



## TR News September-October 2008 Communication, Collaboration, and Infrastructure

### DETAILS

---

36 pages | | PAPERBACK

ISBN 978-0-309-42956-6 | DOI 10.17226/23071

### AUTHORS

---

BUY THIS BOOK

FIND RELATED TITLES

Visit the National Academies Press at [NAP.edu](http://NAP.edu) and login or register to get:

---

- Access to free PDF downloads of thousands of scientific reports
- 10% off the price of print titles
- Email or social media notifications of new titles related to your interests
- Special offers and discounts



Distribution, posting, or copying of this PDF is strictly prohibited without written permission of the National Academies Press. (Request Permission) Unless otherwise indicated, all materials in this PDF are copyrighted by the National Academy of Sciences.

# TR NEWS

NUMBER 258

SEPTEMBER–OCTOBER 2008



11

## 3 In This Together: Collaboration and Communication During the Marquette Interchange Project

*Joseph Schmidt, Toby Peters, Lori Bysong, and Jim Koster*

During the \$810 million reconstruction of the Marquette Interchange in downtown Milwaukee—the largest road project in Wisconsin's history—the Wisconsin Department of Transportation (DOT) implemented a community-sensitive design approach. The DOT and Marquette University, a major stakeholder, developed processes to communicate and collaborate effectively to minimize disruptions for all groups affected by the project.

## 11 Communicating with John and Jane Q. Public: Competition Identifies Successful Models for Conveying Transportation Concepts

*Marcy Schwartz and Ann Hovland*

To underscore the importance of communicating transportation concepts clearly to the public, the TRB Planning and Environment Group sponsored a competition to identify the top methods and models for effectively reaching nontechnical audiences. Here are descriptions of—and images from—the winning entries in the five media categories, demonstrating a wide range of creativity and inspiration.



16

## 16 POINT OF VIEW Eminent Domain After *Kelo*: Is Condemnation of Property for Economic Purposes Legal?

*David B. Snyder*

The power of eminent domain authorizes the government to take private property for a public use, such as building roads, schools, and firehouses. In *Kelo v. City of New London*, the U.S. Supreme Court found that a local government may condemn private property for the sole purpose of economic development. The 2005 decision has generated strong reactions, including legislative activity at the state and national levels, with implications for transportation projects.



22

## 22 NEW TRB SPECIAL REPORT Great Lakes Shipping, Trade, and Aquatic Invasive Species

*Nancy Huddleston and Jill Wilson*

Since 1959, the St. Lawrence Seaway has provided a route into the Great Lakes not only for trade, but also for aquatic invasive species (AIS), which have had severe economic and environmental impacts. A committee convened by the National Research Council through the Transportation Research Board and the Division on Earth and Life Studies recommends that trade continue on the St. Lawrence Seaway but with a suite of AIS prevention measures that evolves in response to lessons learned and to new technologies.



PHOTO: WISCONSIN DOT AND MILWAUKEE TRANSPORTATION PARTNERS

COVER: A curved steel box girder is placed on one of the system ramps at night during reconstruction of the Marquette Interchange in Milwaukee; communication and collaboration with stakeholders was a key to the successful completion of the project.

# 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.

**TR News is produced by the  
Transportation Research Board  
Publications Office**

Javy Awan, Editor and Publications Director  
Christopher R. D'Amore, Assistant Editor  
Jennifer J. Weeks, Photo Researcher  
Juanita Green, Production Manager  
Michelle Wandres, Graphic Designer

**TR News Editorial Board**

Neil F. Hawks, Chairman  
Charles Fay  
Edward T. Harrigan  
Christopher J. Hedges  
Frederick D. Hejl  
Thomas R. Menzies, Jr.  
Mark R. Norman  
Barbara L. Post

**Transportation Research Board**

Robert E. Skinner, Jr., Executive Director  
Suzanne B. Schneider, Associate Executive  
Director  
Mark R. Norman, Director,  
Technical Activities  
Stephen R. Godwin, Director,  
Studies and Special Programs  
Michael P. LaPlante, Director,  
Administration and Finance  
Christopher W. Jenks, Director,  
Cooperative Research Programs  
Neil F. Hawks, Director, SHRP 2

**TR News** (ISSN 0738-6826) is issued bimonthly by the Transportation Research Board, National Research Council, 500 Fifth Street, NW, Washington, DC 20001. Internet address: [www.TRB.org](http://www.TRB.org).

**Editorial Correspondence:** By mail to the Publications Office, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, by telephone 202-334-2972, by fax 202-334-3495, or by e-mail [jawan@nas.edu](mailto:jawan@nas.edu).

**Subscriptions:** North America: 1 year \$55; single issue \$10. Overseas: 1 year \$80; single issue \$14. Inquiries or communications concerning new subscriptions, subscription problems, or single-copy sales should be addressed to the Business Office at the address below, or telephone 202-334-3216, fax 202-334-2519. Periodicals postage paid at Washington, D.C.

**Postmaster:** Send changes of address to *TR News*, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001.

**Notice:** The opinions expressed in articles appearing in *TR News* are those of the authors and do not necessarily reflect the views of the Transportation Research Board. The Transportation Research Board and *TR News* do not endorse products or manufacturers. Trade and manufacturers' names appear in an article only because they are considered essential to its object.

Printed in the United States of America.

Copyright © 2008 Transportation Research Board. All rights reserved.

---

## ALSO IN THIS ISSUE :

- 26 Research Pays Off**  
**Uninterruptible Power Supplies Keep Traffic Signals On: Illinois Works to Avoid Delays and Dangers from Outages**  
*Yogesh P. Gautam*
- 28 Profiles**  
Kansas DOT Chief Counsel Vicky S. Johnson and concrete paving expert Jamshid M. Armaghani
- 30 News Briefs**
- 31 TRB Highlights**  
Cooperative Research Programs News, 31
- 32 Bookshelf**
- 36 Calendar**

---

## COMING NEXT ISSUE

As a prelude to the 2009 TRB Annual Meeting's spotlight theme of Transportation, Energy, and Climate Change, a feature article in the November–December 2008 *TR News* examines the prospects and the necessary transformations to develop a sustainable transportation system. Also in this issue are features on creating a culture of traffic safety, a state department of transportation's model for context-sensitive solutions, and a TRB policy study on the role of transit in emergency evacuations. The November–December issue also contains the *TRB 2008 Annual Report*.

Photo: Oregon DOT



Oregon Department of Transportation recycled the concrete from a demolition on I-5 into aggregate for another project, saving money and resources.



# In This Together

## *Collaboration and Communication During the Marquette Interchange Project*

JOSEPH SCHMIDT, TOBY PETERS, LORI BYSONG, AND JIM KOSTER

The authors are with Marquette University, Milwaukee, Wisconsin: Schmidt is a civil engineering student, College of Engineering; Peters is Associate Vice President, Office of Administration; Bysong is a former Communications Specialist; and Koster is Consulting Engineer. (Note: Schmidt now has graduated from Marquette and is working as a project engineer for a general contractor in Milwaukee.)

During the \$810 million reconstruction of the Marquette Interchange, the largest road project in Wisconsin's history, the Wisconsin Department of Transportation (DOT) developed processes to communicate and collaborate effectively with area businesses, local communities, and stakeholders, including Marquette University, to minimize disruptions. The interchange, in the heart of downtown Milwaukee, is the meeting point of three major freeways—Interstates 94, 43, and 794—and serves as the travel hub of southeastern Wisconsin.

The original interchange was completed in 1968 and was designed to support 150,000 vehicles per day. By the early 2000s, the interchange was handling 300,000 vehicles per day, or twice the design volume

(1). A project was launched to improve the facility's traffic-handling capabilities, increase driver safety, and accommodate the growth and other changes in Milwaukee and southeastern Wisconsin. The project would require the total reconstruction of the Marquette Interchange.

### Local and University Concerns

Although necessary and beneficial to the community as a whole, the reconstruction raised concerns for the city of Milwaukee and key stakeholders—area businesses, residents, and travelers on the interchange. These travelers included not only commuters to and from downtown Milwaukee, but also motorists passing through. Much of the traffic that moves through Wisconsin traverses the Marquette Interchange at some point. In the

PHOTO: WISCONSIN DOT AND MILWAUKEE TRANSPORTATION PARTNERS



Aerial view of the Marquette Interchange; a portion of the Marquette University campus is visible in the lower quadrant.

early 2000s, the interchange provided access to “7 million visitors annually to downtown festivals and attractions” (1). The interchange also provides access to tourist destinations in northeastern Wisconsin, such as Door County and Green Bay.

Marquette University, a major stakeholder in downtown Milwaukee, was the only entity affected on three sides by the interchange. Because of this location and the round-the-clock, seven-days-a-week activities on the campus, university officials viewed the reconstruction project with concern.

Residence halls on either side of I-43 house 1,200 students. Pedestrian safety, noise, access, land loss, and dust would present challenges for student recruitment and retention. Moreover, the four-year interchange project would last the entire experience of at least one class of Marquette students; the university administration resolved that the project would not define the Marquette experience for that class.

Despite the disruptions and inconveniences of the construction, university enrollment did not decline during the interchange project. Instead, the university experienced record numbers of applications each year that the project was under way. University officials attribute this to the lack of negative impact, to proactive communication, and to effective collaboration between Marquette University, Wisconsin DOT, and

the contractors involved in the reconstruction.

Wisconsin DOT sought to involve the university from the beginning, at the design phase. Through constant communication, the university has been able to work with Wisconsin DOT to address the concerns of the university and its constituents.

## Developing Communication

To collaborate with parties affected by the interchange project, Wisconsin DOT developed a variety of communication methods and mechanisms. Marquette University representatives assisted in the development of these procedures and in the distribution of state-produced informational materials.

Wisconsin DOT teamed with HNTB Corp. and CH2M Hill—which together created Milwaukee Transportation Partners—to develop a website devoted to the Marquette Interchange Project, [mchange.org](http://mchange.org). The website served as a public forum offering traffic information, publications, and photos online. The public could submit complaints and suggestions via the website, and the e-mails received prompt responses.

The website featured many interactive functions. For example, one web page displayed a drawing of the new interchange with points of interest that could be highlighted and selected to reveal related information.

## Marquette Interchange Project at a Glance

The Marquette Interchange was completed October 2, 2008—three months ahead of schedule and \$15 million under budget. Located in downtown Milwaukee, the interchange links I-94, I-43, and I-794, providing a vital route for commuters and commercial traffic.

The four-year reconstruction project replaced and modernized a four-level interchange with a five-level interchange. At a glance, the Marquette Interchange

- ◆ Serves 300,000 vehicles a day;
- ◆ Encompasses 12 miles of urban freeways and more than 180 structures;
- ◆ Contains more than 38,000 tons of structural and reinforcing steel and 2.1 million square feet of bridge deck;
- ◆ Includes 5 miles of retaining wall, 30 ramps, and 56 bridges;
- ◆ Issued 10,254 plan sheets for major contracts and award-



PHOTO: MILWAUKEE TRANSPORTATION PARTNERS

*Construction under way in May 2006; 27 percent of the Marquette Interchange project work was completed by Disadvantaged Business Enterprises, part of the community-sensitive design approach adopted throughout by Wisconsin DOT.*

ed \$120 million in Disadvantaged Business Enterprise contracts for design and construction;

- ◆ Attracted 135 million visits to the project website; and
- ◆ Achieved \$100 million cost savings in design.

The project has received several major recognitions, including the American Road and Transportation Builders Association Pride Award, the Wisconsin Department of Transportation Golden Shovel Award, and the American Association of State Highway and Transportation Officials Large Project “On Time” Award. Working for the Wisconsin Department of Transportation,

Milwaukee Transportation Partners—a joint venture between HNTB Corporation and CH2M Hill—were responsible for the bridge, roadway, and retaining wall design; maintaining traffic during construction; plan preparation; and public involvement.



PHOTO: ROBERT WAZNIAK, WISCONSIN DOT

A view of the construction on the Marquette Interchange project, looking south.

Photographs and a diagram of the original interchange offered a look at its construction and highlighted the improvements of the new design.

### Community Sensitivity

Wisconsin DOT implemented a community-sensitive design (CSD) approach to involve citizens and stakeholders in the project design before major decisions were made. This partnership approach ensured the consideration of community concerns and sensibilities in the design plans.

CSD allowed Milwaukeeans to have a voice in the project; Wisconsin DOT, however, did not employ CSD only as a preproject endeavor but applied the approach throughout the project. To maintain public involvement, Wisconsin DOT kept the public informed, in part through the [mchange.org](http://mchange.org) website, but also through community meetings.

Both Marquette Constructors and Walsh Construction—the two major contractors for the Marquette Interchange Project—needed subcontractors to help with the construction. Two programs provided equal opportunity for all members of the Milwaukee community to be involved in the construction. The Milwaukee Transportation Alliance for New Solutions (M-TrANS), which trains people in the construction trades, was expanded, and a commitment was made to hire Disadvantaged Business Enterprises (DBEs) to bring equal opportunities and new jobs to the community. Wisconsin DOT required that a certain percentage of the subcontractors consist of DBEs—either female- or minority-owned companies. DBEs have contributed to 27 percent of the completed work on the project.

Collaboration extended beyond direct work on the road construction to other opportunities. Decorative artwork was incorporated into the bridge abutments and parapet walls of the bridges, which display the history and culture of the surrounding neighborhood. A mural on the Fond du Lac Avenue corridor depicts the city's role in the Underground Railroad, the route that conducted American slaves to freedom in the 1800s. The project included murals and statues of people who played a major role in the abolitionist movement.

Wisconsin DOT collaborated with representatives of the local African-American, Hispanic, and Hmong communities on the choices for the artwork. The decorative

The community-sensitive design process produced a series of murals about Milwaukee's role in the Underground Railroad and the abolitionist movement. The mural on the northern abutment of I-43 at Fond du Lac Avenue depicts the rescue of runaway slave Joshua Glover from jail in 1854.

PHOTO: JAMES KOSTER, MARQUETTE UNIVERSITY



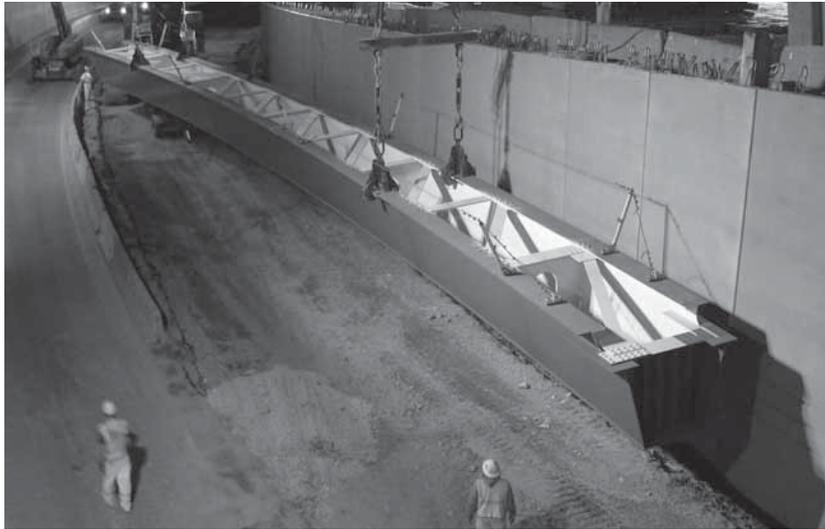


PHOTO: ROBERT WAZNIAK, WISCONSIN DOT

Contractor lifts a tub girder into place for the connector ramp between I-94 Westbound and I-43 Northbound, one of several innovative construction methods employed to ensure rapid completion of the interchange project.

murals provide more than aesthetic appeal—they demonstrate Milwaukee’s diversity and the unifying pride of recognition by the greater community.

### Construction Methods

The project used a variety of construction methods and resources. Wisconsin DOT constructed temporary ramps and quickly opened new roads to traffic with asphalt pavement. The life span of the asphalt in the Marquette Interchange is 75 years.

The use of trapezoidal tub girders instead of steel I-beams for the curved entrance and exit ramps was another innovation. The tub girders required fewer supports and could span longer distances, reducing the construction time for the ramps.

Walsh Construction was awarded the project contract for the North Leg, the first major phase of the interchange reconstruction, which involved the demolition and reconstruction of several bridges and road-

The overnight demolition of the Wisconsin Avenue Bridge, December 2006.

ways on or near the Marquette University campus. Marquette Constructors, LLC, a conglomerate of three local construction companies—Edward Kraemer & Sons Inc., Lunda Construction Co., and Zenith Tech Inc.—won the contracts for the West Leg Project and for the Core and South Leg Projects, locations for the majority of the work. Both contractors communicated and collaborated with Wisconsin DOT and Marquette University throughout the project.

### Milwaukee Microcosm

Marquette University’s location, size, and makeup served as a microcosm for Milwaukee. If the university was able to manage around the construction and if its various constituencies were able to maintain a positive—or at least neutral—attitude toward the project, then the downtown Milwaukee community was likely to do the same.

The general public was concerned that the Marquette Interchange project would require burdensome changes to normal driving routines. Downtown businesses worried that customers would view the project as an obstacle to travel into downtown Milwaukee.

In cooperation with Wisconsin DOT, Marquette University worked to keep the campus community and visitors informed about the reconstruction. The Office of Public Affairs and other university units facilitated efforts to work with downtown stakeholders and the state to advance the project and minimize the negative effects. In this way, businesses and organizations in proximity to the project were able to share concerns with the university.

The theme of the communication efforts was to assure visitors and residents that the downtown was still open for business. As the tagline for the project suggested, motorists should “change their approach, *not* their destination.”

### University Constituencies

Marquette students who lived on or around campus and employees who worked at the university had to deal daily with the noise and inconveniences of construction. Pile driving, sheet driving, demolition work, and general construction noise were heard in university residential buildings, offices, and classrooms. The Wisconsin Avenue Bridge, connecting the main campus with a residence hall and with students who lived off campus, was demolished and reconstructed over the period of one year. Commuter students, faculty, and staff had to deal with route changes. Day-to-day closings and traffic changes were expected, and a way was needed to keep drivers up to date.

Visitors to Marquette also faced unique challenges. Frequent visitors faced problems similar to those of



PHOTO: ROBERT WAZNIAK, WISCONSIN DOT

daily commuters. Occasional visitors would find that routes had changed between trips. Providing revised directions for each new visit to a group already adept at navigating previously used routes was a challenge. All visitors needed assurances that the activities of Marquette University would not be disrupted.

## Communications Team

To address these concerns, Marquette University became involved in the project design in 2000. Toby Peters, Associate Vice President for Administration, served as the university's primary liaison with Wisconsin DOT for the project. With a group of university stakeholders, he negotiated with Wisconsin DOT about design issues related to pedestrian safety and access to the university.

In 2004, Peters assembled a team to work on the interchange project: consulting engineer Jim Koster, a Marquette alumnus with 37 years of experience in the City of Milwaukee Department of Public Works; and communication specialist Lori Bysong, a graduate of Marquette's Diederich College of Communication. The team managed the communications between all concerned parties, both within the university and outside. The goal was to ensure that the Marquette community would be informed and would have a voice in the project.

## Communications Efforts

The interchange team worked to ensure that the community maintained a positive or neutral attitude about the reconstruction. The team sought to minimize access difficulties and noise concerns for students, faculty, and staff, as well as hazards to pedestrians in the construction area.

The interchange team analyzed, condensed, and presented to the campus community the information gained from weekly meetings and personal contacts with Wisconsin DOT and the contractors. The team also established a network of campus building contacts who would receive updates and pass the information along to colleagues. A weekly e-mail update was distributed to all students, faculty, and staff, and the updates were posted on flat-screen monitors in high-traffic campus areas.

The interchange team met regularly with stakeholder groups on campus and every other week with a steering committee of employees and students. The team convened monthly with representatives from the state and the contractors for an external steering committee meeting and held biweekly meetings internally and externally to plan communication efforts.

In addition to these regularly scheduled meetings, the team planned other communication and opinion-gathering events. Focus groups of students were con-



vened at key points in the project, and student government representatives met with the interchange team regularly to discuss the project's progress and to share concerns.

## Creative Approaches

When the Wells Street Bridge, 300 feet from two Marquette residence halls, was scheduled for demolition while students were on campus, students' opinions were solicited about how to minimize the disruption. The two halls that were most affected by the nighttime demolition received advance notice of when and how the demolition would take place. The interchange team collaborated with the Office of Residence Life and Sodexo Food Services to provide refreshments and earplugs to students in the two dorms. These accommodations created a festive atmosphere on the night of the bridge demolition.

To keep the campus community upbeat about the project, the interchange team often took a lighthearted approach to sharing information. For example, the "Where's Jim?" contest invited members of the Marquette community to view a photo of the project site and identify via e-mail where Jim Koster was in the picture; all who responded were entered in a prize drawing. The contest not only entertained but informed the community by showing project developments and progress.

In another creative communication, members of the Marquette community received stress toys. Intended to keep the campus mood light, the tokens were distributed each year to students, employees, and visitors. The toys related to the project through catchy inscriptions along with the project website address. Examples included a miniature construction barrel, a hard hat, a

A late 2005 scene from the "Where's Jim?" contest series, used to build awareness of project developments and progress. (Answer: see photo on next page.)



Annual souvenir stress toys for the Marquette University community featured morale-building wit: a construction barrel, "The Funstruction Begins"; a hard hat, "Hard hats. Cool heads"; a brick, "Bridging the Gap"; an apple, "Getting to the Core of the Project"; and a light bulb, "The light at the end of the tunnel."



PHOTO: JAMES KOSTER, MARQUETTE UNIVERSITY

Temporary pedestrian route along Tory Hill assured safe connections for students and staff walking from a residence hall, an office building, and off-campus housing to the main campus during the reconstruction of the Wisconsin Avenue Bridge.

brick, and an apple inscribed, “Getting to the Core of the Project”—a reference to the Core Project, the focus of most of the interchange work. A recent addition to the collection was a lightbulb with the words, “The light at the end of the tunnel.”

### Wiggles and Walkways

The most stunning example of the collaborative relationship between Marquette University, Wisconsin DOT, and the contractors was the “wiggle,” a relocation of a segment of 11th Street that ran directly between two residence halls on campus. The street would have carried a significant increase in freeway-

In an early interchange design, North 11th Street would have carried additional traffic between two Marquette University residence halls; concerned about safety, university officials worked with Wisconsin DOT to devise the “wiggle,” rerouting the street around the buildings.



PHOTOS: JAMES KOSTER, MARQUETTE UNIVERSITY

The former 11th Street space between the residence halls was converted to a pedestrian mall ahead of schedule, thanks to open and regular communication between the contractor, Wisconsin DOT, and the university.



bound traffic. As an urban campus, the university gives special attention to the safety of students, employees, and guests and noted that the initial design would compromise pedestrian safety.

The state returned to the drawing board and proposed the wiggle—rerouting the street to the east of the residence halls. The university has converted the former street space that was vacated between the two residence halls into much-needed green space. The rerouting exemplifies the state’s responsiveness to the university’s concerns; the cost-effective solution not only helped Marquette but enhanced the interchange design.

Another challenge was the Wisconsin Avenue Bridge demolition, which cut off a university residence hall and office building from the main path of campus travel. To ensure the safety of Marquette students and employees walking from the building on the east side of the interchange, the state created a temporary walkway on the southern edge of campus that was well lit, unobstructed, and safe for pedestrian passage to and from the main campus.

The temporary walkway was constructed with asphalt pavement, and temporary bollards and chains separated the walkway from the street. The lighting was brighter than that of the old Wisconsin Avenue Bridge and contained security cameras and blue-light phones, which connected directly to the university’s Department of Public Safety. The walkway was maintained throughout the full year required for the bridge construction.

### Noise Management

When university officials expressed the need for quiet periods during the weeks of exams, Wisconsin DOT wrote limitations on noise into the contracts for bidding. If the noise limits had to be exceeded, the state would work in advance with the university and the contractors to ensure that students were prepared and informed.

Collaboration was critical in the scheduling of major construction events, including noisy and disruptive operations, such as pile driving operations, the movement of equipment, the erection of bridge structures, and the pouring of bridge decks. The 11th Street wiggle, for example, was not scheduled for construction until 2008, but because the contractors were pile driving in the area, they changed the plan and continued the operations, completing this part of the project earlier.

The schedule change for the wiggle also minimized the noise impact, because students were away from campus; the operation took place only 12 feet from a residence hall. Marquette University benefited from the reduction in noise disturbances and from the earlier construction of the pedestrian mall.

These and other schedule changes and work adjustments contributed to the project’s success from the Mar-

quette University perspective. The Wisconsin Avenue Bridge was completed ahead of schedule because the contractors worked weeknight hours and on Saturdays. The new 11th Street was completed ahead of schedule, because of contractor cooperation and willingness to complete the work in conjunction with other work in the same area—a cost-reducing initiative.

### Academic Laboratory

The reconstruction project served as an outdoor, living laboratory for the university's Department of Civil Engineering. The contractors scheduled student tours of the different phases of the project, and members of the design and construction teams spoke with students to share their experiences and the challenges presented by the project.

Associate Professor James Crovetti was the principal investigator for a project that instrumented the Marquette Interchange. The goal was to assemble real-time data measuring the stresses and strains that the pavement structure would endure throughout its service life. Pavement sensors were installed in the subgrade and aggregate base to measure subgrade moisture levels, subgrade temperatures, and subgrade and base pressures. Strain sensors were installed on the underside of the asphalt pavement to monitor the effects of traffic loads on the pavement structure. Temperature and wheel-load position sensors were installed in the surface course of the asphalt.

The data from these instruments were transmitted to a control panel and then to a computer at Marquette University's Transportation Research Center. The findings from the research will assist engineers in designing better, longer-lasting pavements, ultimately reducing construction delays and taxpayer expenses.

### Survey Results

The Marquette University interchange team measured the results of its communication efforts via the annual Interchange Communication Survey, conducted with assistance from the Department of Information Technology Services. The survey ran for approximately 10 days during each of the spring semesters of 2005, 2006, 2007, and 2008, to gauge student, faculty, and staff reactions to the interchange information they had received.

The survey results are summarized in the table on page 10. Three questions yielded responses that were most descriptive of the community's attitude to the project:

- ◆ “To what extent has the Marquette Interchange project been disruptive to you?” Almost 77 percent responded that at least some disruption occurred.

- ◆ “To what extent have you made changes to



PHOTO: JAMES KOSTLER, MARQUETTE UNIVERSITY

manage the Marquette Interchange reconstruction?” More than 98 percent of the respondents indicated that they had made changes to manage around the disruption from the project. This indicated that the communication efforts were having the desired effect—community members were able to cope with the disruptions.

- ◆ The third question addressed the adequacy of the information received about the project. Throughout the Marquette Interchange Project, less than 6 percent of respondents said they had a need for more information.

### Additional Roles

More than six years ago, when Wisconsin sought federal funding for the Marquette Interchange project, Marquette University representatives, including Vice President for Public Affairs Rana Altenburg, traveled to Washington, D.C., at the invitation of Wisconsin DOT Secretary Frank Busalacchi to meet with legislators. This established the groundwork for the collaborative relationship between Wisconsin DOT, the Milwaukee community, and Marquette University.

The support demonstrated by the state's collaboration with stakeholders communicated a strong message to the Wisconsin congressional delegation that all of the parties involved were ready to work together, that money for the project would be well spent, and that the business community, Marquette University, and the state would collaborate to ensure the best results for the project.

Throughout the reconstruction, Marquette University has participated actively, often in a decision-making capacity. Altenburg has served on several committees that have had communitywide impact; she chaired the committee that chose the colors of the

Temperature and pressure sensors are placed in the pavement subgrade on I-43 Northbound, near Fond du Lac Avenue, for data monitoring and analysis by Marquette University researchers.

**TABLE 1 Marquette Interchange Reconstruction Communication Survey: Comparison of Results for Three Questions, 2005–2008**

	2005		2006		2007		2008	
<b>To what extent has the Marquette Interchange project been disruptive to you?</b>								
Very disruptive	309	23.64%	210	26.89%	116	14.48%	133	9.79%
Somewhat disruptive	871	66.64%	492	63.00%	561	70.04%	910	67.01%
Not at all disruptive	127	9.27%	79	10.12%	124	15.48%	315	23.20%
<i>Total respondents</i>	1,207		781		801		1,358	
<b>To what extent have you made changes to manage the Marquette Interchange reconstruction?</b>								
No changes required	181	13.85%	96	12.29%	124	15.48%	405	29.82%
I have experienced disruption, but have made changes to manage around it	1,080	82.83%	652	83.48%	664	82.90%	935	68.89%
I have been unable to manage the disruption	46	3.52%	33	4.23%	13	1.62%	18	1.33%
<i>Total respondents</i>	1,307		781		801		1,358	
<b>In general, I have received adequate information about the activities associated with the Marquette Interchange project.</b>								
Strongly agree; agree	1,076	82.08%	583	71.45%	602	75.15%	1,025	75.09%
Neutral	177	13.50%	170	21.57%	156	19.48%	256	18.75%
Strongly disagree; disagree	58	4.38%	55	6.98%	43	5.36%	84	6.15%
<i>Total respondents</i>	1,311		788		801		1,365	

concrete and steel for the project—denim and wheat—close to Marquette University’s colors of blue and gold.

### Megaproject Lessons

The Marquette Interchange reconstruction was a major project that ran smoothly and successfully by promoting collaboration. The CSD approach expressed the inclusive character of the project. Involving as many constituencies as possible created attachments to the project and a commitment to collaboration. The physical construction was monumental in scale, but the public involvement renewed the sense of community between Marquette University, the City of Milwaukee, and the state of Wisconsin.

Some major lessons were learned. First, with a large urban project, such as the Marquette Interchange reconstruction, Wisconsin DOT must assess early and thoroughly the people in the area who will be affected, what kinds of disruptions they will experience, and whether or not they could be helpful partners in the project.

Second, the affected constituents should be instrumental in the design and execution of the project. Frequent meetings with constituents are essential; building trust is critical. Trust is the key to achieving a collaborative relationship like that between Marquette University and Wisconsin DOT.

Third, during and after the planning phase, communicating about the project early, often, and accurately is important. Throughout the Marquette

Interchange reconstruction project, groups that were informed earlier and accurately reported less disruption and were happier with the project in general.

Finally, successful project management involves maintaining a positive attitude throughout the process—from planning to completion. Five years ago, Marquette University had genuine concerns about the massive reconstruction of the Marquette Interchange. The positive impact of collaboration and teamwork changed this. Wisconsin DOT, under the leadership of Secretary Busalacchi, and Marquette University were able to create a teamwork environment for the efficient and successful completion of the reconstruction.

### Acknowledgments

Also contributing to this article were Don Reinbold, Project Manager; David Nguyen, Project Construction Supervisor; and Barbara Mikolajczyk, Public Information Officer, Marquette Interchange, Wisconsin Department of Transportation; Rana Altenburg, Vice President, Office of Public Affairs; James Crovetti, Associate Professor, College of Engineering; Caitlin West, public relations student, Diederich College of Communication; and Mary Pat Pfeil, Senior Director of University Communication, Office of Marketing and Communication, Marquette University; and Steve Lunde, Structural Engineer, R.A. Smith and Associates.

### Reference

1. *Project Guide Introduction*. Wisconsin Department of Transportation, 2007. <http://mchange.org/page.jsp?key=pjg&>. Accessed Jan. 30, 2007.

# Communicating with John and Jane Q. Public

## *Competition Identifies Successful Models for Conveying Transportation Concepts*

MARCY SCHWARTZ AND ANN HOVLAND

Schwartz is Senior Vice President, CH2M Hill, Portland, Oregon; chair of the TRB Special Task Force on Climate Change and Energy; past chair of the Planning and Environment Group; and a past member of the Technical Activities Council. Hovland is Sales and Marketing Project Manager, CH2M Hill, Portland.



**T**he public is overwhelmed daily with media and messages. The guiding principle of mass communication seems to be that “it’s not what you say, it’s how you say it.” Transportation professionals who want to connect with the traveling public and deliver substantive messages must find a way to cut through the media noise.

The problems and the solutions that are critical to communicate have increased in complexity—but the public often is not listening. For transportation professionals, the challenge is to develop compelling ways to engage the public and to increase understanding of issues that affect the efficiency of the transportation system.

To underscore the importance of the clear com-

munication of transportation ideas to the public, the Planning and Environment Group of the Transportation Research Board (TRB) sponsored a competition in 2007 to identify the top methods—and to advance models—for effectively reaching nontechnical audiences. The contest attracted 72 entries in a range of media: video, tools and games, graphics, books and booklets, and CD-ROMs and websites. A panel comprising communication and technical experts from inside and outside TRB judged each entry. The winning entries were displayed at a spotlight poster session, Communicating Transportation Concepts to the Public, during the 2008 TRB Annual Meeting. Following are highlights of the 11 award winners.

*Rachel's Drive*, a 3-minute driver simulation video produced by Washington State DOT, demonstrates new HOT lane technologies and rules for HOT lane use in the Seattle area. The video was shown at regional and local meetings, featured in print and broadcast media, and posted on the DOT's website.



IMAGE: WASHINGTON STATE DOT

## Video

### *Rachel's Drive*

The Washington State Department of Transportation (DOT) is constructing high-occupancy toll (HOT) lanes in the Seattle area. The DOT needed to make the abstract concepts of dynamic pricing and electronic tolling more understandable to potential users before implementation. *Rachel's Drive*, a low-budget, 3-minute video, uses simulation to put the viewer in the driver's seat and to present the concepts, functions, benefits, and proper usage of the HOT lanes.

### *Transit Training for Older Travelers*

Elderly people often have difficulty understanding the complexities of the local transit system as an alternative mode of travel. A training video was developed as a case study of residents in the Rossmore Senior Adult Community, Walnut Creek, California. The video features community members traveling successfully by transit to key destinations and navigating various bus routes to the grocery store and to a medical center. The video also educates viewers on how to obtain information about transit schedules, costs, and payment.

## Games and Tools

### *Build a Bridge*

The Sellwood Bridge in Portland, Oregon, must undergo rehabilitation or replacement. Combinations of elements related to rehabilitation versus replacement, interchange type, alignment, and cross-section produced 124 project permutations. An interactive, web-based tool helped the public understand the pros and cons of each alternative. Participants were able to build their own virtual bridges by combining the elements they favored. After selecting the combinations, users were able to compare the cost, the residential and business displacements, and the criteria scores for achieving the project's goals.

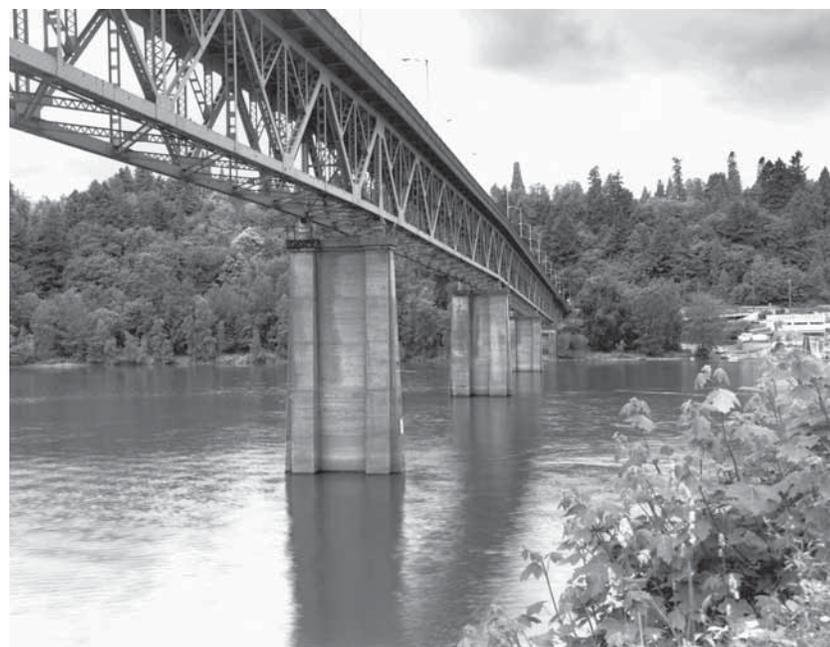


PHOTO: CHAM HILL

An interactive, web-based tool allowed the public to explore the pros and cons—including designs and costs—of alternatives for the rehabilitation or replacement of the Sellwood Bridge (above) in Portland, Oregon.

### *Missouri Funding Allocation Challenge*

To involve citizens in the development of a long-range transportation plan, Missouri DOT created a computer game. Players were given \$100 in coins and asked to drag-and-drop the coins into 10 funding categories to indicate how much Missouri DOT should allocate to each category. After the first allocation was complete, players received additional information and were asked to reallocate the funds.

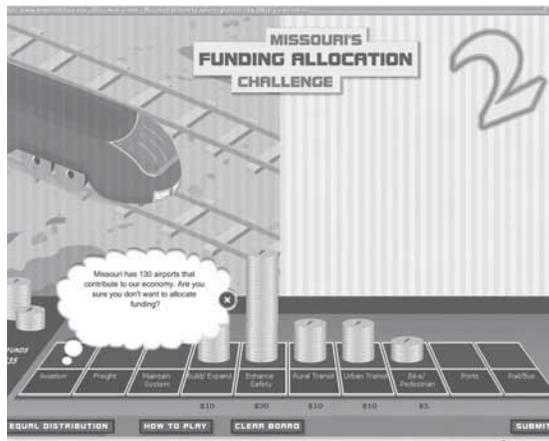


IMAGE: HNTB CORPORATION

## Graphics

### *Snoqualmie Pass Holiday Travel Graphs*

On holiday weekends, highway traffic in Washington State can nearly double, creating lengthy delays. Washington State DOT has developed graphs of hol-

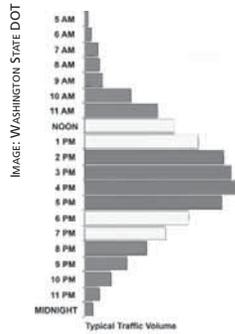
iday traffic volumes to portray the anticipated peak travel times to the public. The graphs were first published on Thanksgiving weekend 2005, when holiday volumes were predicted to cause a full day of stop-and-go traffic and up to 30 miles of backups. Because of media coverage of the graphs, many drivers adjusted travel plans, choosing alternative routes or delaying trips. No long delays developed, and use of the graphs continues to improve traffic operations.

**Street Capacity Exercise: UnJAM 2025**

The Places29 project in northern Albemarle County, Virginia, combines land use planning for four urban counties with the US-29 North Transportation Corridor Study. The project developed a graphic for an information sheet, to illustrate street capacity as an issue that involves the movement of people instead of cars. The four photographs show that if a street is at capacity for automobile traffic, shifting one lane to transit use only could increase capacity without having to widen the roadway.

**Little Cottonwood Canyon Accident Analysis**

Little Cottonwood Canyon, near Salt Lake City, Utah, is one of the highest-rated avalanche corridors in the United States and poses a high risk to winter travelers. Collisions that had occurred in the corridor during a 9-year period were analyzed to identify patterns. A plan view of the route identified the types and the



One of several graphs developed and published by Washington State DOT to alert holiday travelers to peak traffic times. The graphs are color coded, with green indicating the best hours for travel. Posted on the DOT website, the graphs have helped travelers plan ahead, and long delays experienced in the past have not materialized.

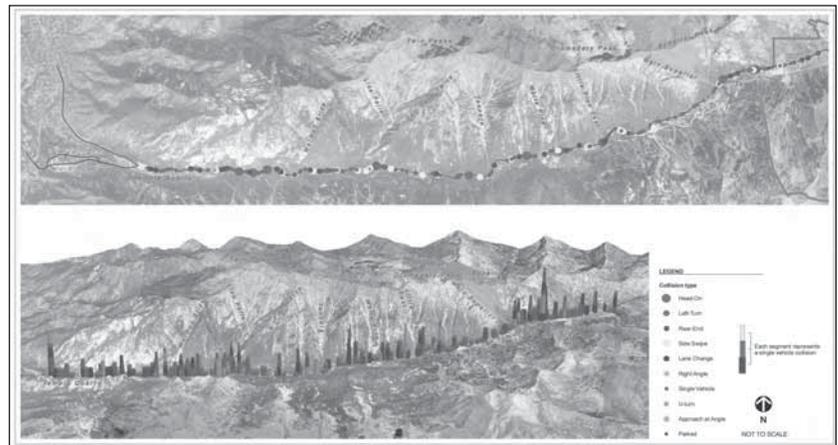


IMAGE: FEHR & PEERS

A graphic developed by Fehr and Peers helps the public understand the risks for collision along Little Cottonwood Canyon outside of Salt Lake City, Utah. Showing the collisions in relation to the mountain terrain emphasizes the canyon slope's severity along the corridor.



Photographs illustrating the tradeoff between moving people and moving cars to create street capacity. The graphic helped prepare the public for participation in a workshop on selecting alternatives for the Places29 project, Albemarle County, Virginia.

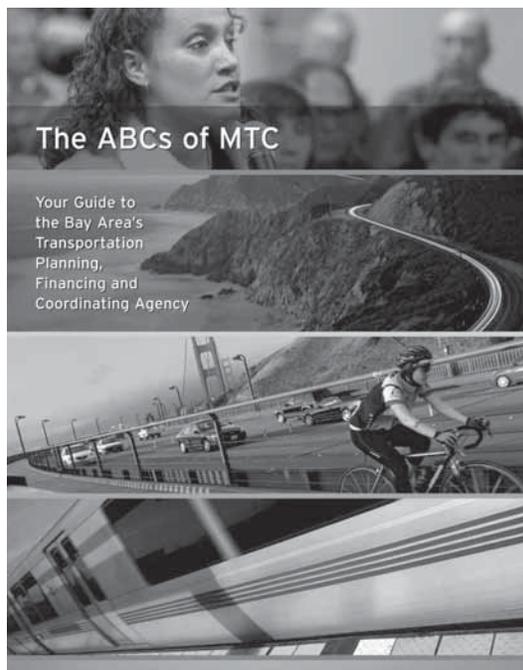


Winnipeg Transit's *Designing for Sustainable Transportation and Transit in Winnipeg* provides information for developers and real estate agents and helps the public understand the principles of sustainable transportation.

Burl the Squirrel helped Washington State DOT playfully engage young and old readers in an activity book presenting details of the I-90 Snoqualmie Pass East Project.



IMAGE: WASHINGTON STATE DOT



**The ABCs of MTC**

Your Guide to the Bay Area's Transportation Planning, Financing and Coordinating Agency

locations of the major collisions. Combining the plan view with a 3-D view—that is, stacking the collisions in a column format—helped the public understand the number and type of collisions in the corridor.

**Books and Booklets**

***Designing for Sustainable Transportation and Transit in Winnipeg***

Winnipeg Transit in Manitoba, Canada, created a booklet to communicate the importance of incorporating transit considerations into the earliest stages of transportation projects instead of addressing transit as an add-on at the end. The booklet outlines the social, economic, environmental, community, logistical, and operations considerations involved in development projects and offers practical recommendations and design guidelines to promote sustainable transportation.

***Burl the Squirrel Activity Book***

The communication team for Washington State DOT's I-90 Snoqualmie Pass East Project in Yakima created an activity book featuring a cartoon character, Burl the Squirrel, to educate children and adults about complicated project issues. The activity book humorously explains the project from an animal's point of view. The DOT has distributed 10,000 activity books throughout the state, mostly at fairs and festivals, proving the publication's popular appeal and generating positive media coverage.

***The ABCs of MTC***

*The ABCs of MTC* was developed to help interested citizens understand and participate more fully in the transportation planning and decision-making process in the San Francisco Bay Area. The booklet aims to demystify transportation policymaking—particularly the unique role of a metropolitan planning organization. A glossary of terms and acronyms renders the sometimes arcane jargon of transportation planning more accessible to the public.

**CD-ROMs and Websites**

***2040 Regional Framework Plan***

The Northeastern Illinois Planning Commission—now the Chicago Metropolitan Agency for Planning—developed a 2040 Regional Framework Plan that communicates a 35-year vision for the six-county Chicago metropolitan area. To build public support for the plan's implementation, the agency released a communications package summarizing the 300-page plan and including a CD-ROM that explains the plan's land use and transportation principles to a diverse audience, from planners and public officials to the general public.

*The ABCs of MTC* is a 42-page sourcebook for the general public on transportation planning and decision making in the San Francisco Bay Area, including a glossary, statistics on the network, demographic trends, travel and commuting patterns, and more.

## Creativity and Inspiration

The judges for the TRB communications competition noted the wide-ranging creativity of the entries. The products selected for awards serve as inspiration to transportation professionals who may be struggling to translate complex transportation concepts for the general public. TRB's communications challenge for the 2009 Annual Meeting has called for entries that present climate change and energy issues to the public. The winning entries will be showcased in a poster session.

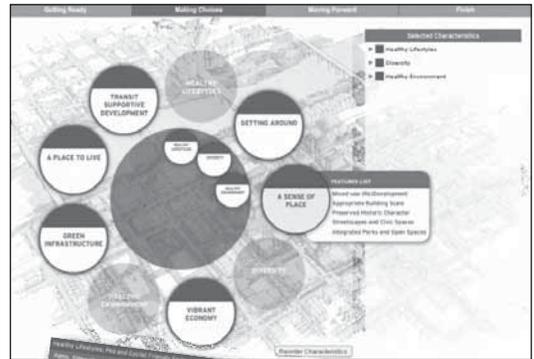


IMAGE: HNTB CORPORATION

The Centers Toolkit CD-ROM, developed for the Chicago Metropolitan Agency for Planning, is intended for electronic presentations at workshops to inform community participants and gain consensus. Workshop facilitators can use the CD to call up selected content as the discussion flows from one topic to the next.



## Authors of the Award-Winning Projects

**Rachel's Drive:** Melissa Loomis, Jamie Holder, Trent Rickman, and Carol Hunter, Washington State DOT; and Bob Hamilton, King County Multi-Media; contact: loomism@wsdot.wa.gov.

**Transit Training for Older Travelers:** Susan A. Shaheen and Caroline J. Rodier, University of California, Berkeley; contact: rodier@pacbell.net.

**Build a Bridge:** Brandy Steffen and Tom Rippetoe, CH2M Hill; and Alex Cousins, Jeanne Lawson Associates; contact: brandy.steffen@ch2m.com.

**Missouri Funding Allocation Challenge:** Eric J. Curtit, Missouri DOT; and Scott Russell, HNTB Corporation; contact: lpope@hntb.com.

**Snoqualmie Pass Holiday Travel Graphs:** Jim Mahugh, Mike Westbay, Melinda Warren, Brian White, Todd Trepanier, Don Whitehouse, Melissa Petty, Stan Suchan, and Jeremy Bertrand, Washington State DOT; contact: westbam@wsdot.wa.gov.

**Street Capacity Exercise: UnJAM 2025:** Harrison B. Rue, Thomas Jefferson Planning District Commission; contact: hrue@tjpd.org.

**Little Cottonwood Canyon Accident Analysis:** Corey Connors and Ron Milam, Fehr and Peers; contact: c.connors@fehrandpeers.com.

**Designing for Sustainable Transportation and Transit in Winnipeg:** Bjorn Radstrom and Alex Regiec, Winnipeg Transit, Canada; and Jeannette Montufar, University of Manitoba, Canada; contact: bradstrom@winnipeg.ca.

**Burl the Squirrel Activity Book:** Mark Pettit, Eric Snider, Summer

Derrey, Brian White, and Mike Foisy, Washington State DOT; contact: snidere@wsdot.wa.gov.

**The ABCs of MTC:** Joe Curley, Metropolitan Transportation Commission; Arlene Finger and Greg Nelson, Finger Design Associates; contact: jcurley@mtc.ca.gov.

**2040 Plan: Centers Toolkit:** Ty Warner, Chicago Metropolitan Agency for Planning; and Timm J. Claudon, HNTB Corporation; contact: lpope@hntb.com.



PHOTO: CALE RISSON, TRB

TRB Technical Activities Director Mark Norman (left) and Planning and Environment Group Chair Marcy Schwartz, CH2M Hill (right), present a 2008 communications award in the books and booklets category to Bjorn Radstrom, Winnipeg Transit; and Jeannette Montufar, University of Manitoba, at the TRB Annual Meeting in January.

# Eminent Domain After *Kelo*

## *Is Condemnation of Property for Economic Purposes Legal?*

The author is an attorney and partner with the law firm Fox Rothschild, LLP. Working in the firm's Philadelphia office, he cochairs the Condemnation Group, which has a national practice. He is a member of the TRB Eminent Domain and Land Use Committee.

In *Kelo v. City of New London*, the U.S. Supreme Court issued one of its most controversial opinions, finding that a local government under certain circumstances has the power to condemn private property for the sole purpose of economic development. The June 2005 decision generated strong reactions—as well as misconceptions about the ruling and about the power of eminent domain. Although many local governments and developers cheered the decision, the backlash has been passionate and widespread.

*Kelo* involved a discrete set of facts and law, yet the ruling has influenced every aspect of eminent domain law and practice. Eminent domain issues are a concern for elected officials, judges, and citizens. One of the first questions asked today about public projects that involve the acquisition of property is “Will the power of eminent domain be used?” Because of this, anyone involved in transportation, government, or real estate should have a working knowledge of *Kelo* and the state of eminent domain.

### The *Kelo* Decision

The power of eminent domain—also known as condemnation—authorizes the government to take private property for a public use. Eminent domain has been a tool for local governments since colonial times. Used properly, it permits a government to acquire properties for such projects as building roads, schools, and firehouses. A government also can use the power in redeveloping blighted urban areas.

In recent years, however, some have maintained that governments have abused this power. Even the most benign condemnation proceedings can become emotional. Property owners often are upset and angry that their property has been taken against their will; governments are hard-pressed to obtain necessary properties for a valid public use.

In *Kelo*, the City of New London tested the boundaries of the power of eminent domain. In 2000, the city approved a large-scale development plan that was intended to create more than 1,000 jobs, to increase tax and other revenues, and to revitalize an economi-

cally distressed city, including the downtown and the waterfront. The plan included replacing a residential neighborhood—which was not blighted—with office space for research and development, a conference hotel, new residences, and a pedestrian riverwalk along the Thames River. Private developers would build and lease portions of the project. The project was designed to derive maximum benefit for the city from a \$350 million research center built nearby by Pfizer, Inc., the pharmaceutical company.

In assembling the land for the project, the city's development agent purchased properties from willing sellers. Several property owners, however, were not willing to sell. The city then initiated condemnation proceedings to acquire the remaining properties.

The property owners fought the condemnations, arguing that the taking of their properties violated the Fifth Amendment's “public use” requirement. The Connecticut Supreme Court, however, upheld the proposed takings, and the property owners appealed to the U.S. Supreme Court.

### Amicus Briefs

Many interest groups filed amicus curiae briefs expressing opinions about the merits of the case. The National League of Cities, the National Conference of State Legislatures, the U.S. Conference of Mayors, developers, and individual governments—such as the City of New York and states from Vermont to Hawaii—were among those filing briefs in support of New London. The National Association of Realtors, the National Association of Homebuilders, the National Association for the Advancement of Colored People, the American Association of Retired Persons, and others filed briefs in support of the property owners.

The *Kelo* case required the Court to consider the federal constitutional limits of a government's power

*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.



PHOTO: ROGER RILEY, FOR NEW LONDON DEVELOPMENT CORPORATION

April 2008 aerial photo of the area contested in the U.S. Supreme Court *Kelo* case and now under development by the City of New London. The parcel that included the Kelo house is immediately above the lower boatyard and is to be cleared of all structures and graded. The four-story brick building in the upper middle will house the U.S. Coast Guard Research and Development Center. The top of

one of the Pfizer Research and Development Headquarters buildings is at the bottom of the photo; Fort Trumbull is at the right. According to New London Development Corporation, despite the legal arguments' focus on economic development, there was a public use justification—the *Kelo* case properties affected street improvements and rights-of-way.

of eminent domain in a context that had not been previously addressed. The case did not involve properties taken for traditional public use—not all of the condemned land would be used by the general public. The project also was not designed to eliminate blight—the intent was to spur economic development through private-sector development and use.

### **Majority Opinion**

In a 5 to 4 decision, the Supreme Court held that the city's proposed disposition of the property for private development and use under an approved development plan qualified as a public use under the Fifth Amendment of the U.S. Constitution. Writing the opinion for the majority, Justice John Paul Stevens restated the principle expressed in previous opinions that the term "public use" in the Fifth Amendment should not be

read literally. Instead, the Supreme Court "has embraced the broader and more natural interpretation of public use as 'public purpose.'" The Court found that "[p]romoting economic development is a traditional and long-accepted governmental function." In sum, the condemnations were for a public purpose and met the public use requirement.

Fundamental to the decision was the Court's deference to local governments. Justice Stevens wrote that the Court's role was not to second-guess the city's judgment of the "efficacy of its development plan" or "what lands it needs to acquire in order to effectuate the project." The Court noted that the city had carefully formulated a development plan to benefit the community—for example, through new jobs and increased tax revenue.

In response to arguments that this holding would

raise the potential for abuse, the Court emphasized that no evidence was presented to indicate any illegitimate purposes. The Court stated that cases involving illegitimate purposes would have a different result—proving that the condemnor’s purposes were improper, however, could be difficult.

Finally, the Court returned the issue to the state courts. The majority wrote: “[N]othing in our opinion precludes any state from placing further restrictions on its exercise of the takings power. ...[T]he necessity and wisdom of using eminent domain to promote economic development are certainly matters of legitimate public debate.”

Defenders of the *Kelo* decision argue that the holding restated principles previously established by the Court. For example, the *Kelo* decision cited *Berman v. Parker*, a 1954 Supreme Court case that upheld a redevelopment plan targeting a blighted area in Washington, D.C.

### ***Dissenting Opinion***

Four of the justices strongly disagreed. Justice Sandra Day O’Connor issued a stinging dissent. “Any property may now be taken for the benefit of another private party, but the fallout from this decision will not be random,” O’Connor wrote. “The beneficiaries are likely to be those citizens with disproportionate influence and power in the political process, including large corporations and development firms.” She added: “The specter of condemnation hangs over all property. Nothing is to prevent the state from replacing any Motel 6 with a Ritz-Carlton, any home with a shopping mall, or any farm with a factory.”

## **The Post-Kelo World**

The reaction to the *Kelo* decision was extraordinary. The mostly hostile response prompted legislators to draft anti-*Kelo* bills. The U.S. Supreme Court acknowledged that Congress and the states have the right to pass laws restricting condemnations. At times, however, the legislation has gone beyond the issues raised by *Kelo*. Nevertheless, the ruling has caused many to reconsider this important power and to evaluate when it should and when it should not be used.

## **Federal Government Reaction**

### ***GAO Study***

The federal government reacted to the *Kelo* decision in several ways. In November 2006, the U.S. Government Accountability Office (GAO) conducted one of the more comprehensive post-*Kelo* studies, reviewing relevant provisions in federal, state, and local laws; conducting site visits to redevelopment projects that had exercised eminent domain; and interviewing national associations of local and state government officials and planning professionals, national public interest groups, and national property rights groups to gain perspectives on the use of eminent domain and the effect on communities and property owners.

Noting that objective data on topics related to eminent domain are scarce—such as how frequently the power is used—the GAO study addressed a variety of critical issues. One critical issue was the adequacy of the relocation benefits paid to condemnees. According to the study, many state and local officials commented that the limits to relocation payment amounts and procedures, established in the Uniform Relocation



Portion of the condemned Fort Trumbull property in New London, Connecticut, contested in the *Kelo* case and now vacated, awaits development.

The condemned house of Susette Kelo was moved from Fort Trumbull and reopened in downtown New London in June 2008 as a memorial to “the landmark 2005 U.S. Supreme Court case,” which “ruled that New London could take this home and others ... in the name of ‘economic development.’” At the dedication (left to right) are Kelo; Avner Gregory, who sponsored the relocation of the house; and attorney Scott Bullock, who stated, “This little pink house will take its place among the homes that have changed the face of America.”



Assistance and Real Property Acquisition Policies Act of 1970 (URA), were too low and needed to be revised. The GAO study stated:

Officials from 6 of the 10 state DOTs [Departments of Transportation] that we contacted remarked that various benefit limits in the URA are too low to properly compensate for business reestablishment costs. According to the U.S. Department of Transportation, the agency responsible for issuing regulations to implement the URA, the agency’s Federal Highway Administration...has received comments about the inadequacy of business reestablishment payments under the URA from states, other federal agencies, and affected businesses.

The GAO study also addressed the allegation that condemnors were making low offers as just compensation. The study stated:

While property valuation is intended to provide property owners compensation at fair market value for their property, property rights groups and owners expressed concern about the reasonableness of property appraisals. Multiple property rights groups believed that localities undervalue property and make offers lower than owners would receive on the market. One group cited large differentials between final jury awards and first appraisal amounts in cases in which owners challenged a condemnation. Owners in this property rights organization who challenged initial offers reported receiving an average of 40 percent more in compensation than the initial

offer. Conversely, officials of the local authority claim that it would be to their detriment to make an unreasonably low offer at any stage in the negotiation process because an offer not in good faith might enable a jury to award additional damages to a prevailing owner.

### **Executive Order**

President Bush reacted negatively to *Kelo*. On the first anniversary of the decision, the President issued an Executive Order, “Protecting the Property Rights of the American People.” The order stated:

It is the policy of the United States to protect the rights of Americans to their private property, including by limiting the taking of private property by the federal government to situations in which the taking is for public use, with just compensation, and for the purpose of benefiting the general public and not merely for the purpose of advancing the economic interest of private parties to be given ownership or use of the property taken.

The Executive Order expressly stated, however, that the exclusions to this policy included condemnations for roadways and “projects designated for public, common carrier, public transportation, or public utility use.”

### **Congressional Response**

Despite an initial negative reaction, Congress has not done much to address *Kelo*. On November 3, 2005, the U.S. House of Representatives passed H.R. 4128, which had the most sweeping potential, by an over-

whelming vote of 376 to 38. Yet the Senate's version of the bill did not make it out of the Judiciary Committee before the end of the Congressional session and never became law.

H.R. 4128 would have prohibited state and local governments from using the power of eminent domain for economic development. The bill defined economic development as "taking private property... and conveying or leasing such property from one private person or entity to another private person or entity for commercial enterprise carried on for profit, or to increase tax revenue, tax base, employment, or general economic health..." The bill includes exceptions to that definition—for example, conveying private property "to an entity, such as a common carrier, that makes the property available to the general public as of right, such as a railroad or public facility" or "for use as a road or other right-of-way or means, open to the public for transportation, whether free or by toll."

### Current Bills

The U.S. House and Senate currently have bills in various committees relating to the power of eminent domain. Both houses have bills titled "Private Property Rights Protection Act" under committee consideration. The House bill, H.R. 3053, encompasses most of H.R. 4128 from the previous session.

The Senate bill, S. 48, makes any condemning authority ineligible for federal funds if it condemns property not for a "public use or public purpose" without the owner's consent. The bill defines public use as "used, owned, operated, or maintained by a government entity and used by the public." Public purpose is defined as the use of property to further a legitimate governmental purpose to protect the health, safety, and welfare of the public directly and substantially. These definitions encompass right-of-ways, roadways, highways, airports, railroads, and "other transportation needs." The bill requires any entity applying for federal funds to certify eligibility and allows the Internal Revenue Service to audit any condemning authority or acquiring party that has made such a certification.

### State Reactions

States have reacted to *Kelo* in a variety of ways. Almost every state has passed some form of legislation in response to the decision. The types of legislation that have been considered include the following:

- ◆ Prohibiting the use of eminent domain for economic development, for increasing tax revenue, or for transferring property to a private entity.
- ◆ Restricting eminent domain to blighted properties and narrowing the definition of blight.

- ◆ Defining public use to include the possession, occupation, or enjoyment of the property by the public or by public agencies.

- ◆ Adding procedural requirements such as more prominent public notices, more public hearings, good-faith negotiations with landowners, and approval by elected governing bodies.

- ◆ Requiring compensation greater than fair market value in certain circumstances—for example, when the property condemned is a principal residence.

- ◆ Establishing legislative study committees or task forces.

### State Legislation

Alabama and Texas were the first states to enact legislation in reaction to *Kelo*. The Alabama statute prohibits condemnation "for the purposes of private retail, office, commercial, industrial, or residential development; or primarily for enhancement of tax revenue; or for transfer to a person, nongovernmental entity, public-private partnership, corporation, or other business entity." According to the statute, however, the prohibition does not apply if there is a "finding of blight." Similarly, the Texas statute prohibits condemnations "for economic development purposes, unless the economic development is a secondary purpose resulting from municipal community development or municipal urban renewal activities to eliminate... blight."

Michigan's legislation, signed into law in September 2006, addresses just compensation, which was not an issue in *Kelo*. For example, the law addresses the concern about low offers by awarding attorneys' fees to a property owner who is awarded an amount that exceeds the condemnor's offer. Specifically it provides that

If the amount finally determined to be just compensation for the property acquired exceeds the amount of the good-faith written offer . . . the court shall order reimbursement in whole or in part to the owner by the agency of the owner's reasonable attorney's fees, but not in excess of 1/3 of the amount by which the ultimate award exceeds the agency's written offer.... The reasonableness of the owner's attorney fees shall be determined by the court.

Missouri enacted legislation with some distinctive elements in July 2006. For example, the legislation provides additional compensation for the condemnation of a "homestead," defined as a "dwelling owned by the property owner and functioning as the owner's primary place of residence." For condemnations of homesteads, the condemnor must pay the fair market value plus 25 percent.

### Ballot Measures

In November 2006, voters in 10 states approved ballot measures limiting the use of eminent domain. Eight of those states passed constitutional amendments: Florida, Georgia, Louisiana, Michigan, New Hampshire, Nevada, North Dakota, and South Carolina. Two states, Arizona and Oregon, passed statutory reforms limiting eminent domain uses. Similar ballot measures failed in California and Idaho.

### State Court Rulings

At least two state courts have rejected *Kelo*. In addition to satisfying the public use requirement of the U.S. Constitution, condemnations also must satisfy provisions in state constitutions.

The Ohio Supreme Court struck down a condemnation in *City of Norwood v. Horney* on July 26, 2006. Acknowledging that economic factors may be considered in determining whether private property may be appropriated, the court concluded that the economic benefit to the government and community did not satisfy the public use requirement of the state constitution. Sounding themes that resonate with property rights groups, the Ohio Supreme Court opined:

Appropriation cases often represent more than a battle over a plot of cold sod in a farmland pasture or the plat of municipal land on which a building sits. For the individual property owner, the appropriation is not simply the seizure of a house. It is the taking of a home—the place where ancestors toiled, where families were raised, where memories were made. Fittingly, appropriations are scrutinized by the people and debated in their institutions.

The May 9, 2006, decision in *Board of County Commissioners of Muskogee County* concerned a county's condemnation of land to acquire right-of-way easements for three water pipelines, two of which would serve a private electric generation plant to be constructed and operated in the county. The Oklahoma Supreme Court held that economic development alone is not a public use or public purpose that justifies the exercise of eminent domain under the state's constitutional law; moreover, economic development did not satisfy the public purpose requirement in a state statute. The Oklahoma Supreme Court explained that economic development alone—despite increased taxes, jobs, and public and private investment in the community from the private electric generation plant—was not a public purpose that would justify the county's exercise of eminent domain.



PHOTO: CASTLE COALITION

Members of the Clarksville Property Rights Coalition protest a proposal in June to redevelop an area of the Tennessee city encompassing more than 1,000 acres of private property. The group is trying to prevent the city from exercising eminent domain to achieve economic development.

### Stricter Requirements

In Arkansas, at the request of a state senator, the attorney general addressed the import of *Kelo* under Arkansas law—specifically whether a city could use eminent domain “to take private property for a private enterprise.” The attorney general responded that an exercise of eminent domain similar to that in the *Kelo* case—that is, for strictly economic development purposes, with no primary underlying public use—would not be permissible under Arkansas case law and the state constitution. The attorney general pointed out that Arkansas had adopted a narrower view of the public use test than other states and the federal courts.

Some state courts, however, when presented with similar issues before the *Kelo* decision, had reached a different conclusion. The *Kelo* opinion explained, “[M]any states already impose ‘public use’ requirements that are stricter than the federal baseline. Some of these requirements have been established as a matter of state constitutional law, while others are expressed in state eminent domain statutes that carefully limit the grounds upon which takings may be exercised.”

### Continuing Battle

These battles will continue. Those who are involved in acquiring properties via eminent domain should monitor the legislation and court decisions within their local jurisdictions.

## NEW TRB SPECIAL REPORT

# Great Lakes Shipping, Trade, and Aquatic Invasive Species

NANCY HUDDLESTON AND JILL WILSON

Huddleston is Senior Communications Officer, Division on Earth and Life Studies, National Research Council of the National Academies, Washington, D.C. Wilson is Senior Program Officer, TRB Division of Studies and Special Programs; she served as Study Director for this project.

Since its opening in 1959, the St. Lawrence Seaway has provided a route into the Great Lakes not only for trade, but also for aquatic invasive species (AIS), which have had severe economic and environmental impacts on the region. The governments of Canada and the United States have introduced prevention measures, but reports of newly discovered AIS continue, and the impacts that these species may have are yet unknown. Pressure to solve the problem has even led to proposals to close the seaway.

A committee of experts, convened by the National Research Council (NRC) of the National Academies through the Transportation Research Board and the Division on Earth and Life Studies (see box, page 25), recommends that trade should continue on the St. Lawrence Seaway but with a more effective suite of prevention measures that evolves in response to lessons learned and to new technologies. The study committee's findings and recommendations are detailed in TRB Special Report 291, *Great Lakes Shipping, Trade, and Aquatic Invasive Species*.

## Unintended Effects

The Great Lakes are the largest unfrozen reservoir of fresh water on earth, accounting for almost one-fifth of the world's fresh surface water. The lakes are vital to the economy of the region and to the quality of life of its residents, providing drinking water for more than 33 million people in Canada and the United States, supplying hydroelectric power, supporting industries, providing waterborne transportation, and offering a variety of recreational opportunities.

The completion of the St. Lawrence Seaway in 1959 promised important economic benefits for Canada and the United States through enhanced navigation and associated trade and by the generation of much-needed hydroelectric power. Years later, people became aware of an unintended effect—the introduction of AIS inadvertently taken aboard at previous ports of call. The rapid spread of the European zebra mussel (*Dreissena polymorpha*), discovered in Lake St. Clair in 1988 and soon throughout the Great Lakes, drew public attention to the problem. According to recent estimates, AIS in the Great Lakes number more

PHOTO: PHIL JENKINS



Oceangoing bulk carrier transits the St. Lawrence Seaway, which has provided a trade route to the Great Lakes region but also has led to environmental impacts from aquatic invasive species.

PHOTO: U.S. GEOLOGICAL SURVEY



Zebra mussels (*above*) have become emblematic of the problem of AIS in the Great Lakes. The cost of removing them from piping in power generation plants, public and private drinking water plants, and industrial facilities, as well as from lock and dam structures and marinas, has been estimated at more than US\$1 billion since 1989, with some estimates as high as US\$5 billion. In addition, zebra mussels have modified the aquatic food web and led to a suite of indirect effects. Other introductions include the spiny water flea, shown in an accumulation (*right*).

than 180 and include algae, fish, invertebrates, and plants.

At the request of the Great Lakes Protection Fund, the NRC study committee identified and explored options for the Great Lakes region that would meet two criteria:

1. Enhance the potential for global trade in the Great Lakes region, and
2. Eliminate further introductions of AIS into the Great Lakes by vessels transiting the St. Lawrence Seaway.

The report reviews research and efforts to reduce AIS introductions and identifies ways to strengthen these efforts for an effective solution.

### Ballast Water, Ships, and AIS

Ships' ballast water has accounted for 55 to 70 percent of reported AIS introductions into the Great Lakes since 1959. Other means of introducing AIS include deliberate releases, aquaculture, home aquaria, water gardens, and recreational boating.

Ships with little or no cargo aboard carry ballast water to provide stability for safe operations in a range of conditions. In contrast, ships fully laden with cargo contain only unpumpable residual water and sediment in their ballast tanks and are described as having no ballast on board (NOBOB). At one time NOBOBs were not considered to be a source of AIS introductions into the Great Lakes, but research in the past decade has shown that this assumption was not correct.

Predicting which species might be introduced is difficult. Invaders such as the zebra mussel—and more

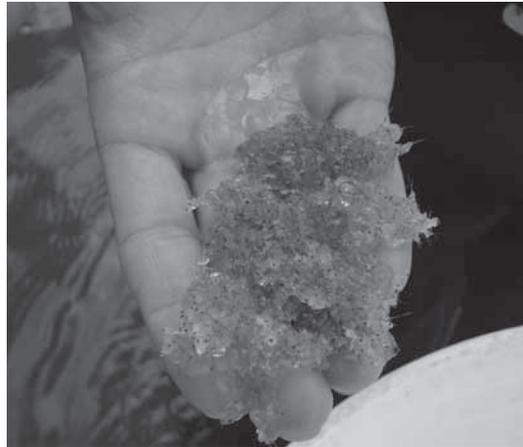


PHOTO: GREAT LAKES INSTITUTE FOR ENVIRONMENTAL RESEARCH

recently, the quagga mussel—are impossible to ignore because of their abundance, size, and readily observable impacts; however, not all AIS are evident. Analyses of beach sand, for example, have revealed introduced species that are inconspicuous and that have low impact. Plants and microorganisms also can be invasive, and the introduction of a species as damaging as the zebra mussel is always possible. Therefore continual monitoring and research are needed to identify species that have arrived or that could arrive.

### Prevention Measures

Efforts have been under way since 1989 to prevent further introductions of AIS into the Great Lakes by focusing on steps that ships can take to manage their ballast water (see box, next page). The Canadian and U.S. federal governments and the joint seaway authorities have issued rules and regulations specifying ballast water management requirements for ships entering the Great Lakes–St. Lawrence Seaway sys-



PHOTO: PHIL JENKINS

Ballast water from ships has been the source of more than half of the AIS reported in the Great Lakes since 1959.

The round goby was first reported in the Great Lakes in 1990. A bottom-dwelling fish, it is 4 to 10 inches long, eats voraciously, and reproduces rapidly.



PHOTO: ENVIRONMENTAL PROTECTION AGENCY



GREAT LAKES INSTITUTE FOR ENVIRONMENTAL RESEARCH

Bloody-red shrimp (*Hemimysis anomala*), 1.5 in. in length, is native to eastern European seas, but was discovered in the Muskegon Lake channel in late 2006, and soon after in Lake Ontario.

tem. The International Maritime Organization also has proposed a set of requirements for managing ballast water worldwide.

Vessels operating into the Great Lakes manage their ballast water by ballast water exchange and by saltwater flushing. Prototype shipboard ballast water treatment systems have been installed on several vessels trading into the Great Lakes but have yet to be proved in an operational environment. Systems that can meet the International Maritime Organization's proposed requirements for ballast water management, however, are expected to become commercially available by 2009.

Time is needed to assess the effectiveness of prevention measures. Newcomer species may take time to manifest themselves, and the time taken to identify new AIS may well depend on the level of effort devoted to surveillance.

### No "Silver Bullet"

One possible goal is to eliminate all further AIS introductions via ships' ballast water, recognizing that AIS may continue to be introduced by other means.

Achieving this goal would require closing the St. Lawrence Seaway to all vessel traffic, an action that clearly would not enhance the potential of the Great Lakes region for global trade. Moreover, closing the seaway appears impractical from a political perspective, potentially taking years to accomplish, if it could be accomplished at all.

The committee therefore focused on identifying compromises that would reduce—instead of eliminating entirely—further ship-vectored AIS introductions into the Great Lakes. Two different alternatives were identified:

- ◆ Close the seaway to traffic at the highest risk for introducing AIS—namely, transoceanic vessels engaged in trade with countries outside of Canada and the United States; or
- ◆ Require the use of ballast water management technologies—namely, ballast water exchange, saltwater flushing, and ballast water treatment—to kill or remove organisms in ships' ballast water.

Research has shown that the ballast water of transoceanic ships—those engaged in international trade—is a major means of transferring AIS from locations such as the Baltic, Black, and North Seas. Although closing the seaway to these vessels would reduce the risk of further AIS introductions substantially, the committee concluded that serious disadvantages outweigh the benefit. Most notably, the action could not be implemented in a timely way. Moreover, economic principles indicate that eliminating a transportation option would increase the cost of moving goods and therefore would not enhance trade. Other disadvantages could include adverse environmental impacts from alternative transportation modes and routes, as well as reprisals by the trading partners of the United States and Canada.

## Ballast Water Management Techniques

**Ballast water exchange** replaces a vessel's ballast water with ocean water. It removes organisms from a ship's ballast tanks by dilution and exposes freshwater organisms to salt water, killing many of them.

**Saltwater flushing**, an alternative to ballast water exchange for vessels with no ballast on board, allows a limited amount of saltwater to slosh around in an individual ballast tank with the ship's rolling and pitching during passage. The agitation resuspends trapped sediments and provides a salinity shock to the biota—that is, the flora and fauna—which then are discharged into the open ocean.

**Shipboard treatment** to kill organisms in ballast water offers greater operational flexibility than either ballast water exchange or saltwater flushing and may offer greater effectiveness. A variety of proven water treatment technologies is available, but shipboard application presents technical challenges; progress has been made in recent years to meet the ballast water treatment standard proposed by the International Maritime Organization.

### Suite of Prevention Measures

As an alternative to closure, the committee recommends restricting access to the Great Lakes through the St. Lawrence Seaway to vessels that have taken protective measures aimed at ensuring they do not harbor living aquatic organisms. The use of ballast water management technologies should be mandatory for all categories of vessels known to pose a risk, not just for transoceanic vessels. Recent research has shown that vessels involved in North American coastal trade also can introduce AIS; these vessels therefore should be required to manage ballast water as well. Effective vessel monitoring and enforcement are needed to support these requirements, including an AIS surveillance and containment program for the Great Lakes.



Typical transit of a transoceanic vessel on the Great Lakes: the inbound leg includes stops in Hamilton, Ontario; Cleveland, Ohio; and Burns Harbor, Indiana, where cargo is discharged and Great Lakes' ballast water is loaded, mixing with residual water in the ballast tanks. The inbound leg terminates in Lake Superior, where mixed ballast water is discharged—along with surviving species—when outbound cargo is loaded in the Twin Ports of Duluth, Minnesota, and Superior, Wisconsin.

The committee identifies nine actions to reduce further ship-vectored AIS introductions. To avoid unacceptable delays, U.S. and Canadian organizations should undertake the recommended actions under expanded mandates, if necessary. In the committee's view, many of these actions could be implemented within the next 2 to 3 years if Canada and the United States exercise the necessary political will.

To establish a solid foundation for the control program, the following four actions should be undertaken as quickly as possible:

1. **Prevention measures for all ships that pose a risk.** Transport Canada and the U.S. Coast Guard should ensure that all vessels entering the Great Lakes after operating in coastal areas of eastern North America take protective measures similar to those required for transoceanic vessels—notably, ballast water exchange for ballasted vessels, and saltwater flushing for vessels declaring no ballast on board.

2. **Create uniform standards.** The United States should follow Canada's lead and immediately adopt and implement for the Great Lakes the ballast water exchange and performance standards specified in the International Maritime Organization's International Convention for the Control and Management of Ships' Ballast Water and Sediments.

3. **Improve monitoring for AIS.** Establish a binational science-based surveillance program to monitor the Great Lakes for new AIS. The program should involve dedicated lake teams, as well as academic researchers, resource managers, and citizen groups, and should leverage current monitoring activities wherever possible.

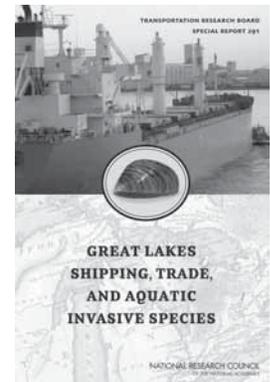
4. **Create feedback mechanisms for improving the program.** Establish an adaptive process to ensure

that policies designed to prevent further AIS introductions into the Great Lakes are updated periodically in a timely way to reflect practical experience and research findings. The organization responsible for this process should have a binational mandate, adequate resources to conduct the work, and the ability to draw on the advice of scientific and policy experts in Canada, the United States, and elsewhere as needed. The organization also should be perceived as independent and remain free from conflicts of interest.

### Meeting the Criteria

Uncertainty about future ballast water management regulations for the Great Lakes may hinder investment in the transportation system. Timely implementation of the committee's recommendations on ballast water management and associated standards, therefore, could reduce barriers to the development of trade-enhancing transportation infrastructure and services through the removal of regulatory uncertainties.

In the committee's judgment, the recommended suite of actions comes closer than any other options to meeting the two project criteria of enhancing the potential for global trade in the Great Lakes region and eliminating further introductions of AIS into the Great Lakes by vessels transiting the St. Lawrence Seaway.



TRB Special Report 291, *Great Lakes Shipping, Trade, and Aquatic Invasive Species*, is available from the TRB online bookstore, [www.trb.org/bookstore/](http://www.trb.org/bookstore/); to view the book online, go to <http://onlinepubs.trb.org/onlinepubs/sr/sr291.pdf>. The background papers commissioned by the study committee are available online at [http://trb.org/news/blurb\\_detail.asp?id=9281](http://trb.org/news/blurb_detail.asp?id=9281).

## Committee on the St. Lawrence Seaway: Options to Eliminate Introduction of Nonindigenous Species into the Great Lakes, Phase 2

**Jerry R. Schubel**, Aquarium of the Pacific, Long Beach, California, *Chair*

**Richard M. Anderson**, Duke University, Durham, North Carolina

**Stephen W. Fuller**, Texas A&M University, College Station

**Trevor D. Heaver**, University of British Columbia, Vancouver, Canada (emeritus)

**Geoffrey J. D. Hewings**, University of Illinois, Urbana-Champaign

**Philip T. Jenkins**, Philip T. Jenkins and Associates, Ltd., Fonthill, Ontario, Canada

**Hugh J. MacIsaac**, University of Windsor, Ontario, Canada

**Steven W. Popper**, Rand Corporation, Santa Monica, California

**Frank H. Quinn**, Consultant, Tecumseh, Michigan

**Thomas D. Waite**, Florida Institute of Technology, Melbourne

**M. Gordon Wolman**, Johns Hopkins University, Baltimore, Maryland

**Joy B. Zedler**, University of Wisconsin, Madison

**Ann P. Zimmerman**, University of Toronto, Ontario, Canada

### National Research Council Staff

**Jill Wilson**, Transportation Research Board, *Study Director*

**Stephen R. Godwin**, Transportation Research Board

**Lauren Alexander**, Water Science and Technology Board



# Uninterruptible Power Supplies Keep Traffic Signals On

## Illinois Works to Avoid Delays and Dangers from Outages

YOGESH P. GAUTAM

The author is Traffic Systems Engineer, Bureau of Operations, Illinois Department of Transportation, Springfield.

Power interruptions—brownouts and blackouts—can cause traffic signals to flash or to go dark. Traffic signals with light-emitting diode (LED) lamps consume less power and can operate on uninterruptible power supplies (UPSs)—or battery backups. UPSs function as a separate source to maintain a continuous supply of electric power to connected equipment whenever utility power is not available.

### Problem

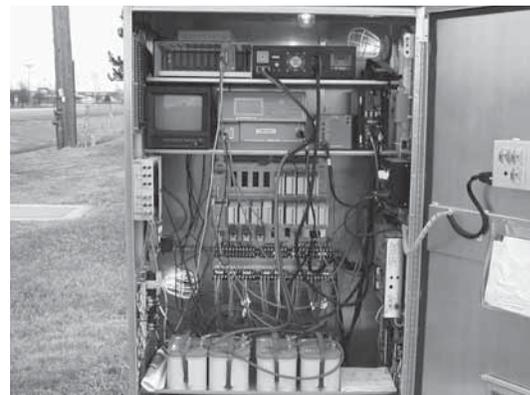
A traffic signal that is dark or flashing contributes to traffic congestion and jeopardizes safety for vehicles and pedestrians. Emergency vehicles are unable to preempt the operation of the nonfunctional traffic signal, experiencing unwanted delays. In addition, power interruptions render useless the signals that are interconnected with railroad crossings, which keep the tracks clear of vehicles before the arrival of a train. A power interruption lasting only a fraction of a second may send the signals into the flash mode, and the signals may continue flashing until manually reset.

Although other transportation agencies were realizing benefits from UPSs, the Illinois Department of Transportation (DOT) allowed only marginal use, noting that the performance had yet to be proved and that standard specifications were lacking. A survey conducted in 2000 found that only seven states had installed UPSs at traffic signals (1). Use is likely more widespread today.

### Solution

The research objective was to evaluate UPSs in terms of compliance with Illinois DOT specifications. Tests were conducted at the Traffic Operation Laboratory (TOL) at the University of Illinois, Urbana–Champaign. Compliance was determined in the contexts of the vendor literature, visual inspection, direct questions to the vendors, and tests at the lab. District personnel from Illinois DOT were involved in the evaluations and were informed about the findings.

The primary focus of the tests was to determine how long a UPS would operate under full load of



Installation of UPS and batteries in a cabinet's available space.

approximately 700 watts, the power consumption of a traffic signal with LED signal heads, and at varying temperatures: room temperature of 24°C (75°F), a high temperature of 72°C (162°F), and a low temperature of –25°C (–13°F).

The tests also examined the switchover from line power to UPS and vice versa at specified voltages and for specified periods of time. The researchers recorded the battery recharge times and verified the opening and closing of contact switches under various conditions—such as signals on UPS, signals operating on UPS for 2 hours, and signals with 40 percent of the batteries drained.

Four vendors submitted their latest UPS models for the lab tests. All of the UPSs met the minimum requirement for maintaining 700-watt loads at room temperature for 2 hours. As expected, the UPSs operated longer at the high temperatures and significantly shorter at the subfreezing temperatures. The photographs on this and the facing page show the UPS units under testing, along with typical UPS cabinet installations.

Some of the recommendations that derived from the lab testing included the following:

1. Consider operating the traffic signals in the flashing or in the normal-and-flashing modes during



UPS units from two manufacturers undergo testing.



Monitoring and testing of UPS units at subfreezing temperatures in a freezer.

cold weather to extend battery life. The red-yellow-green signal operation is safer than the flashing mode, which is safer than dark signals. Operation in the flashing mode consumes only about half the power of the normal mode. At subfreezing temperatures, when the battery capacity is significantly reduced, entering the flashing mode early can prolong the battery life and delay dark signals.

2. Use heater pads to keep batteries warm at sub-zero temperatures.

3. Inform traffic operations personnel if a signal is on UPS. Unless the UPS contact switch is monitored, operations personnel would not know that the signals are operating on UPS or how much battery capacity remains. The signal controller can monitor the UPS contact switches, notify the operations personnel, and generate alarms automatically to the central computer if the signal status changes.

The evaluation reports for each of the UPS units are available online.<sup>1</sup>

## Application

The compliance testing of the UPSs and the publication of the findings addressed most of the initial concerns of potential users, and UPS deployment has been on the rise in the state. Illinois DOT districts and the local municipalities increasingly specify UPSs, especially at high-priority traffic signals. Recent Illinois DOT policy requires the installation of UPSs when signals interconnected with railroads are first installed or are upgraded.

In 2006, 9 UPSs were installed at traffic signals on state highways, but the number increased to 43 in 2007. Additionally, approximately 365 UPSs have been installed with funding from the Department of Homeland Security at signals in the downtown Chicago Loop.

## Benefits

UPSs prevent traffic signals from going dark or into the flashing mode after power interruptions. Maintaining the signals' red, yellow, and green operation reduces the problems with congestion, safety, emergency vehicles, and railroad crossings, described above. Although the benefits of reducing congestion and crashes with UPSs at traffic signals are obvious, research is needed to quantify the effects. Power interruptions vary widely with weather—such as lightning or high winds—as well as with the capacity margins of the local electrical system and the reliability of the electrical equipment.

The congestion and safety impacts of power inter-

ruptions also vary widely, depending on traffic volumes and roadway geometrics, with busier and larger intersections gaining greater benefits from more reliable traffic signal operation. Drivers must treat a dark traffic signal as an all-way stop, which has significantly less capacity than a traffic signal.

Crash statistics are unreliable, because most crashes occur at low speeds, and the police usually do not record crashes that result in property damage only. The reports for more severe crashes often do not indicate that the traffic signal was dark or that the crash occurred in a queue caused by a dark signal. Installing UPSs at intersections commonly traveled by emergency service vehicles and at those with sizable volumes of pedestrians—particularly pedestrians with disabilities—yield additional benefits.

Although these benefits are difficult to quantify, the life-cycle cost of a UPS is straightforward. Adding a UPS to a traffic signal costs less than \$5,000, as long as the cabinets in use have sufficient room. The maintenance costs are minimal. The total quantifiable benefits from this research project would be the net benefit from a UPS times the total number of related UPS installations.

## Acknowledgments

The Illinois Center for Transportation, a joint partnership of the Illinois Department of Transportation and the University of Illinois, Urbana-Champaign, supported and funded the research to test and evaluate UPSs for traffic signals.

*For further information, contact Yogesh (Yogi) Gautam, Bureau of Operations, Illinois Department of Transportation, 2300 South Dirksen Parkway, Room 009, Springfield, IL 62764; telephone 217-782-3452; fax 217-782-7990; e-mail yogesh.gautam@illinois.gov.*

## Reference

1. Chapman, J. R., and R. F. Benekohal. Light-Emitting Diode (LED) Traffic Signal and Uninterruptible Power Supply (UPS) Usage: A Nationwide Survey. Civil Engineering Studies, Transportation Engineering Series No. 115, Traffic Operations Lab Series No. 2, Traffic Operations Laboratory, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, December 2001. <http://sftp.cee.uiuc.edu/research/tol/reports/tolseries2.pdf>.

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

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



Installation of UPS in a separate, attached cabinet; the UPS unit is on the top shelf, and the batteries are on the middle and bottom shelves.



UPS unit and batteries in a piggyback cabinet; the design is suitable for retrofitting a signal cabinet for UPS equipment.

<sup>1</sup> See Traffic Operations Lab Series Nos. 7–9 and 16–17 at <http://sftp.cee.uiuc.edu/research/tol/reports.html>.

## Vicky S. Johnson

*Kansas Department of Transportation*

**C**hief counsel for the Kansas Department of Transportation (DOT), Vicky Johnson applies her three decades of legal experience to lead a staff of seven attorneys and to oversee all aspects of the Kansas DOT legal department. During her 25 years with Kansas DOT, she has been responsible for handling administrative, contract, condemnation, and trial work and for supervising the department's litigation section and the attorney who heads Kansas DOT's Risk Management Program.

"When I started at Kansas DOT, the agency was acclimating to a new liability landscape, with a tort claims act that subjected government agencies to tort liability," Johnson recalls. "A theme of preventability quickly emerged during my experiences as a trial lawyer, and I have since placed emphasis on what I call 'preventive lawyering.'"



**"As in-house counsel to [a state transportation] agency, I want legal staff at the table when a new policy is being considered. We can help policy makers identify legal risks...."**

Johnson considers her contributions to the creation of Kansas DOT's risk management program a key accomplishment. The program was created in response to an increase in the number of liability cases involving accidents that had occurred several years before. To defend such cases effectively, department attorneys and a special investigator now review a Highway Patrol Crash Log each day, to identify accidents that could lead to litigation.

"In many cases, it was apparent to the department that if an accident scene had been documented nearer in time to the occurrence of the accident, the claims could have been more effectively defended," Johnson explains. "Review of the highway patrol crash log and proper documentation of the accident scene can mean the difference between a tort claims cap case and a summary judgment."

A second focus of Johnson's work is the review of Kansas DOT legislation, agency manuals, and policies, as well as contributing to policy review at the national level. Conversations she had about tort liability with former Kansas Secretary of Transportation and Federal Highway Administration Executive Director E. Dean Carlson led to the proposal of 23 U.S.C.

409, which provides an evidentiary privilege for accident records, to prevent use of the records in litigation against states.

Other measures that Johnson has championed at Kansas DOT include oversight of the communications between agency staff and outside lawyers, training agency staff on the legal implications of day-to-day activities, and the legal review of proposed changes to agency policy. She also works to inform staff about proper methods of project documentation and makes regular presentations at Kansas DOT meetings and training events.

"Engineers are good at recognizing the engineering implications of their policy decisions, but they are not as good at taking the legal defense needs of the agency into account," Johnson comments. "As in-house counsel to the agency, I want legal staff at the table when a new policy is being considered. We can help policy makers identify legal risks, as well as ways in which to mitigate those risks."

A personal highlight for Johnson was her participation in developing Kansas DOT guidelines for the flexible design concept, which will allow the department to do more with less. Johnson works to inform engineers about legal issues that could arise from the application of flexible design and encourages discussion on proper documentation of flexible design-related decisions to preserve information necessary for a reasonableness defense if litigation should

arise. During Johnson's tenure at Kansas DOT, the department has experienced a decrease in litigation and judgments in terms of both the number of cases and the dollars spent.

An active participant in TRB activities, Johnson has served as a member of the Tort Liability and Risk Management Committee and on the NCHRP Project Panels on Variable Speed Limit Implementation and on Feasibility Assessment of a National Reporting System for Highway Tort Claims Made Against Governmental Entities.

Johnson values her association with the Tort Liability Committee for "the opportunities to share ideas, to make contacts with engineering committees working on policy, and to be associated with research projects guided by people who have the hands-on experience to benefit the industry and transportation users."

Johnson holds a bachelor's degree from Emporia State University, as well as a juris doctor and a master's degree in public administration from the University of Kansas. She received admittance to practice law from the Kansas Supreme Court and from the U.S. District Court, 10th Circuit, in 1979, and from the U.S. Court of Appeals, 10th Circuit, in 1995.

## Jamshid M. Armaghani

### *Florida Concrete and Products Association*

Jamshid Armaghani works under the principle that the quality and sustainability of concrete pavements are best assured by holding to the fundamentals of concrete materials, sound design, and quality construction. A career pavement and materials research engineer, Armaghani serves as the director of concrete paving for the Florida Concrete and Products Association (FCPA). He has also worked as a pavement consultant, as a pavement and materials research engineer, and as state pavement evaluation engineer for the Florida Department of Transportation (DOT).

“During my 15 years at Florida DOT, I contributed to a variety of research projects and directed the implementation of many proven technologies,” Armaghani recalls. “I conducted one of the largest departmental research projects on the strength and durability of concrete using Florida aggregates, which



**“We should always look for more innovative and cost-effective ways to design and construct pavements.”**

resulted in major changes to Florida DOT materials specifications to ensure the durability of bridges in coastal environments. I also participated in implementing such technologies as whitetopping—a thin layer of portland cement concrete to rehabilitate and improve the durability of highway and airport asphalt surfaces.”

From 1994 to 2000, as Florida DOT state pavement evaluation engineer, Armaghani managed and directed research projects in concrete pavements with a budget of more than \$2 million; the projects were both sponsored and in-house. He was responsible for the annual condition evaluation and survey of the 40,000 lane miles of the Florida highway system, and he worked to establish the Florida Accelerated Pavement Testing Facility—one of only three testing facilities for pavement performance and materials in the United States.

In his position as director of concrete paving at FCPA, Armaghani is an advocate for concrete pavement quality improvement and maintains that “we should always look for more innovative and cost-effective ways to design and construct pavements.” In 2000, he promoted the concept of concrete pavement warranties for highways and airports to improve pavement quality and reduce maintenance. In succeeding years,

pavement warranties have become common in many state highway and airport projects in Florida. Armaghani participates in many concrete pavement research projects at the national level; provides technical services to design consultants and the construction industry; and promotes training, education, and research on—and implementation of—new and innovative technologies in all aspects of concrete pavements.

Armaghani has been active in TRB and has attended TRB Annual Meetings since 1986. He chairs the Concrete Materials Section and is a past chair of the Committee on Basic Research and Emerging Technologies Related to Concrete. He is a member of the Design and Construction Group, the Properties of Concrete Committee, and the Portland Cement Concrete Pavement Construction Committee. A past member of the Durability of Concrete, the Rigid Pavement Design, and the Pavement

Rehabilitation committees, he also has served on the National Cooperative Highway Research Program Project Panel on Methods for Determining Material Properties of Pavement. In 2005, he was a moderator and organizer for the TRB Workshop on Pavement Warranties.

“TRB is an excellent forum for molding ideas from researchers and practitioners,” Armaghani explains. “As chair of the concrete section, I have tried to establish a balance between basic

research and applied technology among the section committees. With the support of TRB leadership and staff, I helped establish a Nanotechnology-Based Concrete Materials Task Force to promote fundamental research and to organize TRB sessions and conferences to present the latest research findings and products.”

In addition to TRB, Armaghani participates in many other professional organizations. He is cochair of the Florida DOT Industry Rigid Pavement Committee; an external advisory board member for the Civil and Coastal Engineering Department, University of Florida; a member of the board of directors of the International Society for Concrete Pavements; and a member of the American Society of Civil Engineers’ Airfield Pavement Committee.

Armaghani was recognized for his contributions to Florida DOT in 1991 and in 1999 with the I Made a Difference Award. A registered professional engineer in Florida, he earned a bachelor’s degree in civil engineering from the University of Baghdad, Iraq, in 1971; a master’s degree in civil and structural engineering from the University of Sheffield, United Kingdom, in 1978; and a doctorate in civil engineering from the University of Florida in 1987.

# NEWS BRIEFS



PHOTO: ASSOCIATED PRESS

Transit systems throughout the United States are experiencing ridership increases in 2008; Amtrak expects to serve a record 28 million passengers this year.

## Drivers Seek Alternative Modes of Transportation

According to an American Public Transportation Association (APTA) study, transit systems in the United States are experiencing increased ridership as a result of higher gas prices. U.S. commuters living in cities that place in the top 20 for transit ridership can save more than \$8,000 per year by choosing public transportation instead of driving, and savings can range from \$8,703 for commuters in Honolulu, Hawaii, to \$7,084, for Washington, D.C., commuters.

Figures for the APTA study were computed using the American Automobile Association's driving cost formula—which factors in charges for gas, maintenance, tires, insurance, registration, depreciation, and financing—and the cost of a monthly transit pass in each of the 20 metropolitan areas in the study.

In addition, Amtrak reported a 13.9 percent systemwide increase in ridership in July 2008, compared with statistics for the same month in 2007. Increases of 25 percent were recorded for 10 short-distance routes in July, and Amtrak is projected to serve a record 28 million passengers in 2008—an increase of approximately 8.5 percent from 2007.

## U.S. Traffic Fatalities at 13-Year Low

U.S. vehicular traffic fatalities decreased by 3.9 percent from 2006 figures, and the fatality rate per 100 vehicle miles traveled decreased to 1.37—the lowest number on record—according to the U.S. Department of Transportation's annual traffic safety assessment.

Injuries resulting from traffic crashes totaled 2.49 million—a record low—and alcohol-related fatalities dropped by 3.7 percent. U.S. Secretary of Transportation Mary Peters cited safer automobiles, strict enforcement of safety-related laws, and the efforts of the National Highway Traffic Safety Administration as contributing to the injury reduction.

Puerto Rico and 35 states recorded reductions in traffic deaths since 2006. The greatest decline in the number of persons killed occurred in California, with a fatality reduction of 266 persons. The greatest percentage declines occurred in South Dakota and Vermont, both at 24 percent. The largest increase in persons killed was recorded in North Carolina, with an increase of 121 deaths, and the largest percentage increase in fatalities occurred in the District of Columbia, with 19 percent.

To view the 2007 NHTSA traffic safety annual assessment, visit [tinyurl.com/07deaths](http://tinyurl.com/07deaths).

## Seat Belt Use at Record Level

The National Highway Traffic Safety Administration's (NHTSA) 2008 National Occupant Protection Use Survey found that 84 percent of passenger car occupants on U.S. roadways use seat belts, an increase from 82 percent in 2007. For every 1 percent increase in seat belt use, NHTSA estimates that approximately 270 lives are saved.

Findings also indicate that approximately 86 percent of passengers in vans and sport utility vehicles buckle up, compared with 74 percent of truck occupants. Safety belt use increased or remained level in every region of the United States, with the highest usage in the West (93 percent) and the lowest in the Midwest and Northeast (79 percent).

Contributing to the increase in belt use are high-visibility law enforcement efforts such as the Click It or Ticket program, a nationwide enforcement effort with a \$7.5 million advertising campaign, and primary seat belt laws. Data indicated that states with primary belt laws—allowing officers to issue a stand-alone citation for seat belt violations—average approximately 13 percentage points higher in seat belt use than states with secondary laws.

Download the report at <http://www.nrd.nhtsa.dot.gov/Pubs/811036.PDF>.



PHOTO: DELAWARE OFFICE OF HIGHWAY SAFETY

A Delaware state trooper observes motorists at a Click It or Ticket seat belt enforcement and safety awareness program checkpoint.

# TRB HIGHLIGHTS

## TRB Leaders Honored as National Associates

TRB Executive Committee members Adib K. Kanafani, University of California, Berkeley; Neil J. Pedersen, Maryland State Highway Administration; Henry Gerard (Gerry) Schwartz, Jr., consultant; and Linda S. Watson, LYNX—Central Florida Regional Transportation Authority, have been named National Associates by the National Research Council (NRC) of the National Academies. Also receiving the honor were longtime TRB leaders Robert C. Johns, University of Minnesota, Chair of the TRB Technical Activities Council; Geraldine Knatz, Port of Los Angeles, past Chair of the Marine Board; and John R. Njord, Utah Department of Transportation, past Chair of the TRB Executive Committee.

Other TRB leaders and contributors honored by NRC included Jonathan L. Gifford, George Mason University; Ralph C. Haas, University of Waterloo; John M. Kulicki, Modjeski and Masters Consulting Engineers; Kam K. Movassaghi, C. H. Fenstermaker and Associates; H. Douglas Robertson, University of North Carolina; and Robert L. Walters, Arkansas State Highway and Transportation Department (retired).

The National Associates program formally recognizes extraordinary contributions through pro-bono service to the NRC and the Institute of Medicine programs. Individuals are designated National Associates by the NRC chair under guidelines established by the NRC Governing Board. Membership in the National Associates Program is for life, and new designations are made annually.



**TRANSIT IDEAS**—Among the participants at the Transit IDEA (Innovations Deserving Exploratory Analysis) panel meeting on August 5, 2008, in Washington, D.C., (from left) Harvey Berlin, TRB Senior Program Officer, and panel members Paul Messina, Bombardier Transportation; Frank Lonyai, Los Angeles County Metropolitan Transportation Authority; Anthony Kouneski, AMK and Associates; and Paul Jamieson, Wabtec Passenger Transit consider a Transit IDEA project that developed and tested a system to warn track workers on rail rapid transit systems of an approaching train. The Transit IDEA Program promotes innovative approaches to improving the safety, security, efficiency, and ridership of transit systems by supporting applied research and prototype testing. For more information about the program, visit the IDEA website, [www.trb.org/idea](http://www.trb.org/idea).

## COOPERATIVE RESEARCH PROGRAMS NEWS



PHOTO: HILARY FISHER

**PROGRAM PEER EXCHANGE**—The National Cooperative Highway Research Program (NCHRP) Peer Exchange 2008 was held in the National Academies Keck Center, Washington, D.C., and provided participants with a forum for open exchange of ideas on aspects of the NCHRP program. Participants included (left to right) Ken Kobetsky, American Association of State Highway and Transportation Officials (AASHTO); Anthony Kane, AASHTO; Thomas Brahms, Institute of Transportation Engineers; Wes Lum, California Department of Transportation (DOT); Chris Jenks, TRB; and Monique Evans, Ohio DOT. The 2008 peer exchange was organized by Crawford Jenks, Chris Hedges, and Nanda Srinivasan of the TRB staff.

## Safety Manual Adds Training Materials

The National Cooperative Highway Research Program (NCHRP) is developing information to include in the first edition of the *Highway Safety Manual*, to be published by the American Association of State Highway and Transportation Officials. The manual will provide information and tools to aid transportation professionals in making decisions for roadway planning, design, operations, and maintenance. Included will be effective techniques for safety management of a roadway system; state-of-the-art approaches to evaluation of safety effectiveness; and a summary of knowledge on the safety effects of roadway design and operations in a format that users can readily apply.

Guidance is needed to assure that HSM information and tools are effectively implemented, and briefing and training materials—as well as a training plan to be coordinated with the first edition of the HSM—are needed for engineers and planners. Oregon State University, Corvallis, Oregon, has been awarded a \$400,000, 18-month contract (NCHRP Project 17-38, FY 2007) to develop HSM briefing materials and for a training course for departments of transportation.

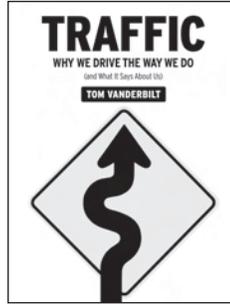
For more information, contact Chuck Niessner, TRB, 202-334-1431, [chedges@nas.edu](mailto:chedges@nas.edu).

**Traffic: Why We Drive the Way We Do (And What It Says About Us)**

Tom Vanderbilt. Alfred A. Knopf, 2008; 402 pp.; \$24.95; 978-0-307-26478-7.

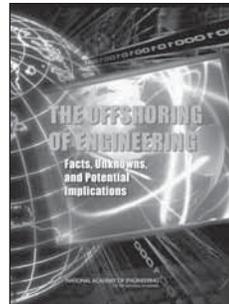
Author Vanderbilt explores driver psychology and the everyday challenges and dangers of operating a motor vehicle. Based on research and interviews with driving experts and traffic officials from around the world, the text examines such topics as the safety benefits of roundabouts; why pedestrian safety plans can lead to more accidents; conditions that create traffic jams; late merging on freeways; unintended consequences of road safety measures; congestion pricing; congestion parking; and more.

Also explored is the role of the automobile in American life; the psychology of traffic jams; the automobile as an expression of freedom and how this concept affects the personal interactions of American citizens; societal benefits of road rage; the effects of anonymity on driver behavior; and the subtle differences of road etiquette and traffic signage in different parts of the world.

**The Offshoring of Engineering: Facts, Unknowns, and Potential Implications**

The National Academies Press, 2008; 240 pp.; \$54.00; 978-0-309-11483-7.

The offshoring of U.S. engineering projects to affiliated and unaffiliated entities abroad has raised concerns about the impacts of globalization and the future of the U.S. engineering enterprise. Focusing on six industries—software, semiconductors, personal computer manufacturing, construction engineering and services, automobiles, and pharmaceuticals—the text examines trends and impacts on U.S. engineering from a broad perspective, and should be of interest to academics, policy makers, and others concerned about strengthening and sustaining U.S. engineering capabilities.

**Transport Revolutions: Moving People and Freight Without Oil**

Richard Gilbert and Anthony Perl. Earthscan Publications, Ltd., 2007; 368 pp.; \$90; 978-1-844-072-484.

Authors Gilbert and Perl lay out the challenges of

industrialized societies' growing dependence on transportation fueled by low-priced oil and argue that land transport in the first half of the 21st century will experience the replacement of internal combustion engines with electric drives and the powering of electric drives from the electric grid instead of on-board fuel.

The text also explores current transportation modes, focusing on energy use and its adverse impacts, as well as the nature and dynamics of past transportation revolutions. Organizational and technical innovations for ensuring effective, environmentally responsible, economical, and secure movement of people and goods are proposed.

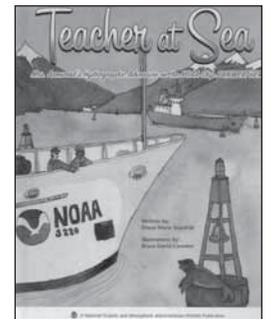
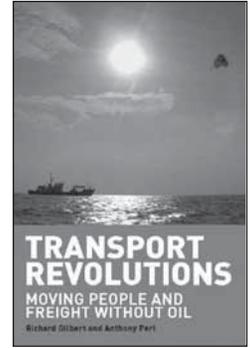
Professor and Director of the Urban Studies Program at Simon Fraser University, Vancouver, British Columbia, coauthor Perl is chair of the TRB Intercity Passenger Rail Committee.

**Teacher at Sea: Mrs. Armwood's Hydrographic Adventure on the NOAA Ship Fairweather**

Diane M. Stanitski. National Oceanic and Atmospheric Administration, 2007; 42 pp.; online.

In this third book of the National Oceanic and Atmospheric Administration's (NOAA) Teacher at Sea series, author Stanitski, a former university professor and NOAA Teacher at Sea, chronicles the experiences of geospatial and environmental science teacher Linda Armwood aboard the NOAA oceanographic research ship *Fairweather*. Armwood, from George Wythe High School, Richmond, Virginia, was a participant in the NOAA Teacher at Sea program, which offers kindergarten through college-level educators in the United States the opportunity to witness scientific research first hand.

Suitable for children studying science at the middle school level, the text emphasizes the significance of coastal surveying to the U.S. economy and maritime safety and presents readers with science and math activities, a glossary of coastal terms, conversion tables, photos, descriptions of the NOAA research and survey fleet, and more than 20 full-color illustrations ([http://teacheratsea.noaa.gov/books/pdf/tas\\_book3.pdf](http://teacheratsea.noaa.gov/books/pdf/tas_book3.pdf)).



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

## TRB PUBLICATIONS

### **Human Performance, User Information, Simulation, and Visualization**

#### **Transportation Research Record 2018**

This volume includes a Charley V. Wootan Award-winning paper on a wide-area, four-dimensional, real-time, interactive transportation visualization tool for incident management and emergency management personnel. Also included is research on car-following behavior on Swedish motorways; the influence of roadside infrastructure on driving behavior, including driver speed choice and vehicle positioning; driver deceleration rates at yellow-phase transitions on high-speed signalized intersection approaches; and more.

2007; 108 pp.; TRB affiliates, \$39; nonaffiliates, \$52. Subscriber category: safety and human performance (IVB).

### **Statistical Methods, Safety Data, Analysis, and Evaluation 2007**

#### **Transportation Research Record 2019**

Authors present an analysis of road risk and of road safety for road users in Belgium by age and by gender; explore a comparison between regression-to-mean effects and the effectiveness of low-cost safety improvements in high-crash intersections in Detroit and Grand Rapids, Michigan; evaluate the safety impacts of improved traffic signal visibility at urban, signalized intersections; define nine operational criteria of causality for observational road safety evaluation studies; and develop a method for assessing route safety in a road network.

2007; 264 pp.; TRB affiliates, \$52.50; nonaffiliates, \$70. Subscriber category: safety and human performance (IVB).

### **Concrete Materials 2007**

#### **Transportation Research Record 2020**

A K. B. Woods Award-winning paper on image processing technology for the evaluation of the static segregation resistance of hardened, self-consolidating concrete is a highlight of this volume. Also featured are papers on fracture mechanics and saw cutting requirements of concrete pavements; factors that influence thermal and autogenous shrinkage of very early strength latex-modified concrete; deicing solutions for airfield mortar and concrete pavements, as well as the alkali-silica reactions; and the freeze-thaw resistance of concrete with marginal air content.

2007; 88 pp.; TRB affiliates, \$36.75; nonaffiliates, \$49. Subscriber category: materials and construction (IIIB).

### **Advances in Travel Behavior Analysis 2007**

#### **Transportation Research Record 2021**

Studies address the interhousehold interactions of a husband, wife, and child, using a joint time-allocation model with 2003 data from a household survey in Toyama, Japan; weekend time use patterns of individuals 15 years old and older; the effects of uncertain spatiotemporal settings on the determination of interaction spaces or meeting places; activity rescheduling responses to an unexpected 1-hour delay in arrival at a designated activity site; and more.

2007; 125 pp.; TRB affiliates, \$39; nonaffiliates, \$52. Subscriber category: planning and administration (IA).

### **Transportation Security; Emergency Response and Recovery**

#### **Transportation Research Record 2022**

This volume gathers papers on a variety of security and response topics, including optimal allocation of multiple emergency service vehicles for the protection of critical transportation infrastructure; an information-sharing framework to aid road organizations in emergency response and recovery; tradeoffs for protective measures that limit vehicle access to structures in a transportation system; a framework for finding an optimal postdisaster reconstruction strategy using a spatiotemporal analysis model; and emergency logistics problems in the U.S. Gulf Coast during Hurricane Katrina.

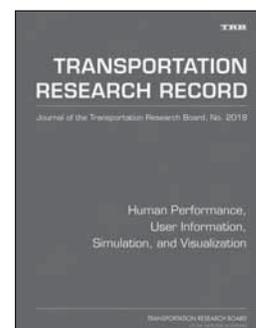
2007; 102 pp.; TRB affiliates, \$36.75; nonaffiliates, \$49. Subscriber category: security (X).

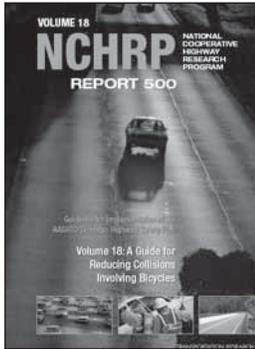
### **Geometric Design and the Effects on Traffic Operations 2007**

#### **Transportation Research Record 2023**

Potential changes to the 2004 American Association of State Highway and Transportation Officials Green Book adjustment factors for highway entrance and exit terminals; a performance comparison between the crossover displaced left turn and the upstream signalized crossover intersection types; safety performance function and accident modification factors for rural frontage road segments; the relationship between lane width and safety on urban and suburban arterial roads; and freeway on-ramp control signal placement are some of the topics covered in this volume.

2007; 139 pp.; TRB affiliates, \$41.25; nonaffiliates, \$55. Subscriber categories: highway operations, capacity, and traffic control (IVA); highway and facility design (IIA).





## TRB PUBLICATIONS (continued)

### **Information Technology, Geographic Information Systems, and Artificial Intelligence**

Transportation Research Record 2024

Authors examine the development and field testing of a link-monitoring system evaluation procedure for traffic data collection; transportation asset management and visualization using semantic models and Google Earth; a Global Positioning System–based method for collecting historical travel time data; an interactive computer tool based on geographic information systems for the evaluation and analysis of full marginal costs of highway transportation in New Jersey; a fuzzy optimization approach for setting traffic signal timing; and more.

2007; 125 pp.; TRB affiliates, \$39; nonaffiliates, \$52. *Subscriber category: planning and administration (IA).*

### **Highway Facility Design 2007**

Transportation Research Record 2025

Part 1: Road Safety Design contains papers on guardrail systems for long-span culvert applications and a performance evaluation of low-tension, three-strand cable median barriers. Part 2: Landscape and Environmental Design and Context-Sensitive Design and Solutions includes research on road design and the road environment in small rural communities and on models for the evaluation of freeway green landscape. Part 3: Hydrology, Hydraulics, and Water Quality presents information on particle separation and hydrologic control in cementitious permeable pavement and on the benefits of porous asphalt overlay on storm water runoff quality.

2007; 140 pp.; TRB affiliates, \$41.25; nonaffiliates, \$55. *Subscriber category: highway and facility design (IIA).*

### **Guidance for Implementation of the AASHTO Strategic Highway Safety Plan: A Guide for Reducing Collisions Involving Bicycles**

NCHRP Report 500, Volume 18

This report identifies strategies for reducing collisions involving bicycles at intersections, roadways, and midblock crossings, and for reducing motor vehicle speeds, improving safety awareness and behavior, increasing the use of bicycle safety equipment, reducing the effect of hazards, and more.

2008; 166 pp.; TRB affiliates, \$41.25; nonaffiliates, \$55. *Subscriber category: safety and human performance (IVB).*

### **Guidance for Implementation of the AASHTO Strategic Highway Safety Plan: A Guide for Reducing Head-On Crashes on Freeways**

NCHRP Report 500, Volume 20

Strategies are described for the reduction of head-on crashes on freeways. The strategies are classified as proven, tried, or experimental, and include public education programs, improvements to safety management systems and to emergency medical and trauma system services, enforcement of traffic safety laws, and more.

2008; 84 pp.; TRB affiliates, \$35.25; nonaffiliates, \$47. *Subscriber category: safety and human performance (IVB).*

### **Standardized Procedures for Personal Travel Surveys**

NCHRP Report 571

This report explores standardization of personal travel survey components with the goal of improving the quality, consistency, and accuracy of the data. The technical appendix to this volume is published as NCHRP Web-Only Document 93.

2008; 103 pp.; TRB affiliates, \$37.50; nonaffiliates, \$50. *Subscriber category: planning and administration (IA).*

### **A Guidebook for Using American Community Survey Data for Transportation Planning**

NCHRP Report 588

Incorporating the U.S. Census Bureau's American Community Survey (ACS) data into transportation planning processes at the national, state, metropolitan, and local levels is explored. ACS data and products are evaluated, and their uses in a range of transportation planning applications are demonstrated.

2007; 275 pp.; TRB affiliates, \$45; nonaffiliates: \$60. *Subscriber categories: planning and administration (IA); operations and safety (IV); aviation (V); public transit (VI); rail (VII); freight transportation (VIII); marine transportation (IX).*

### **Improved Conditioning and Testing Procedures for HMA Moisture Susceptibility**

NCHRP Report 589

Combining the environmental conditioning system with the simple performance test to provide a superior procedure for determining the moisture susceptibility of hot-mix asphalt is the focus of this report.

2007; 69 pp.; TRB affiliates, \$30.75; nonaffiliates, \$41. *Subscriber category: materials and construction (IIIB).*

**TRB PUBLICATIONS** *(continued)***Compilation of Public Opinion Data on Tolls and Road Pricing**

NCHRP Synthesis 377

Public opinion on tolls and road pricing is examined, and the factors associated with the acceptance or rejection of road pricing are highlighted.

2008; 57 pp.; TRB affiliates, \$31.50; nonaffiliates, \$42. Subscriber categories: *planning and administration (IA); highway operations, capacity, and traffic control (IVA)*.

**Guidebook for Measuring, Assessing, and Improving Performance of Demand-Response Transportation**

TCRP Report 124

This report aids urban, demand-response transportation systems in measuring, assessing, and improving their performance.

2008; 123 pp.; TRB affiliates, \$39; nonaffiliates, \$52. Subscriber category: *public transit (VI)*.

**Guidebook for Mitigating Fixed-Route Bus-and-Pedestrian Collisions**

TCRP Report 125

Guidance for small, medium, and large transit agencies and their communities in identifying preventive or remedial strategies for reducing the frequency and severity of bus-and-pedestrian collisions is provided. Strategies to mitigate collisions are examined, and methods for improving pedestrian safety around transit buses are highlighted.

2008; 65 pp.; TRB affiliates, \$28.50; nonaffiliates, \$38. Subscriber category: *public transit (VI)*.

**Leveraging ITS Data for Transit Market Research: A Practitioner's Guidebook**

TCRP Report 126

Intelligent transportation systems (ITS) and transit ITS technologies are reviewed, and ITS systems' potential to provide market research data—as well as methods to collect and analyze the data—are explored. Included are three case studies that illustrate ways ITS data have been used to improve market research practices.

2008; 82 pp.; TRB affiliates, \$35.25; nonaffiliates, \$47. Subscriber category: *public transit (VI)*.

**Paratransit Manager's Skills, Qualifications, and Needs**

TCRP Synthesis 71

This synthesis reports on current knowledge and practice and provides a compendium of the best knowledge available on measures that have proved

successful in problem resolution.

2007; 52 pp.; TRB affiliates, \$27; nonaffiliates, \$36. Subscriber category: *public transit (VI)*.

**AVL Systems for Bus Transit: Update**

TCRP Synthesis 73

The uses of computer-aided dispatch and automatic vehicle location (AVL) systems in fixed-route and demand-responsive services, as well as changes in agency practices related to the use of AVL systems, are explored.

2008; 104 pp.; TRB affiliates, \$37.50; nonaffiliates, \$50. Subscriber category: *public transit (VI)*.

**Evaluation and Mitigation of Aircraft****Slide Evacuation Injuries**

ACRP Report 2

Guidance is provided for reducing injuries and for improving safety and coordination during aircraft slide evacuations. Injuries to aircraft crew and passengers during the slide evacuations are examined, along with methods for prevention.

2008; 77 pp.; TRB affiliates, \$35.25; nonaffiliates, \$47. Subscriber category: *aviation (V)*.

**Analysis of Aircraft Overruns and Undershoots for Runway Safety Areas**

ACRP Report 3

Authors explore overrun and undershoot accident and incident data, as well as conditions relating to these events. The report includes runway safety area risk assessment and alternatives to the traditional runway safety area.

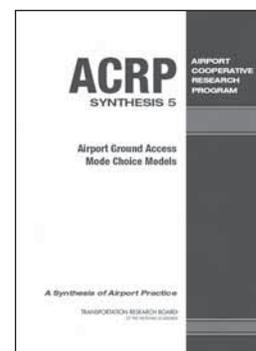
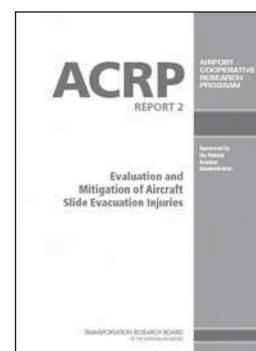
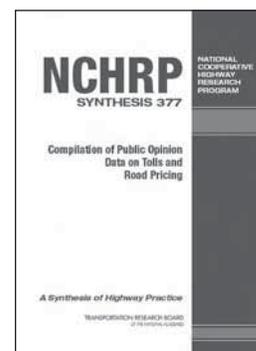
2008; 50 pp.; TRB affiliates, \$30; nonaffiliates, \$40. Subscriber categories: *aviation (V), planning and administration (IA), and safety and human performance (IVB)*.

**Airport Ground Access Mode Choice Models**

ACRP Synthesis 5

This synthesis examines the characteristics of ground access mode choice models and explores the issues in the development and use of such models to improve the understanding and acceptance of their role in airport planning and management.

2008; 104 pp.; TRB affiliates, \$29.25; nonaffiliates, \$39. Subscriber categories: *aviation (V); planning and administration (IA)*.



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

## CALENDAR

TRB Meetings  
2008**November**

- 10 Airport Cooperative Research Program Industry Outreach Workshop, West Coast  
Irvine, California
- 11–14 Gulf Coast Hurricane Preparedness, Response, Recovery, and Rebuilding\*  
Mobile, Alabama
- 13 Asphalt Rubber Technology Workshop\*  
Piscataway, New Jersey
- 13 Airport Cooperative Research Program Industry Outreach Workshop, East Coast  
Washington, D.C.
- 20 Developing a Theoretical Understanding of Highway Crash Causation\*  
(by invitation)  
Washington, D.C.  
Richard Pain

**December**

- 1–4 2008 Highway Geophysics–Nondestructive Evaluation Conference\*  
Charlotte, North Carolina
- 2–3 2nd International Summit on Agricultural and Food Transportation\*  
Washington, D.C.
- 7–9 Transportation Finance Summit\*  
Washington, D.C.

- 9–11 Strategic Highway Safety Plan Peer Exchange and State Department of Transportation Safety Engineer Peer Exchange  
(by invitation)  
Houston, Texas  
Richard Pain
- 10–12 Advancing Regional Traffic Operations and Management  
Washington, D.C.  
Richard Cunard
- 15–17 International Conference on Integrated Transport for Sustainable Urban Development\*  
Beijing, China

**2009****January**

- 11–15 TRB 88th Annual Meeting  
Washington, D.C.

**March**

- 24–25 Midwest Traffic Monitoring Workshop  
Columbus, Ohio

**April**

- 19–22 11th Joint Light Rail Transit Conference\*  
Los Angeles, California
- 22–24 National Conference on Preservation, Repair, and Rehabilitation of Concrete Pavements\*  
St. Louis, Missouri

- 22–24 Teamwork in U.S. Railroad Operations  
Irvine, California  
Richard Pain

**May**

- TBD 4th Bus Rapid Transit Conference\*  
Seattle, Washington  
Peter Shaw
- 3–6 7th National Aviation System Planning Symposium  
Monterey, California  
Christine Gerencher
- 27–29 11th Annual Harbor Safety Committee Conference\*  
Tampa, Florida  
Joedy Cambridge

**June**

- TBD North American Transportation Statistics Interchange  
(by invitation)  
Washington, D.C.  
Thomas Palmerlee
- 21–24 2nd International Symposium on Freeway and Tollway Operations\*  
Honolulu, Hawaii  
Richard Cunard
- 29– July 2 8th International Conference on the Bearing Capacity of Roads, Roadways, and Airfields\*  
Champaign, Illinois

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

\*TRB is cosponsor of the meeting.

## INFORMATION FOR CONTRIBUTORS TO

# TR NEWS

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

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

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

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

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

**CALENDAR** covers (a) TRB-sponsored conferences, workshops, and symposia, and (b) functions sponsored by other agencies of interest to readers. Notices of meetings should be submitted at least 4 to 6 months before the event.

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

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

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

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

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

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

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



# TRANSPORTATION RESEARCH BOARD 88TH ANNUAL MEETING

WASHINGTON, D.C.

JANUARY 11–15, 2009

## TRANSPORTATION, ENERGY, AND CLIMATE CHANGE

The twin issues of energy and climate change are among the most significant public policy issues facing the transportation profession today and in the coming decades. To address these challenges, it is critical to develop and share knowledge and experiences on ways to mitigate the adverse impacts of transportation on energy resources and the climate—and to adapt transportation to the new realities. The spotlight theme for the TRB 88th Annual Meeting will explore these issues—and more.

**REGISTER  
BEFORE  
NOVEMBER 30,  
2008, TO TAKE  
ADVANTAGE OF  
LOWER FEES!**

### ***Plan now to***

- » Network with more than 10,000 transportation professionals;
- » Take advantage of more than 3,000 presentations in 600-plus sessions and specialty workshops;
- » Explore energy and climate change issues from the perspectives of all transportation modes, with insights from a wide range of stakeholders and subject-matter experts;
- » Examine how energy and climate change issues will affect transportation policy making, planning, design, construction, operations, and maintenance; and
- » Learn what federal, state, regional, and local transportation agencies are doing—and can do—to address these issues.

**For more information, go to [www.TRB.org/Meeting](http://www.TRB.org/Meeting)**

## **THE NATIONAL ACADEMIES™**

*Advisers to the Nation on Science, Engineering, and Medicine*

The nation turns to the National Academies—National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council—for independent, objective advice on issues that affect people's lives worldwide.

[www.national-academies.org](http://www.national-academies.org)