

TR NEWS

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The ability of the U.S. freight transportation system to handle rapid growth in international trade is limited—a long-term planning and research perspective is needed and should begin now, the authors maintain. They note that TRB can encourage efforts to strengthen multimodal freight planning, to recognize the role of freight transportation in the nation's economy, and to stimulate research to support the development of a freight network that can secure U.S. competitiveness in a global economy.

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The history of the development of the Interstate Highway System makes clear that analysis, research, and investigation were at the foundation, observes the author, 2006 Chair of the TRB Executive Committee. Design standards, materials, right-of-way requirements, bridge loadings, and other critical components of highway design were in place before the program started. Similar data-based, problem-focused, and performance-measured efforts are needed now to enhance the system's performance.



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COVER: The Internet is an invaluable tool for disseminating information and linking transportation professionals around the world. Successfully navigating this ever-expanding network requires care, know-how, and keeping up to speed with the latest in web search technology and trends.

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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19 TRB 2006 ANNUAL MEETING HIGHLIGHTS Focusing on Transportation's Critical Issues: Sharing Achievements, Gearing Up for Solutions

With attendance passing 10,200, TRB's 85th Annual Meeting presented a program of more than 500 sessions, 70 workshops, and 250 committee meetings, with a total of 1,800 papers, plus awards, honors, exhibits, special events, and featured speakers. Four spotlight themes and the debut of the latest edition of *Critical Issues in Transportation* provided a focus. New research programs were launched, anniversaries celebrated, and new leaders took office. A selection of photos shows some of the highlights.

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COMING NEXT ISSUE

The 50th anniversary of the Interstate Highway System is the subject of feature articles in the May–June *TR News*. Authors examine how the Interstate came to be, what the Interstate has meant to the nation, and the many engineering achievements involved, as well as the system's effects on society, urban development, the supply chain, and more.



Sign announcing one of the many firsts of the Interstate Highway System, on Highway 40, now Interstate 70, St. Charles County, Missouri, 1956.

Fast Lanes on the Transportation Information Superhighway

Tips for Efficient, Comprehensive Internet Research

BONNIE OSIF

The author is engineering reference and instruction librarian, Engineering Library, Pennsylvania State University. She is a member of TRB's Library and Information Science for Transportation Committee and the Conduct of Research Committee.

In *40 Years of the U.S. Interstate Highway System: An Analysis of the Best Investment a Nation Ever Made*, published in 1996, Wendell Cox and Jean Love wrote, "Without a first-class system of Interstate highways, life in America would be far different" (1). They noted that the highway system has

- ◆ "Enriched the quality of life for virtually every American,"
- ◆ Saved lives and prevented injuries,
- ◆ Returned value for investment,
- ◆ "Positioned the nation for improved international competitiveness,"

- ◆ "Permitted the cherished freedom of personal mobility to flourish," and
- ◆ "Enhanced international security."

At approximately the same time that President Dwight D. Eisenhower signed the Federal-Aid Highway Act of 1956, computer networks were being used for airline reservations and for a defense system. These networks were rudimentary, however, and it wasn't until 1969 that the Advanced Research Projects Agency (ARPA) of the U.S. Department of Defense implemented ARPANET, a connection of computers at several government and university research locations. This is commonly considered the beginning of the Internet.

From this small, exclusive network based on technically dense programming, the protocols and interfaces evolved that now are activated at the click of a mouse. In the beginning, the Internet was textual and accessed by known computer site addresses—the Internet Protocol or IP addresses—or through rough directories. Tim Berners-Lee developed a graphical interface for CERN, the European Council for Nuclear Research, that changed electronic file access points to hyperlinked icons and words. In 1993 this interface became public and the World Wide Web of hyperlinked Internet resources became the tool of the masses.

Paradoxical Directions

The benefits of the literal superhighways as described by Cox and Love and the benefits of the figurative information superhighway have many similarities. The information superhighway has enriched lives by making so much quality information readily accessible, has returned value for investments of time and money, and has permitted freedom to flourish through the almost overwhelming ethic of freedom of expression on the Internet. The free exchange of information has contributed to the improvement of life. The web's enhancement of international security, however, may be debatable.

The one statement that can be paraphrased without hesitation is that without the Internet, “life in America would be far different,” both at work and at leisure.

Many cartoonists have taken on the subject of the web, caricaturing both the high praise and the dire warnings voiced about the new medium. The truth may be between the two extremes. The cartoon below depicts the dichotomy of the Internet—the road forks in two paradoxical directions. The Internet can be a well-paved superhighway with excellent signage and worth traveling, or it can be a potholed detour with no roadside assistance and an undesirable destination.

The best-planned trip on this highway can turn

unexpectedly into a nightmarish dead end. A little preparation and knowledge can save time and effort—and help a search from becoming the equivalent of roadkill on the information superhighway.

Staggering Growth

Since the 1990s the growth of the Internet has been staggering. With no coordinating body and with web publishing relatively easy, information about almost anything and anybody can be found on the web.

According to the Internet World Stats website, growth in usage between 2000 and 2005 has been 160 percent worldwide (2). Approximately 68 percent of the United States, 36.8 percent of Europe, 49.2 percent of Oceania and Australia, 12.5 percent of Latin America, 8.9 percent of Asia, 8.3 percent of the Middle East, and 1.8 percent of Africa are connected to the Internet.

Search Engines

The most popular way to navigate the web is with a search engine. Most search engines use spiders or web crawlers, automatic programs that follow the hyperlinks from a web page to collect websites. In this way, the spider creates a web of ever-expanding pages, which grow exponentially.

Web users have their own favorite search engines. A few of the more popular include the following:

- ◆ Google (www.google.com);
- ◆ Altavista (www.altavista.com);
- ◆ Yahoo (www.yahoo.com);
- ◆ Teoma (www.teoma.com); and
- ◆ A9 (a9.com).

Google, which indexes more than 8 billion websites, is so widely used that its name has become a verb synonymous with “search”—people say they will “google the web.”

A recent development is the separation of scholarly content to enable specialized searches. Google Scholar (scholar.google.com) is an example.

Another way of searching the web is with a metasearch engine, an interface that employs several search engines at the same time. These include

- ◆ Excite (www.excite.com);
- ◆ Izito (izito.com);
- ◆ Vivisimo (vivisimo.com); and
- ◆ Webcrawler (www.webcrawler.com).

Invisible Web

The number of hits on a web search may be vast but does not include what is called the “invisible web” or the “deep web.” Not every web page is linked to other pages, making it invisible to the spider that is search-

“When you come to a fork in the road, take it” is a saying attributed to Yogi Berra. The forks in a web search can lead in paradoxical directions.

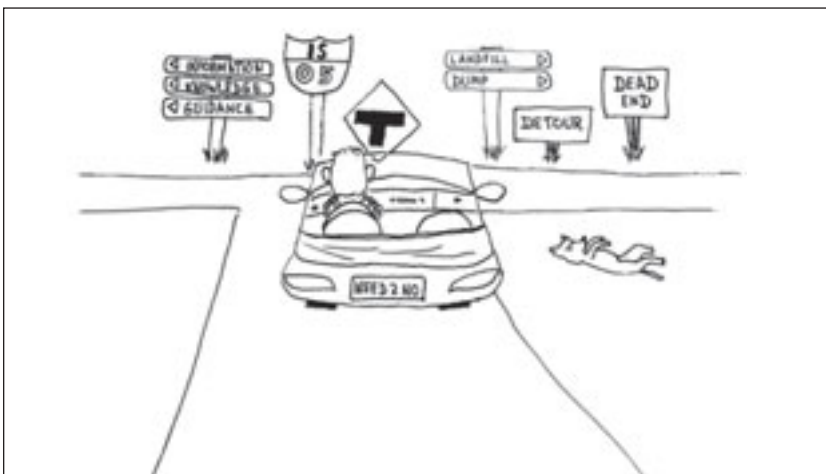


ILLUSTRATION BY T. OSO

ing the web. Many of these unseen pages can be extremely valuable.

For example, a database created on a topic may have no links to a web page. When a topic is searched, the records are generated dynamically in response to the query. No permanent record or links are made, and these records return to invisibility after the user is finished with the results. Specialized search engines have been created to access these sites and make these web pages searchable. These search engines include the following:

- ◆ Find Articles (www.findarticles.com);
- ◆ Complete Planet (www.completeplanet.com);
- ◆ Resource Discovery Network (www.rdn.ac.uk);
- ◆ Scirus (www.scirus.com); and
- ◆ Turbo10 (turbo10.com).

Choosing an Engine

Users should read the search tips and do some investigation into the search engine they use. Questions to ask include the following:

- ◆ How often does the search engine update?
- ◆ How precise is the search?
- ◆ What is the role of advertising on the site—does advertising have an effect on the order in which the results will be displayed?
- ◆ Does the search engine allow Boolean searches by adding “and,” “or,” and “not”?
- ◆ Does the search engine allow truncation and wildcards?

Search Tips

Learning one or two search engines well—along with their idiosyncrasies—is recommended. When a search is important or does not yield the results expected, running a second search engine may improve the coverage. Some sources of information, tips, and reviews of websites include the following:

- ◆ Infopeople (www.infopeople.org) offers tutorials, tips on evaluating resources, and charts on search engine characteristics;
- ◆ Phil Bradley’s Finding Information: Search Engines (www.philb.com/whichengine.htm) lists the best resources for a specific search; and
- ◆ SearchEngineWatch (searchenginewatch.com) has news, a blog, search tips, and more; some links are free, but others require paid membership.

Getting results or hits from a web search is seldom the problem. The problem is the overwhelming flood of information that results from a typical search, which usually is only one or two words long. Many of the



results may not be related to the intent of the search and often the first hits are advertisements for products.

For greater accuracy, the search terms should be as exact as possible. The instructions for advanced searches give more precise ways to phrase and limit a search. These include limits by language, by the type of organization posting the web page—for example, .edu for an educational institution, or .gov for a government site—or by the country of origin.

Phrase searching and Boolean operators are other means to fine-tune a search. For tips on how to perform these tasks on the search engine in use, consult the help screen, which is usually a click away.



Web Portals

Another, often preferable way to search the web is to begin at an evaluated, specialized site. A specialized web portal will decrease the number of hits, produce more narrowly focused results, and provide a higher degree of confidence in the returned web pages, which have been evaluated by a person knowledgeable in the field and without any economic incentive to include marginal or biased sites. The following web portals are useful in transportation and related fields:

- ◆ National Transportation Library (ntl.bts.gov), which offers databases, data sets, full-text resources and reports, and more, and hosts Transportation Research Information Services (TRIS) Online;
- ◆ EEVL (www.eevl.ac.uk/), which serves as the Internet Guide to Engineering, Mathematics, and Computing;
- ◆ Firstgov (firstgov.gov), which provides a “gateway to government information”;
- ◆ Internet Public Library (www.ipl.org), which hosts general and specialized reference resources; and
- ◆ Science.gov, which is the gateway to the U.S. government’s science and technology information.

Free or Fee?

The web offers a range of resources, including full-text resources such as bibliographies, conference papers, databases, data sets, dictionaries, directories, encyclopedias, journal and magazine articles, maps, real-time video, technical reports, and white papers.

Although much of the web is free, a significant portion is not. Commercial presses publish most of the academic journals in transportation and related fields and make the contents available only at a charge. Citations from these titles may turn up on a web search but the full-text article or conference paper, in most cases, will not.

Books, handbooks, and many standards also are normally available only for a fee. Many printed resources are not yet in electronic format, although the trend has been to convert any materials that have a market.

Indexes and Abstracts

Indexes and abstracting databases provide formal access to many information resources in transportation. The major transportation databases are TRIS, International Transport Research Documentation (ITRD, www.itrd.org/), and Transport, which com-

Online Portal to European Research

COLIN HOWARD

The International Transport Research Documentation (ITRD) database is a cooperative worldwide database of published information on transportation and transportation research. Since 1972 the Road Transport Research Program of the Organisation for Economic Co-operation and Development has overseen the development of the ITRD to facilitate the sharing of published information and of ongoing research in the field of transportation.

More than 30 renowned institutes and organizations from more than 23 countries provide input to the ITRD database in one of four languages through the appropriate language coordinating center:

- ◆ English—TRL Limited, Crowthorne, U.K.;
- ◆ French—INRETS (Institute National de Recherche sur les Transports et leur Securite), Arcueil, France;
- ◆ German—Bundesanstalt für Strassenwesen, Bergisch Gladbach, Germany; and
- ◆ Spanish—Centro de Estudios y Experimentación de Obras Públicas, Madrid, Spain.

The sharing of research and experience through ITRD is intended to prevent overlap and reinvention, while making new ideas and technologies accessible in a timely way. More than 350,000 bibliographical references to the transportation research literature and to ongoing research are available electronically from ITRD via the Internet or other complementary channels such as the TRANSPORT CD-ROM.

Each record contains an informative abstract from the literature published worldwide on transportation, including reports, books, journal articles, and conference proceedings. A second type of reference covers research in progress.

More than 10,000 references are added each year. Each record is available in one of the four official languages—English, French, German, or Spanish. The quadrilingual thesaurus allows all records to be searched by the term’s code, which is the same whatever the language of the abstract.

Membership is not required for searching the ITRD database. ITRD Online is available through STN International (www.fiz-karlsruhe.de/). ITRD is combined with the Transportation Research Information Services (TRIS) Database on the TRANSPORT product available from Ovid Technologies (www.ovid.com).

For more information, visit the ITRD website, www.itrd.org.

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bines the TRIS and ITRD databases.

Thorough coverage may require consulting other databases. Compendex—or the Computerized Engineering Index—covers all areas of engineering, going as far back in the literature as 1884, and indexing journal articles and conference papers with some coverage of reports, dissertations, and books. The database is available through several vendors.

The National Technical Information Service (www.ntis.gov) indexes technical reports published since 1967. Most of the reports are from the United States, but many international reports are included. The Society of Automotive Engineers indexes publications from around the world in SAE Global Mobility. Other specialized databases cover materials, aerospace, environment, and related subjects. Librarians can help determine which databases are available and how to gain access when the specialized need arises.

In general, these databases are searchable by author, title words, subject words, or a combination of these, and the search can be limited by year. Except for TRIS, all of these databases require a subscription, either to the individual database or through a fee-based vendor such as Dialog or STN, which host several databases.

Many databases provide an alerting service. The user creates a profile, and an automatic notice is sent via e-mail when new records are added to the database that meet the user's criteria.

Library Consortia

A database search produces a list of records for articles, conference papers, conferences, book chapters, reports, websites, and the like. The record will provide a link to the full text of an item or to the information for finding the article. If an article is not available locally, most organizations can request a copy or a loan through consortial networks, or they will purchase a copy. Libraries cannot collect all of the resources necessary for their patrons and therefore have joined together to collect, organize, and lend materials to meet research needs efficiently.

The Midwest Transportation Knowledge Network (MTKN) is an example of a transportation consortium: "A network of state department of transportation and academic transportation libraries in the Midwest, . . . the network is a forum to pool resources [and] share expertise and best practices" (3).

TLCat is a specialized transportation catalog of the holdings of the MTKN plus other transportation collections, with a guest link from the NTL website (<http://ntl.bts.gov/link.cfm>). TLCat allows transportation researchers and librarians to locate libraries with the items needed and to request a loan.



Electronic Libraries

Documents, reports, white papers, books, data sets, and more are increasingly available in full text on the web. Many state departments of transportation (DOTs) are publishing reports electronically, and several transportation magazines are available for free on the web.

Another trend is that searchable reference titles are being made available in full text in electronic collections. These services are fee-based and place links to a large number of pertinent titles and specific information from the computer's desktop. Three collections that address engineering are

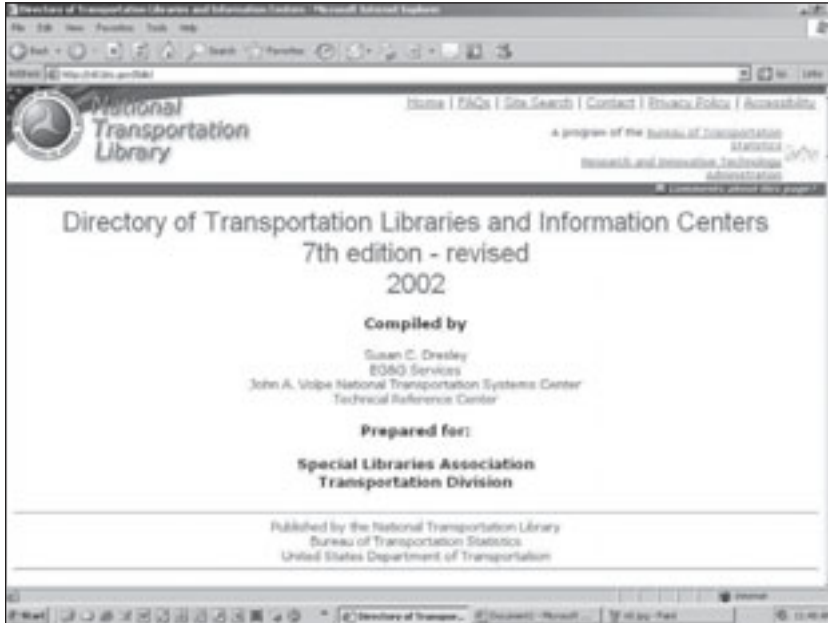
- ◆ ENGnetBASE from CRC Press (www.engnet-base.com);
- ◆ The Digital Engineering Library from McGraw-Hill (www.digitalengineeringlibrary.com/); and
- ◆ Knovel (www.knovel.com).

These aggregated electronic libraries provide fast, full-text access to information. The majority of the works in these collections are handbooks, encyclopedias, manuals, and other reference titles.

Finding the Right Information

Evaluating the materials posted on the web is a crucial step, but not difficult. As with print materials, not everything published on the web comprises valid, reliable information. As with print, the criteria for web document evaluation are

- ◆ The credentials of the author or authors,
- ◆ The reputation of the publisher or host of the website,



- ◆ The timeliness and currency of the information,
- ◆ The reliability and accuracy of the information, and
- ◆ The absence of bias.

Because publishing on the web is easy, evaluating the resources can be a challenge. Many print books, reports, papers, and articles go through a rigorous editing process and professional review. The reader therefore must consider from the information available whether or not the evaluation criteria have been met: from URLs or web addresses, attributions of authorship, references, dates of submission and updating, and the text itself.

A web portal, or gateway, can function as a filter that goes directly to web resources that have been evaluated. EEVL, hosted at Heriot Watt University in Scotland, is one of the best portals for general engineering and technology, with some transportation links. The NTL, hosted by the U.S. DOT Research and Innovative Technology Administration, offers a wealth of information organized for transportation professionals, students, and the public. Along with TRIS Online, NTL includes a reference collection and TLCat, the online union catalog of transportation library catalogs.

In addition to these two portals, many state DOTs, university transportation or engineering libraries, and other organizations have useful sites. An excellent example is the Minnesota DOT Library (www.dot.state.mn.us/library), which has links to local, national, and international websites, publications, statistical information, and more. Bookmark-

ing these sites can save time sifting through the pages of hits that are routinely returned by a search engine.

A few other sites are worth noting for the evaluation of web documents:

- ◆ Directory of Transportation Libraries and Information Centers (ntl.bts.gov/tldir);
- ◆ The Internet Scout Project (scout.wisc.edu/), which provides objective, critical reviews of web resources;
- ◆ Librarians' Index to the Internet (www.lii.org), which has the motto "Information you can trust," and which acts as a directory of Internet resources; and
- ◆ WWW Virtual Library (vlib.org), which lists web guides to several topics.

Monitoring Misinformation

As the Internet has gained in popularity and evolved from a specialized and relatively exclusive tool of researchers to an icon on almost every computer desktop, reliability has become an issue. Rumors and misinformation abound. Common sense and some of the same evaluation criteria used in assessing print information are essential.

Several websites monitor Internet misinformation. These include

- ◆ Snopes.com (www.snopes.com/), which is especially useful for software virus rumors and various forms of misinformation that are common on the Internet; and
- ◆ Urban Legends and Folklore (<http://urbanlegends.about.com/>).

Other Web Services

Through RSS—which stands for Really Simple Syndication, Rich Site Summary, or RDF (Resource Description Format) Site Summary—a user can subscribe to a service that scans RSS-friendly web pages for items of interest; the service then sends the subscriber a brief notice via e-mail, usually with links to the full text. RSS functions as a semicustomizable news service and is valuable for keeping up-to-date on topics of specific interest. Travel alerts, road construction, and new projects are the kinds of topics suited to this service.

Blogs, or web logs, have gained notoriety as popular tools in politics. In the information world, blogs can be valuable for keeping up with a topic. Several librarians write blogs that are similar to an electronic library newsletter, reporting on new resources and services, and providing search tips and pertinent websites.

Blogs have proliferated but tend to be transitory. To find a useful blog, search the web and evaluate the content critically to see if it is worth bookmarking, or ask a librarian for recommendations.

List servers or discussion groups cover a range of topics. Most TRB committees have e-mail groups for their members to discuss committee activities. Interested parties must join the subscription list to receive and send regular e-mails within the group. Lists of interest can be located via

- ◆ CataList (www.lsoft.com/lists/listref.html);
- ◆ Tile Net (www.tile.net/); and
- ◆ Google Groups (<http://groups.google.com/>).

Keeping Up

Like smart travelers checking road updates from state DOTs, the smart Internet user keeps up with changes in the web. Periodic reviews of favorite search engines or database search tips are advisable to discover any changes to the sites. “What’s new” links are helpful. Register for updates if the service is offered.

Get to know your local librarian in person or by e-mail. If problems arise with a search or with a database, ask the librarian for suggestions—the librarian is probably a regular web user and can provide pointers to refine or refocus a search.

Savvy Usage

The Internet can be both a waste of time and a fantastic timesaver, the disseminator of time- and money-saving information, as well as of misleading information. This is the paradox of the web, inherent in the openness, freedom, and ease of access in this seemingly ubiquitous medium. Applying a little know-how can make the web yield a wealth of important information.

Savvy users learn to drive a browser on the information superhighway the same way they learn to drive a car—with knowledge of the rules, lots of practice, and constant evaluation of road conditions. Although not every item of information is available on the Internet—especially for free—many destinations are worth the effort to learn for efficient use of the Internet.

Some claim the information superhighway is the best thing since sliced bread—or since high-occupancy vehicle lanes or E-Z Pass. It puts a wealth of information at the desktop of anyone with access to a networked computer or to almost any device with network capability. From reading novels to finding motorcycle helmet laws in a particular state, the information is there.

Others claim that the information superhighway is an overcrowded, poorly organized mess of pages with little of worth, and that determining what is and is not worth using is difficult. Both sides—and those in the middle—are right.

Making the information superhighway work is the same as making the Interstate system work. Know the destination and determine the highway to follow and

Publications Index Retooled

The Transportation Research Board (TRB) has launched a new and enhanced version of its online Publications Index at <http://pubsindex.trb.org> (or click on Publications Index in the left-hand menu on the TRB home page, www.TRB.org).

The TRB Publications Index is a searchable bibliographic database containing more than 30,000 records of papers, articles, and reports published by TRB and the Cooperative Research Programs, as well as by the Highway Research Board, the Strategic Highway Research Program, and the Marine Board, from 1923 to date.



Both simple and advanced query screens are available, allowing searches by author, title, series, conference, abstract, index terms, and date. The default keyword search automatically reviews several fields with a single query.

Links are provided from the bibliographic record to the full-text document—if it is available on TRB’s website—and to information about ordering the document. Search results can be displayed, downloaded, or e-mailed.

For more information about the TRB Publications Index, contact Barbara Post, bpost@nas.edu.

in what direction. Have a map, understand the road signs, and be alert to detours and warnings. Understanding what is and what is not on the web, the search tools, and the basic terminology—and having some sense of adventure—will make a journey on the information superhighway as efficient and useful as a drive along Route 80.

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Transportation Knowledge Networks

A Management Strategy for the 21st Century

NANCY P. HUMPHREY

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

The rapid delivery of reliable information and data enables public- and private-sector transportation professionals to perform their work, carry out the mission-critical goals of their organizations, and remain on the cutting edge of new research and technologies. The availability of the Internet and web search engines, however, has caused some transportation agencies to question the need for maintaining traditional libraries with central physical collections; library budgets are easy targets for cutbacks.

Despite the promise of the Internet, transportation professionals still report that they face an overwhelming volume of information. Many often have difficulty locating and retrieving technical reports, even the reports that are available in digital formats.

Strategic Advice

Concerned about the downsizing and closing of transportation libraries, as well as about the growing

demand for information services geared to new technologies, the Standing Committee on Research of the American Association of State Highway and Transportation Officials (AASHTO) requested the Transportation Research Board (TRB) to take a fresh look at how transportation information should be managed and provided. Through the National Research Council of the National Academies, TRB assembled a study committee of experts in information and computer science, library science and management, transportation policy and research, and transportation agency and research administration (see box, this page).

AASHTO charged the TRB study committee to provide strategic advice to the federal government and the states on the core needs for information services and on a sustainable administrative structure and funding mechanism to meet those needs.

Focusing on Basics

Users of transportation information represent a diverse and decentralized community that comprises the state and federal agencies involved in transportation; more than 600 transit agencies; nearly 400 metropolitan planning organizations; countless public works officials in thousands of cities, towns, and counties, supported by private contractors and consultants; universities; and private transportation companies and professional associations.

These groups not only need transportation information but also frequently assemble reports, research, and technical information that are not always widely shared. The study committee therefore focused on how to improve the identification, collection, accessibility, and preservation of information to increase the circulation and sharing of these resources among users.

The committee's report, issued as Special Report 284, *Transportation Knowledge Networks: A Strategy for the 21st Century*, covers all types of transportation information—from reports and journal articles to conference proceedings, as well as databases and statistical information, in the United States and abroad. The

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focus is on the basics, however: ensuring that narrative information—such as reports, articles, and conference proceedings—is identified and made available, preferably in electronic form, and that it remains accessible to major user groups. The report addresses the provision of information services in general, not only the accessibility through libraries.

Achieving the Vision

Many transportation information services are products of a transportation information management system envisioned in the early 1970s. These include the Transportation Research Information Services (TRIS) bibliographic database, the Research in Progress database, and a Transportation Thesaurus to improve and standardize the indexing and retrieval of transportation information.

In addition, the Online Computer Library Center catalogues the collections of many U.S. transportation libraries and locates documents for participating users. The recently launched TLCat is a special online catalogue of the collections of transportation libraries.

These services, however, have evolved piecemeal, are unevenly funded, and depend on informal institutional arrangements. The primary elements of the original vision for a transportation information management system have yet to be realized—notably the establishment of a sustainable coordinating mechanism and stable financial support.

In 1998, Congress authorized the U.S. Department of Transportation (DOT) to establish and maintain a National Transportation Library (NTL). The NTL provides a small digital collection of documents and websites, makes a major portion of TRIS available on the web, and offers reference services and free public access to TLCat; it also initiated a pilot consortium of libraries in the Midwest.

The NTL was positioned to become the national-level coordinating entity that U.S. transportation professionals had envisioned. But without stable funding and support from U.S. DOT, the NTL has been able to operate to date only within a narrow definition of its mission.

Making the Case for Change

In today's digital age, why are transportation libraries and information services not valued more? Many state DOT libraries, for example, are staffed by only one full-time equivalent professional, and two-thirds of state DOT libraries have annual budgets of less than \$15,000.

Part of the reason is that desktop access to online information is ubiquitous. Cost-conscious managers ask why the personnel costs and space requirements of running a library and providing information services are necessary when users can summon the informa-



tion they require at their desktops.

Making the business case for the gains in time and efficiency—the value added—through well-organized, readily accessible, and reliable information resources can be difficult. Like research, good information is often taken for granted, and the benefits are not always evident. The services offered by librarians—reference and research, document retrieval from international sources, literature reviews, collection development, full-text article retrieval, and other subscription services—are frequently not recognized, especially at the level of state DOT leadership, where turnover among chief executive officers is high.

Libraries and information professionals in other fields, such as health and agriculture, have addressed this problem by transforming their libraries. As information has become increasingly electronic, libraries have evolved from centralized and managed physical collections into decentralized networks of information, providing information services to users wherever they reside.

According to the committee, networks could form the backbone of a better system for managing transportation information. The consortium of Midwestern transportation libraries provides a good model.

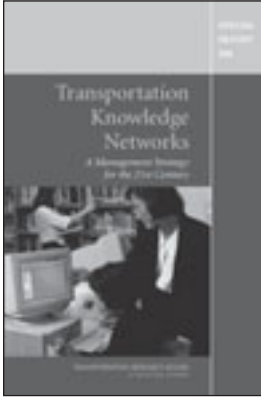
Knowledge Networks

To address the information service needs of the transportation sector in the digital age, the committee developed a series of consensus findings and recommendations for the organization and development of a transportation information management system.

The committee recommends the establishment of transportation knowledge networks (TKNs) in every region of the United States and at the federal level to link information providers to users (see figure, next page). Management and coordination of the activities of the TKNs should be at the national level, located within U.S. DOT's Research and Innovative Technology Administration (RITA).

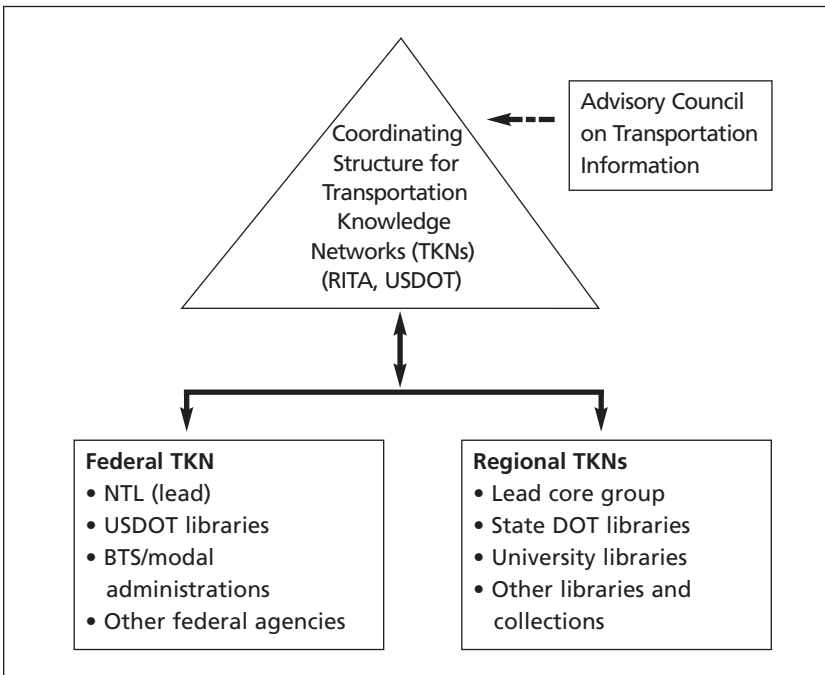
RITA should establish the governance for the coor-

Members of the Committee for a Future Strategy for Transportation Information Management presented their findings and recommendations and released Special Report 284 at a 2006 TRB Annual Meeting session, Wednesday, January 25: (left to right) Lance Grenzeback, Francis Francois (*chair*), Leni Oman, Bonnie Osif, Roberto Sarmiento, and Robert Johns.



TRB Special Report 284, *Transportation Knowledge Networks: A Management Strategy for the 21st Century*, is available from the TRB online bookstore, www.TRB.org/bookstore; to view the book online, www.TRB.org/publications/sr/sr284.pdf.

Proposed nationwide system for transportation information management.



ordinating structure by broadening the focus and membership of the Advisory Council on Transportation Statistics to become the Advisory Council on Transportation Information, with responsibility for policy direction and oversight and for reporting annually to Congress. External peer reviews of the activities of the coordinating structure and the TKNs also should be conducted, and the TKNs should consider organizing a representative, independent nonprofit association.

Sustaining the System

The lack of sustained funding and of ownership in the development of a nationwide transportation information management system has been a critical problem. This has hindered the support necessary for building a coordinating structure with a national vision to meet the information service needs of transportation users.

The committee therefore recommends initiating and funding the proposed coordinating structure for the first 3 years through annual federal grants of \$3 million to \$5 million. The funds will be used to set up the coordinating structure, start up the critical programs, and make pilot grants to help establish a federal TKN and the regional TKNs.

After the first 3 years, the federal grants should be increased and local matching funds should be required to support network operations, leveraging a total annual program budget of \$7.5 million to \$13 million. The coordinating structure's funds would help finance continuing network development and expansion; underwrite individual projects with national applications, such as information infrastructure, tool build-

ing, and products for network use; support professional capacity building; and conduct research. The network funds would support collection coordination and development, interlibrary loan services, the coordinated preservation and storage of printed and electronic materials, reference services for regional users, and professional development for members.

Follow-On Project

The committee recommends a follow-on project funded through the National Cooperative Highway Research Program to develop a business plan, including details of proposed functions and funding for the recommended transportation information management system.¹ In addition, the committee calls on U.S. DOT to expedite the establishment and funding of the national coordinating structure as recommended. Recognizing that funding for RITA is constrained under the current surface transportation legislation, the committee is focusing its recommendations for federal funding on the next reauthorization.

Finally, the committee urges the amending of the legislation for the Advisory Council on Transportation Statistics as soon as possible to broaden its membership, focus, and reporting functions, to provide a strong governance body for the coordinating structure. The follow-on study should be completed in time to enable Congress to review both the recommended funding requirements and legislative changes before the next reauthorization.

A Winning Strategy

A critical benefit of the proposed transportation information management system will be to improve access for users to more complete, reliable, and rapidly delivered information. The network focus, in particular, provides a winning strategy for leveraging resources, minimizing duplication, and stretching budgets for libraries and information services in today's business environment, in which transportation professionals are asked to do more with less.

A more coordinated information management system also should foster the sharing of expertise by training users to search for and locate information and by keeping librarians and other information professionals abreast of rapidly changing technology advances. The proposed coordinating structure, supporting a federal TKN and the regional TKNs, should provide the leadership to bring about a transportation information management system to meet the information needs of the transportation sector well into the 21st century.

¹The AASHTO Standing Committee on Research approved a two-year follow-on project through the National Cooperative Highway Research Program on March 21, 2006.

Directions for Freight Systems Research

Bingham is principal, Global Insight, Inc., Washington, D.C. Brooks is William A. Black Chair of Commerce, Dalhousie University, Halifax, Canada. Harrison is Senior Research Scientist, Center for Transportation Research, University of Texas at Austin. All serve on the TRB International Trade and Transportation Committee—Brooks as chair, Bingham as secretary, and Harrison as a member.

Global Trade Flows and Transportation Challenges

PAUL BINGHAM, MARY R. BROOKS, AND ROBERT HARRISON

International trade grew from 11 percent of the U.S. gross domestic product in 1970 to more than 26 percent in 2000. The geographic distribution and the types of commodities involved in this trade have changed in waves, altering the demands on the U.S. freight transportation system.

The dominance of East–West trade with Europe weakened during the 1960s, as trade with Japan increased through the 1970s, soon joined by trade with the newly industrialized economies of Asia. The North American Free Trade Agreement (NAFTA) brought additional North–South trade with Canada and Mexico in the 1990s.

NAFTA became the model for several bilateral and regional free trade agreements negotiated by the United States. These agreements are likely to increase trade volumes and to shift the location of transportation demand again. Since 2000, the source of the growth in trade and transportation demand has shifted back to Asia, through commerce with China.

Capacity Problems

Changing trade patterns and strong trade growth have caused episodes of severe congestion at U.S. ports of entry since the mid-1990s, with systemwide repercussions. The concentration of freight traffic at a small number of ports, airports, and border crossings produces congestion and delays, which can deter economic growth. According to TRB Special Report 271, *Freight Capacity for the 21st Century*, released in 2002, “the borders are among the most prominent bottlenecks in the freight system” (1).

Security concerns, inland network constraints, and institutional factors affect the ability to move to alternative port gateways or border crossings. Creating additional physical capacity at the ports of entry is critical, but the magnitude and cost of the projects and the involvement of many jurisdictions slow the investment response time and impede implementation. Innovative procedures and improvements in coordination have raised capacity at border and maritime ports of entry, but these measures alone cannot eliminate congestion.

The terrorist attacks of September 11, 2001, irrev-



ocably changed freight transportation globally; stricter security measures at land borders exacerbated congestion and delays. In the 2005 Thomas B. Deen Distinguished Lecture, Lillian Borrone—former assistant executive director of the Port Authority of New York and New Jersey—focused on the change in transportation demand and the challenges this creates for the United States (2). She noted that in the 1980s and 1990s the freight system offered limited extra capacity, but now “we have blown through our excess capacity buffer and run into a wall.” She stated that the freight system therefore is at risk.

Changing Patterns

The global pattern of international trade has altered dramatically in the past 15 years. China, for example, has grown from the ninth largest trading partner of the United States to the second largest. The U.S. economy has become more dependent on international trade, but the nation has not invested in sufficient seaport, airport, and land border infrastructure to support the growth in commerce.

In the 1990s third-party and fourth-party logistics firms emerged—intermediaries that are neither the cargo owners nor the carriers yet control the purchase of freight transportation and the terms of use. This is a byproduct of the globalization of production and indicates a shift in power from manufacturers to



Lillian Borrone delivering the 2005 Thomas B. Deen Distinguished Lecture, which raised awareness of the problems facing the U.S. freight transportation system.

retailers focused on cost reduction.

Growth in global supply chain complexity depends on reliable and efficient international transportation. Changing manufacturing practices have increased the trade of components and goods at intermediate stages of production. Often several import and export shipments are associated with the final import or export of a finished product. For example, U.S.-manufactured chemicals are exported to be made into fiber, which is imported back to the United States to be woven into fabric. The fabric then is exported to be cut into pieces, which may be imported or exported to a third country for sewing and then reimported to the United States for finishing or packaging into apparel ready for sale.

The cross-border flow of automobiles and components reveals the continental integration of the automobile industry, which began with the 1961 Auto Pact with Canada and which has flourished under NAFTA. The industry requires free-flowing borders.

International transportation, warehousing, and logistics practices are increasing in sophistication, incorporating techniques to reduce the cost of inventory, the exchange rate risk, and prices to optimize sales. Direct single-port gateways to single national import distribution centers have given way to regional gateways that connect to regional distribution centers or to the stores directly. The intermodal inland movement of standard ocean shipping containers now involves transloading high-volume commodities into more capacious, high-cube domestic containers and truck trailers.

Border Backups

Border crossings can be choke points in the freight system. Higher-value goods have affected the rate of growth in truck volumes, particularly at the southern border. From 1990 to 2000, according to data from the Texas Center for Border and Economic Enterprise Development, truck border crossings between Mexico and Texas increased 220 percent, but the growth rate has slowed since then. Congestion at Laredo–Nuevo Laredo has eased as Mexican shipment values have risen and low-cost production has moved to China.

Congestion and delays for truck and rail traffic at U.S. land border crossings remain unpredictable, hindering efforts to lower transportation costs. Delays are the result of physical infrastructure limitations, as well as of the complexities of the customs, security, and immigration processes. Road network congestion and delay are the primary complaint from carriers at high-volume border crossings, such as Detroit–Windsor. Transportation planning for a highly unpredictable environment requires solid research.

Seaport connectivity poses many challenges for the international trade network. Large urban areas grew

up around most seaports in the last two centuries, so that demands for landside access to the ports compete with other potential land uses and for capacity on the urban transportation network.

Security is an issue for high-profile ports that are potential targets for criminal and terrorist activity. Although aviation security has received the most funding and attention from the federal government, all modes of transportation face significant security costs at the borders. Within the transportation system, the international trade portion—particularly the containerized element—is the most vulnerable.

International air cargo shares airspace and some airport capacity with domestic air cargo and passengers. Although significant congestion and delays for international air cargo have not been frequent, the domestic air traffic system is straining under increased flights. Several international air cargo carriers have shifted traffic away from passenger airports in urban areas to inland airports. Federal Express at Memphis and UPS at Louisville are examples of air cargo hubs away from large urban airports.

Nevertheless, passenger aircraft convey a sizable volume of air cargo. The most significant international air cargo airports are major passenger airports in large urban areas: Los Angeles International, John F. Kennedy, and Miami International.

Long-Term Planning

In the Deen lecture, Borrone concluded that part of the problem is that U.S. policy is “too preoccupied with the politics of resource allocation, which is dictated by 50-year-old alliances built around separate highway, maritime, rail, and aviation development programs.” The solutions to many capacity challenges assume that other modes will pick up the excess demand, but all modes are encountering problems. For example, continued growth is expected for trucking, but the highways are choked, and driver recruitment is difficult. Short sea shipping is an intermodal option that can bypass this problem, but development requires more research.

The ability of the freight transportation system to handle rapid growth in international trade is limited. Moreover, domestic traffic is increasing at a greater rate than capacity expansion in many parts of the system. The intercity network of highways is growing at less than 0.5 percent per year, and federal capital funding for roads, airports, and waterways is projected to decline in real dollars.

Capital funding for ports and freight railroads depends on nonfederal sources. The public agencies and private companies responsible for these facilities face significant funding challenges. These trends imply that capacity constraints may degrade the nation’s international logistics efficiency in this decade, unless

new solutions can be implemented. Recent shifts of Asian cargoes from West Coast to East Coast ports via Panama Canal and Suez Canal routings underscore the problems of inadequate transport capacity.

Traffic on some international trade corridors of the rail system has reached the limits of capacity several times in the past 10 years. Officials are concerned about road and rail bottlenecks at ports that are receiving the new generation megaships. Barge operators need investments to maintain and upgrade the aging inland waterway infrastructure, particularly in areas with severe congestion. In addition, Federal Aviation Administration forecasts of dramatic growth in the volume of international air cargo in the next 20 years suggest increased conflict between passengers and freight at airports, barring investments in new air cargo facilities. A long-term planning and research perspective is needed and should begin now.

Policy Options

Policy options for increasing the capacity for trade can be complex and controversial. Constraints include available revenues, environmental restrictions, and lack of public support. Moreover, major additions to capacity often require 10 years or more for completion after approval. Railroads and air carriers already are setting prices to manage demand, a controversial practice that is gaining acceptance in the passenger sector in the United States—most obviously through tolls. Demand pricing may be an important infrastructure tool within two decades.

Another way to increase highway system capacity is to allow larger vehicles, an approach resisted by motorist, safety, and railroad interests. Capacity at ports and rail yards often is limited by dense adjacent development, local resistance to increases in freight traffic, and the lack of politically acceptable funding mechanisms.

Intelligent transportation systems and advances in port terminal technology and train control may help, but the benefits and feasibility of widespread implementation are uncertain. Each mode can no longer rely on the others to pick up the excess, and the private sector is seeking efficiency but without addressing the needs outside the operating scope of their businesses. As Borrone noted, the private sector does not invest in the transportation system's buffer capacity and backup redundancy.

Roles for TRB

In general, TRB can encourage efforts to strengthen multimodal freight planning in the United States and to recognize the role of freight transportation in the national economy. International trade deserves specific programs, so that federal and state planning agencies can address infrastructure needs on the supply side and

user needs on the demand side in a coherent manner. The continental integration of many sectors of the economy and reliance on just-in-time production and distribution systems require an improved understanding of the international aspects of freight movements and their impacts on the freight distribution network.

TRB activities and initiatives to support programs oriented to international freight could include the following:

1. *Examine the role of international trade and transportation in the U.S. economy.*

More needs to be known about the macroeconomic relationship between the U.S. economy and that of its international trading partners—in particular, Canada, Mexico, the European Union (EU), and China. Forecasts of trade growth between the United States and its primary trading partners, and accompanying data—currently incomplete—on transportation corridors and modes would form important inputs into supply-side planning. For example, key trade transportation corridors could receive a special designation and a likelihood of increased federal spending, either directly or through public-private partnering. Without this capability, the continent's terminals and corridors are likely to continue to experience congestion.

2. *Support efforts to improve planning data.*

Information on international trade—particularly from federal sources—is inadequate and does not provide transportation planners with the modal data for evaluating investment programs. TRB can support the Bureau of Transportation Statistics (BTS) in the U.S. Department of Transportation's Research and Innovative Technology Administration in efforts to improve trade databases, particularly in the area of international trade.

Within the United States, efforts to enhance and extend the Commodity Flow Survey are critical, because the data are central to many private, state, and federal analyses. U.S. Customs and Border Protection (CBP) should be encouraged to allow the Census Bureau to access new programs that include a wealth of transport data previously not collected on international trade. Although the manifest data filed before the arrival of a consignment at CBP vary from mode to mode, the transportation data help in assigning a level of risk. The Census Bureau can aggregate the information appropriately for BTS to disseminate for transportation infrastructure planning. TRB should assist BTS through joint sponsorship of workshops and seminars identifying the data needs for planning.

3. *Develop Annual Meeting spotlight sessions.*

TRB Annual Meeting spotlight sessions focus attention on key areas of interest and offer a venue to explore





Linking Freight to Public Policy was the subject of one of a series of four sessions on global supply chain issues at the 2005 TRB Annual Meeting.

issues. Crosscutting sessions present opportunities for TRB committees to work together, expanding the base of participants. Topics examining trade corridors, EU programs and policies, emerging technologies, and Asian trade are likely candidates.

4. Organize and cosponsor workshops and symposia.

Interest in international trade and freight transportation issues can be cultivated at other meetings, linking TRB activities to parallel events throughout the year. Discussion of topics such as supply chain issues, terminal design, ship design and operational factors, and the efficiency of land corridors would provide opportunities to communicate the importance of understanding the benefits of effective planning for freight transportation.

5. Develop models for public-private partnerships.

Improvements to the state and federal transportation planning process can come about only with the cooperation and support of the private sector. Infrastructure improvements, particularly at the corridor level, are costly and require some form of public-private partnering. These can range from megaprojects—like the Chicago Region Environmental and Transportation Efficiency Program and Southern California's Alameda Corridor—to improving marine port land-side access, the access to big box distribution centers, and the use of shuttle trains. Government can no longer do it all—greater public-private sector cooperation and financing partnerships will be central to transportation system improvement. Many lessons can be learned from key U.S. trading partners, and workshops and symposia will be valuable venues.

6. Advise on the development of cost-effective transportation security systems.

Initiatives to make the nation more secure must be carefully planned and implemented to avoid raising the cost of transporting commodities substantially and affecting the economy adversely. Agencies developing and implementing new security programs should be encouraged to engage the private sector to help ensure that the new systems and processes offer benefits to the nation and to the users and service providers—such as radio frequency identification, which tracks shipments to provide security and inventory management. TRB conferences and workshops can facilitate dialogue with transportation system users and suppliers on producing security systems that are cost-effective and can promote a clear understanding of freight transportation processes and costs to inform and guide security agency rulemaking.

Each of these activities can generate TRB publications in print and on the web—circulars, peer-

reviewed papers, magazine articles and theme issues, e-sessions, and other reports. Creating awareness of the need for immediate and long-term solutions can gain the sponsorship and funding for conferences and workshops and for studies by expert committees appointed through the National Research Council under the auspices of TRB; these projects produce TRB Special Reports and many of the TRB Conference Proceedings. In addition, the National Freight Cooperative Research Program, funded under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, will begin its work this year, identifying research topics, awarding contracts, and publishing results.

Raising Awareness

TRB can ensure that the necessary research is completed to support the development of a freight-handling network that secures U.S. competitiveness in a global economy. Increased security does not necessarily mean diminished trade. TRB can encourage dialogue between trade and transport interests at all levels. TRB also can raise awareness of the importance of freight—particularly international freight—to the economic well-being of U.S. citizens and address the growing incidence of congestion at key borders through appropriate data exchange, continuing information development, and providing a forum for discussion of cost-effective border management.

Borrone suggested that “we need a new unity between transportation experts and our political and social leaders.” By the time freight congestion becomes obvious or important to the taxpayer, it is too late. The invisible system that supports the economy will become visible in failure.

Acknowledgments

Much of the information in this article derives from presentations at the 2005 TRB Annual Meeting in four related sessions on the global supply chain. For more information about the work of the TRB International Trade and Transportation Committee, visit the website, www.trb-trade.com.

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2. Borrone, L. C. Sparking the Globalized Trade and Transportation Connection: Supplying Freight System Responses to Global Trade Demands. In *Transportation Research Record: Journal of the Transportation Research Board*, No. 1906, Transportation Research Board of the National Academies, Washington, D.C., 2005, pp. 5–16.

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.

Research Is the Foundation

Reflections on the Past and Future of the Interstate Highway System

MICHAEL D. MEYER

The author, Professor in the School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, is Chair of the TRB Executive Committee. He delivered these observations at the TRB 85th Annual Meeting at the American Association of State Highway and Transportation Officials' exhibit, during the January 23 ribbon-cutting ceremony that inaugurated the celebration of the 50th anniversary of the Interstate Highway System.

The Transportation Research Board Annual Meeting is the appropriate place to commemorate the 50th anniversary of the Interstate Highway System. Not only has research contributed greatly to the Interstate system we have today, but it will continue to enhance the Interstate system of tomorrow. It is appropriate at this meeting to look back at the origins of the Interstate system and acknowledge the tremendous efforts of those who conceptualized and developed it. The Interstate system probably relied more on the results of research and analysis than any other major public works program in the history of the United States, if not of the world.

Impressive Record

The historical record of the Interstate system is impressive. The published and unpublished histories give many details of the contributions of research and analysis.

Yet many in our generations—I use the plural intentionally—may not understand this level of accomplishment. The “chauvinism of the present” is a term I have coined from my experience in teaching thousands of students and interacting with many people in the course of my career. Many hold the view that our ancestors were not as smart as we are and were limited in what they could achieve because they did not have the technology that we have. This thinking goes on to believe that our predecessors may have accomplished much, but these accomplishments pale in comparison with what we can achieve. Nowhere is this chauvinism of the present more in error than when it is applied to a view of the Interstate Highway System and its development.

In a 1920 address to the Road Builders Association, Thomas MacDonald, Head of the Bureau of Public Roads, stated: “We have found by scientific study of the character, origin, and destination of highway travel that 90 percent of the traffic which uses our average highway is of local character.” In 1922, addressing the professional focus of highway engineering, which was then burgeoning, MacDonald said, “this development



illustrates...the leadership attained through a determination of the facts by research and investigation and their application to our modern conditions unhampered by limitations and mystifying and inaccurate traditions.”

The term “research” as used by MacDonald is different in meaning from the word today. But reading the history of the development of the Interstate Highway System makes clear that analysis, research, and investigation served as its foundation. Without the investigations into design standards, materials, right-of-way requirements, bridge loadings, traffic behavior, and the many other critical components of basic highway design before the start of the Interstate program, we probably still would be in the midst of Interstate construction.

Daunting Challenges

Fast forward 50 years, and the Interstate Highway System is facing enormous challenges. Although I don't want to fall victim to my own chauvinism of the present, I would suggest that today's challenges are more daunting than those faced many years ago, because the world of “getting things done” is more complex. The growth in population and the location of that population in the country and in metropolitan areas has placed significant pressures on major urban freeway systems originally designed to serve our nation's downtowns. The highway funding scheme that was brilliantly laid out for the Interstate system is beginning to be stretched, with seri-

A stretch of Interstate 40 under construction near Winston-Salem, North Carolina, 1958.



FORESTHILL COUNTY PUBLIC LIBRARY PHOTOGRAPH COLLECTION

ous questions now being raised about how to fund future improvements to the highways.

Freight movement, the global position of our nation's economy, and the critical role of the Interstate system in supporting freight movement are much more important than they were five decades ago. Increased sensitivity to the impacts of highways on communities and on the environment severely limits the ability to expand the capacity of urban Interstate roads in most metropolitan areas. The rapid increases in technology during the past two decades—and the application of future technologies yet only dreamt of—raise questions not only about the technologies themselves but about the future availability of people with the right mix of professional skills and abilities.

Research Portfolio

All of these questions—and thousands of others—lend themselves to what MacDonald termed “scientific study.” Thanks to the efforts of many leaders in transportation and of Secretary Norman Y. Mineta, who provided U.S. Department of Transportation (DOT) leadership, the U.S. Congress has included funding for research into many of the issues that will be of critical importance for the future of the Interstate Highway System, under the Safe, Accountable, Flexible, Efficient Transportation Efficiency Act: A Legacy for Users (SAFETEA-LU).

The new Strategic Highway Research Program (SHRP II), funded through SAFETEA-LU, is a targeted, short-term, results-oriented program of research to advance highway performance and to improve system safety. The program emphasizes four areas—

safety, renewal, reliability, and capacity. A user-oriented, peer-reviewed process under the auspices of TRB chose these four areas as the likeliest to have an impact on the nation's economy and on the quality of life for our nation's citizens.

The SHRP II research portfolio reflects a significant difference from the scientific inquiry of MacDonald's day. It encompasses many research disciplines, provides a critical mass of resources to make a difference in a short time, and focuses on innovation applied to an existing road network. Nonetheless, as a review of the changes in transportation during the past 50 years suggests, many other issues and topics will engage the nation's research community.

In many years of participating in and observing public policy development and program implementation, I have concluded that the most effective and successful initiatives are those that are data-based, problem-focused, and performance-measured. Our nation's efforts to enhance the performance of the Interstate Highway System must be similarly founded. Research is integral to this foundation. The TRB community is capable of helping the U.S. DOT and the nation in making this foundation as strong as possible.

SIGNALS is a guest editorial column, published on an occasional basis, that offers thought-provoking commentary by organizational leaders, to stimulate discussion on topics related to transportation research, practice, and policy. Reader response is encouraged in the form of letters to the editor.

Focusing on Transportation's Critical Issues *Sharing Achievements, Gearing Up for Solutions*

1 Secretary of Transportation Norman Y. Mineta (*center*) cuts the ribbon to inaugurate the national celebration of the 50th anniversary of the Interstate Highway System, January 23. Participants include (*front row, left to right:*) William W. Millar, American Public Transportation Association; Gary Ridley, Oklahoma Department of Transportation (DOT); Gloria J. Jeff, Los Angeles DOT; Robert E. Skinner, Jr., TRB; Secretary Mineta; John C. Horsley, American Association of State Highway and Transportation Officials (AASHTO); and T. Peter Ruane, American Road and Transportation Builders Association.



2 After signing the memorandum of understanding to launch SHRP II on January 25, J. Richard Capka, Federal Highway Administration; John C. Horsley, AASHTO; and Ralph J. Cicerone, National Academy of Sciences, share congratulations.

More than 10,200 transportation researchers, practitioners, and administrators representing government, industry, and academia from the United States and abroad gathered in Washington, D.C., January 22–26, 2006, to participate in the 85th Annual Meeting of the Transportation Research Board. The 5-day program offered attendees a variety of opportunities for information sharing and interaction with more



than 2,600 presentations in more than 500 sessions; 70 specialty workshops; 250 meetings of committees, subcommittees, and task forces; and many additional events, such as the inauguration of the celebration of the 50th anniversary of the Interstate Highway System and the signing of a memorandum of agreement between the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the National Academies to establish the second Strategic Highway Research Program (SHRP II).

The meeting incorporated four spotlight themes—Transportation 2025: Getting There from Here; The Interstate Highway System's 50th Anniversary: What Have We Learned?; SAFETEA-LU: What It Means for Research and the Transportation Community; and Disaster Preparedness, Response, and Recovery. Details and highlights appear on the following pages.

*Annual Meeting
photographs by
Cable Risdon
Photography*

TRB 2006 ANNUAL MEETING HIGHLIGHTS

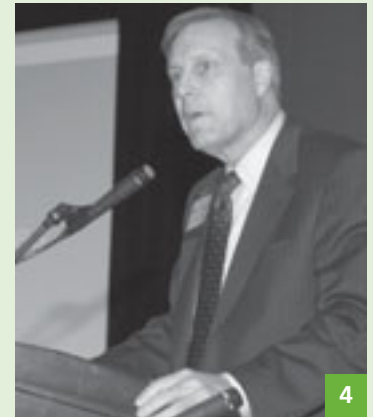
TWO GUIDEBOOKS

- 1** Zvezda Van Pelt, American Trucking Associations, consults the comprehensive Final Program.
- 2** Executive Committee member James R. Hertwig, CSX Intermodal, studies *Critical Issues in Transportation*, distributed to every attendee.



EXPERT ADVICE

- 3** Rail Group Chair Christopher P. L. Barkan (*right*) answers questions from first-time attendees Jessica Sick and Matt Melzer.



WELCOME!

- 4** TRB Executive Director Robert E. Skinner, Jr., briefs the New and Young Attendees Welcome Session.

TECHNICAL ACTIVITIES COUNCIL

- 5** Chairs of nine groups within the Technical Activities Division coordinate the development of annual meeting program content.



- 5** (*TAC Council, left to right:*) Patricia V. McLaughlin, Moore Iacofano Golstman, Inc.; Leland D. Smithson, Iowa DOT; James M. Crites, Dallas-Fort Worth International Airport; Christina S. Casgar, U.S. DOT; Arlene L. Dietz, C&A Dietz, LLC; Chair Neil J. Pedersen, Maryland State Highway Administration; Barry M. Sweedler, Safety & Policy Analysis International; Robert C. Johns, University of Minnesota; Mark R. Norman, TRB; L. David Suits, North American Geosynthetic Society.

SPOTLIGHT: 2025

- 6** Maureen Hammer, Virginia DOT, speaks on the Preservation of Institutional Knowledge in a session on the Future Transportation Workforce.
- 7** Several spotlight sessions—like *Crude Awakening: Oil in the New Millennium*—drew standing-room-only audiences.





SPOTLIGHT: 2025

(continued)

1 Sherry S. Borener, FAA-NASA Joint Planning and Development Office, discusses the Next Generation Air Transportation System.

2 Glen Hiemstra, consultant; Timothy R. Newman, CH2M Hill; and Dennis Judycki, FHWA, examine Advancing Future Transportation with Breakthrough Innovations.



3 Session formats invite audience questions and discussion. Allen Zeyher, *Roads and Bridges*, pursues a point with panelists for Advancing Future Transportation.

4 John C. Horsley, AASHTO, and T. Peter Ruane, American Road and Transportation Builders Association, participate in a roundtable discussion on the Federal Highway Program: Is There Life After SAFETEA-LU?



5 U.S. DOT administrators shared insights in a dialogue session, Transportation 2025 and the U.S. DOT.

6 FAA Administrator Marion Blakey considers a dialogue response.

7 Jeffrey N. Shane, U.S. DOT, moderated the dialogue, which covered the vision for 2025 and how to achieve it, the major issues and how to address them, funding, and more.

5 (U.S. DOT representatives, left to right): Cliff Eby, Federal Railroad; David Horner, Federal Transit; Brigham McCown, Pipeline and Hazardous Materials Safety; Ashok Kaveeshwar, Research and Innovative Technology; Marion Blakey, Federal Aviation; Jeffrey N. Shane, U.S. DOT; Craig Middlebrook, St. Lawrence Seaway Development Corporation; Annette Sandberg, Federal Motor Carrier Safety; Jacqueline Glassman, National Highway Traffic Safety; John Jacob, U.S. DOT; and J. Richard Capka, FHWA.



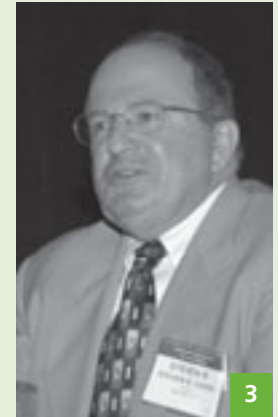
TRB 2006 ANNUAL MEETING HIGHLIGHTS

SPOTLIGHT: INTERSTATE 50th

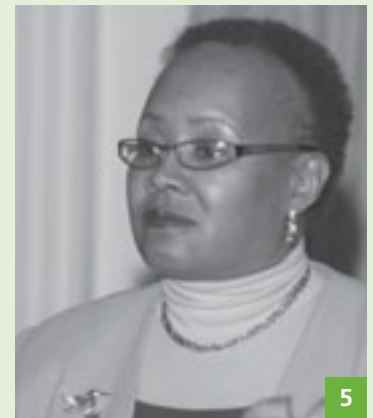
1 Sande Snead, Virginia DOT, gains information from meet-the-author poster session speaker Alan E. Pisarski, consultant, on Mapping the Interstate.



2 Joe P. Mahoney, University of Washington, focuses on the Western states in describing Pavement Lessons from the 50-Year-Old Interstate System.



3 Steven B. Chase, FHWA, contributes to 50 Years of Interstate Structures: Successes and Future Developments, looking at condition assessments.



SPOTLIGHT: SAFETEA-LU

4 Phyllis F. Scheinberg, U.S. DOT; Edward L. Mortimer, U.S. Chamber of Commerce; and Rudolph Penner, Urban Institute, participate in a roundtable discussion on transportation infrastructure investment, dealing with fuel taxes, charging users, and valuing assets.



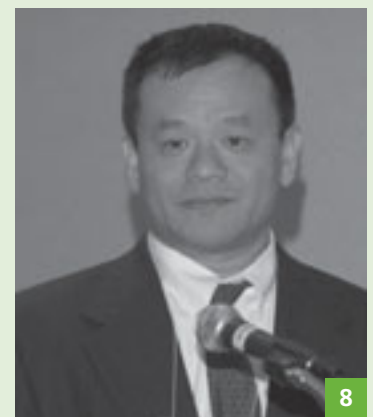
6 (Road Weather Research speakers, left to right:) Wilfrid A. Nixon, University of Iowa; John T. Snow, University of Oklahoma; Jeffrey F. Paniati, FHWA; Steven R. Barnum, National Oceanic and Atmospheric Administration; and Anthony R. Kane, AASHTO.

5 Deborah D. Johnson, Bureau of Transportation Statistics, presents Highlights of New Freight Analysis Framework Estimates at the Freight Data Users Forum.



SPOTLIGHT: DISASTERS RESPONSE

8 John Haoqiang Fu, Louisiana State University, traces a sequential logit dynamic travel demand model in Mode, Departure Time, and Hurricane Evacuation Models.



6 Speakers group for SAFETEA-LU Road Weather Research and Development Program.

7 U.S. Representative Elijah E. Cummings (D-Md.) explains the SAFETEA-LU provisions for a Hazardous Materials Transportation Cooperative Research Program.



SESSIONS AND WORKSHOPS

1 Nan Shellabarger, FAA, answers audience questions on FAA Forecasting Methodology.

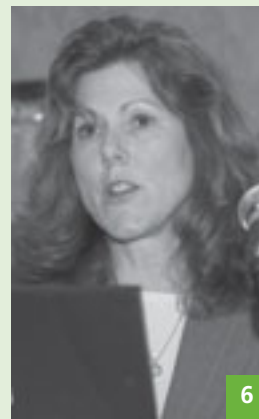
2 New Paradigm for Rail Pricing: Negotiating in an Era of Tight Capacity is the subject for John Kevin Neels, Brattle Group; John T. Gray, Union Pacific Railroad; John Ficker, National Industrial Transportation League; and Linda J. Morgan, Covington & Burling.

3 Planning committee for the 39th annual Human Factors in Transportation Workshops.

4 Thomas Dingsu, Virginia Tech Transportation Institute, presents the Human Factors in Transportation Workshops luncheon address.



3 (*Human Factors in Transportation Workshops Planning Committee, front row, left to right:*) Thomas Raslear, Federal Railroad Administration; Alex Landsburg, Maritime Labor, Training, and Safety; Neil Lerner, Westat; Suzanne E. Lee, Virginia Tech Transportation Institute; (*standing, left to right:*) Chair Michael Mollenhauer, Realtime Technologies; Gihon Jordan, consultant; Christopher Monk, FHWA; Fred Hanscom, Transportation Research Corporation; Helmut Zwahlen, Ohio University; Michael Perel, National Highway Traffic Safety Administration; Rick Pain, TRB; and Jerry Wachtel, Veridian Group.



5 Randell H. Iwasaki, California DOT, reviews the Caltrans program in Vehicle Infrastructure Integration: What Does It Mean to Transportation Agencies?

6 Donna Bialozor, National Cancer Institute, describes a technology transfer partnerships program in the workshop, Research Collaboration: How Can We Improve Our Partnerships?



8 Victor Mendez, Arizona DOT, and Gary Henderson, FHWA, field questions at the Long-Term Pavement Performance State Coordinators' Meeting.



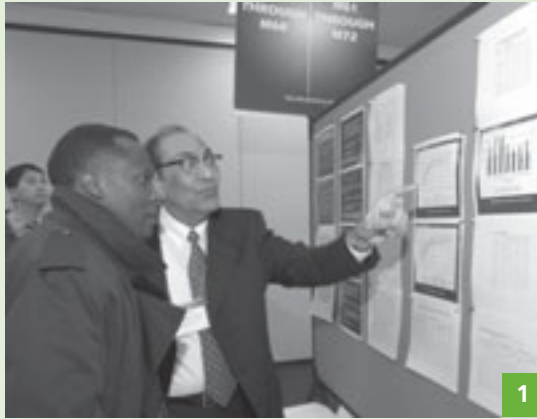
7 At poster session on Transportation Security, Kriste Henson (*right*), Los Alamos National Laboratory, discusses the modeling of homeland security applications with Joe Hill, Illinois DOT, and Thomas F. Ewing, Argonne National Laboratory.

TRB 2006 ANNUAL MEETING HIGHLIGHTS

SESSIONS AND WORKSHOPS

(continued)

1 Sukvarsh Jerath (right), University of North Dakota, reviews findings on the influence of aggregate gradation on performance of fly ash concrete in highway pavements with Lubinda Walubita, Texas A&M University.



2 Michael Ronkin, Oregon DOT, speaks at workshop on Complete Streets: Balancing User Needs in Suburban Design.



3 Panelists Lucy Garliauskas, FHWA; Janette Sadik-Khan, Parsons Brinckerhoff; Debbie Niemeier, University of California, Davis; and Anne P. Canby, Surface Transportation Policy Project, discuss Women in the Transportation Workforce and Transportation Leadership.



4 Lorant Antal Tavasszy, TNO Inro, Netherlands, describes the new Dutch national freight model in Emerging Innovations in European Freight Modeling.



5 Jeff Dowd, U.S. Department of Energy, addresses Improving the Conduct of Research Through Peer Review and Peer Exchanges.



6 Robert C. Johns, University of Minnesota, contributes to Future Strategy for Management of Transportation Information.



7 Delmar R. Salomon, Pavement Preservation Systems, presides at session on Asphalt Emulsion Technology.

8 Panelists consider strategies in Port Reserve Capacity: Meeting Commercial and Military Needs in Time of War and Catastrophic Events (left to right:) Fred Stribling, South Carolina State Ports Authority; Richard Flood, College of William and Mary; William Aird, U.S. DOT; and Jim Hudgens, Surface Deployment and Distribution Command.



1



2

SESSIONS AND WORKSHOPS

(continued)

1 Edward W. West, Jones & Stokes Associates, presents a slide show on bioacoustic profiles in Land Noise and Animal Impacts.

2 Anthony R. Kane, AASHTO, presides at Improving Highway Safety Through Crash Data Systems.

3 (Truck Lanes and Road Pricing speakers, left to right:) Paula Dowell, Wilbur Smith Associates; Max Donath, University of Minnesota; Michael Tunnell, American Transportation Research Institute; Peter F. Sweatman, University of Michigan Transportation Research Institute; Rob Di Cristoforo, ARRB Group, Ltd., Australia; and Steven E. Shladover, University of California, Berkeley, Institute of Transportation Studies.



3

3 Speakers group for Truck Lanes and Road Pricing, a two-part session.

4 Meet-the-author poster sessions engage active audiences.

5 Donald R. Jackson, FHWA, speaks on Value Engineering Best Practices.

6 Semih F. Kalay, Transportation Technology Center, Inc., presents Railway Track and Vehicle Performance Data for Design and Maintenance Planning.



4



5

7 Catching up at the Aviation Caucus are Peter Muller, PRT Consulting; Bob Zimmerman, NASA; and James M. Crites, Dallas-Fort Worth International Airport.



6



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TRB 2006 ANNUAL MEETING HIGHLIGHTS

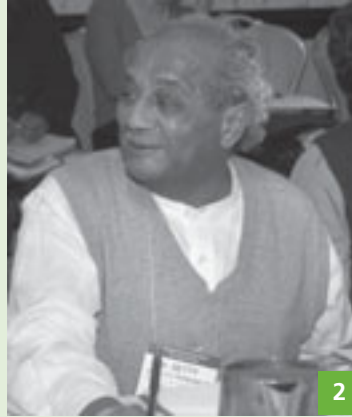
COMMITTEE MEETINGS

1 Miranda Carter, United Kingdom Department for Transport, contributes to discussion at the Women's Issues in Transportation Committee meeting.



1

2 V. Setty Pendakur, Pacific Policy and Planning Associates, chairs the meeting of the Transportation in Developing Countries Committee.



2



3

3 Elaine B. Weinstein, National Transportation Safety Board, conducts the meeting of the Occupant Protection Committee.

4 The Concrete Materials Section Executive Board honors outgoing chair Michael M. Sprinkel, Virginia Transportation Research Council.



4

4 (Concrete Materials Section Executive Board, left to right:) Richard Alan Miller, University of Cincinnati; Jamshid M. Armaghani, Florida Concrete and Products Association; Donald A. Streeter, New York State DOT; Thomas John Van Dam, Michigan Technological University; Chair Michael M. Sprinkel; and Frederick D. Hejl, TRB.

MAKING CONNECTIONS

5 A participant checks informational postings.



5

6 Following up on materials between sessions are Ron Grover, New Mexico DOT, and John Casola, Malvern Instruments, Inc.



6

EXHIBITS

7 Tere Druen and Kristen Gifford provide information at the Diesel Technology Forum exhibit.

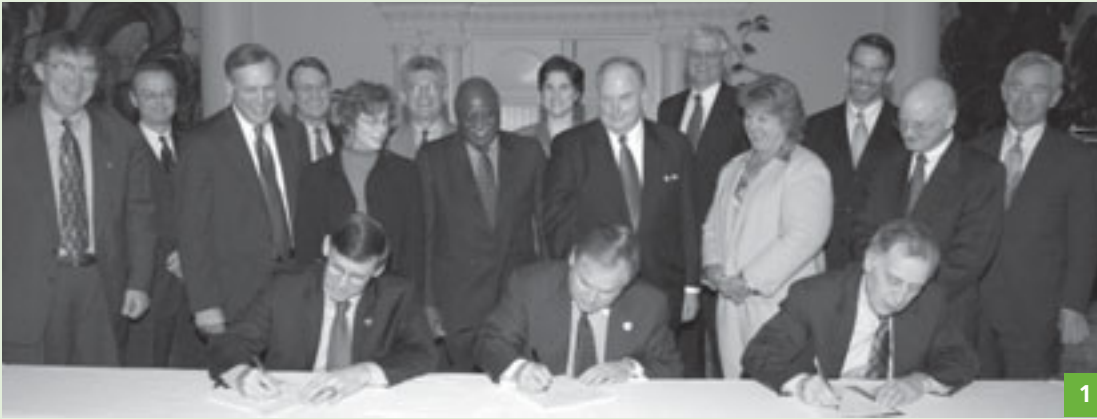


7

8 The extensive FHWA exhibit displays the latest data van.



8



1 (SHRP II signing, at table, left to right:) J. Richard Capka, FHWA; John C. Horsley, AASHTO; and Ralph J. Cicerone, National Academy of Sciences. (Standing, left to right:) Brian McLaughlin, Federal Motor Carrier Safety Administration; Stephen Godwin, TRB; TRB Executive Director Robert E. Skinner, Jr.; Dennis Judycki, FHWA; Anne Canby, Surface Transportation Policy Project; Allen Biehler, Pennsylvania DOT; Nicholas Garber, University of Virginia; Ann Brach, TRB; C. Michael Walton, University of Texas, Austin; Neil Pedersen, Maryland State Highway Administration; Rebecca Brewster, American Transportation Research Institute; John Njord, Utah DOT; Neil Hawks, TRB; and Henry G. Schwartz, Washington University, St. Louis.

SHRP II LAUNCHED

1 The memorandum of understanding is signed by the leaders of the three organizations involved to establish SHRP II, with a group of witnesses including members of the oversight committee.

2 Ralph J. Cicerone (right) addresses SHRP II in the context of the mission of the National Academies. J. Richard Capka (left) and John C. Horsley also commented on the significance of the SHRP II venture.

3 SHRP II Interim Director Neil Hawks, TRB, presents a report to the TRB Executive Committee.

4 Neil Hawks and Deputy Director Ann Brach (at head of table) conduct one of several informal briefings on SHRP II, its plans and scope, and the next steps.

5 Ann Brach, speaking before the TRB Executive Committee, displays the new SHRP II brochure.



New Research Program Starts Up

A memorandum of understanding signed January 25 officially established the new Strategic Highway Research Program (SHRP II) to be administered by the Transportation Research Board of the National Academies in cooperation with the Federal Highway Administration and the American Association of State Highway and Transportation Officials. SHRP II is a targeted, short-term, results-oriented program of strategic highway research designed to advance highway performance and safety for U.S. highway users. SHRP II will focus on applied research in four areas: safety, renewal, reliability, and capacity.

For more information, visit the SHRP II website, <http://trb.org/shrpii>.



TRB 2006 ANNUAL MEETING HIGHLIGHTS

AWARDS

1 Genevieve Giuliano, University of Southern California, is the recipient of the W. N. Carey, Jr., Distinguished Service Award, for outstanding leadership and service to transportation research and to TRB.



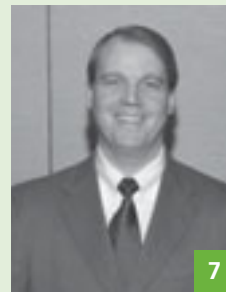
2 John M. Kulicki, Modjeski and Masters, Inc., receives the Roy W. Crum Distinguished Service Award, for outstanding contributions to bridge design and engineering research.



3 Recipient of the Sharon D. Banks Award for Innovative Leadership in Transportation, Sandra L. Draggoo, Capital Area Transportation Authority, Lansing, Michigan, displays a copy of an inspirational book by Banks.



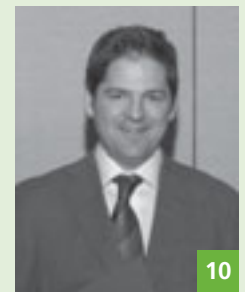
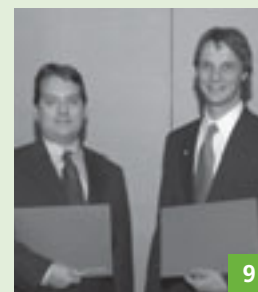
4 Abba Lichtenstein delivers the Thomas B. Deen Distinguished Lecture on the Preservation of Historic Transportation Facilities.



6 The Charley V. Wootan Award honors authors of the outstanding paper in the field of policy and organization: (left to right) Jeff Kramer, University of South Florida; Scott C. Paine, University of Tampa; and Hal Beardall, Florida State University. (Not pictured: Jessica Perdomo, University of Tampa.)

7 Roger B. Bligh, Texas Transportation Institute, is the recipient of the K. B. Woods Award for outstanding paper in the field of design and construction of transportation facilities.

8 Darcy M. Bullock, Avery Rhodes, and Zachary Clark, Purdue University, receive the D. Grant Mickle Award for outstanding paper in the field of operation, safety, and maintenance of transportation facilities. (Not pictured: James R. Sturdevant, Indiana DOT, and David G. Candey, Jr., Econolite Control Products.)



Fred Burggraf Awards for outstanding papers by authors under age 35 honor

9 Andrew Holick and Paul J. Carlson, Texas Transportation Institute, in the field of operations and maintenance; and

10 Sean T. Doherty, Wilfrid Laurier University, in the field of planning and environment.



CHAIRMAN'S LUNCHEON

1 Executive Committee Vice Chair Michael D. Meyer presents a plaque honoring the service and leadership of Chair John R. Njord.

2 Featured speaker Ralph J. Cicerone, President of the National Academy of Sciences, presents his views on how transportation interacts with the nation's critical issues involving science and technology, including the connection between climate change and transportation.

3 Chairman Njord passes the gavel to his successor, Michael D. Meyer.

Meyer to Chair Executive Committee

Michael D. Meyer, Professor in the School of Civil and Environmental Engineering at the Georgia Institute of Technology, is the 2006 Chair of the TRB Executive Committee. From 1983 to 1988, Meyer was Director of Transportation Planning and Development for Massachusetts, responsible for statewide planning, project development, traffic engineering, and transportation research. Before that, he was a professor in the Department of Civil Engineering at Massachusetts Institute of Technology (MIT).

He has written more than 140 technical articles and has authored or coauthored texts on transportation planning and policy. A registered professional engineer in the State of Georgia, he holds a BS degree in civil engineering from the University of Wisconsin; an MS degree in civil engineering from Northwestern University; and a PhD in civil engineering from MIT.

Linda S. Watson, the Executive Director of the LYNX-Central Florida Regional Transportation Authority, is the 2006 Vice Chair of the Executive Committee. Joining the Executive Committee

are John D. Bowe, Regional President, APL Americas; Harold Linnenkohl, Commissioner, Georgia DOT; Debra L. Miller, Secretary, Kansas DOT; Sandra Rosenbloom; Professor of Planning, University of Arizona; and Henry G. Schwartz, Jr., Senior Professor, Washington University, St. Louis.



PASSPORTS FOR RESEARCH

George Giannopoulos, Hellenic Institute of Transport, Greece, and TRB Executive Director Robert E. Skinner, Jr., sign a memorandum of understanding between the European Conference of Transportation Research Institutes (ECTRI) and TRB. The agreement will facilitate scanning tours; participation in conferences, committees, and projects; and other joint activities. ECTRI was established as a nonprofit association headquartered in France representing 20 transportation research institutes in 17 European countries.

TRB 2006 ANNUAL MEETING HIGHLIGHTS

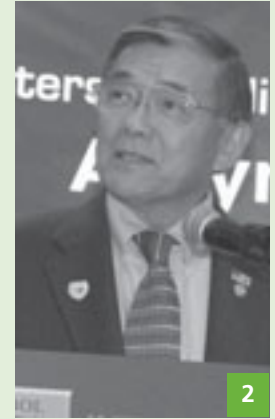
INTERSTATE ANNIVERSARY

1 Robert E. Skinner, Jr., speaking at the ribbon-cutting ceremony to inaugurate the 50th anniversary of the Interstate Highway System, displays the program from the 1956 Annual Meeting, TRB's 35th.



Celebrating 50 Years of Interstates

The Year of the Interstate—nationwide commemorations of the 50th anniversary of the Interstate Highway System—was inaugurated at the American Association of State Highway and Transportation Officials (AASHTO) exhibit at the TRB Annual Meeting, with speeches by transportation leaders and a ribbon-cutting ceremony. AASHTO President Harold Linnenkohl, Georgia DOT, called the system “one of the greatest engineering achievements of all time” and “the linchpin of the U.S. economy.”



2 Secretary of Transportation Norman Y. Mineta praises the “vision, courage, and daring” that created the Interstate Highway System.



TRB MILESTONE

3 TRB quietly celebrated its own 85th anniversary with a gathering of past Executive Committee chairs, Subcommittee for NRC Oversight chairs, current officers, and executive directors.

EXECUTIVE BRIEFING

The Executive Committee policy session featured speakers on the topic of Raising the Public Profile of Transportation:

4 Bob Orr, CBS News, on gaining media attention;



5 Florida State Senator Jim Sebesta, on political decision making;



6 Mitch Baranowski, Bemporad-Baranowski, on potential marketing campaigns; and



7 Humphrey Taylor, Harris Poll, on public attitudes to transportation.



8 Executive Committee member Deborah H. Butler, Norfolk Southern Corporation, presents the rapporteur's summary of the session.



3 (TRB Executive Committee chairs, left to right:) Linda S. Watson (2007), Louis J. Gambaccini (1989), Joseph M. Sussman (1994), James W. van Loben Sels (1996), Martin Wachs (2000), Michael S. Townes (2004), Lester A. Hoel (1986), Michael D. Meyer (2006), Genevieve Giuliano (2003), Peter G. Koltzow (1979), Executive Director Robert E. Skinner, Jr., current Subcommittee for NRC Oversight (SNO) chair C. Michael Walton (1991), past Executive Director Thomas B. Deen, E. Dean Carlson (2002), past SNO chair L. Gary Byrd (1989–1995), John M. Samuels (2001), William W. Millar (1992), David N. Wormley (1997), Herbert H. Richardson (1988), and Joseph M. Clapp (1984).



EXECUTIVE COMMITTEE

1 John R. Njord, Utah DOT, chairs the Executive Committee business meeting.

2 Michael D. Meyer, Georgia Institute of Technology, takes the helm for 2006.

3 Linda S. Watson, LYNX-Central Florida Regional Transportation Authority, takes office as Vice Chair for 2006.



4 Ashok G. Kaveeshwar, Research and Innovative Technology Administration, comments on a report; Technical Activities Council (TAC) representative Barry M. Sweedler is at right.

5 Immediate past Chair Michael S. Townes, Hampton Roads Transit, offers advice to new member Henry G. Schwartz, Jr., Washington University, St. Louis.



Joining in discussions are
6 Carol A. Murray, New Hampshire DOT;
7 C. Michael Walton, University of Texas, Austin; and
8 New member Debra L. Miller, Kansas DOT.

9 TAC Chair Neil J. Pedersen (*right*) shares his experiences in briefing the media. At left are Nicholas J. Garber, University of Virginia, and Michael R. Morris, North Central Texas Council of Governments.



10 Anne P. Canby, Surface Transportation Policy Project; Ron Hynes, Federal Transit Administration; and TAC representative Patricia V. McLaughlin, Moore, Iacafano Goltsman, Inc., review points during a break.

Honoring Long-Term Leadership and Service

TRB awarded emeritus membership to 28 individuals, honoring their significant, long-term contributions and outstanding service through participation on TRB standing committees. The 2006 group of honorees, recognized at the Annual Meeting, are listed below.

Policy and Organization

Ralph C. Erickson

Transportation Economics

David J. Forkenbrock

Transportation Economics

Lester A. Hoel

Transportation History

David L. Lewis

Accessible Transportation and Mobility

Michael A. Replogle

Transportation in Developing Countries

Planning and Environment

Michael D. Meyer

Statewide Multimodal Transportation Planning

Howard H. Newlon, Jr.

Historic and Archeological Preservation in Transportation

Neil J. Pedersen

Statewide Multimodal Transportation Planning

Design and Construction

Darrel L. Baker

Photogrammetry, Remote Sensing, Surveying

and Related Automated Systems

Jackson L. Durkee

Construction of Bridges and Structures

Jeffrey R. Keaton

Exploration and Classification of Earth Materials

Carl L. Monismith

Flexible Pavement Design

Raymond K. Moore

Cementitious Stabilization

L. David Suits

Geosynthetics

Robert A. P. Sweeney

Dynamics and Field Testing of Bridges

Alex T. Visser

Low-Volume Roads

Matthew W. Witzczak

Flexible Pavement Design

Operations and Maintenance

Douglas W. Harwood

Operational Effects of Geometrics

Richard A. Mather

Highway–Rail Grade Crossings



Arunprakash Shirole, Arora and Associates (*left*), receives an emeritus membership certificate from Bridge Management Committee Chair Richard W. Shepard, County of El Dorado DOT.

Arunprakash M. Shirole

Bridge Management

Ronald C. Sonntag

Freeway Operations

Arlen T. Swenson

Maintenance Equipment

System Users

Richard D. Blomberg

Pedestrians

Richard L. Knoblauch

Pedestrians

Public Transportation

Sally Hill Cooper

Public Transportation Planning and Development; Bus Transit Systems

Edward R. Fleischman

Committee on Bus Transit Systems

S. David Phraner

Rail Transit Systems

Freight Systems

Alan M. Clayton

Motor Vehicle Size and Weight



Receiving emeritus membership for service to the Transportation Economics Committee are David J. Forkenbrock, University of Iowa (*second from right*), and Ralph C. Erickson, FHWA (*right*), joined by Martine A. Micozzi, TRB; Transportation Policy Section Chair Mary Lynn Tischer, Commonwealth of Virginia; and Chair Douglass B. Lee, Jr., Volpe National Transportation Systems Center.

TRB Meetings 2006

May

- 3–4 Environmental Geospatial Information for Transportation: A Multidisciplinary Examination of Noteworthy Practices *(by invitation)*
Thomas Palmerlee
- 17–19 6th National Aviation System Planning Symposium
Daytona Beach, Florida
- 21–23 Innovations in Travel Modeling 2006: A Conference
Austin, Texas

June

- 4–7 North American Travel Monitoring Exposition and Conference
Minneapolis, Minnesota
- 4–7 1st International Symposium on Freeway Operations* *(by invitation)*
Athens, Greece

July

- 8 Challenges of Data for Performance Measures *(by invitation)*
La Jolla, California
Thomas Palmerlee
- 9–11 TRB 2006 Summer Conference
La Jolla, California
- 9–11 31st Annual Summer Ports, Waterways, Freight, and International Trade Conference
La Jolla, California

- 16–19 3rd International Conference on Bridge Maintenance, Safety, and Management*
Porto, Portugal
- 16–20 11th AASHTO–TRB Maintenance Management Conference*
Charleston, South Carolina
- 23–26 45th Annual Workshop on Transportation Law
Chicago, Illinois
James McDaniel
- 25–29 5th International Symposium on Highway Capacity*
Yokohama, Japan
- 30– Aug. 3 2nd International Symposium on Transportation Technology Transfer*
St. Petersburg, Florida
Kimberly Fisher

August

- 2–4 3rd Bus Rapid Transit Conference
Toronto, Ontario, Canada
Peter Shaw
- 6–9 1st International Conference on Fatigue and Fracture in the Infrastructure: Bridges and Structures of the 21st Century*
Philadelphia, Pennsylvania
- 13–16 7th National Access Management Conference
Park City, Utah

- 13–16 9th International Conference on Applications of Advanced Technology in Transportation*
Chicago, Illinois
Thomas Palmerlee
- 23–26 7th International Conference on Short- and Medium-Span Bridges*
Montreal, Quebec, Canada
- 27–29 The Metropolitan Planning Organization: Present and Future—A Conference
Washington, D.C.
Kimberly Fisher

September

- 13–15 10th National Conference on Transportation Planning for Small and Medium-Sized Communities: Tools of the Trade
Nashville, Tennessee
- 18–20 5th National Seismic Conference on Bridges and Highways*
San Mateo, California
- 25–27 Freight Demand Modeling: Tools for Public-Sector Decision Making
Washington, D.C.
Elaine King
- 26 Symposium on Applications of Geophysics for Geotechnical Projects
Breckenridge, Colorado

Additional information on TRB meetings, including calls for abstracts, meeting registration, and hotel reservations, is available at www.TRB.org/calendar. To reach the TRB staff contacts, telephone 202-334-2934, fax 202-334-2003, or e-mail 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.



Improving Guide Sign Legibility

New Lettering Reads Larger, Clearer, Farther

PAUL J. CARLSON

The author is Division Head, Operations and Design, Texas Transportation Institute, Texas A&M University System, College Station.

The traditional font—or lettering design—used for text on highway guide signs was developed in the 1950s and was tested on signs using white text on black backgrounds. The test conditions were nearly static—subjects walked toward the signs until they could read the words correctly.

Problem

In the past 50 years, sign fabrication techniques and materials, driver characteristics, and highway speeds have changed substantially. The text on guide signs usually is fully retroreflective, incorporating the latest and most efficient types of retroreflective sheeting materials. The sign lighting can be reduced, along with the costs of sign construction, maintenance, and operation.

Some older drivers, however, have difficulty reading the fully retroreflective text—the reflected light causes the edges of the characters to appear fuzzy. This effect is known as blooming and can be particularly acute for older drivers.

A 1994 study by the Federal Highway Administration (FHWA) found that guide signs did not provide adequate viewing distance and reaction time for older drivers. The report recommended enlarging the size of the letters on signs by 20 percent to increase the legibility distance.

The use of larger letters, however, would require increasing the size of the signs by 40 to 50 percent. Signs would cost more, as would the supporting structures.

Solution

For more than 10 years, a new font, Clearview, has been under development and testing to improve the legibility of highway guide signs. The Pennsylvania Department of Transportation (DOT) cosponsored research on Clearview in the early 1990s at the Pennsylvania Transportation Institute (PTI), Pennsylvania State University.

In the first study, subjective field evaluation and objective laboratory studies with computer simulation identified deficiencies in the current font, Series E Modified (Figure 1), and guided the development of Clearview as an alternative (Figure 2). Two major improvements—a reduced and variable stroke width and larger holes in letters like “e” and “o”—reduced the blooming effect. A second study concluded that a 5-inch tall Clearview font was legible at substantially greater distances than was a 5-inch tall Series E Modified font.

To build on these findings, Texas DOT sponsored a full-scale legibility study of the Clearview font at Texas Transportation Institute (TTI), part of the Texas A&M University System. Working with larger sizes of letters revealed minor improvements that could be made to the font.

In a second study by Texas DOT and TTI, 60 participants—20 young, 20 middle-aged, and 20 older—drove along a closed course and read full-size guide signs. Each guide sign had a randomly selected test word in either the Clearview or the Series E Modified

Clearview lettering on highway signs in Texas.





FIGURE 1 Guide sign with Series E Modified lettering, which has served as the standard font.



FIGURE 2 Clearview version of guide sign increases legibility at greater distances without increasing letter or sign sizes.

font. The legibility distance was recorded when the participants correctly read the guide sign aloud.

This study showed conclusively that the legibility distance for the Clearview font is 12 percent greater on average than that for the Series E Modified font. This corresponds to an approximately 25 percent increase in reading time at 70 miles per hour. In addition, older drivers experienced the largest gains in legibility distance and reading time with the Clearview font.

A third Texas DOT–TTI study used the Clearview font on guide signs to determine the best combinations of retroreflective sheeting for the white Clearview text on a green background. The study showed that the greatest legibility distance was obtained with the most efficient microprismatic materials; moreover, high-intensity retroreflective material in the green background did not compromise the legibility distances.

A combination of the most efficient microprismatic materials for the legend with high-intensity materials for the background yields win-win results. The signing agency gains durability and cost-efficiency in the signs, and drivers gain contrast, which is beneficial for legibility in dark conditions.

Application

As a result of the research, in September 2004 FHWA's Office of Transportation Operations granted interim approval for use of the Clearview font on guide signs.¹ At least 12 states, including Pennsylvania and Texas, have adopted the Clearview font for signs.

Research on Clearview continues. Texas DOT and TTI are evaluating the Clearview font for regulatory and warning signs. Because these signs have nonreflective black letters instead of the bright white letters used on guide signs, separate research is needed to evaluate the font's performance.

¹ http://mutcd.fhwa.dot.gov/res-ia_clearview_font.htm.

Benefits

The research shows that use of the Clearview font can improve sign legibility and reading time substantially without increasing the size of the sign. This helps all drivers—particularly older drivers—and will decrease the occurrence of navigational errors and crashes.

Quantifying these effects, however, is not possible, because data on navigational errors are not available, and crash reports do not indicate if the signs were a contributing factor in the crash. A before-and-after study is unlikely to develop a statistically significant crash-reduction factor for the Clearview font because so many other factors are involved.

A definite benefit is that the Clearview font can meet FHWA's recommendations for accommodating older drivers without having to increase the sign size. This allows state DOTs to improve service for drivers age 65 and older at a minimal cost.

Critical to the successful development of the Clearview font is the collaboration and coordination between the developer of Clearview (Don Meeker of Terminal Design), the PTI research team (Phil Garvey and Martin Pietrucha), and the TTI research team (Paul J. Carlson, Gene Hawkins, and Sue Chrysler). The vision, guidance, and support of Art Breneman, formerly with Pennsylvania DOT, and of Greg Brinkmeyer, Texas DOT, were equally vital. For more information about this research or this article, please contact Paul J. Carlson, Division Head, Operations and Design, TTI, at 979-845-6004; paul-carlson@tamu.edu.

EDITOR'S NOTE: Appreciation is expressed to B. Ray Derr, Transportation Research Board, for his effort in developing this article.

Suggestions for "Research Pays Off" topics are welcome. 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).

Henry G. R. Kerali

The World Bank

“We need to do much more to analyze the impact of budget allocations on the future performance of transport infrastructure,” observes Henry G. R. Kerali, Lead Transport Specialist and Program Team Leader at the World Bank, Washington, D.C., since January 2003.

He applies his 20 years of experience in transportation policy development, institutional reform, and human resource development to managing the bank’s portfolio of transportation sector projects in Bulgaria, Romania, Croatia, and Central Asia. The portfolio includes projects and policy studies that cover all of the major areas of transportation, particularly roads, rail, aviation, urban transportation, and ports and inland waterways.

Kerali thrives on building a consensus between transportation professionals and government agencies around the world. Before



“Greater effort is needed from transport professionals to put forward a strong case for adequate funding for transport infrastructure, particularly for roads.”

taking his position with the bank, he was a Professor of Highway Engineering and Management at the University of Birmingham in England. He was also involved in several consulting assignments for the African Development Bank, the Asian Development Bank, the Department for International Development of Great Britain, the European Commission, and various international finance institutions and consulting firms.

A firm believer that “transport infrastructure and systems are the cornerstones to a nation’s economic growth,” Kerali points out that in developing countries, “budget allocations for investments in the transport sector are often less than what is required to keep the infrastructure and transport system in a sustainable operating condition.”

Faced with tight budget constraints, the transportation sector often must compete for funds with other sectors such as health, education, and security. Although a lack of financing for the other sectors often results in immediate political pressure, the same does not usually apply to roads, Kerali points out.

“It can take years for transport infrastructure to deteriorate to a level that might generate equivalent public pressure for more financing—yet timely preventive maintenance is usually three to four times less expensive than rehabilitation,” he observes. “Greater

effort is needed from transport professionals to put forward a strong case for adequate funding for transport infrastructure, particularly for roads.”

Appointed Professor of Highway Engineering and Management at the University of Birmingham in 2001, Kerali set to work on what would become one of his most recognized projects, a testament to his beliefs that a sustainable transportation infrastructure is essential for economic growth. Kerali spearheaded the international effort to produce the highway development and management system HDM-4, a cost–benefit analysis model designed to support decision making by highway administrators and engineers. The model predicts economic, social, and environmental impacts that could occur during the investment decision-making process.

For example, the road deterioration models in HDM-4 attempt to present the highly complex interactions between vehicles, the pavement surface, and the environment. Many developing and transition countries, The World Bank, and other donor agencies currently use the HDM-4 model to assess the economic feasibility of road investments throughout the world.

Kerali emphasizes the importance of communicating clearly with governing agencies in countries with transportation projects under way. The use of terminology and indicators that can be readily understood by politicians and the public is vital.

“Presenting the average condition of a road network as good, fair, or poor will have much more impact than presenting [information about] the average riding quality of a road network using the International Roughness Index,” Kerali notes.

A Uganda native proficient in four languages, Kerali attended Makerere University in Kampala, graduating with a bachelor of science degree in civil engineering. After working for several years in Uganda, postgraduate studies led him to Birmingham, England, where he earned a master’s degree in highway and traffic engineering. Kerali completed his studies at the University of Birmingham in 1986, gaining a doctorate in road management and financing for transitional and developing countries.

Kerali has published in more than 100 journals, papers, and books. He has participated in the Transportation Research Board’s Data Analysis Working Group and has served on the Rigid Pavement Design Committee. He is currently a member of the Long-term Pavement Performance Committee and the Transportation in the Developing Countries Committee.

A chartered professional engineer, he is a fellow of the Institution of Civil Engineers, London. His knowledge and first-hand experience solving transportation problems have gained him invitations to make keynote presentations at several international and regional conferences and workshops.

Roger E. Smith

Texas A&M University

As Herbert D. Kelleher Professor of Transportation and the associate head for undergraduate studies in the department of civil engineering at Texas A&M University, Roger E. Smith is a teacher and a leader.

From 1968 to 1975, Smith honed his leadership skills in the U.S. Army Corps of Engineers while stationed in Korea, Vietnam, and Germany. As an officer in the Corps, Smith served in a variety of capacities. He commanded an atomic demolitions munitions delivery platoon, commanded an engineer company responsible for constructing and maintaining roads in Vietnam, served as an adviser to the Army Reserve Construction Engineer Battalion, commanded an armored engineering company, and served as brigade engineer for an armored brigade. In the Corps, Smith gained valuable experience in military engi-



“Conducting research keeps my knowledge of the subjects I am teaching current with available knowledge and generally beyond the state of the art and practice.”

neering, construction management, building construction, highway construction, pavement maintenance, and technical writing.

In 1975, Smith left the Corps to start work on a bachelor of science and eventually master of science degree in civil engineering at the University of Illinois. In the course of his studies, Smith participated in research on load transfer systems for concrete pavements for the Federal Aviation Administration and the Federal Highway Administration and helped develop a nationwide pavement evaluation system.

In 1984, while working for ERES Consultants in Champaign, Illinois, Smith applied his expertise to a project for the Metropolitan Transportation Commission (MTC) of Oakland, California. This led to MTC launching a pavement management initiative, known as the Street Saver Pavement Management Program (PMP), to provide pavement maintenance and rehabilitation decision support for local agencies in the San Francisco Bay Area. The initiative sought not only to provide information to the engineering and public works staff, but to improve pavement funding levels and allocation of funds to better address pavement needs. Smith provided technical guidance, direction, and support.

“The challenge was to develop a business-like approach to managing the design, maintenance, rehabilitation, and reconstruction of pavement networks by incorporating basic engineering principles,” Smith recalls. The program was a success—PMP is now used by more than 105 of the 109 Bay Area cities and counties, as well as by dozens of other cities and counties throughout California, Oregon, and Washington State. Smith has continued to provide technical training and support for the PMP.

Another example of Smith’s research is the American Association of State Highway and Transportation Officials’ (AASHTO) *Guide for Pavement Management*, which he developed with two colleagues, Tom Freeman and Eric Moody. Prepared through the National Cooperative Highway Research Program, the guide was created to assist state highway agencies throughout the United States in adopting, implementing, and using pavement management principles. The Task Force on Pavements of AASHTO reviewed the guide and eventually published it in 2001.

In 1986, Smith earned a doctorate in civil engineering from the University of Illinois and joined Texas A&M University as an associate professor. His areas of expertise include pavement evaluation and rehabilitation, management and design, infrastructure management, and

transportation and construction materials.

“Practicing engineers do not always adopt the best knowledge, methods, and practices available,” Smith says. “A large portion of my research before coming to Texas A&M was directed toward application of engineering principles to solve current problems.” This gave him the benefit of being involved in research that supports the courses and material he teaches at Texas A&M.

“I have never considered research as a distraction from teaching—I have always considered it a necessary part of my teaching activities,” he reports. “Conducting research keeps my knowledge of the subjects I am teaching current with available knowledge and generally beyond the state of the art and practice.”

Active in the Transportation Research Board since the mid-1980s, Smith first served on the Strength and Deformation Characteristics of Pavement Sections Committee. He chaired the Pavement Maintenance Committee from 1990 to 1996, and he helped form and cochair the subcommittee on Local Agency Pavement Management. In 2004, Smith was named an emeritus member of the Pavement Maintenance Committee, and in 2005 he was named an emeritus member of the Pavement Monitoring, Evaluation, and Data Storage Committee.

Engineers Receive Career Honors

The National Academy of Engineering (NAE) of the National Academies has elected 76 new members and 9 foreign associates for significant career achievements and contributions to the profession in research, practice, education, or developing technology. The newly elected members include four who have been active in TRB:

◆ A. Ray Chamberlain, Manager, Parsons Brinckerhoff, Denver, Colorado, was cited for innovations in the mobility, aesthetic, safety, and environmental aspects of transportation systems. He is a former chair (1993) of the TRB Executive Committee and was the 2005 recipient of TRB's W. N. Carey Distinguished Service Award.

◆ Robert A. Dalrymple, Willard and Lillian Hackerman Professor of Civil Engineering, Department of Civil Engineering, Johns Hopkins University, Baltimore, Maryland, was elected for contributions to coastal and ocean engineering. He is a current member of TRB's Marine Board.

◆ John M. Kulicki, Chief Executive Officer, President, and Chief Engineer, Modjeski and Masters, Inc., Harrisburg, Pennsylvania, was cited for the design of major bridges and for leadership in the development of load and resistance factor design specifications. Recipient of TRB's 2005 Roy W. Crum Distinguished Service Award, he serves on TRB's Steel Bridges Committee.

◆ Surendra P. Shah, Walter P. Murphy Professor, Department of Civil and Environmental Engineering, and Director, Center for Advanced Cement-Based Materials, Northwestern University, Evanston, Illinois, was singled out for work on

advanced cement-based materials and for promoting interdisciplinary research and education on concrete materials. He currently serves as a member of TRB's Basic Research and Emerging Technologies Related to Concrete Committee.

Founded in 1964, NAE provides engineering leadership in service to the nation. Its more than 2,200 peer-elected members and foreign associates are among the world's most accomplished engineers.

E-Newsletter Delivers via Cyberspace

Circulation of the TRB E-Newsletter passed the 20,000 mark in March, including 2,789 subscribers in 94 countries outside the United States. The newsletter is distributed via e-mail free of charge and is posted on TRB's website, where it serves as a portal to the latest developments in transportation research.

Issued weekly since June 2002, the newsletter provides summary updates on TRB news and publications; on federal, state, university, and international research news; and includes related items of interest in a section called "In the Know." Each summary has web links to related information and documents.

To subscribe, send an e-mail to RHouston@nas.edu with "TRB E-Newsletter" in the message subject field.

CAREFUL CONSIDERATION— Meeting in Washington, D.C., March 21–23, the American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Research (SCOR) considered 188 candidates for National Cooperative Highway Research Program funding in fiscal year 2007 and selected 53 projects totaling \$20.5 million. SCOR Chair Victor Mendez (*center*), Arizona Department of Transportation, presided at the meeting; he is flanked by Vice Chair Wes Lum, Caltrans (*left*), and Secretary Bob Reilly, TRB.



Assessing and Managing the Ecological Impacts of Paved Roads

Committee on Ecological Impacts of Road Density, National Research Council, The National Academies Press, Washington, D.C., 2006; 324 pp.; \$65; 0-309-10088-7.

In the past two decades, the Federal Highway Administration and state transportation agencies increasingly have recognized the need to reduce the negative effects of transportation on the natural environment. All phases of road development—from construction to use by vehicles to maintenance—affect physical and chemical soil conditions, water flow, and air and water quality, as well as plants and animals. This report provides guidance on ways to reconcile the different goals of road development and environmental conservation. It identifies the ecological effects that can be evaluated in the planning, design, construction, and maintenance of roads and offers several recommendations to improve the understanding and management of the ecological impacts of paved roads.

Box Boats: How Container Ships Changed the World

Brian J. Cudahy, Fordham University Press, Bronx, New York, 2006; 352 pp.; \$29.95; 0-8232-2568-2.

Container ships have revolutionized the marine transport of goods worldwide. Marking the 50th anniversary of the maiden voyage of the first container ship, Cudahy provides a concise history of world shipping—from freighter types to steamship lines—and explores the growth of global trade carried by box boats and ship lines connecting Asia, Europe, and the Americas. This maritime history shows how fleets of ungainly

box boats have become a necessity for the world's economies and traces the positive and negative effects.

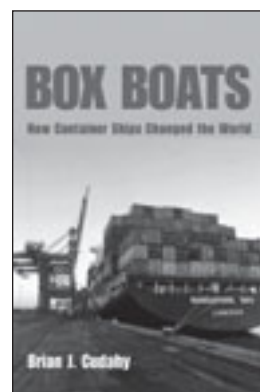
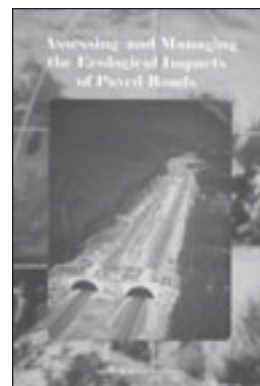
The Great Society Subway: A History of the Washington Metro

Zachary M. Schrag, The Johns Hopkins University Press, Baltimore, Maryland, 2006; 384 pp.; \$30; 0-8018-8246-X.

In an era when Americans embraced the automobile, how did Washington, D.C., reject freeways and build rail transit instead? Using extensive archival research as well as oral history, Schrag argues that the decision to build the Washington Metro can be understood only in the political context of its time—the Great Society liberalism of the Kennedy, Johnson, and Nixon administrations, when Americans believed in public investments suited to the grandeur and dignity of the world's richest nation.

Schrag examines the project from its earliest days, including general planning, routes, station architecture, funding decisions, land use impacts, and the behavior of Metro riders. He explores Metro not only as a work of planning, engineering, and architecture, but as a work of politics and ideology. The story of the Great Society subway sheds light on the development of metropolitan Washington, postwar urban policy, and the promises and limits of rail transit in American cities.

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



TRB PUBLICATIONS

Integrating Sustainability into the Transportation Planning Process

Conference Proceedings 37

Participants in the Conference on Integrating Sustainability into the Transportation Planning Process, in Baltimore, Maryland, July 11–13, 2004, exchanged perspectives on the challenges to creating sustainable transportation systems. This proceedings reports on a general session that examined the indicators of sustainability and on concurrent sessions that focused on challenges and potential solutions. Findings and recommendations of the conference committee are provided, along with two resource papers on defining sustainable transport and on taking actions to meet the challenges. TRB, the Federal Highway Administration, and the U.S. Environmental Protection Agency sponsored the conference.

2005; 59 pp.; TRB affiliates, \$24.75; TRB nonaffiliates, \$33. Subscriber categories: *planning and administration (IA); energy and environment (IB).*

Bituminous Binders 2005

Transportation Research Record 1901

Bituminous Binders 2005 includes papers on such topics as the effect of filler on the aging potential of asphalt mixtures, the adhesion and cohesion of asphalts in relation to the effect of moisture on laboratory performance of asphalt mixtures, low-temperature properties and the fragility of asphalt binders, and the high-temperature rheological properties of asphalt binders.

2005; 59 pp.; TRB affiliates, \$30.75; TRB nonaffiliates, \$41. Subscriber category: *materials and construction (IIIB).*

Transportation and Land Development 2005

Transportation Research Record 1902

Transportation and Land Development 2005 includes papers on automobile ownership and use in neotraditional and conventional neighborhoods; transportation-efficient land use regulations and their application in the Puget Sound region of Washington State; metrics of

TRB PUBLICATIONS



urban form and the modifiable areal unit problem; impacts of comprehensive planning and smart growth initiatives on transportation; the analysis of day-to-day variability in an individual's action space; and more.

2005; 144 pp.; TRB affiliates, \$37.50; TRB nonaffiliates, \$50. Subscriber category: *planning and administration (IA)*.

Transit: Bus, Rural Public and Intercity, and Paratransit

Transportation Research Record 1903

Papers in this volume apply to three public transit categories: bus; rural public and intercity bus; and paratransit. Research is presented on fleet sizes for variable bus schedules, initiating bus rapid transit in Indonesia, coordinated transportation services in rural communities, the plan and design of a taxipool dispatching service, and related topics.

2005; 104 pp.; TRB affiliates, \$33.75; TRB nonaffiliates, \$45. Subscriber category: *public transit (VIA)*.

Highway Facility Design

Transportation Research Record 1904

Papers address roadside safety design; context-sensitive design and solutions; and hydrology, hydraulics, and water quality. Subjects include the transition from guardrail to concrete bridge rail for low-speed roadways, a framework for measuring state transportation agency performance in context-sensitive solutions, the management of Utah's highway culverts, and the mass loading of first-flush pollutants with treatment strategy simulations.

2005; 143 pp.; TRB affiliates, \$37.50; TRB nonaffiliates, \$50. Subscriber category: *highway and facility design (IIA)*.

Transportation Security: Continuity of Operations (COOP) Planning Guidelines for Transportation Agencies

NCHRP Report 525, Volume 8, and

TCRP Report 86, Volume 8

Continuity of operations (COOP) plans describe how an organization will prepare for, respond to, and recover from a disruption in internal operations caused by natural or human-precipitated events. This joint NCHRP-TCRP report provides guidelines for state and local transportation agencies to develop, implement, maintain, train for, and exercise COOP capabilities. The guidelines are designed to assist COOP planners responsible for all modes of transportation.

2005; 74 pp.; TRB affiliates, \$15.75; TRB nonaffiliates, \$21. Subscriber categories: *planning and administration (IA)*; *operations and safety (IV)*; *aviation (V)*; *public transit (VI)*; *freight transportation (VIII)*; *marine transportation (IX)*.

Consideration of Environmental Factors in Transportation Systems Planning

NCHRP Report 541

Procedures, methods, and institutional arrangements are described for successful consideration of environmental factors in transportation planning. The report offers a broad framework for assessing, evaluating, and integrating environmental issues and concerns into systems-level transportation planning and decision making.

2005; 108 pp.; TRB affiliates, \$18; TRB nonaffiliates, \$24. Subscriber categories: *planning, administration, and environment (I)*; *public transit (VI)*; *freight transportation (VIII)*.

Managing Archaeological Investigations

NCHRP Synthesis 347

Addressed in this volume are practices that streamline the transportation project delivery process but at the same time enhance the stewardship of archaeological resources. Approaches to improve and maintain good communication and coordination at all stages of transportation programs are examined, including communication between agencies and native Americans, as well as efforts at public outreach. Internal state department of transportation business practices are reviewed, along with effective and innovative practices for complying with Section 106 of the National Historic Preservation Act and the National Environmental Policy Act.

2005; 56 pp.; TRB affiliates, \$12.75; TRB nonaffiliates, \$17. Subscriber categories: *planning and administration (IA)*; *energy and environment (IB)*.

Track-Related Research: Direct-Fixation Track Design Specifications, Research, and Related Material

TCRP Report 71, Volume 6

This two-part report, supplied on CD-ROM, offers guidance on the design and construction of direct-fixation track systems. Part A includes sections describing track-design principles and material evaluation methods for direct-fixation fasteners and track, as well as example specifications and commentary for the fasteners, fastener qualifications and production tests, track construction, and materials used in direct-fixation applications. Part B provides data, evaluations, field reviews, and analyses of direct-fixation fasteners from a variety of sources, to ascertain their characteristics and proper applications.

2005; CD-ROM; TRB affiliates, \$21; TRB nonaffiliates, \$28. Subscriber categories: *public transit (VI)*; *rail (VII)*.

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FEATURES are timely articles of interest to transportation professionals, including administrators, planners, researchers, and practitioners in government, academia, and industry. Articles are encouraged on innovations and state-of-the-art practices pertaining to transportation research and development in all modes (highways and bridges, public transit, aviation, rail, and others, such as pipelines, bicycles, pedestrians, etc.) and in all subject areas (planning and administration, design, materials and construction, facility maintenance, traffic control, safety, geology, law, environmental concerns, energy, etc.). Manuscripts should be no longer than 3,000 to 4,000 words (12 to 16 double-spaced, 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.

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- ◆ 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.

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Congestion, emergencies, energy and environment, equity, finance, human and intellectual capital, infrastructure, institutions, and safety are the critical issues in transportation that challenge the nation. Addressing these challenges will require new ideas, creativity, and innovation. TRB has produced an array of information to help transportation professionals and decision makers address the critical issues. Recent TRB publications of interest include the following:

Critical Issues in Transportation

TRB Miscellaneous Publication, 16 pages, 8.5 x 11, free (2006). To order, contact Russell Houston at RHouston@nas.edu.

The Fuel Tax and Alternatives for Transportation Funding

TRB Special Report 285, 6 x 9, paperback, on press—forthcoming May 2006

Future Truck and Bus Safety Research Opportunities

TRB Conference Proceedings 38, ISBN 0-309-09422-4, 107 pages, 8.5 x 11, paperback, \$40.00 (2006)

Integrating Sustainability into the Transportation Planning Process

TRB Conference Proceedings 37, ISBN 0-309-09418-6, 59 pages, 8.5 x 11, paperback, \$33.00 (2005)

Guide for Emergency Transportation Operations

National Cooperative Highway Research Program (NCHRP) Report 525, Vol. 6, ISBN 0-309-08829-1, 56 pages, 8.5 x 11, paperback, \$21.00 (2005)

State Construction Quality Assurance Programs

NCHRP Synthesis 346, ISBN 0-309-09749-5, 75 pages, 8.5 x 11, paperback, \$17.00 (2005)

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Transit Cooperative Research Program Report 105, ISBN 0-309-08813-5, 77 pages, 8.5 x 11, paperback, \$31.00 (2004)

The Marine Transportation System and the Federal Role: Measuring Performance, Targeting Improvement

TRB Special Report 279, ISBN 0-309-09452-6, 180 pages, 6 x 9, paperback, \$24.00 (2003)

The Workforce Challenge: Recruiting, Training, and Retaining Qualified Workers for Transportation and Transit Agencies

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