Change and the Harvard Civil Rights Project, 2003. [www.civilrightsproject.harvard.edu/research/transportation/MovingtoEquity.pdf](http://www.civilrightsproject.harvard.edu/research/transportation/MovingtoEquity.pdf).
12. Bullard, R. D., G. S. Johnson, and A. O. Torres. Dismantling Transit Racism in Metro Atlanta. In *Highway Robbery; Transportation Racism and New Routes to Equity* (R. D. Bullard, G. S. Johnson, and A. O. Torres, eds.), South End Press, Cambridge, Mass., 2003.
13. Cohen, S., and J. Hobson. Transportation Choices in the San Francisco Bay Area. In *Highway Robbery; Transportation Racism and New Routes to Equity* (R. D. Bullard, G. S. Johnson, and A. O. Torres, eds.), South End Press, Cambridge, Mass., 2003.
14. Ungemah, D. H. This Land Is Your Land, This Land Is My Land: Addressing Equity and Fairness in Tolling and Pricing. In *Transportation Research Record: Journal of the Transportation Research Board*, No. 2013, Transportation Research Board of the National Academies, Washington, D.C., 2008, pp. 13–20.
15. *TRB Special Report 285: the Fuel Tax and Alternatives for Transportation Funding*. Transportation Research Board of the National Academies, Washington, D.C., 2006.
16. Kriger, P., S. Shiu, and S. Naylor. *NCHRP Synthesis 364: Estimating Toll Road Demand and Revenue*. Transportation Research Board of the National Academies, Washington, D.C., 2006.



Peter Rickershauser, Vice President, Network Development, BNSF Railway Company, pointed out that the private sector can make operational decisions quickly and responsively to customer needs and can find innovative and cost-effective ways of delivering services.

# Libraries in a Digital Age

## *An Essential Resource for Research and Information*

RITA EVANS

*The author is Librarian, Institute of Transportation Studies, University of California, Berkeley, and is Secretary of the TRB Library and Information Science for Transportation Committee.*

A transportation planner embarking on a new project employs Google to search for documents about transit-oriented development. She reads some useful entries on smart growth and new urbanism in Wikipedia. She accesses online business statistics from the U.S. Census Bureau's American FactFinder web page. With all of these tools at her desktop, why would this planner also make an appointment with her agency's librarian?

The journey on the information superhighway may be well under way, but some traditional approaches still can yield valuable and unexpected results. Professional librarians or information specialists have expertise in identifying, locating, acquiring, and synthesizing information that goes far beyond searching Google or checking a reference in Wikipedia.

### A Librarian's Resources

To begin, the librarian can assist in defining the information need. For example, the transportation planner approached the librarian for resources on transit-oriented development.

"What aspect of development are you interested in?" the librarian asked, initiating an information interview to help define the search. "Are you looking at planning and community involvement? Housing mixes that work? The role of retail? The typical vacancy rates in the first year?"

The librarian's questions helped the planner focus her search. She was seeking examples of successful types of small retailers and service providers in transit-oriented locations. She wanted a clear idea of who was likely to purchase homes near transit. The planner recognized that, in addition to published sources, she would need to supplement her research with data on commuting patterns and home sales.

Gaining access to experts is another benefit of consulting with a librarian. Having worked with similar questions in the past, the librarian was able to recommend a statistics expert at the local planning organization who could assist in locating and compiling data from the census and area surveys. The librarian also called the planning organization's library, which set aside several printed reports from their collection for the planner to review.

Expertise in working with information tools such as catalogs and indexes is part of the librarian's repertoire. The librarian showed the planner different ways to search the WorldCat catalog, including use of the Library of Congress subject headings. In addition to transit-oriented development, the librarian suggested other relevant subject terms, such as real estate development, land use, and mixed-use development.

The librarian suggested searching the Transportation Research Information Services (TRIS), the primary bibliographic database for transportation research. A quick search for transit-oriented development turned up more than 600 articles and reports. Specifying that the term had to be used in the Transportation Research Thesaurus (TRT)—the controlled vocabulary for transportation research—cut the search results by half. Adding the term "housing"



narrowed the search further, and TRIS showed approximately 25 articles on transit-oriented development and housing from the past 5 years.

Knowing how to find the source material quickly is another task at which librarians excel. Many of the items found in the TRIS search were available in full text online, but a dissertation, several journal articles, and a book were not. The librarian found the book and articles in the library's catalog and signed them out to the planner. The librarian also ordered an electronic copy of the dissertation, which was delivered to the planner's in-box later that day.

The planner's investment of time in a visit to the library provided the following benefits:

- ◆ A clear definition of the information need;
- ◆ Referral to a subject expert;
- ◆ Access to material in a specialized collection outside the organization;
- ◆ Insight into how a particular data set is compiled and why it may be unavailable;
- ◆ Expert assistance in identifying useful sources of information;



PHOTO: WISCONSIN DOT

- ◆ Instruction on making the best use of resources to uncover information; and
- ◆ Valuable print material with information not available online.

Wisconsin DOT Librarian John Cherney assists a staff transportation practitioner in locating information vital to a project.

These results are considerably different from those obtained via Google and Wikipedia.

### Defining the Information Need

One of the most valuable services a librarian can provide to any information seeker is assistance in clearly

## The Argument for Libraries *Anecdotal Evidence*

MAGGIE SACCO

### Librarians Deliver Needed Information Quickly

An engineer at the Minnesota Department of Transportation (DOT) came to the library reference desk after spending 2 hours searching the Internet for the BTU energy content of various fuels. The librarian was able to produce the information in 2 minutes from a table on the U.S. Energy Department's website.

### Librarians Save Organizations Time and Money

An internal customer at Wisconsin DOT was about to solicit a request for proposals on a \$50,000 project to determine the demerit points and administrative license withdrawal systems used by other states. Librarian John Cherney not only had the National Highway Traffic Safety Administration study on the topic on the shelf but was able to deliver it to the general counsel's office within 15 minutes of receiving the request.

### Libraries Ensure Smart Use of Taxpayers' Money

A bridge hydraulics engineer at Kansas DOT noted, "The Kansas DOT Library has been an indispensable resource that I have used often over the past few years. Without it, I would have spent hours looking for articles, visiting local libraries, making phone calls, and waiting on faxes or mail. This has meant not only better-informed decisions by staff

engineers, but an actual savings to the taxpayers in the state of Kansas."

### Library Services Add Depth and Value to Research

When Research Engineer John Siekmeier of the Minnesota DOT Office of Materials needs to find an obscure technical paper or an author, he contacts the library; staff members handle his frequent requests with ease. He also values their network of expert resources: "Being able to contact authors allows me to pursue issues in greater depth, gain added context, and possibly establish a working relationship," Siekmeier observes.

### One-of-a-Kind Resources in Transportation Libraries

Late one afternoon shortly before Christmas 2001, Minnesota DOT Librarian Jerry Baldwin received a phone call from a librarian in the Executive Office of the President. An adviser was doing research critical for policy after the terrorist attacks of September 11 and immediately needed an item held only in the Minnesota DOT Library: *Values of Life and Time Implied by Motorist Use of Protection Equipment*, by Glenn Blomquist and Ted Miller, circa 1990.

*The author is Library and Information Services Consultant, CTC & Associates LLC, Madison, Wisconsin.*



defining an information need. In the example, the planner thought that transit-oriented development was a well-defined topic when she started, but she was not looking for everything on that subject.

The librarian's carefully framed questions focused the query on specific aspects and types of information. First, the scope of the inquiry was narrowed, and relevant subtopics were identified. Then the types of information that were likely to fill the need were identified. In this case, published technical reports and articles about retail and housing for transit-oriented development could be supplemented with statistics.

### Connections to Experts

Searching for information in publications and on websites is a logical approach for many inquiries, but speaking with experts may uncover information not otherwise accessible. An agency may have unpublished data or a collection of photographs that is exactly what is needed, but these cannot be found without help. Being directed to additional experts also may benefit. A librarian who has worked with professionals specializing in many aspects of transportation often can recommend or locate someone with the expertise, saving valuable time and expense.

Just as librarians are familiar with the experts in many areas, they also know which institutions and libraries are likely to specialize in specific types of research and resources. Librarians know when it makes sense to go beyond the resources that are locally available. They are familiar with the policies of other collections and often have established a working relationship with counterparts, which can make for smoother access.

### Invisible Data

Imagining how much information lurks beyond routine web searches is difficult, but librarians are aware that the so-called deep web may be 500 times bigger than the web that is revealed through search engines. Available are statistics, scholarly articles, and other types of information generally accessed through databases.

The librarian may direct an aviation planner looking for statistics on airline fuel consumption and prices, for example, to the Air Transport Association's website for statistics and links to information about specific airlines. The librarian also may suggest following the links to government sources of information, leading the user to a wealth of data from the Energy Information Administration.

Federated searches offer another approach to unlocking the deep web. The librarian may direct a bridge engineer looking for comparative data on seis-

mic design to the Earthquake Engineering Research Center's site, which quickly identifies five sets of ground motion data.

A researcher looking into alternative fuels may be overwhelmed by the number of potential sites and concerned about missing essential information; an information specialist can refer the researcher to a website such as Science.gov, designed to make government science and research results readily findable. With a single search, the researcher could access more than 1,800 scientific websites.

### Interdisciplinary Approach

Librarians are professionals at using tools to find information. Many transportation researchers know to search TRB's TRIS database for citations to journal articles, technical reports, conference papers, and more. With approximately 700,000 records, TRIS is the primary resource for transportation information.

Searching similar databases in related disciplines often is useful. A wealth of other catalogs and indexes is available; choosing appropriate starting points can be daunting, but librarians quickly can determine the best resources. Someone investigating road rage and driver psychology, for example, may search PsycINFO; an engineer researching vehicle infrastructure integration may consult Inspec for in-depth coverage of journals and conferences about electronics.

### Authoritative Sources

Wikipedia is only a starting point, an easy, quick way to gain a general description of a topic. Librarians are trained to assess the reliability of information sources and will direct users to high-quality, proven sources, not necessarily to the websites that are most easily accessed. Librarians consider the website's sources and producers; they recognize when a researcher should search for scholarly journals and conference materials; and they can determine when to spend money to conduct a search in a commercial database to access peer-reviewed journal articles.

This type of assistance may direct the habitual Google user to the Google Meta Transportation site, approximately 900 websites, selected by librarians, from government agencies, transit organizations, universities, and other trusted sources. Other strategies may be to limit the search to .edu web addresses or to use Google Scholar.

### Applying the Tools

Finding the right sources, however, may not be enough. Knowing how to query the system effectively is key. This may involve knowing how to construct a search statement, how to look for plurals and variations in a word—for example, looking for any

word with the root “transport”—or how to use the controlled vocabulary for a given discipline.

In the example search in TRIS, the librarian knew that using terms from the TRT could add precision, producing a smaller number of more relevant hits. Librarians often can extract information from less-than-user-friendly databases or websites.

## Website Changes

An engineer assigned to review recent developments in incident management had performed a search on a similar topic 5 years ago using the Partners for Advanced Transit and Highways (PATH) database. The database focused on intelligent transportation systems, and because the search results were good, the engineer decided to start his search there. He searched a while in a database with a similar name but was not able to locate the database he remembered.

The librarian, however, knew that the PATH database had been discontinued, but that similar information now was indexed in TRIS, which contains all of the previous PATH database records. The librarian directed the engineer to TRIS and suggested several

search terms after consulting the TRT.

Familiarity not only with resources but with their providers and their history is another asset that librarians offer. A librarian may direct a planner to a particularly relevant data set from the 2000 Census Transportation Planning Package, for example, recognizing that the large sample size means the data are reliable.

## Consult Your Librarian

A librarian or information specialist is an expert in the tools, resources, and access points to all types of information. Although a researcher may be able to find similar information, knowledgeable library professionals are likely to direct the researcher to resources not otherwise found, with an efficient use of time.

Just as a financial professional brings expertise to improve a project’s outcome, so can an information professional enhance the content and quality of a search for information. Talking to a librarian can demonstrate that even in an age of access to information at our desktops, investing a small amount of time can yield big dividends.

## Who Reads Journal Articles?

GREG MARSDEN

**W**ho reads journal articles? The following insights are a by-product of qualitative research with practitioners and academics:

- ◆ The practitioner and academic communities alike are under time constraints and face a common problem of “too much information.”

- ◆ Local government practitioners are not likely to turn to academic literature as a source of knowledge, preferring informal networks of trusted contacts and short news articles. Although sometimes they may seek guidance on good practices and may attend conferences, local government practitioners value informal contacts because they trust the results. Comparative research has found that North American practitioners are slightly more likely than their North European counterparts to engage with journals.

- ◆ Consultants, lobbying groups, and think tanks draw slightly more on the journal knowledge base, but even this is limited.

- ◆ Journal articles are the stock and trade of academics. Several senior transport academics in the United Kingdom, however, indicated that reading all of the articles necessary to keep up in a subject area had become impossible. A former editor suggested that the numbers of journals made the publications more important for authors than for readers.



The findings are from a small sample of the population of practitioners and academics. The time challenges may be less for doctoral students and junior-level researchers and practitioners but remain an important issue.

What does this suggest for the future of journals? Perhaps that less is more? Is everything that is published good enough, and are more journals needed if what we have cannot be read? Alternative dissemination streams are needed to reach practitioners. How can the academic community and major journal publishers ensure that their articles connect with the technical press? Research in this area is ongoing.

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# The Momentum of Transportation Information

## A History of TRB's Transportation Research Information Services

KEN WINTER, SHIRLEY MORIN, AND BARBARA POST

Winter is Director, Library and Information Services, Virginia Department of Transportation Research Library, Charlottesville; Morin is Database Administrator, Transportation Research Board (TRB), Washington, D.C.; and Post is Manager, Information Services, TRB.

The idea of a citation index for transportation literature dates back to 1920, with the founding of the Highway Research Board (HRB), the predecessor of the Transportation Research Board (TRB). A stated purpose of HRB was “to collect and distribute information of completed and current research.”

In 1928, \$8,000 was appropriated for the development of a “highway research information clearinghouse.” The project inaugurated *Highway Research Abstracts*, a printed bibliography of published highway research.

### Dawn of the Computer Era

In the mid-1960s, technology emerged that could support the computerization of *Highway Research Abstracts*. In 1967, HRB established the Highway Research Information Service (HRIS) database, with the sponsorship of state highway departments and the federal Bureau of Public Roads, which later became the Federal Highway Administration. Developed over a 3-year period, HRIS employed a mainframe computer and automated technology to expand the bibliographic clearinghouse, which had assembled citations and abstracts of published highway literature and summaries of research in progress.

### Development of TRIS

In the early 1970s, after HRB became TRB, the Board received federal funding to expand the highway information service to cover transportation noise issues, as well as research and published material on rail, air, maritime transportation, and mass transit. To reflect the expanded, multimodal scope, the service received a new umbrella name,

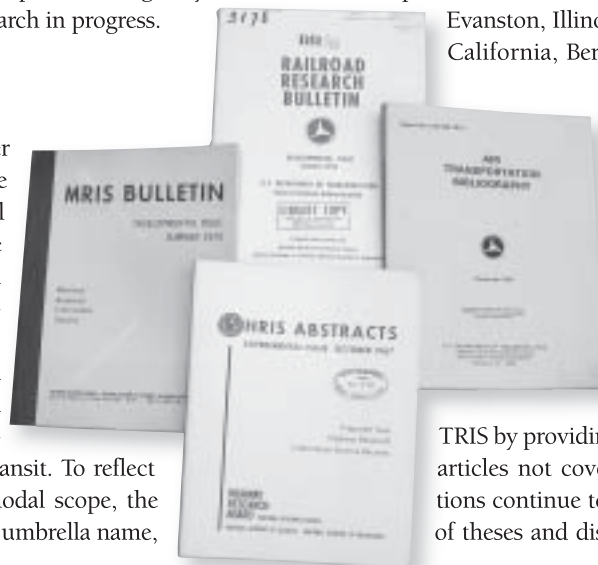
Transportation Research Information Services (TRIS), recognizing and accommodating the research and information needs of all modes of transportation.

From the start, TRIS has functioned as a collaborative database. In addition to a staff of trained indexers and abstractors who work with transportation journals, conference proceedings, technical reports, and books on all aspects of transportation, TRB's information service has worked with many partners to obtain information about transportation research.

TRIS has had exchange and collaboration agreements with such organizations as the American Society of Civil Engineers; the National Safety Council's Safety Research Information Service; the Science Information Exchange at the Smithsonian Institution; the Maritime Technical Information Facility; the British Maritime Technology Database; the Partners for Advanced Transit and Highways (PATH) Database at the University of California, Berkeley; and the International Transport Research Document (ITRD) Database, which is overseen by the Organisation for Economic Co-Operation and Development.

In the 1980s, TRB signed agreements with the transportation libraries at Northwestern University, Evanston, Illinois, and at the University of California, Berkeley, to provide TRIS with records of analytics—that is, individual records created for items that are part of a larger set, such as articles from a journal. These catalog records are designated in TRIS as TLIB—for transportation library.

The two transportation libraries make a significant contribution to TRIS by providing catalog records of journal articles not covered by TRB; the contributions continue to expand, including records of theses and dissertations. In 2007, North-



Abstracts from the early HRIS and mode-focused databases were published in printed volumes.



A gathering at an HRIS Users Workshop in February 1978 in Charlottesville, Virginia.

western supplied TRIS with 19,000 records from its Environmental Impact Statement Database.

In addition, in the past 2 years, TRIS has expanded its international coverage through agreements with the Transportation Association of Canada; Australia's ARRB; VTI, the Swedish National Road and Transport Research Institute; and SWOV, the Institute for Road Safety Research in the Netherlands.

### Access to TRIS

In the early days of HRIS, the mainframe computer-aided searching was state of the art, but the process nonetheless was slow, expensive, and difficult—the service was only feasible with the mediation of information professionals. HRIS and then TRIS offered batch-mode file searches, which were conducted each week by expert staff and printed; selected search results were mailed—slowing the service further—to state departments of transportation and other sponsors. Self-guided desktop access to search tools was yet decades away, and few researchers considered the option of conducting their own searches.

The development of the HRIS database raised the possibility of providing researchers with direct access to transportation information. HRB had experimented with online searching as early as 1969, and in 1973 TRB initiated a demonstration project to study the effectiveness of online retrieval of transportation research information. Working with Battelle Columbus Laboratories, TRB provided a limited group of transportation personnel with remote access to HRIS information, allowing them to conduct their own searches and retrievals from a limited set of abstracts and summaries.

Users of the HRIS remote online database were able to do something revolutionary—construct and execute their own searches against 30,000 records drawn from issues of *HRIS Abstracts* published from June 1971 to March 1976 and from the contents of *Highway Research in Progress*. In cooperation with the International Road Federation, HRIS also contributed 3,000 summaries of ongoing non-U.S. research proj-

ects to the online service to help meet the increasing demand for international coverage of transportation research. At the time, only 17 TRB sponsors were using the new online database.

By 1977, researchers were convinced of the power of TRB's computerized database, and as computer searches grew in popularity, the number of works cited in TRIS grew. An article in *Transportation Research News* in 1978 reported that by December 1977 HRIS had stored 8,940 summaries of research in progress and 67,300 abstracts of research reports.

“The state highway and transportation departments requested a record 710 searches of the HRIS file during 1977, an increase of 120 searches over the former record set in 1975,” the article noted. “The monthly printouts of current awareness subject area groups were requested by the 35 states that have been receiving this product of HRIS for several years.”

### Commercial Partnerships

In 1980, TRB partnered with the database vendor Dialog to create File 63, the first commercially available version of TRIS. This database included bibliographic records of research and published material from all TRIS modes, giving end users what they desired—the ability to search TRIS records without an intermediary. Researchers could expect immediate turnaround for

A TRIS staffer demonstrates a software and hardware upgrade, ca. 1990.







A set of SilverPlatter TRANSPORT CD-ROMs.

their information inquiries and—perhaps equally important—the opportunity to reformulate search strategies to an optimal match between their needs and the database contents. Dialog’s interface was powerful, but not user-friendly.

In the 1990s, TRB partnered with a second commercial database vendor to host TRIS records. SilverPlatter Information, Inc., produced a new version of the TRIS database, called TRANSPORT, which resided on a set of two CD-ROMs. TRANSPORT’s user interface was highly regarded; engineers, practitioners, and librarians rated it user-friendly. With changes in technology, TRANSPORT became available on the web as a fee-based service.

## TRIS on the Web

In 1999, TRB and the U.S. Department of Transportation’s Bureau of Transportation Statistics signed a memorandum of understanding leading to the creation of TRIS Online—fully accessible, free, and easily searchable. In January 2000, TRIS Online became available through the National Transportation Library’s website, offering all of the records in TRIS except those provided by ITRD.

TRIS Online also is readily accessible, without charge, on TRB’s website. TRIS Online provides more than 47,000 direct links from the records to the full-text reports or articles that are available on the web or from document suppliers such as WorldCat.

## Libraries Edge Search Engines in TRIS User Survey

KEN WINTER

In 2007, the TRB Library and Information Science for Transportation Committee conducted an online survey of core TRIS users—the first large-scale TRIS user survey in 30 years. Of the 327 respondents, 96 percent affirmed their satisfaction with TRIS, saying they would recommend the service to other transportation researchers. TRIS users also had high expectations for future enhancements.

The most-cited enhancement was for more links to freely accessible full-text documents online. Nevertheless, copyright concerns, royalty and licensing issues, and an abundance of practical and technical issues make full-text links for every citation an expectation impossible to meet. The survey, however, did not ask users for realistic expectations, but to extrapolate from their typical search patterns.

At the time of the survey, approximately 40,000 of the 690,000 TRIS Online records included a link to the full text. Currently more than 47,000 of 700,000 records have full-text links.

One survey question asked: “When you get results from TRIS that do not include a link to an online source, what are the most typical methods you employ to get the documents cited?” This open-ended question generated 299 responses—the most of any open-ended question on the survey. After using TRIS to discover documents, most respondents reported multiple strategies to acquire the texts if the TRIS record did not include a link. Sometimes they contacted the publisher or went to Amazon.com to purchase the title. In other cases, they contacted colleagues or looked for similar documents by the same authors. Yet others gave up. In most cases, however, respondents said their first step was to try a library or to use Google or a similar search engine to locate an online copy.

### Findings

Libraries, librarians, and library and information services were most often cited and most frequently listed as the primary means for acquiring documents found in TRIS that had no link to full text.

A total of 183 respondents (61 percent) used libraries for this task—143 (48 percent of all respondents) listed libraries first as the most typical method to acquire documents discovered in TRIS, and another 40 (13 percent) listed libraries as a second method.

Close behind were search engines, led by Google; 134 respondents (45 percent) listed search engines first as the most typical method to gain documents discovered in TRIS; 36 respondents (12 percent) listed search engines as their second method; and 2 listed search engines third, for a total of 172 respondents (57.5 percent) listing search engines as a way they acquired documents.

### Fast and Effective Option

If the search for the full text takes little time and costs no money, users may be inclined to Google a title initially found in TRIS, hoping that someone, somewhere has placed a free copy online. But if that fails to yield the full text in a few searches, or if they reach a publisher’s site and have to pay, transportation professionals may consider other options.

Often the articles, books, reports, and other documents discovered via TRIS are available to researchers through their own library or another. As the survey results indicate, the library option may be the fastest, cheapest, most effective way to get the needed information—especially at a time when everyone in the field is being asked to do more with less.

*Note: This survey was about TRIS, not about libraries; the instrument was not designed for respondents to rank their favorite means of accessing full-text documents. The survey did not ask how many respondents had access to a library.*

*The author is Director, Library and Information Services, Virginia Department of Transportation Research Library, Charlottesville.*

## TRIS Today

From the earliest plans to expand the service's coverage, to make it accessible and searchable for users, and to broaden its target audience, TRIS has grown and changed with advances in computer technology and applications. TRIS is a core activity of TRB and is funded by TRB sponsors, including the state departments of transportation and the modal administrations of the U.S. Department of Transportation.

The explosive growth from a total of 710 searches of 67,300 TRIS documents in 1977 to more than 1 million searches of more than 700,000 TRIS documents in the past year demonstrates a continuing dedication and commitment to the original purpose, "to collect and distribute information of completed and current research."

After 40 years, TRIS continues to expand its coverage of the field of transportation, to explore new technology that facilitates user access, and to appeal to a wider range of transportation professionals than ever before.

## The World Comes to TRIS

**T**RB has launched the new TRISworld database, which allows employees of TRB sponsor organizations to search both the Transportation Research Information Services (TRIS) database and the English language records of the International Transport Research Documentation (ITRD) database. TRISworld opens up access to more than 720,000 records of published transportation research.

Established in 1972, the ITRD database covers all land transportation modes and is expanding into aviation and maritime topics. More than 25 institutes and organizations in more than 20 countries supply material for the database, which is updated monthly and adds approximately 10,000 new references each year.

TRISworld records are searchable by title, author name, agency, serial or conference information, or index terms. Ready-to-use topic searches on the TRISworld database include economic recovery, probe vehicles and transit, sustainable communities, aircraft bird strikes, airport security, and climate change.

## Virginia's Federated Search Tool *Unifying Access to Transportation Research*

KEN WINTER

**T**ransportation researchers are overwhelmed by the volume of books, articles, reports, and websites publicly available. The good news is that more high-quality databases and library catalogs are being created to focus on transportation research and information. The bad news is that few of those resources are interconnected.

As a result, researchers, practitioners, and decision makers must run and rerun searches in several databases and library catalogs to ensure that they do not miss any documents. Searching all the silos, however, consumes too much time.

Often the solution for busy professionals is to apply Google, assuming the search will yield comprehensive results. Although Google does a great job searching for a little of everything on the web, it was never designed to focus on either transportation or research. A Google search, therefore, may miss more transportation research materials than it finds.

Customers of the Virginia Department of Transportation (DOT) Research Library raised a common complaint: "Why can't I have just one place to search?" In response, the library tested a commercially available federated search solution to create a custom search engine that would focus on transportation research.

A federated search works by broadcasting a search from one interface to many different databases; it then unifies the results by bringing them back into the same interface. The approach

sounds simple, but under the hood, the search engine is complex, merging proprietary search technologies with the native technologies of several heterogeneous databases.

The library selected the vendor Webfeat, which provided a hosted search interface named VDOT OneSearch. The interface allows a single search to pass to nearly 30 transportation library catalogs, three key TRB databases—TRIS Online, Research in Progress, and Research Needs Statements—and a dozen other databases and online resources.

Proponents say that the technology properly implemented saves time and simplifies the search process by providing one tool for quickly searching dozens—or even hundreds—of databases. Opponents counter that what is gained in speed is lost in precision. To address this concern, in addition to listing and describing each searchable database from the main screen, OneSearch links back to all of the native interfaces, allowing users to link to them at any time to run a search. The software also can pass searches through the advanced search screens of all the databases included in a search.

In this way, OneSearch can serve as a handy listing of some of the top, publicly accessible transportation research databases available on the web. Webfeat has allowed Virginia DOT to make a demonstration version openly available for beta testing at <http://vtrc.net/library/onesearch.htm>. The demo does not search any licensed content or private Virginia DOT content.

POINT  
OF VIEW

# Making Transportation Libraries and Information Services a Priority

MARK LINSENMAYER AND PATRICK CASEY

Linsenmayer is Research and Writing Manager, and Casey is CEO, CTC & Associates LLC, Madison, Wisconsin. This article was produced for the Transportation Library Connectivity Pooled Fund Study; for more information about the study, see [www.libraryconnectivity.org/](http://www.libraryconnectivity.org/).

When the Minnesota Department of Transportation (DOT) was developing the MnPAVE pavement design software<sup>1</sup>, Senior Engineer John Siekmeier and his colleagues needed specific data about the material properties for each standard classification of soil—such as gravel, sand, loam, and clay. Obtaining all of the data needed would involve years of laboratory analysis.

Siekmeier contacted the Minnesota DOT Library and received a series of reports presenting the results of laboratory tests by the University of Illinois between 1976 and 1989 on 50 Illinois soils. The material properties were directly applicable to the MnPAVE project. One call saved the agency hundreds of thousands of dollars and sped up the development of the MnPAVE design software by several years.

Minnesota DOT has invested consistently in its transportation library since 1957. Many other states, however, have had to restrict expenditures for onsite information professionals and local collections.

## Justifying the Investment

Ten years ago, funding for government agency libraries in several fields was under attack. The tide is now turning for the transportation sector, thanks

to the Transportation Research Board's (TRB) Special Report 284, *Transportation Knowledge Networks: A Management Strategy for the 21st Century (I)*. This report made the convincing case that continued growth in the transportation sector—as in the sectors of medicine and agriculture—depends on the dissemination and application of new technologies and research findings. Dissemination and application lead to improvements in public safety, in freight and passenger movement, and in use of government resources.

Library services in state DOTs and other transportation organizations play a significant role in dissemination. Consequently, interest is growing at the federal and state levels to increase investments in transportation libraries and information services.

The American Association of State Highway and Transportation Officials (AASHTO) has requested that the upcoming bill authorizing transportation spending include 6 years of funding for transportation knowledge networks as defined in Special Report 284. These state and regional networks, under the direction of the National Transportation Library, would be funded at approximately \$13.5 million per year. A portion of this funding would provide seed grants to state DOTs to develop local library resources and enter state-produced publications into a national catalog accessible to the wider transportation community, either online or through inter-library loans.

This proposal, however, will not proceed without contest. The Internet makes accessible a great wealth of information without the intervention of a librarian or the need to house resources locally as physical copies in a dedicated space. What are the arguments for supporting state transportation libraries from a DOT engineer's perspective? Do investments in this area make that much difference, or could the money be better spent elsewhere?

## Savings in Time and Dollars

Minnesota DOT's experience demonstrates that work by information professionals can save money by preventing unnecessary rework. Siekmeier comments: "This was not an isolated case—the library repeatedly has tracked down reports for us that have prevented us from replicating previous work."

Wisconsin DOT Library, interior view.

<sup>1</sup> [www.dot.state.mn.us/app/mnpave/](http://www.dot.state.mn.us/app/mnpave/).





**CENTER OF LEARNING**—Wisconsin DOT recently moved its transportation library from the eighth floor to a highly visible location in the main lobby of its central building, emphasizing the library's role as an "information commons and learning center." According to Wisconsin DOT Librarian John Cherney, "The extra space, more computers, other technological resources, and better physical layout provide additional comfort, self-learning options, and better opportunities for collaboration in a more user-friendly environment." The library collection and the services of onsite professional librarians are available to Wisconsin DOT engineers and other staff, university professors and students, contractors, consultants, and the public.

Recently, the Kansas DOT was performing alkali-silica reactivity testing to help prevent the premature failure of concrete pavements. The particular test has been used since the 1930s and was specific to Kansas. Kansas DOT Concrete Research Engineer Rod Montney and his colleagues questioned the rationale for certain parameters in the test. Answers to these questions would require another round of testing at a cost of more than \$3,000.

After receiving an e-mail about the researchers' questions, Marie Manthe in the Kansas DOT Library located a paper by the original developer of the test in the proceedings of a 1949 meeting of the American Society for Testing and Materials. The paper provided the rationale sought by the Kansas DOT engineers. No additional testing was necessary; this saved time and money.

Closing down an onsite library may free up space and slightly reduce the number of employees. Cases like those at the Minnesota and Kansas DOTs, however, show that the value of onsite libraries can outweigh the limited savings from closing the library down.

## The Efficiency Argument

In the Minnesota DOT Library's user studies to improve performance, most comments have not related to a specific, spectacular success, but to the efficient, consistent delivery of services. According to Jerry Baldwin, former Library Director at Minnesota DOT, "Only rarely does any particular library encounter result in some directly measurable, relatively large savings or benefit to an individual or organization. What users value in library services is our day-in, day-out ability to deliver information when it is needed, and this value is recognized by the wide range of professionals employed in a typical state DOT."

The transportation library community faces a key challenge—dispelling the image of the librarian as a caretaker of a physical collection. Today's librarians are information experts whose job is not simply to catalog and track a collection but to navigate skillfully and quickly the ever-expanding thicket of electronic databases to find the right resource for a given problem. As Minnesota DOT Library Director Sheila Hatchell has noted, "Librarians are trained to question the spellings of names, the accuracy of dates



Minnesota DOT Library Director Sheila Hatchell offers insights on refining and focusing a literature search.

and geographic locations, and other information vital to locating a specific document. We often are successful at finding something our customers had searched for and gave up.”

As many business managers know, getting a job done right is often a matter of dedicating a resource specifically to that job. Even if engineers have the ability to search the Internet and its transportation-specific resources effectively, having a dedicated information professional on hand who has been trained to serve the needs of transportation researchers can speed up the turnaround time in information gathering and can ensure that all necessary searches are accomplished.

## The Quality Argument

A transportation agency's research will be better if it is fully informed by relevant studies. But not all studies are easily accessible—or even available—via the Internet. Although conferences and regular reviews of periodicals can provide an engineer with a perspective on the state of the art in his or her area of specialty, what is available through these activities at any given time may not always relate directly to the work at hand. An agency library and its dedicated information professionals, in contrast, can identify and retrieve pertinent research when it is needed.

In addition, in most cases, the transportation

## Developing a Transportation Knowledge Network

LENI OMAN

**L**ike transportation, information is put to use almost every day. But as with the transportation system, the information that is seen and used represents only a small portion of the effort that went into its creation and availability.

Transportation practitioners benefit from many information professionals working behind the scenes to capture, organize, and deliver information to meet the business needs of the transportation community. But finding the information needed, when it is needed, and in the form it is needed can be difficult, even with the level of effort today.

In 2004, at the request of the American Association of State Highway and Transportation Officials' (AASHTO's) Standing Committee on Research, TRB conducted a policy study on the future needs of transportation information. The study committee's findings and recommendations were published as TRB Special Report 284, *Transportation Knowledge Networks: A Management Strategy for the 21st Century* (2006).

The study recommended the development of transportation knowledge networks and proposed a sustainable administrative structure and possible funding sources. A knowledge network is an alliance of organizations and people, supported by technology, sharing information resources and expertise. The networks strengthen the capacity for sharing and applying knowledge among the member organizations and link information providers to users at any location.

To facilitate the rapid development of the transportation knowledge networks, the committee recommended a follow-on National Cooperative Highway Research Program (NCHRP) project to develop a business plan and guiding concepts. The business plan produced under NCHRP Project 20-75, *Implementing a Transportation Knowledge Network*,

incorporates input from a range of stakeholders. The plan outlines a model for organizing information and defines the key transportation knowledge network functions necessary to achieve noticeable improvements in information access for transportation practitioners.

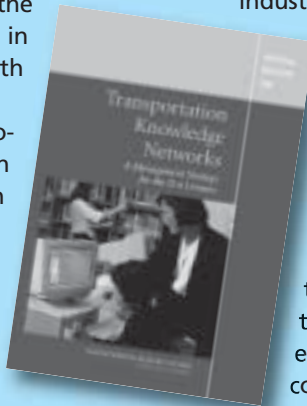
Implementation of the plan will establish an infrastructure to sustain a knowledge base that grows with changes in the industry. Information providers will benefit from a network that allows them to be more efficient and effective in delivering services. Information users will have access to a user-friendly web portal, as well as to a coordinated network of information centers, allowing them to find what they need rapidly.

Some concepts from these efforts are being implemented. With the support and guidance of the National Transportation Library and transportation librarians, three regional transportation knowledge networks have been established and are collaborating to improve information delivery. These efforts are beneficial, but funds are needed to fulfill

the vision, to bring more information sources into the network, and to improve user awareness and access. AASHTO therefore is seeking a sustainable source of funding to support the full implementation of transportation knowledge networks.

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*The author is Director, Office of Research and Library Services, Washington State Department of Transportation, Olympia, and chair of the NCHRP Project Panel on Implementing the National Research Council Policy Study, Transportation Information Management: A Strategy for the Future. She also is a member of the Task Force on Transportation Knowledge Networks of the AASHTO Research Advisory Committee.*





Marie Manthe (*left*) assists a Kansas DOT staff member in finding a research report.

librarian is charged with alerting engineers to new resources in their fields. This helps ensure that the most recent information will be available for setting agency research priorities and for performing research already under way.

When Oregon DOT Librarian Laura Wilt saw a recent Federal Highway Administration report on retaining wall blocks, she knew that Retaining Walls Engineer Thomas Kammerer and his colleagues would be interested and sent them the report. Their replies reveal the value of this ongoing service: “Bravo!” one exclaimed. “This is a timely article; we are preparing a section in the Geotechnical Design Manual on retaining dry cast units (segmental retaining wall blocks).” Another commented, “I was not aware of this report, and it is an important study.”

### The Objectivity Argument

Many state DOTs and the partnerships formed by state DOTs and local universities increasingly employ consultants. Why not outsource transportation information management?

Siekmeier notes that a critical reason not to outsource is the loss of objectivity. The universities and consulting groups that may provide information searches may be the same groups that would receive contracts to do the work if the pertinent information were not found.

“If you have a problem, and you turn to consultants or universities to solve it, they have limited motivation to find things that would save them time and effort,” Siekmeier explains, “They are not concerned about reinventing the wheel, because they will get paid to do it and think they can do it better. As a taxpayer, I want the DOTs to have a library system in place so that they don’t duplicate what other DOTs and universities and consultants have

already done. There’s no question that this is money well spent.”

State DOT information services, moreover, are a significant benefit to consultants. The library services are generally available to contractors working for the state, and many are open to the public. This free service helps contractors learn what their counterparts are doing in other parts of the country and around the world, enabling rapid improvement in construction and other areas.

### Why Not Centralize?

But why are library services needed in all state DOTs? DOT engineers can make use of local university libraries and information services to keep up to date on advances in their areas and to gain access to journals. They could turn to librarians in other states or at the federal level for objective and thorough information searches. Perhaps centralizing services would be more efficient than creating redundant systems in all 50 states.

## Networking for Information Access

The Transportation Library Connectivity Pooled Fund Study, TPF-5(105), is a grassroots networking effort by librarians and information professionals across the country. Members include 17 state DOTs, two university transportation centers, and a transit authority, with several states planning to join in 2009. The study’s mission is to bring the benefits of effective information access to the entire transportation community through networking and technical support. Benefits include strategic planning and resource exchanges, cooperative technology transfer activities, a Transportation Librarian’s Toolkit<sup>a</sup>, and other tools.<sup>b</sup> For more information, please see [www.libraryconnectivity.org](http://www.libraryconnectivity.org).

<sup>a</sup> [www.libraryconnectivity.org/librarianresources\\_files/Toolkit\\_final1-5-08\\_WEB.pdf](http://www.libraryconnectivity.org/librarianresources_files/Toolkit_final1-5-08_WEB.pdf).

<sup>b</sup> [www.libraryconnectivity.org/librarianresources.html](http://www.libraryconnectivity.org/librarianresources.html).

Monique Evans, Ohio DOT: "Quick access to the right information in a useful format is one of the most effective tools any decision maker has at his or her disposal."



PHOTO: HILARY FREER

Centralization makes sense. AASHTO was aware of this in requesting federal funds for transportation knowledge networks. Transportation libraries are engaged in a variety of initiatives to centralize and digitize information to ensure maximum distribution (see sidebar, page 20). As Minnesota DOT's Hatchell observes, "Transportation librarians are wonderfully networked—not only for loans of materials but also for web-delivered training and for discussing and sharing ideas."

A network, however, requires nodes, and the National Transportation Library would rely on transportation knowledge networks. Like many large, centralized corporations that have regional distribution centers and local outlets to deliver products to consumers, local information experts would be essential in delivering information to local practitioners.

When Kansas DOT's Montney needed local help to obtain information on a Kansas-specific test, the DOT librarian's connection to locally produced resources made a good case for retaining local information resources. As Montney says, "We may have a good handle on what our immediate agency predecessors did, especially because we often can reach them in retirement; but for things that happened two or three or more predecessors ago, the records and documents are important."

From the 1960s through the 1980s, state DOTs performed many practical studies that yielded valuable information; the findings, however, may not have warranted publication beyond the DOT. As a result, even local universities are not able to track these documents. Moreover, several engineers at the same DOT often may need to stay abreast of a given publication series—such as the National Cooperative Highway Research Program (NCHRP) reports in a certain area. Maintaining a physical collection of critical national resources at a state DOT library can accommodate this need conveniently and cost-effectively.

## Prospects for Funding

The National Transportation Library has a history of being underfunded. A 2007 NCHRP-sponsored study, *Background Information on National Transportation Research*, included a survey of state DOT research directors (2). AASHTO used the findings to develop funding recommendations (2, Appendix B).

The survey respondents called for stable funding at increased levels to allow the National Transportation Library to take a greater role in coordinating transportation knowledge management. If Congress follows AASHTO's recommendations, the network would be strengthened with more funds. In addition, a new, separate Data and Information funding classification would provide the National Transportation Library with more visibility in the federal transportation budget. The state DOT libraries that would serve as the network's nodes also would receive more federal support and be less vulnerable to state budget crises.

Monique Evans, administrator of Ohio DOT's Office of Research and Development and cochair of the Research Funding Task Force of the AASHTO Standing Committee on Research, has observed, "Knowledge isn't power. The access to knowledge and the application of knowledge is power. Quick access to the right information in a useful format is one of the most effective tools any decision maker has at his or her disposal."

## References

1. *Special Report 284: Transportation Knowledge Networks: A Management Strategy for the 21st Century*. Transportation Research Board of the National Academies, Washington, D.C., 2006. <http://onlinepubs.trb.org/onlinepubs/sr/sr284.pdf>.
2. CTC & Associates LLC. *Transportation Research: Value to the Nation—Value to the States: Background Information on National Transportation Research for the AASHTO Standing Committee on Research*. Revised Final Report, National Cooperative Research Program Project 20-80(1), February 15, 2008. [www.transportation.org/sites/research/docs/NCHRP20-80\\_1\\_Final\\_Report\\_2008-Feb-15.pdf](http://www.transportation.org/sites/research/docs/NCHRP20-80_1_Final_Report_2008-Feb-15.pdf).

## Additional Resources

AASHTO Standing Committee on Research:  
[www.transportation.org/sites/research/docs/SCOR\\_Auth\\_Rec-shortened.doc](http://www.transportation.org/sites/research/docs/SCOR_Auth_Rec-shortened.doc).

AASHTO survey of state DOT research directors:  
[www.transportation.org/sites/research/docs/AASHTO%20RAC%20Survey%20-%20Technical%20Memorandum.pdf](http://www.transportation.org/sites/research/docs/AASHTO%20RAC%20Survey%20-%20Technical%20Memorandum.pdf).

*POINT OF VIEW presents opinions of contributing authors on transportation issues. The views expressed are not necessarily those of TRB or TR News. Readers are encouraged to comment in a letter to the editor on the issues and opinions presented.*

# TRB 2009 ANNUAL MEETING HIGHLIGHTS

## Transportation, Energy, and Climate Change



**1** V. Thera Black, Chair of the Metropolitan Policy, Planning, and Processes Committee (*left*), briefs a group of first-time and young professional Annual Meeting attendees at the Welcome Session, which offered opportunities to network, learn about TRB, and become involved.

**2** Members of President Barack Obama's Department of Transportation transition team, Jeff Morales, PB Consult, Inc. (*left*), and Peter J. Basso, American Association of State Highway and Transportation Officials (AASHTO), brief the TRB Executive Committee on the Administration's transportation agenda.

The 2009 Transportation Research Board Annual Meeting turned the spotlight on the challenges and issues surrounding transportation, energy, and climate change, January 11–15, 2009, in Washington, D.C. Despite the economic downturn, nearly 10,000 transportation researchers, practitioners, policy makers, and administrators converged for the meeting, which offered approximately 3,000 presentations at 90 workshops and 600 sessions—including lectern and meet-the-author poster sessions—plus 450 committee



meetings, special events, awards presentations, and more. The theme of transportation, energy, and climate change was covered in 60 sessions and workshops.

As always, the meeting was a prime occasion for transportation professionals from the United States and abroad to network and share knowledge with their peers across all modes and disciplines. More than 1,800 papers were included in the 2009 Annual Meeting Compendium of Papers, and 60 sessions were recorded and posted online as e-sessions at [www.TRB.org](http://www.TRB.org).

This year's Welcome Session, an event for meeting newcomers, attracted more than 400 first-time attendees. Committee chairs made informal presentations on their areas and recruited more than 200 volunteers to serve on TRB standing committees.

Geraldine Knatz of the Port of Los Angeles delivered the 2009 Thomas B. Deen Distinguished Lecture, and General Motors research executive Lawrence D. Burns spoke at the Chairman's Luncheon, which included major award presentations. This year's meeting also featured a special briefing by members of the Obama Administration's transition team for transportation to the TRB Executive Committee.

Details and highlights appear on the following pages.

*Annual Meeting photographs by Cable Risdon Photography*



# TRB 2009 ANNUAL MEETING HIGHLIGHTS

## INTERSECTIONS

**1** Audience members listen to panelists discuss the Moving Cooler study, which assessed the cost-effectiveness of measures to reduce greenhouse gas emissions, at one of 60 spotlight sessions on energy and climate change.



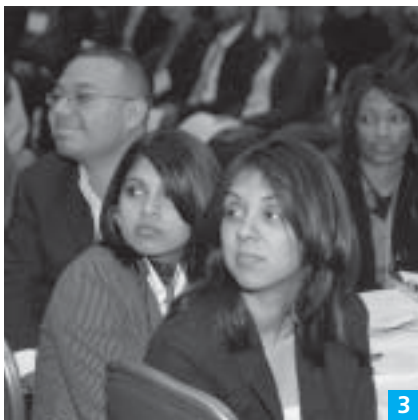
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**2** Northwestern University students (*left to right*) Omer Verbas, Jean Goilav, Hermann Orth, and Alexis Roque plan out their meeting agenda with the 300-page Annual Meeting program.



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**3** At the welcome session, young and first-time attendees gained an overview of TRB, tips on navigating the Annual Meeting, career development information, and more.



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**4** TRB Technical Activities Council is the hub of Annual Meeting planning.



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**5** International Road Federation fellows are introduced at the International Participants' Reception.



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**6** Guy Bourgeois, head of the European Conference of Transport Research Institutes, which has a collaborative agreement with TRB, acknowledges applause at the International Participants' Reception.



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**7** Robert Accetta and Mark Bagnard of the National Transportation Safety Board (NTSB) prepare for a presentation at a session on emerging highway safety issues.



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**8** The well-attended exhibit hall showcased a variety of transportation-related products and services, as well as displays by TRB sponsors.



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# TRB 2009 ANNUAL MEETING HIGHLIGHTS



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## SPOTLIGHT SESSIONS

**1** Steven Davis-Mendelow, Bombardier Aerospace, speaks at Climate 101: Basics of Climate Change.

**2** George C. Eads, Charles River Associates, Inc., discusses Climate Change and Transportation 101.

**3** Nancy Young, Air Transport Association of America, addresses Reducing Your Aviation Carbon Footprint.

**4** Robyn V. McGregor, EBA Engineering Consultants, Ltd., discusses winter road management in Adapting Transportation Infrastructure to Accommodate Climate Change.



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**5** Panelists for Climate Change Law 101 were Kyle Danish, Van Ness Feldman (*left*); David H. McCray, California Department of Transportation (DOT); and Janet L. Myers, Federal Highway Administration (FHWA).

**6** Gordana Petkovic, Norwegian Public Roads Administration (*left*), chats with session moderator Deborah Goodings, University of Maryland, at Geotechnical Engineering Strategies to Meet Effects of Climate Change on Transportation Infrastructure.



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**7** Robert Rosner, Argonne National Laboratory, considers The U.S. Energy Crisis: Solutions to Meeting the Nation's Energy Needs.

**8** David L. Miller, Conway Inc., offers the motor carrier perspective at Moving Freight Through Global Change, Part 2.

**9** Laurie Cullen, HNTB Corporation, speaks at Roles and Responsibilities of Government Entities on Climate Change Regulations in Aviation.



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**10** Jeff Houk, FHWA (*left*), and Douglas S. Eisinger, Sonoma Technology Inc., guide discussion at Incorporating Greenhouse Gas Considerations into Transportation Project and Metropolitan Planning Requirements.

**11** David Diamond, LMI, asks a question at Moving Cooler, a session on strategies to reduce greenhouse gas emissions.



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# TRB 2009 ANNUAL MEETING HIGHLIGHTS

## SESSIONS AND WORKSHOPS

**1** Jeff Heilman, Parametrix, Inc., emphasizes a point in Measuring Ecosystem Effects in the Emerging World of Ecosystem Markets.



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**2** Richard Marrotoli, VA Connecticut Healthcare System (left), and Shelley Bhatlacharya, University of Kansas, listen to presentations at Medications and Medical Review.



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**3** Gabriel Rousseau, FHWA, reviews the Nonmotorized Transportation Pilot Program and How It Works.

**4** Terry Allard, Office of Naval Research (standing), speaks at Human Factors Implementation: The Way Ahead.



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**5** Ron Duych, Research and Innovative Technology Administration (left), discusses issues with presenter Doug MacIvor, California DOT, at Freight Data Research in 2008 and Priorities for the Future.



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**6** John Francis Munro, FHWA, speaks at the International Research Collaboration session.

**7** Mary Lou Ralls, Ralls Newman, LLC (left), and Bituminous Materials Section Chair Bob McGennis, Holly Asphalt Center (right), present Mariely Mejias and Haley Bell, both of the U.S. Army Corps of Engineers, with the section's award for best poster.



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**8** Robert Accetta, NTSB, delivers a presentation on a motor coach override during the Emerging Highway Transportation Issues session.

**9** Shay K. Hope, Virginia DOT, moderates Issues That Will Shape Disadvantaged Business Enterprise Programs in the Future.



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**10** A poster session on the Second Strategic Highway Research Program (SHRP 2) allowed participants to network and exchange ideas.



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# TRB 2009 ANNUAL MEETING HIGHLIGHTS



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## SESSIONS AND WORKSHOPS

(continued)

**1** Attendees examine a poster detailing the status of projects in the SHRP 2 Capacity Research Focus Area.

**2** Charles R. Everett, TranSystems Corporation, makes a presentation during a session on the possibilities of airline reregulation.

**3** Rebecca M. Brewster, American Transportation Research Institute, moderates discussion during Truck Drivers, Congestion, and Carbon Footprints.

**4** Turen Al-Ahad Eham, University of Central Florida, asks a question during Traffic: Why We Drive the Way We Do (And What It Says About Us): A Conversation with Tom Vanderbilt.

**5** Author Vanderbilt responds with insights from his book.

**6** Richard de Neufville, Massachusetts Institute of Technology (center), receives the Aviation Group's Francis X. McKelvey Award from Greg Casto, Airport and Aviation Professionals, Inc. (left), and Group Chair James M. Crites, Dallas-Fort Worth International Airport, during the Aviation Forum.

**7** Allison C. de Cerreño, New York University, moderates a session on financing passenger rail.

**8** Arlene Dietz, A&C Dietz and Associates, LLC (left); Eric Shen and Jolene Hayes, Port of Long Beach; and Paul H. Bingham, IHS Global Insight, participate in the Freight Systems and Marine Forum.

**9** H. Thomas Kornegay, Port of Houston Authority, reviews port funding and governance options at Institutional Framework of Seaports as Public Enterprise for the 21st Century.



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**10** Doug Meegan, Applied Research Associates (left), reviews findings on Smart Sensors for Autonomous Noise Monitoring with Xion Yu, Case Western Reserve University, during a poster session of TRB's Innovations Deserving Exploratory Analysis (IDEA) Program.



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# TRB 2009 ANNUAL MEETING HIGHLIGHTS

## SESSIONS AND WORKSHOPS

(continued)

**1** Peter M. Bartek, Pro-Tran1 LLC, demonstrates an approaching-train warning device at the Transit IDEA Program poster session.



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**2** TRB Executive Director Robert E. Skinner, Jr. (left), and Planning and Environment Group Chair Katherine F. Turnbull, Texas Transportation Institute, present Melissa Miller, Whatcom Council of Governments (right), with a communications award for Transportation Town: A Regional Transportation Website.



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**3** Terry Shelton, Federal Motor Carrier Safety Administration (FMCSA), reviews FMCSA's analysis, research, and technology.



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**4** Speakers for Naturalistic Driving Analysis Methods for SHRP 2.

**4** (Speakers for Naturalistic Driving Analysis Methods for SHRP 2, standing, left to right:)

Daniel V. McGehee, University of Iowa (UI); Shauna Hallmark, Iowa State University; Linda Ng Boyle, UI; Lidia P. Kostyniuk, University of Michigan; (seated, left to right:) Gary A. Davis, University of Minnesota; and Paul P. Jovanis, Pennsylvania State University.



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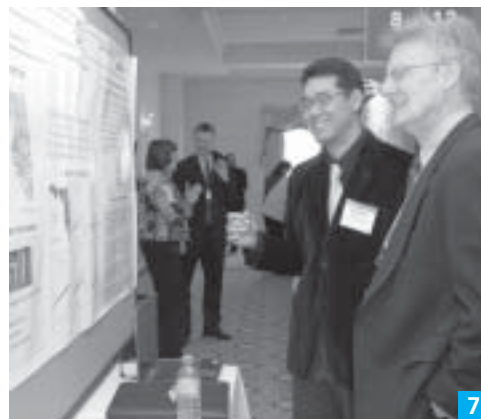
**5** Ronald Knipling discusses his book, *Safety for the Long Haul*.

**6** Stephen Perkins, Organisation for Economic Co-operation and Development, speaks on SHRP 2 International Coordination.



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**7** Jeongho Oh, Texas Transportation Institute (left), discusses a poster at Research Program and Project Evaluations: International Perspective.



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**8** Lily Elefteriadou, University of Florida, provides a researcher's perspective at SHRP 2: Reliability and the Highway Capacity Manual.



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**9** Jim Deschenes, Michael Baker Jr., Inc., speaks at Design-Build: Playing a Critical Role in Emergency Project Delivery.



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**10** Panelists at a session on biofuels included (left to right:) Jesse Fleming, Natural Resources Canada; Audrey Lee, U.S. Department of Energy; and Ian Hodgson, European Commission, Belgium.



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# TRB 2009 ANNUAL MEETING HIGHLIGHTS



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## COMMITTEE MEETINGS

**1** Technical Activities Council (TAC) Chair Robert C. Johns, University of Minnesota, and Mark R. Norman, TRB Director of Technical Activities, guide the TAC meeting.

**2** Members of the Special Task Force on Climate Change and Energy are briefed on research programs addressing climate change.

**3** Design and Construction Group Chair Mary Lou Ralls reviews National Cooperative Highway Research Program projects during a meeting of the Structures Section.

**4** Anthony Perl (*striped shirt, center*), Simon Fraser University, chairs a meeting of the Intercity Passenger Rail Committee.

**5** Cheryl Allen Richter, FHWA (*left*), and Charles Larson, Stantec Consulting, Inc., consider plans for Pavement Management Section initiatives.

**6** Wade Casey, FHWA, offers insights at a meeting of the Maintenance and Preservation Section.

**7** Roadside Safety Design Committee Chair Ronald Seitz, Kansas DOT (*left*), presents the committee's best paper award to Dean Sicking, University of Nebraska, Lincoln; and Karla Lechtenburg and Cody Stolle, Midwest Roadside Safety Facility.

**8** Concrete Materials Section Chair Jamshid Armaghani, Florida Concrete and Products Association (*left*), presents a certificate of appreciation to Mohammad S. Khan, Professional Service Industries, Inc., outgoing chair of the Basic Research and Emerging Technologies Related to Concrete Committee.

# TRB 2009 ANNUAL MEETING HIGHLIGHTS

## EXHIBITS

**1** John Risley, Traffix Devices, Inc. (*left*), and Steve Phillips, Forum of European National Highway Research Libraries (FEHRL), discuss FEHRL's model roadway display.



**1**

**2** Anja Estel of Ruhr University, Germany (*left*), observes as Paul Tremont explains an FHWA exhibit.



**2**

**3** A SHRP 2 task group meets in the exhibit hall to discuss implementation.



**3**

## CHAIRMAN'S LUNCHEON

**4** General Motors research executive Lawrence D. Burns—a former student of 2009 Executive Committee Chair Adib Kanafani—delivered the Chairman's Luncheon Address on high-tech innovations in automotive design.



**4**

**5** Roy C. Edgerton, 1978 recipient of the W. N. Carey, Jr., Distinguished Service Award and retired TRB Director of Technical Activities, takes a bow at the Chairman's Luncheon.



**5**

## OUTSTANDING PAPER AWARDS

**6** The Fred Burggraf Award recognizes outstanding papers by young researchers.



**6**

**6** Jennifer Duthie (*right*) and S. Travis Waller (*not pictured*), University of Texas, Austin, received the Burggraf Award in Planning and Environment from TAC Chair Robert C. Johns, University of Minnesota (*left*).

**7** Wesley Marshall (*left*), Norman W. Garrick, and Gilbert Hansen (*not pictured*), University of Connecticut, won the Wootan Award for "Reassessing On-Street Parking."



**7**

**7** The Charley V. Wootan Award honors an outstanding paper in policy and organization.

**8** The Patricia F. Waller Award recognizes an outstanding paper in the field of safety and system users.



**8**

**8** Recipients of the Waller Award, with TAC Chair Robert C. Johns (*right*): (*back row, left to right*): Richard D. Blomberg, Dunlap and Associates, Inc.; Martin M. Levy, National Highway Traffic Safety Administration; Yingling Fan, University of Minnesota; Austin Brown, University of North Carolina (UNC); David Henderson of the Miami-Dade Office of the County Manager; and (*front row, left to right*): Jane Stutts, Lauren Marchetti, Charles V. Zegeer, Libby J. Thomas, and Laura S. Sandt, UNC. (*Not pictured*: Scott Masten, UNC.)

(continued on next page)

# TRB 2009 ANNUAL MEETING HIGHLIGHTS



**1** TAC Chair Robert C. Johns (*left*); Robert E. Skinner, Jr., TRB Executive Director; Thomas B. Deen, former TRB Executive Director; and 2008 Executive Committee Chair Debra L. Miller (*right*) present Knatz (*center*) with the Deen Distinguished Lecture-plaque.



## AWARDS

**1** Geraldine Knatz (*center*), Executive Director of the Port of Los Angeles, presented the 2009 Thomas B. Deen Distinguished Lecture on "Local Seaport Initiatives Driving International Policy."

**2** Thomas B. Deen, recipient of the Frank Turner Medal for Lifetime Achievement in Transportation, addresses the audience at the Chairman's Luncheon.



**3** Dennis C. Judycki, former Associate Administrator for Research, Development, and Technology, FHWA (*left*), was honored for his leadership in transportation research management with the Roy W. Crum Distinguished Service Award, presented by 2009 TRB Executive Committee Chair Adib Kanafani.

**4** Michael D. Meyer, Professor of Civil and Environmental Engineering at the Georgia Institute of Technology, shares his reflections after receiving the W. N. Carey, Jr., Distinguished Service Award.



**5** Khandker M. N. Habib, University of Alberta, Canada (*left*); Eric J. Miller, University of Toronto, Canada; and Juan-Antonio Carrasco, Universidad de Concepcion, Chile (*not pictured*), won the Pyke Johnson Award for their paper, "Social Context of Activity Scheduling: Discrete-Continuous Model of Relationship Between 'With Whom' and Episode Start Time and Duration."



**6** The K. B. Woods Award went to Thomas A. Bennert (*left*) and Ali Maher, Rutgers University, for "Field and Laboratory Evaluation of a Reflective Crack Inter-layer in New Jersey."

## OUTSTANDING PAPER AWARDS

(continued)

**5** The Pyke Johnson Award is presented annually for a paper in the field of transportation systems planning and administration.

**6** The K. B. Woods Award recognizes the best paper in the area of design and construction of transportation facilities.

**7** The D. Grant Mickle Award honors an outstanding paper in the field of operation, safety, and maintenance of transportation facilities.

**7** Authors of the Mickle Award-winning paper, "Safety-Effectiveness of Selected Treatments at Urban Signalized Intersections," are (*left to right*;) Nancy X. Lefler and Frank Gross, Vanasse Hangen Brustlin, Inc.; Forrest M. Council, University of North Carolina (UNC); and Bhagwant Persaud and Craig Lyon, Ryerson University, Canada. (*Not pictured*: Raghavan Srinivasan, UNC.)





# TRB 2009 ANNUAL MEETING HIGHLIGHTS

## New Officers Guide Executive Committee

**A**dib Kanafani, civil engineering professor at the University of California, Berkeley (UCB), is the 2009 Chair of the TRB Executive Committee. He succeeds Debra L. (Deb) Miller, Secretary of the Kansas Department of Transportation. Michael R. Morris, Director of Transportation, North Central Texas Council of Governments, is the 2009 Vice Chair.



Kanafani

Kanafani is the Edward G. and John R. Cahill Professor of Civil Engineering at UCB. Elected to the National Academy of Engineering in 2002, he has received many awards, including the American Society of Civil Engineers' (ASCE) James Laurie Prize in 2000. In 2008, Kanafani was named a lifetime National Associate of the National Academies. He is the author of more than 170 publications on transportation, and has been active on TRB committees since the mid-1970s.

A member of the UCB faculty since 1970, Kanafani has engaged in research addressing such

topics as transport demand analysis, airport capacity analysis, and airline network analysis. Director of UCB's Institute of Transportation Studies from 1983 to 1998, Kanafani was a founding member of Mobility 2000 and of California's Partners for Advanced Transit and Highways (PATH) program, and played an important role in establishing the intelligent transportation systems research effort in the United States. His areas of expertise include the planning and

economics of transportation systems, airport planning and design, airline economics, and air traffic management.

Kanafani's long record of public service includes membership on national and international advisory panels to governments, multinational organizations, and industry, as well as National Research Council (NRC) panels and committees. He chaired the ASCE Air Transport Division. He earned his master's and PhD degrees from UCB, and a bachelor's degree in

*(continued on page 34)*

### POLICY INSIGHTS

**1** James Jensen, the National Academies' Director of Congressional and Government Affairs, offers perspectives at the Executive Committee meeting on governmental changes accompanying the transition to the Obama Administration. He reported that eight members of the National Academy of Sciences were appointed to posts in the new Administration.

**2** Mort Downey, Chair of PB Consult, Inc., and member of the presidential Transportation Transition Team, discusses the new Administration's perspectives on transportation policy.

Speakers at the Executive Committee policy session addressed knowledge gaps on key issues in transportation and climate change and recommended research:

**3** Cynthia Burbank, PB Americas;

**4** Sue McNeil, University of Delaware; and

**5** Jim Whitty, Oregon DOT.



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# TRB 2009 ANNUAL MEETING HIGHLIGHTS



## EXECUTIVE COMMITTEE

**1** Michael Morris, North Central Texas Council of Governments, was named Executive Committee Vice Chair for 2009.

**2** Executive Committee Chair Debra L. Miller, Kansas DOT, and Executive Director Robert E. Skinner, Jr., guided the business meeting agenda.

**3** C. Michael Walton, University of Texas, Austin, Chair of the Subcommittee for NRC Oversight, enjoys a break in the discussions.

Also contributing to the Executive Committee Meeting discussions and deliberations were

**4** John T. Gray, Association of American Railroads;

**5** Pete K. Rahn, Missouri DOT;

**6** Susan Martinovich, Nevada DOT;

**7** Steve Williams, Maverick USA, Inc.;

**8** Gloria Shepherd, FHWA;

**9** Allen D. Biehler, Pennsylvania DOT;

**10** Vincent Valdes, Federal Transit Administration (*left*); John C. Horsley, AASHTO; Edward A. Helme, Center for Clean Air Policy;

**11** Sarah Dunham, Environmental Protection Agency;

**12** Past Chair Linda Watson, LYNX-Central Florida Regional Transit Authority; consultant Gerry Schwartz (*right*), Vice Chair of the Subcommittee for NRC Oversight; and

**13** New Executive Committee member Steven Scalzo, Marine Resources Group.



# TRB 2009 ANNUAL MEETING HIGHLIGHTS

Adib Kanafani, 2009 Chair of the TRB Executive Committee (left), presents a plaque to outgoing Chair Debra Miller during the Chairman's Luncheon.



## New Officers Guide Executive Committee

(continued from page 32)

engineering from the American University of Beirut.

Morris's responsibilities as Director of Transportation for the North Central Texas Council of Governments include implementation of the Regional Transportation Plan, the Transportation Improvement Program, and air quality-related transportation control measures in the State Implementation Plan. Previously, he was assistant director of the Transportation Department and in 1994 received the Transportation Engineer of the Year Award from the Institute of Transportation Engineers. In

1995, Morris was presented with the Texas Department of Transportation Road Hand Award. He earned a master's degree in civil engineering from the State University of New York at Buffalo in 1979 and is a registered professional engineer in the state of Texas.

Newly appointed to the Executive Committee is Steven T. Scalzo, Chief Operating Officer, Marine Resources Group (MRG). Before joining MRG in 2005, Scalzo was president of Foss Maritime for 6 years, after holding positions within the company as port captain, general manager of marine operations, and senior vice president of operations. Scalzo has served on TRB's Marine Board, as well as on other TRB and NRC committees. He is a graduate of the U.S. Merchant Marine Academy and earned a master's degree in law and commerce at Gonzaga University.

## Standing Committees Recognize Meritorious Service

**T**RB awarded emeritus membership to 24 individuals at the 2009 Annual Meeting, honoring significant, long-term contributions and outstanding service on technical activities committees. The honorees and their committees are listed below.

**Gerald W. Bernstein**  
*Aviation Economics and Forecasting Committee*

**James E. Bryden**  
*Work Zone Traffic Control Committee*

**Betsy Buxer**  
*Paratransit Committee and Accessible Transportation and Mobility Committee*

**Robert M. Clarke**  
*Motor Vehicle Size and Weight Committee*

**Forrest M. Council**  
*Safety Data, Analysis, and Evaluation Committee*

**Carol D. Cutshall**  
*Environmental Analysis in Transportation Committee*

**Robert T. Dunphy**  
*Transportation and Land Development Committee*

**Konstadinos G. Goulias**  
*Traveler Behavior and Values Committee*

**Brelend C. Gowan**  
*Tort Liability and Risk Management Committee*

**James S. Kalchbrenner**  
*Signing and Marking Materials Committee*

**Thomas J. Kazmierowski**  
*Pavement Rehabilitation Committee*

Performance Measurement Committee Chair Daniela Bremmer presents an Emeritus Membership certificate to Lance A. Neumann, Cambridge Systematics, Inc.

**Ronald J. Kilcoyne**  
*Bus Transit Systems Committee*

**Robert L. Lytton**  
*Engineering Behavior of Unsaturated Soils Committee*

**Hani S. Mahmassani**  
*Traveler Behavior and Values Committee*

**David R. Miller**  
*Public Transportation Planning and Development Committee*

**Eric J. Miller**  
*Transportation Demand Forecasting Committee*

**Glen E. Miller**  
*Modeling Techniques in Geomechanics Committee*

**Patricia L. Mokhtarian**  
*Traveler Behavior and Values Committee*

**Roger P. Moog**  
*Intergovernmental Relations in Aviation Committee*

**Lance A. Neumann**  
*Performance Measurement Committee*

**Richard L. Russell**  
*Transportation Law Committee*

**David J. Sampson**  
*Bus Transit Systems Committee*

**Gary S. Spring**  
*Artificial Intelligence and Advanced Computing Applications Committee*

**Richard J. Weiland**  
*Intelligent Transportation Systems Committee*



## NEW TRB SPECIAL REPORT

# Implementing the Results of the Second Strategic Highway Research Program

## Saving Lives, Reducing Congestion, Improving Quality of Life

ANN BRACH

The author is Deputy Director, Strategic Highway Research Program 2, Transportation Research Board of the National Academies, Washington, D.C.

The highway system has a pervasive presence in U.S. society. Whether driving, biking, or riding the bus, most people use the nation's roads every day in tending to personal, professional, family, and social responsibilities. These facilities have been in constant use for decades, often exceeding their original design life and traffic volumes, leaving a deteriorating and increasingly congested system. Moreover, deaths and injuries from highway crashes constitute a major public health concern.

Congress authorized the second Strategic Highway Research Program (SHRP 2) to address some of the most pressing concerns about highway transportation. As part of the SHRP 2 authorization, Congress requested a report by early 2009 about promising results from the research and how these results could be implemented most effectively. The Transportation Research Board's Special Report 296, *Implementing the Results of the Second Strategic Highway Research Program: Saving Lives, Reducing Congestion, Improving Quality of Life*, outlines what is needed to implement the program results and to reap the promised benefits.

The committee that authored the report (see box, page 38) was appointed by the National Research Council of the National Academies under the auspices of the Transportation Research Board (TRB).

The committee believes that widespread implementation of products developed by SHRP 2 is necessary to address the nation's roadway safety, renewal, reliability, and capacity issues.

To accomplish this, an implementation program should be established; the Federal Highway Administration (FHWA) should serve as the principal implementation agent, in partnership with others; stable and predictable funding of \$400 million over 6 years should be provided for the implementation activities; a stakeholder advisory structure should be established; and detailed implementation plans should be developed as soon as feasible.

### The Challenges

The 4-million-mile highway system is the backbone of the U.S. economy, carrying 65 percent of the nation's \$15 trillion in freight traffic (1) and 88 percent of the noncommercial person miles traveled (2). The system and its functioning are taken for granted. Today, however, the system faces major challenges, as facilities have aged, often exceeding their original design life and traffic volumes.

The National Highway System is totally resurfaced every 7 to 8 years (3) and totally reconstructed on a 50-year replacement cycle, although roadways typically are designed only for a 20-year life span. The average age of bridges in the national inventory is 40 years; 27.5 percent of this inventory is structurally deficient or functionally obsolete (4).

In 2005, congestion cost travelers in 437 urban areas 4.2 billion hours and \$78 billion, wasting 2.9 billion gallons of fuel (5). Some 43,000 deaths and millions of injuries occur on the nation's roads every year. Motor vehicle crashes remain the leading cause of death for those between the ages of 5 and 34, and highway crashes are estimated to cost the nation \$230 billion annually (6).

These infrastructure renewal, congestion, and safety problems will intensify with the growth predicted in the next two decades: the U.S. population is expected to grow by 24 percent by 2030; despite a

Utah Department of Transportation workers use self-propelled modular transporters—computer-controlled, multi-axle, platform vehicles—to speed bridge installation.



Photo: Utah DOT

recent downturn, the number of vehicle miles traveled (VMT) is projected to increase by 60 percent by 2030, with truck VMT increasing by 75 percent (7); and the number of truckloads is predicted to increase by 80 percent, to nearly 23 billion tons, by 2035 (8).

This expected growth calls for better system operation and more rapid renewal of in-place infrastructure to optimize capacity and improve travel time reliability. Additional highway capacity will be needed in selected locations to move motorists and freight.

One estimate indicates that an additional 173,000 lane miles of Interstate highway will be needed by 2035 to maintain the current level of highway performance (9). This implies the addition of more than 5,700 lane miles of Interstate highway annually for the next 30 years—nearly comparable with the rate of expansion during the Interstate construction years. Capacity enhancements will have to integrate environmental, economic, and community requirements.

## SHRP 2

Research and innovation have an important role to play in addressing the issues and concerns associated with the building, maintenance, operation, and use of the highway system. In 2005, because of the success of the first SHRP, which was conducted in the late 1980s and early 1990s, Congress authorized a highly focused SHRP 2 in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.

The program focuses on goals that are meaningful to highway users—such as increasing safety, reducing congestion, minimizing disruption to users when roads are being rehabilitated, and providing new capacity that enhances neighborhoods and avoids environmental harm. The 7-year, \$170 million program addresses four research focus areas:

- ◆ **Safety:** Significantly improve highway safety by achieving an understanding of driving behavior through a study of unprecedented scale.

- ◆ **Renewal:** Develop design and construction methods that cause minimal disruption and produce long-lasting facilities to renew the aging highway infrastructure.

- ◆ **Reliability:** Reduce congestion and improve travel time reliability through incident management, response, and mitigation.

- ◆ **Capacity:** Integrate mobility, economic, environmental, and community needs into the planning and design of new transportation capacity.

## Promising Results

Research projects in SHRP 2 have been under way for less than 2 years of the program's projected 7-year duration. Preliminary results, however, indicate that SHRP 2 research products will contribute substantially to addressing some of the most salient challenges for highway transportation.

### Safety

SHRP 2 will conduct a naturalistic driving study of unprecedented scale—sensors will be installed on the vehicles of 4,000 volunteer drivers for 2 years in several sites across the United States. The sensors will collect data on driver and vehicle performance as the volunteers go about their ordinary driving routines. These data, linked with roadway data, will be used by safety researchers and practitioners to improve highway safety for years, if not decades, into the future.

Additional products include initial findings from the study that can be used to modify or improve safety treatments; analysis tools and research protocols that safety researchers can build on to develop new countermeasures; and a site-based video system for studying vehicle behavior on particular roadway segments, such as intersections.



### Renewal

SHRP 2 will develop tools to support the consistent and systematic rapid renewal of highways—completing highway projects quickly, with minimal disruption to the community, and producing facilities that are long-lasting. This new way of doing business relies on more collaborative relationships and decision making; better integration of management, planning, design, construction, and maintenance; and more synergistic use of technologies and methods, so that



## Potential Beneficiaries of SHRP 2 Research Products

- ◆ Taxpayers
- ◆ Motorists
- ◆ Commercial drivers
- ◆ Bus riders
- ◆ Shipping and logistics professionals
- ◆ Environmental agencies
- ◆ Communities, businesses, and owners of event venues served by the highway system
- ◆ Railroads
- ◆ Utilities
- ◆ Automobile manufacturers and suppliers
- ◆ Metropolitan planning organizations
- ◆ Law enforcement
- ◆ Firefighters
- ◆ Emergency medical services
- ◆ Highway designers, contractors, and suppliers
- ◆ State and local transportation agencies

optimal benefits can be realized from complementary sets of innovations.

Among the products of this research are bridge and pavement materials and systems, equipment, and innovative designs; and new ways to address construction and asset management, quality control, risk management, and institutional arrangements between transportation agencies and their many partners.

### Reliability

SHRP 2 will develop tools to improve travel time reliability by addressing congestion problems that arise from nonrecurring events, such as crashes, vehicle breakdowns, inclement weather, special events, and work zones.



Products of the research include data and methods to support decision making; guidance on the institutional changes needed to support agencies' increased focus on operations; and analyses of the effectiveness of highway designs and operational countermeasures to support incorporation of reliability into planning, programming, and design manuals and procedures. The research also will define future needs and explore innovative ideas to address these needs.

### Capacity

SHRP 2 will address the challenge of planning and designing new transportation capacity that integrates mobility, economic, environmental, and community needs.



The central product is the Collaborative Decision-Making Framework (CDMF), an integrated web-based tool focusing on key decision points in the planning and programming process.

The CDMF brings together the right people with the right information at the right time. The framework is supported by tools developed in three other research areas. In the area of ecology, products include an ecosystem-based credits system, a business model, and guidelines for strategies that rise above resource-by-resource mitigation. In the area of travel behavior, products include mathematical relationships between motorist behavior, pricing, and congestion and demonstrations of the effects of highway management strategies on highway throughput. In the area of economics, products include before-and-after case studies of economic development impacts, a practitioner's handbook to make the development impacts more transparent to noneconomists, and improved economic analysis tools.



PHOTO: AAA FOUNDATION FOR TRAFFIC SAFETY

The Second Strategic Highway Research Program's naturalistic driving study will collect data on driving behavior that, when combined with roadway data, will be used to improve highway safety.

## Recommendations

In addition to identifying these promising results of SHRP 2 research, the committee's report, as requested by Congress, presents potential incentives for, impediments to, and methods of implementing SHRP 2 results; estimates the costs of implementation; and discusses the administrative structure and organization best suited to carry out an implementation program. Following is a summary of the committee's recommendations.

### Recommendation 1: A SHRP 2 implementation program should be established.

A robust and comprehensive effort to implement the products of SHRP 2 should address all four focus

## Potential Value of Widespread Implementation of SHRP 2 Results

### *Small Percentages Translate into Big Impacts*

The committee that authored Special Report 296, *Implementing the Results of the Second Strategic Highway Research Program: Saving Lives, Reducing Congestion, Improving Quality of Life*, believes that implementation of results from SHRP 2 will provide significant benefits to roadway users and to society in general. For example, every 1 percent decrease in congestion from the implementation of SHRP 2 products will provide the following benefits annually:

- ◆ \$780 million saved,
- ◆ 42 million fewer hours spent in traffic delays, and
- ◆ 29 million fewer gallons of fuel consumed.

Similarly, every 1 percent improvement in highway safety from applying findings from the SHRP 2 safety program would provide the following annual benefits:

- ◆ 400 lives saved,
- ◆ More than 25,000 injuries avoided, and
- ◆ \$2.3 billion in reduced costs to society from roadway injuries and deaths.

The hub of the Maryland State Highway Administration's Coordinated Highways Action Response Team (CHART) program is the Statewide Operations Center in Hanover. According to a University of Maryland study, the CHART program in 2001 may have prevented as many as 766 secondary incidents through its prompt clearing of primary incidents and may have eliminated 25.80 million vehicle-hours of delay, saving 4.35 million gallons of fuel and keeping 4,027 tons of vehicular emissions out of the air.



PHOTO: MARYLAND SHA CHART PROGRAM

areas: safety, renewal, reliability, and capacity. The program should use demonstrated implementation strategies, as well as other innovative approaches that may be developed.

**Recommendation 2:** The Federal Highway Administration (FHWA) should serve as the principal implementation agent for SHRP 2, in partnership with the American Association of State Highway and Transportation Officials (AASHTO), the National Highway Traffic Safety Administration (NHTSA), and TRB. NHTSA should exercise a leadership role in the long-term stewardship of the safety database.

Promoting technology has been central to FHWA's mission since its earliest predecessor, the Office of Road Inquiry, was established in 1893. FHWA has

long-established relationships with state departments of transportation (DOTs), including field offices in each state with staff who work closely with DOT staff, in addition to expertise in Washington, D.C., and a multidisciplinary highway research center in Virginia. The agency's expertise encompasses most of the major disciplinary areas covered by SHRP 2: highway planning, design, and construction; environmental and safety concerns; and highway operations.

In addition to providing funds and technical assistance to state and local transportation agencies, FHWA can modify or waive regulations to facilitate testing and implementation of new technologies and methods. FHWA administered a successful implementation effort for the first SHRP and learned many practical lessons from that experience.

The committee believes that the agency is best positioned to administer SHRP 2 implementation, as long as it takes into consideration the specific differences between the first SHRP and SHRP 2, as well as the unique challenges facing SHRP 2 implementation. The agency will need to engage in reorganization to provide dedicated management and technical support for SHRP 2 implementation. It may need to recruit staff to provide additional technical expertise.

Although many stakeholders will be involved in the implementation program, several stand out as potential partners. Primary among these is AASHTO, because the state DOTs remain the principal user group. AASHTO also can play a role in setting standards to facilitate the adoption of innovations by state and local government transportation agencies.

TRB's involvement is a result of its role in administering the research program. TRB offers a network

## Committee for the Strategic Highway Research Program 2: Implementation

**Kirk T. Steudle**, Michigan Department of Transportation, *Chair*

**Forrest M. Council**, University of North Carolina

**C. Douglass Couto**, Citrix Systems, Inc.

**Thomas B. Deen**, Consultant

**Joel P. Ettinger**, New York Metropolitan Transportation Council

**David R. Gehr**, PB Americas, Inc.

**Robert C. Johns**, University of Minnesota

**Robert C. Lange**, General Motors Corporation

**Sandra Q. Larson**, Iowa Department of Transportation

**Ananth K. Prasad**, HNTB Corporation

**Mary Lou Ralls**, Ralls Newman, LLC

**Mary Lynn Tischer**, Virginia Department of Transportation

**John P. Wolf**, California Department of Transportation

of technical committees, other communication and coordination mechanisms, and the ability to establish high-level advisory, oversight, and technical committees. The safety component of SHRP 2 calls for a strong role for NHTSA.

**Recommendation 3: Stable and predictable funding should be provided over several years to support SHRP 2 implementation activities. Total funding for the first 6 years of the implementation program is estimated at \$400 million. The need for additional funding thereafter should be assessed at the appropriate time. Implementation planning and budgeting should take into account the need of several SHRP 2 products, especially the safety database, for support that extends beyond the initial 6-year period.**

Effective implementation will require a plan for several years of effort with a predictable funding flow; ideally, funding should be authorized to be “available until expended.” The funding recommended for SHRP 2 implementation would be over and above the usual level of funding for ongoing research and technology activities at FHWA and NHTSA, to ensure that the implementation program does not have a negative impact on other much-needed activities at these agencies.

**Recommendation 4: A formal stakeholder advisory structure should be established to provide strategic guidance on program goals, priorities, and budget allocations, as well as technical advice. At a minimum, this advisory structure should include an executive-level oversight committee for the entire SHRP 2 implementation program and a second oversight committee focused exclusively on administration of the safety database.**

Members of the executive-level SHRP 2 implementation oversight committee should include the principal users of SHRP 2 products—state DOTs, local transportation agencies, metropolitan planning organizations, and appropriate private-sector and academic representatives—as well as experts on research implementation, information technology, and knowledge management.

**Recommendation 5: Detailed implementation plans should be developed as soon as feasible to guide the implementation efforts.**

As soon as implementation funding is made available, FHWA should develop detailed plans, with appropriate input from users and technical experts, in coordination with the ongoing SHRP 2 research program. The implementation plans should be living documents, updated periodically, and should be publicly available.

## Focused on Improvement

The four focus areas of SHRP 2—safety, renewal, reliability, and capacity—were developed through almost 3 years of study and consultation with an array of stakeholders to ensure that the most critical highway user needs would be addressed. Increasing safety, reducing congestion, minimizing disruption to users when roads are being rehabilitated, and providing new capacity that enhances neighborhoods and avoids environmental harm are outcomes that are valuable to highway users.

In addition, SHRP 2 is focused on changing the way that highway agencies do business. Changing institutions and processes is risky, especially in the public sector. SHRP 2 will produce methods and guidance, as well as technologies, to help agencies make the changes necessary to improve service to their customers while managing the risk involved with institutional change. If widely implemented, the products of SHRP 2 research could enhance taxpayers’ investments in transportation and improve the daily experience of roadway users significantly.

## References

1. *Our Nation's Highways 2008*. FHWA-PL-08-021, Federal Highway Administration, Washington, D.C., 2008. [www.fhwa.dot.gov/policyinformation/pubs/pl08021/index.cfm](http://www.fhwa.dot.gov/policyinformation/pubs/pl08021/index.cfm).
2. Hu, P. S., and T. R. Reuscher. *Summary of Travel Trends: 2001 National Household Travel Survey*. Federal Highway Administration, Washington, D.C., December 2004. <http://nhts.ornl.gov/2001/pub/STT.pdf>.
3. *Special Report 260: Strategic Highway Research: Saving Lives, Reducing Congestion, Improving Quality of Life*. Transportation Research Board, National Research Council, Washington, D.C., 2001.
4. *Status of the Nation's Highways, Bridges, and Transit: 2004 Conditions and Performance*. Federal Highway Administration, Washington, D.C., 2004. [www.fhwa.dot.gov/policy/2004cpr/execsum.htm](http://www.fhwa.dot.gov/policy/2004cpr/execsum.htm).
5. *2007 Urban Mobility Report*. Texas Transportation Institute, College Station, 2007. <http://mobility.tamu.edu/ums/>.
6. Blincoe, L., A. Seay, E. Zaloshnja, T. Miller, E. Romano, S. Luchter, and R. Spicer. *The Economic Impact of Motor Vehicle Crashes, 2000*. NHTSA Technical Report No. DOT HS 809 446, National Highway Traffic Safety Administration, Washington, D.C., 2002.
7. *Annual Energy Outlook Report*. DOE/EIA-0383, Energy Information Administration, Washington, D.C., 2007. [http://tonto.eia.doe.gov/FTP/ROOT/forecasting/0383\(2007\).pdf](http://tonto.eia.doe.gov/FTP/ROOT/forecasting/0383(2007).pdf).
8. *Freight Facts and Figures 2007*. Federal Highway Administration, Washington, D.C., 2007. [http://ops.fhwa.dot.gov/freight/freight\\_analysis/nat\\_freight\\_stats/docs/07factsfigures/index.htm](http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/07factsfigures/index.htm).
9. PB Consult, Inc., Cambridge Systematics, Inc., A. E. Pisarski, and K. E. Heanue. *Future Options for the National System of Interstate and Defense Highways*. Final report, NCHRP Project 20-24(52)—Task 10, Transportation Research Board of the National Academies, Washington, D.C., 2007. [http://onlinepubs.trb.org/onlinepubs/trbnet/acl/NCHRP\\_20-24\\_52Task10\\_NCHRPFinal.pdf](http://onlinepubs.trb.org/onlinepubs/trbnet/acl/NCHRP_20-24_52Task10_NCHRPFinal.pdf).



TRB Special Report 296, *Implementing the Results of the Second Strategic Highway Research Program: Saving Lives, Reducing Congestion, Improving Quality of Life*, is available from the TRB online bookstore, [www.trb.org/bookstore/](http://www.trb.org/bookstore/); to view the book online, go to <http://onlinepubs.trb.org/onlinepubs/sr/sr296.pdf>.





# ShakeCast

## Caltrans Deploys a Tool for Rapid Postearthquake Response

LOREN L. TURNER, DAVID WALD, AND KUO-WAN LIN

Turner is Senior Transportation Engineer, California Department of Transportation, Division of Research and Innovation, Sacramento; Wald is a Supervisory Geophysicist and Lin is a Geophysicist with the U.S. Geological Survey, Golden, Colorado.

After a major earthquake, one of the most critical tasks for the California Department of Transportation (Caltrans) is to assess the impact on the condition of all bridges and roadway corridors in the state highway system. Timely response ensures public safety, guides emergency vehicle traffic, and reestablishes critical lifeline routes.

### Problem

Immediately after an earthquake, bridge inspection teams had difficulty setting priorities, because precise information was not available to locate the most severe shaking, where the greatest damage was likeliest. After the 1994 Northridge earthquake, identifying the damage areas and mobilizing bridge inspection teams took several hours.

Without sufficient data, Caltrans had to locate the earthquake's epicenter, find the closest fault, and develop a list of bridges within a specified buffer zone around the fault or the epicenter. Television newscasts often provided the best indicator of damage areas.

With this information, inspection teams were dispersed widely within the region to perform the initial reconnaissance. This task took up precious time. Moreover, the shaking levels can vary dramatically within a buffer zone. An earthquake rarely ruptures along the entire length of a fault. Furthermore, ground shaking at the same distance from a rupture zone can vary by nearly tenfold, because of various seismological and geotechnical effects. A buffer zone large enough to account for all areas that could have been shaken strongly will include wide swaths of undamaged zones, which can lead to an inefficient use of limited resources.

### Solution

In 2005, Caltrans initiated a research contract with the United States Geological Survey (USGS) to develop and implement a Caltrans-specific version of ShakeCast, a postevent software analysis tool. The goal was to change the way that Caltrans responds to a major earthquake. ShakeCast is a web-based application that automatically retrieves measured earthquake shaking

data and analyzes the data in relation to individual bridge performance characteristics. Within minutes of an event, the program generates e-mails to set priorities for inspection and assembles other web-based products to assist emergency responders.

ShakeCast was built on ShakeMap, a USGS product that receives measured ground motion data from a network of more than 1,900 sensors throughout California—approximately two-thirds of all sensors nationwide—and combines the information with geological data to create maps that show ground-shaking intensity. The maps provide a level of detail that far surpasses the general information about the earthquake's epicenter and magnitude, which the news media commonly report. ShakeMap provides the input parameters for ShakeCast, which in turn uses the Caltrans bridge and highway inventory data to develop automated analyses and to produce prioritized lists for bridge inspection.

Deployed at Caltrans in June 2008, ShakeCast features Internet-based account management, system administration, and Google Maps visualization tools (see sample screen image, below). In addition, it auto-



ShakeCast website and visualization tools. (MMI = Modified Mercalli Index; PGA = peak ground acceleration; PGV = peak ground velocity; PSA = peak spectral acceleration for 0.3 s, 1 s, and 3 s.)

matically generates products for direct use in Google Earth®, ArcGIS®, and Excel®.

Caltrans operates ShakeCast on two redundant servers at the Transportation Laboratory in Sacramento, supporting a group of responders who perform postearthquake bridge inspections. The servers operate 24 hours a day, 7 days a week, and rely on a robust system of Caltrans e-mail servers to distribute the notifications.

For events greater than magnitude 4.0, ShakeCast automatically determines the shaking value at the locations of more than 12,700 bridges and facilities, compares the values with the threshold preestablished for each facility, and distributes e-mails to designated responders within 15 minutes of the event. The e-mails contain general information about the event and a table of bridges sorted by inspection priority.

Each bridge in the system's database has a unique fragility, determined with bridge damage models originally published by Basöz and Mander (1) and implemented in the Hazards U.S. (HAZUS) software of the Federal Emergency Management Agency. The fragility models employ 1-second peak-spectral accelerations and take into account bridge geometry, such as span lengths, number of spans, column heights, and skew; the years of design, construction, and retrofit; and the component material types.

Although the fragility methodology generates probabilities that a structure will be at a defined damage level, the results are presented in the context of inspection prioritization, to avoid any perception that the analysis represents actual damage. Because of the uncertainties in the range of ground motions and the assumptions made in bridge fragility computations, the tool is considered effective in prioritizing resources if the bridges with actual damage in an earthquake were flagged in the top 10 percent of the ShakeCast analysis. Inspection priorities are coded red, orange, yellow, and green, corresponding to high, medium-high, medium, and low priority for full engineering assessment.

## Application

The July 2008 earthquake near Chino Hills was magnitude 5.4; only one bridge sustained significant damage. The damage included concrete spalling and transverse displacement of a deck span at the center pier (see photo, this page).

The initial Caltrans ShakeCast notification identified the bridge as the 30th highest inspection priority of the more than 300 bridges assessed. A follow-up notification message, which took into account more comprehensive ground motion measurements, listed

<sup>1</sup> www.shakeout.org/.

the bridge as the third highest inspection priority after assessing more than 400 bridges. Although not considered a major event, the Chino Hills earthquake provided an opportunity to exercise the capabilities of ShakeCast during the test deployment phase and to build confidence in the system.

The Golden Guardian earthquake preparedness exercise<sup>1</sup> in November 2008 deployed ShakeCast to generate assignments for Caltrans bridge inspections. The exercise scenario hypothesized a magnitude 7.8 earthquake on Southern California's San Andreas Fault to test the coordination efforts of regional responders. The Golden Guardian exercise gave Caltrans responders valuable insight into the potential impacts a severe event would have on the highway infrastructure because of bridge damage.

## Benefits

The test deployment phase of the ShakeCast software already has realized benefits. The ShakeCast system has proved a valuable tool for Caltrans in post-earthquake response during real events and in scenario planning exercises.

ShakeCast facilitates the complicated assessment of potential damage to widely distributed facilities. The system compares the complex distribution of the shaking with the bridge inventory's damageability—which can be highly variable—and provides a simple, hierarchical list with maps of the structures and facilities most likely affected. By focusing inspection efforts on the most critically shaken areas, ShakeCast has drastically reduced Caltrans' response time to assess potentially damaged structures after an earthquake.

*For more information, contact Loren L. Turner, Senior Transportation Engineer, Caltrans, Division of Research and Innovation, 5900 Folsom Blvd., MS 5, Sacramento, CA 95819; telephone 916-227-7174; e-mail loren\_turner@dot.ca.gov.*

## Reference

1. Basöz, N., and J. B. Mander. Enhancement of the Highway Transportation Lifeline Module in HAZUS. Final prepublication draft prepared for the National Institute of Building Sciences, Washington, D.C., March 31, 1999.

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

Suggestions for "Research Pays Off" topics are welcome. Please contact G. P. Jayaprakash, Transportation Research Board, Keck 488, 500 Fifth Street, NW, Washington, DC 20001 (telephone 202-334-2952, e-mail gjayaprakash@nas.edu).



Bridge damage from magnitude 5.4 Chino Hills earthquake.

## Eugene (Gene) R. Russell, Sr.

*Kansas State University*

Professor Emeritus of Civil Engineering at Kansas State University (K-State), Gene Russell remains actively involved as principal or coprincipal investigator for five highway safety-related research projects. As Chair of the Transportation Research Board (TRB) Roundabouts Task Force, which he started as a subcommittee in 2002, he developed the technical program for the second national conference on roundabouts, held in Kansas City last May.

“In regard to all things transportation-related, I have been like a kid in a candy store—wanting all of it,” he quips. “In an age of specialization, I have taught and conducted research in a broad spectrum of transportation topics—I may be the last of the generalists.”



**“We ... have to work harder at reducing highway fatalities below the approximately 40,000 annually.”**

With a master’s degree in soils and highway materials engineering from Iowa State University, and a doctorate from Purdue University in transportation planning and traffic, Russell has taught undergraduate courses at K-State in surveying, transportation planning, highway engineering, traffic engineering, soils and foundations, and pavement design. He also has taught graduate courses via video and the Internet on pedestrian and bicycle facilities design, accident reconstruction, highway design for safety, roundabout design, and more.

After serving in the U.S. Navy during the Korean War, he thought that electrical engineering was his calling. “But after two summers working for the Illinois highway department in 1955 and 1956,” he recalls, “I realized that I loved this work and switched to civil engineering.”

After earning a bachelor of science in civil engineering in 1958 from Missouri School of Mines and Metallurgy—now Missouri University of Science and Technology—Russell worked on Interstate 80 in California as an assistant bridge engineer and then in Iowa as a resident construction engineer.

“I’m proud to have been part of the development of the greatest highway system in the world,” he says. “But as highway professionals, we need to do a better job of convincing politicians to provide the funds to rehabilitate and maintain our

transportation infrastructure—even if it means raising gasoline taxes. We also have to work harder at reducing highway fatalities below the approximately 40,000 annually.”

Russell’s recent research has concentrated on highway safety and the modern roundabout. “More than 20 percent of our annual highway fatalities occur at intersections,” he notes. “Recent research shows that roundabouts reduce injury crashes by 80 percent and can reduce fatalities by 90 percent.”

Another area of research for Russell is centerline rumble strips, which can reduce crossover accidents significantly on two-lane highways. Throughout his career, Russell has been involved in highway–rail grade crossing safety: “Annual fatalities have dropped from around 1,600 per year in 1969 to less than 400 in recent years—one of the greatest safety programs in our history.”

Russell started his academic career in 1965 at Indiana Institute of Technology, Ft. Wayne, and later was a research associate at Purdue University. He has spent the major part of his career at K-State, starting in 1974 as Associate Professor. He has been principal or coprincipal investigator on more than 100 research projects and author or coauthor of more than 170 publications.

Between 1990 and 2002, Russell held such positions as director of K-State’s Center for Transportation Research and Training; director of Traffic Assistant Services for Kansas; and associate director of the Region VII University Transportation Center. From 1997 to 2000, he was the Mark H. and Margaret Hulings Chair in Engineering.

Russell has attended every TRB annual meeting since 1972 and has served 35 years on the Highway–Rail Grade Crossings Committee, which named him an emeritus member; 18 years on the Transportation of Hazardous Materials Committee, 9 as secretary; 6 years on the Transportation and Safety Management Committee; and is completing a third term on the Traffic Control Devices Committee.

In addition, Russell has served on National Cooperative Highway Research Program (NCHRP) panels on roundabouts, road safety audits, rural and semirural two-lane highway safety, and optimal distributions for traffic signals. He has authored or coauthored NCHRP Synthesis reports on centerline rumble strips and on hazardous materials incidents.

Russell is a fellow and life member of the American Society of Civil Engineers and of the Institute of Transportation Engineers. In January 2009 the Council of University Transportation Centers presented him with an award for distinguished lifetime contributions to education and research. He also has been inducted into the Missouri University of Science and Technology’s Academy of Civil Engineers.

## G. A. Giannopoulos

### *Hellenic Institute of Transport*

“Transportation research is at the forefront of developments in the transportation sector throughout the world,” observes G. A. Giannopoulos, Director, Hellenic Institute of Transport, National Center for Research and Development, Greece, and Professor of Transportation Engineering, Aristotle University of Thessaloniki. “Transportation research leads the cycle of innovation necessary for the development of new systems and for the viability of existing ones. There can be no policy formulation or implementation without the investigation, analysis, and documentation that comes from transportation research. The application of new and innovative transportation systems is the result of successful research.”



**“Transportation research leads the cycle of innovation necessary for the development of new systems and for the viability of existing ones.”**

Giannopoulos is known internationally as a leader in transportation research organizations. He founded the South East European Transport Research Forum, a network of approximately 30 organizations in 14 southern European countries, and he is a founding member and the first two-term president of the European Conference of Transport Research Institutes (ECTRI). In January 2006 he signed a memorandum of understanding on behalf of ECTRI with the Transportation Research Board (TRB) to initiate collaborative projects.

“Successful transportation research requires several contributing conditions,” he maintains. “These include well-motivated and well-trained researchers; collaboration among research teams at regional, national, and international levels; strategic use of research infrastructures; collaboration with industry; and well-defined policies and organizational structures for programming and funding.”

Giannopoulos keeps actively involved in research and has participated in more than 150 research projects since 1979. His research interests and areas of expertise include freight and transportation intermodality; port planning and management; communications technologies; transportation planning and modeling; and systems integration and project management.

“I am a hands-on manager who likes to work closely with

colleagues and with the researchers under my guidance,” Giannopoulos says. “Simple communication is a prerequisite for good professional relationships—I always enjoy what I am doing and try to do what I enjoy.”

Giannopoulos is passionate about working to shape the future of transportation. “I have been blessed to have many excellent students, and I have grown both personally and professionally from these relationships,” he notes. Since 1982, he has supervised more than 20 doctoral students, and he has served on review panels for more than 30 additional doctoral dissertations.

Giannopoulos is a member of the TRB International Activities Committee. In addition, he has contributed to more than 50 committees and working groups of the European Conference of Ministers of Transport, the United Nations Economic Commission for Europe, and the European Economic Community. He chairs the Transport Advisory Group of the European Union (EU) Directorates General of Research and Technological Development and of Transport and Energy, and he is cochair of the EU-U.S. Collaboration in Transport Research Working Group.

“The Working Group’s report presents discussions, analyses, and practical recommendations that will enhance international cooperation and promote excellence in transport research,” Giannopoulos explains. “I hope that the recommendations will help shape EU-U.S. relations and collaboration in transport research, as well as more international collaborations globally.”

In his 40-year career, Giannopoulos has founded and directed the Laboratory of Transport Engineering and directed the Transport and Organization Section of the Civil Engineering Department at Aristotle University. He was a visiting research fellow at the Massachusetts Institute of Technology School of Management and Transportation Center, Cambridge, in 1986; a visiting scientist at the University of California, Berkeley, in 1987; and a visiting professor at the postgraduate school of the Institute of Economics and Maritime Transport, University of Antwerp, Belgium.

Giannopoulos is the author or coauthor of several books, including the two-volume *Transportation Planning and Traffic Engineering* (in Greek), and *Transport and Communication Innovation in Europe* and *Bus Planning and Operation in Urban Areas: A Practical Guide* (in English), as well as more than 100 peer-reviewed scientific and technical papers. He received a diploma in civil engineering from the National Technical University of Athens in 1968; and a diploma in 1970, a master’s degree in transportation planning and engineering in 1971, and a doctorate in transportation in 1973 from Imperial College, University of London.

## CALENDAR

TRB Meetings  
2009

## June

- 2–3 Data on Goods Movement Impacts on Air Quality  
Irvine, California
- 14–17 26th International Bridge Conference\*  
Pittsburgh, Pennsylvania
- 21–24 2nd International Symposium on Freeway and Tollway Operations\*  
Honolulu, Hawaii
- 22–24 North American Transportation Statistics Interchange (*by invitation*)  
Washington, D.C.  
*Thomas Palmerlee*
- 22–26 5th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design\*  
Big Sky, Montana  
*Richard Pain*
- 28–  
July 1 Earthquake Engineering in a Multihazard Environment\*  
Oakland, California
- 29–  
July 2 8th International Conference on the Bearing Capacity of Roads, Roadways, and Airfields\*  
Champaign, Illinois

## July

- 8–10 6th International Conference on Maintenance and Rehabilitation of Pavements and Technological Control\*  
Politecnico, Di Torino, Italy

- 19–22 2009 TRB Joint Summer Conference  
Seattle, Washington
- 19–22 48th Annual Workshop on Transportation Law  
Denver, Colorado  
*James McDaniel*
- 19–23 12th AASHTO–TRB Maintenance Management Conference\*  
Annapolis, Maryland
- 22 Northwest Traffic Data Workshop  
Seattle, Washington
- 28–29 2009 Transportation Planning, Land Use, and Air Quality Conference  
Ames, Iowa

## August

- 3–6 GeoHunan: Challenges and Recent Advances in Pavement Technologies and Transportation Geotechnics\*  
Hunan, China
- 17–18 5th New York City Bridge Conference\*  
Battery Park, New York
- 24–27 Transportation Hazards and Security Summit 2009: Progress Through Partnership (*by invitation*)  
Irvine, California  
*Joedy Cambridge*
- 29–  
Sept. 2 14th Conference on Cold Regions Engineering\*  
Duluth, Minnesota  
*G. P. Jayaprakash*

## September

- 6–9 4th International Congress of Smart Rivers 21: The Future of Inland Navigation\*  
Vienna, Austria
- 14–15 Integrated Corridor System Management Modeling Best Practices Workshop  
Irvine, California
- 16–17 North American Freight Flows Conference 2009  
Irvine, California
- 17–18 Research on the Transmission of Disease in Airports and on Aircraft: A Symposium  
Washington, D.C.
- 28 Long-Term Performance of Geotechnical Infrastructure  
Buffalo, New York  
*G. P. Jayaprakash*

## October

- 5–7 European Transport Conference\*  
Leiden, Netherlands
- 13–14 Infrastructure Security Workshop\*  
Rutgers, New Jersey  
*Joedy Cambridge*
- 19–22 8th National Conference on Asset Management  
Portland, Oregon
- 27–30 4th International Conference on Women's Issues in Transportation  
Irvine, California

Additional information on TRB meetings, including calls for abstracts, meeting registration, and hotel reservations, is available at [www.TRB.org/calendar](http://www.TRB.org/calendar). To reach the TRB staff contacts, telephone 202-334-2934, fax 202-334-2003, or e-mail [lkarson@nas.edu](mailto:lkarson@nas.edu). Meetings listed without a TRB staff contact have direct links from the TRB calendar web page.

\*TRB is cosponsor of the meeting.

# TRB HIGHLIGHTS

## IN MEMORIAM

### L. G. (Gary) Byrd, 1923–2009

Lloyd Garland (Gary) Byrd, past member of the TRB Executive Committee and interim director of the first Strategic Highway Research Program (SHRP), died on March 20 in Tryon, North Carolina, at the age of 85. During his decades-long career in civil engineering, Byrd served with distinction on many TRB committees, including 6 years on the Executive Committee from 1989 to 1995 as chair of its Subcommittee for National Research Council (NRC) Oversight and as an ex officio member of the NRC Governing Board.

Born in Atlanta, Georgia, Byrd served in World War II in Europe in the 76th Infantry Division under General George S. Patton. In 1950, he graduated from Ohio State University with a bachelor's degree in civil engineering. He began his career as an engineer with the Ohio Department of Highways and then became a field engineer and maintenance engineer with the Ohio Turnpike Commission. From 1960 to 1963, he was associate editor of *Public Works Publications* in Ridgewood, New Jersey.

Byrd cofounded the consulting firm of Byrd, Talamy, MacDonald and Lewis in 1963. In 1972, the firm became a division of Wilbur Smith and Associates, in which he served as firm manager, senior vice president, and director until 1984. While at Wilbur Smith and Associates, Byrd was principal-in-charge of projects for the transportation departments of Virginia, Maryland, Pennsylvania, Illinois, and New York, as well as for the Washington Metropolitan Area Transit Authority. Among his many projects, he led management systems studies of highway operations, maintenance and equipment fleets for transportation agencies in nine states (Idaho, Nevada, Montana, Colorado, Ohio, Illinois, New York, New Jersey, and Massachusetts) and two countries (Bolivia and Jordan).

As interim director of the first SHRP from 1984 to 1986, Byrd guided the planning for a landmark \$150 million, 5-year national program of highway research. Administered by NRC, SHRP produced significant advances in pavement design, highway maintenance, and operations. Byrd subsequently worked as an independent consulting engineer until his retirement to Tryon, North Carolina, in 1999.

Byrd was inducted into the National Academy of Engineering in 1987 for "pioneering contributions to highway maintenance management systems and research." His long history of working with TRB began in 1959, when he became a member of the Maintenance of Controlled-Access Highways Committee. He offered his expertise in maintenance of transportation facilities as chair or member of many other TRB committees. He served on the Technical Activities Council from 1973 to 1976 as chair of the Division Group 3 Council (Operation, Safety, and Maintenance of Transportation Facilities).

A respected author and editor, Byrd was responsible for the inaugural issues of two notable TRB reports. He authored the National Cooperative Highway Research Program (NCHRP) Report 1, *Evaluation of Methods of Replacement of Deteriorated Concrete Structures*, and NCHRP Synthesis of Highway Practice 1, *Traffic Control for Freeway Maintenance*. In 1996, Byrd wrote a narrative of TRB's first 75 years for a special anniversary edition of *TR News*. He also wrote many other articles and reports.

In 1998, Byrd was honored with a Distinguished Lectureship from TRB and was a 1986 recipient of the Roy W. Crum Distinguished Service Award. Other awards include the Ohio State University College of Engineering Distinguished Alumnus Award (1978), the Road Gang's P. D. McLean Memorial Award (1989), the American Society of Civil Engineers' Wilbur S. Smith Award (1985), and the Francis C. Turner Lecture Award (1995).



Gary Byrd delivers the TRB Distinguished Lecture (now the Thomas B. Deen Distinguished Lecture) at TRB's 77th Annual Meeting in 1998.

**RESEARCH PROJECTS SCORE**—The American Association of State Highway and Transportation Officials' Standing Committee on Research (SCOR) met at the National Academies' Keck Center, Washington, D.C., in March to review the status of the National Cooperative Highway Research Program (NCHRP) and to choose NCHRP projects for fiscal year 2010. SCOR allocated approximately \$28 million worth of funds to various research projects. Among the meeting's attendees were (left to right) Colin Franco, Rhode Island Department of Transportation (DOT); Richard Long, Florida DOT; Randell Iwasaki, California DOT; Michael Trentacoste (foreground), Federal Highway Administration (FHWA); and Debra Elston, FHWA.



**Safety for the Long Haul: Large Truck Crash Risk, Causation and Prevention**

Ron Knipling. *American Trucking Associations*, 2009; 600 pp.; \$159; ISBN 978-069-200-0731.

This comprehensive textbook on large truck safety covers more than 100 topics relating to large truck crash risk, causation, countermeasures, safety management, and safety policy, exploring driver fatigue; crash threats posed by four-wheeler errors; the need for defensive truck driving; mechanical failures; emerging vehicle-based technologies to prevent crashes; high-risk road and traffic situations; and causes and countermeasures for eight truck crash types, including road departure, rear-end, and lane-change crashes and merge crashes.

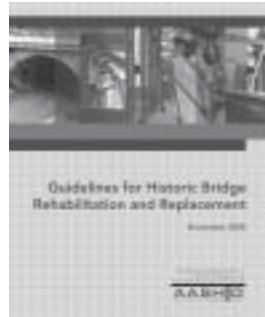
Other subject areas addressed are carrier safety management; regulatory compliance; company safety practices; risk-avoidance strategies; and use of onboard safety technologies. The book incorporates guest commentaries from top truck safety experts as well as 400 reference citations.

Author Ron Knipling, Senior Research Scientist at Virginia Tech Transportation Institute, is a member of the TRB Truck and Bus Safety Committee and of the System Users Group Executive Committee.

**Guidelines for Historic Bridge Rehabilitation and Replacement**

*American Association of State Highway and Transportation Officials (AASHTO)*, 2008; 68 pp.; AASHTO members, \$40; nonmembers, \$48; 1-56051-430-5.

Using the results of a literature search and survey findings, this report offers nationally applicable decision-



making guidelines for the rehabilitation of historic bridges. The report details the current state of historic bridge rehabilitation or replacement decision-making by state and local transportation agencies.

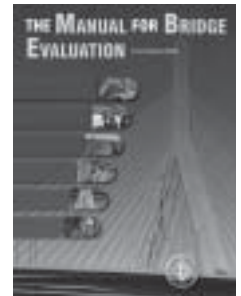
Intended for use as protocol for determining when rehabilitation of historic bridges can be prudent and feasible—and when it is not, based on engineering and environmental data and judgments—the guidelines identify approaches to bring historic bridges into conformance with design and safety guidelines and standards. Presented in narrative and matrix format, and incorporating tables and images of historic bridges, this report also examines the effect or implications of remedial action on historical significance.

**Manual on Bridge Evaluation**

AASHTO, 2008; 548 pp.; AASHTO members, \$225; nonmembers, \$270; 1-56051-394-0.

Offering assistance to bridge owners at all phases of bridge inspection, this manual incorporates allowable stress, load factor, and load and resistance factor rating methods into one publication. The manual provides guidelines for the procedures and policies for determining the physical condition, maintenance needs, and load capacity of highway bridges, along with rating examples. Sections include bridge records, bridge management systems, inspection, material testing, load rating, fatigue evaluation of steel bridges, and nondestructive load testing.

Developed to aid bridge owners in establishing inspection procedures and evaluation practices that meet the National Bridge Inspection Standards, the manual includes a CD-ROM with search features.



The books in this section are not TRB publications. To order, contact the publisher listed.

**TRB PUBLICATIONS****Guidance for Implementation of the AASHTO Strategic Highway Safety Plan: A Guide for Addressing Collisions Involving Motorcycles**  
NCHRP Report 500, Volume 22

This guide aims to improve awareness by highway agencies of the special characteristics of motorcycles and their needs on the roadway. It presents strategies for motorcycle operation, the traveled way, and road-sides that are intended to reduce the number and severity of motorcycle crashes.

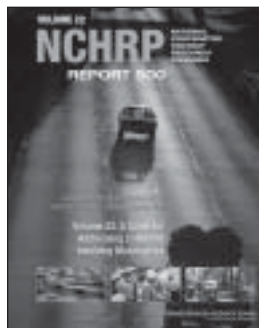
2009; 165 pp.; TRB affiliates, \$42; TRB nonaffiliates, \$56. *Subscriber category: safety and human performance (IVB).*

**Costing Asset Protection: An All-Hazards Guide for Transportation Agencies (CAPTA)**

NCHRP Report 525, Volume 15

CAPTA is designed as a planning tool for top-down estimation of both capital and operating budget implications of measures intended to reduce risks to locally acceptable levels. The report supports the mainstreaming of an integrated, high-level, all-hazards, national incident management system and of a responsive, multimodal, consequence-driven risk management process into transportation agency programs and activities.

2009; 126 pp.; TRB affiliates, \$40.50; TRB nonaf-



**TRB PUBLICATIONS** (continued)

filiates, \$54. *Subscriber categories: planning and administration (IA), operations safety (IV), aviation (V), public transit (VI), rail (VII), freight transportation (VIII), marine transportation (IX), and security (X).*

**Human Factors Guidelines for Road Systems, Collection B: Chapters 6, 22 (Tutorial 3), and 23 (Updated)**

NCHRP Report 600B

Guidance is provided to help the nonexpert in human factors effectively consider the roadway user's capabilities and limitations in the design and operation of highway facilities.

2008; 23 pp.; TRB affiliates, \$26.25; TRB nonaffiliates, \$35. *Subscriber category: safety and human performance (IVB).*

**Safe and Aesthetic Design of Urban Roadside Treatments**

NCHRP Report 612

This report explores recommended design guidelines for safe and aesthetic roadside treatments in urban areas. It also examines a toolbox of roadside treatments to balance pedestrian, bicyclist, and motorist safety and mobility.

2008; 64 pp.; TRB affiliates, \$31.50; TRB nonaffiliates, \$42. *Subscriber category: safety and human performance (IVB).*

**Changeable Message Sign Displays During Non-Incident, Non-Roadwork Periods**

NCHRP Synthesis 383

The ways that changeable message signs are used to convey information during nonrecurrent events are presented, including approaches to environmental problems, special event traffic, and other special operating conditions.

2008; 68 pp.; TRB affiliates, \$33.75; TRB nonaffiliates, \$45. *Subscriber category: highway operations, capacity, and traffic control (IVA).*

**Forecasting Metropolitan Commercial and Freight Travel**

NCHRP Synthesis 384

Methods of freight and commercial vehicle travel forecasting are examined, along with promising techniques that are emerging from ongoing research. The primary focus is on metropolitan-level forecasting, although some consideration is given to statewide freight models.

2008; 130 pp.; TRB affiliates, \$40.50; TRB nonaffiliates, \$54. *Subscriber categories: planning and administration (IA); freight transportation (VIII).*

**Local and Regional Funding Mechanisms for Public Transportation**

TCRP Report 129

Focusing on traditional tax- and fee-based funding for transit—as well as common business, activity, and related funding sources—this report explores several transit funding mechanisms. It includes an online regional funding database, which provides an extensive list of funding sources at the local and regional levels to support public transportation. A user manual for the database is also available online.

2009; 71 pp.; TRB affiliates, \$34.50; TRB nonaffiliates, \$46. *Subscriber categories: public transit (VI) and planning and administration (IA).*

**Lightning-Warning Systems for Use by Airports**

ACRP Report 8

This report investigates the operational benefits that lightning detection and warning systems may be able to generate in reducing flight delays. The report is designed to help assess whether the systems are cost-beneficial for an individual airport or an airline.

2008; 71 pp.; TRB affiliates, \$33.75; TRB nonaffiliates, \$45. *Subscriber category: aviation (V).*

**Airport Sustainability Practices**

ACRP Synthesis 10

With information gathered from a literature review and a web-based survey, this synthesis examines airport sustainability practices in terms of environmental, economic, and social issues.

2008; 112 pp.; TRB affiliates, \$39; TRB nonaffiliates, \$52. *Subscriber category: aviation (V).*

**U.S. and International Approaches to Performance Measurement for Transportation Systems**

TRB Conference Proceedings 44

Summarized are the sessions of a September 2007 conference that explored the use of performance measurement as a strategic tool to communicate goals, objectives, and results to a range of stakeholder groups. Session topics included performance measures as an organizational management tool to establish accountability; communicating performance results effectively to customers; data and tools; the use of performance measures to gauge the effectiveness of tolling and congestion pricing and of other transportation strategies to address sustainability and safety issues; and performance-based contracting and project delivery.

2008; 152 pp.; TRB affiliates, \$44.25; nonaffiliates, \$59. *Subscriber category: planning and administration (IA).*







## TRB PUBLICATIONS (continued)

### **Performance Measurement, Demand Management, and Issues of Major U.S. Cities**

Transportation Research Record 2046

The 11 papers in this volume investigate topics such as travel time reliability measures; performance measures of freeway operations; communicating performance measures and results; incorporating transportation demand management into the land development process; evaluating urban parking policies; and reassessing on-street parking. Also examined are the transportation benefits for employees in high transit mode share areas; compressed work-week choices; the removal of inner-city freeways; the ways in which civil engineering students choose a specialization; and a teaching laboratory for a course in integrated land use and transportation.

2008; 93 pp.; TRB affiliates, \$40.50; nonaffiliates, \$54. Subscriber category: *planning and administration (IA)*.

### **Freeway Operations 2008**

Transportation Research Record 2047

Authors explore the capacity and performance implications of ramp closure; traffic diversion rates caused by changeable message sign messages; the returns on investment from safety service patrol programs; ramp metering policies; the effect of variable speed limits on traffic flow; and the impact of intelligent transportation systems on queue discharge flow variability. Other papers present findings on the characteristics of freeway incidents; estimating changes in toll plaza delays; estimating vehicle queue length at metered on-ramps; ramp closure for incident management; estimating time-dependent origin–destination demands with different data coverage; and a microscopic toll plaza and toll road corridor model.

2008; 110 pp.; TRB affiliates, \$41.25; nonaffiliates, \$55. Subscriber category: *highway operations, capacity, and traffic control (IVA)*.

### **Developing Countries 2008**

Transportation Research Record 2048

Papers cover sustainable mobility; competition in and for the public transportation market; the impact of rail transit on land use; and a multicriteria fuzzy methodology for a feasibility study of transport projects. This volume also examines walking behavior and pedestrian flow on different types of facilities; operating speeds of bicycles and electric bicycles; exposure of motorcycles at signalized intersections; and the effectiveness of helmets in reducing the severity of head injuries.

2008; 76 pp.; TRB affiliates, \$39; nonaffiliates, \$52. Subscriber categories: *planning and administration (IA) and safety and human performance (IVB)*.

### **Data Systems and Travel Survey Methods**

Transportation Research Record 2049

This volume contains 21 papers exploring subjects such as the relationship between transit's usual and actual mode shares; errors in real-time estimation of travel times; a prototype information system for estimating average vehicle occupancies from traffic accident records; sampling schemes for weigh-in-motion traffic data collection; and a look at changes in traffic volume pattern during holiday periods. Also explored are regional traffic data for the Mechanistic–Empirical Pavement Design Guide; the accuracy of design hourly volume estimates; the consideration of weather conditions in estimating traffic data; travel time prediction; piecewise inverse speed correction with individual travel times; sensor locations for reliable travel time prediction; Bayesian updating of transferred household travel data; and evaluation of voluntary travel behavior change programs. In addition, this volume also reviews amendments to the incentive for strategic bias in stated preference studies; field evaluation of Global Positioning System (GPS)–enabled personal digital assistants; a managed-lanes stated preference survey in Atlanta, Georgia; a methodology to obtain a Mexico–U.S. multi-product origin–destination matrix; passive GPS technology for collecting commercial vehicle tour data; Freight Analysis Framework, Version 2, data for Florida; and the Netherlands National Data Warehouse.

2008; 185 pp.; TRB affiliates, \$43.50; nonaffiliates, \$58. Subscriber category: *planning and administration (IA)*.

### **Structures 2008**

Transportation Research Record 2050

The 18 papers on general structures focus on traffic barriers and bridge rails; steel bridges; concrete bridges; the dynamics and field testing of bridges; seismic design and performance of bridges; pipe roof reinforcement in a shallow multiarch tunnel; the stability of corroded metal culverts; and the structural fiber reinforcement of cable-stayed bridges.

2008; 186 pp.; TRB affiliates, \$43.50; nonaffiliates, \$58. Subscriber category: *bridges, other structures, and hydraulics and hydrology (IIC)*.

*The TRR Journal Online website provides electronic access to the full text of more than 9,000 peer-reviewed papers that have been published as part of the Transportation Research Record: Journal of the Transportation Research Board (TRR Journal) series since 1996. The site includes the latest in search technologies and is updated as new TRR Journal papers become available. To explore the TRR Online service, visit [www.TRB.org/TRROnline](http://www.TRB.org/TRROnline).*

To order TRB titles described in Bookshelf, visit the TRB online Bookstore, at [www.TRB.org/bookstore/](http://www.TRB.org/bookstore/), or contact the Business Office at 202-334-3213.

## INFORMATION FOR CONTRIBUTORS TO

# TR NEWS

*TR News* welcomes the submission of manuscripts for possible publication in the categories listed below. All manuscripts submitted are subject to review by the Editorial Board and other reviewers to determine suitability for *TR News*; authors will be advised of acceptance of articles with or without revision. All manuscripts accepted for publication are subject to editing for conciseness and appropriate language and style. Authors receive a copy of the edited manuscript for review. Original artwork is returned only on request.

**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, typed pages). Authors also should 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 improve a reader's understanding of 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 photographs 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 appears. 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. Notices of meetings should be submitted at least 4 to 6 months before the event.

**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, price, and ISBN. Publishers are invited to submit copies of new publications for announcement.

**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.

**SUBMISSION REQUIREMENTS:** Manuscripts submitted for possible publication in *TR News* and any correspondence on editorial matters should be sent to the Director, Publications Office, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, telephone 202-334-2972, or e-mail [jawan@nas.edu](mailto:jawan@nas.edu).

- ◆ All manuscripts should be supplied in 12-point type, double-spaced, in Microsoft Word 6.0 or WordPerfect 6.1 or higher versions, on a diskette or as an e-mail attachment.

- ◆ Submit original artwork if possible. Glossy, high-quality black-and-white photographs, color photographs, and slides are acceptable. Digital continuous-tone images must be submitted as TIFF or JPEG files and must be at least 3 in. by 5 in. with a resolution of 300 dpi or greater. A caption should be supplied for each graphic element.

- ◆ Use the units of measurement from the research described and provide conversions in parentheses, as appropriate. The International System of Units (SI), the updated version of the metric system, is preferred. In the text, the SI units should be followed, when appropriate, by the U.S. customary equivalent units in parentheses. In figures and tables, the base unit conversions should be provided in a footnote.

**NOTE:** Authors are responsible for the authenticity of their articles and for obtaining written permissions from publishers or persons who own the copyright to any previously published or copyrighted material used in the articles.

## Leading the Way to Safer Roads

According to estimates, more than 37,000 people lost their lives on the nation's highways during 2008. The American Association of State Highway and Transportation Officials (AASHTO) has adopted a national highway safety goal of halving fatalities over the next two decades, reducing the number of fatalities by 1,000 per year. This can be achieved through the widespread application of low-cost, proven countermeasures that reduce the number of crashes on the nation's highways.

To support this goal, the Transportation Research Board's National Cooperative Highway Research Program (NCHRP) has developed a series of publications, *Report 500: Guidance for Implementation of the*

*AASHTO Strategic Highway Safety Plan*. Each of the 23 titles in the series addresses an emphasis area from the AASHTO Strategic Highway Safety Plan and offers specific strategies for dealing with safety problems involving the road user, the highway, the vehicles, the environment, and the safety management system. The guides strongly encourage the development of programs to address the emphasis areas in a coordinated manner.

The guidebooks in the series are available online at [www.TRB.org](http://www.TRB.org) and may be purchased from the TRB Bookstore at 202-334-3213 or [TRBSales@nas.edu](mailto:TRBSales@nas.edu) or online at [books.trbbookstore.org](http://books.trbbookstore.org).



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