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*CTS Research E-News brings you the latest research project milestones, published reports, and seminar coverage.*

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## TRB Annual Meeting

### University of Minnesota researchers to participate in TRB Annual Meeting

Driver behavior, pavement construction, congestion mitigation, land use, and traffic modeling are just some of the topics that will be discussed by researchers from the [University of Minnesota](#), the [Metropolitan Council](#), and the [Minnesota Department of Transportation](#) at the [85th Annual Meeting](#) of the Transportation Research Board, January 22–26, in Washington, D.C.

More than 40 University of Minnesota faculty, research staff, and graduate students will participate in a variety of panels and poster sessions throughout the five-day event that brings together researchers, students, and professionals from around the world. In addition to the University of Minnesota contingent, the Minnesota Department of Transportation and the Metropolitan Council will also be represented among the presenters.

For a complete list of presentation topics and session times for U of M, Mn/DOT, and Met Council presenters, visit the [Minnesota Guide to TRB annual meeting presentations](#) (1.2 MB PDF)

University faculty and staff presenters will include:

**CTS and ITS Institute staff**

Robert Johns, Chen-Fu Liao, Arlene Mathison, Ted Morris

**Civil engineering faculty and research staff**

Gary Davis, Ahmed El-Geneidy, John Hourdos, Lev Khazanovich, Joseph Labuz, David Levinson, Henry Liu, Mihai Marasteanu, Panos Michalopoulos, Paul Morris, Arturo Schultz

**Civil engineering graduate students**

Nathan Aul, Clara Celauro, Wei Chen, Vishnu Garg, Xue Li, Norah Montes de Oca, Justin Ocel, Derek Tompkins, Feng Xie, Wuping Xin, Iliya Yut, Lei Zhang, Xi Zou,

**Mechanical engineering faculty and research staff**

Lee Alexander, Pi-Ming Cheng, Max Donath, Alec Gorjestani, Arvind Menon, Bryan Newstrom, Craig Shankwitz, Nicholas Ward

**Hubert Humphrey Institute of Public Affairs faculty and research staff**

Gary Barnes, John Bryson, Frank Douma, Kevin Krizek, Lee Munnich

**Humphrey Institute graduate students**

James Andrew, Stephanie Erickson, Tyler Patterson, Kristin Bethany Thompson, Sarah Watters, Susanna Wilson

**Law school faculty**

Stephen Simon

## Policy & Planning

### Early right-of-way acquisition: a good deal?

Purchasing land for the development of new transportation infrastructure can be a costly and complicated process for transportation agencies, especially in the current climate of budget constraints and rapidly rising land prices. Purchasing land well before it is needed for new facilities—before it is developed or appreciates significantly in value—can seem like a wise financial move. University of Minnesota researchers studying changes in land value examined data from several decades in Minnesota to form a better understanding of the financial factors surrounding early right-of-way acquisition.

**Gary Barnes**, a research associate at the [Hubert H. Humphrey Institute of Public Affairs](#), and graduate student **Sarah Watters** first asked broadly if either developed or undeveloped land tended to increase in value faster than the rate of return on medium-term government bonds, making them good general targets for early acquisition. They found that at an aggregate level, the value of both developed land and farmland had increased in value more slowly over the last 40 years than the rate of return on bonds, and thus early acquisition was not justified as a general policy.

Barnes and Watters next turned to the question of whether it was possible to identify specific circumstances—such as locations or land types—in which land tends to increase in value faster than average, making such tracts more suitable for early acquisition. This proved to be a difficult question. Among the land characteristics the researchers looked at are levels of land development, the conditions under which land is offered for sale, proximity to developed areas or to transportation corridors, and perceived likelihood of future development.

In their final report, Barnes and Watters point out that it would be a mistake to look at right-of-way acquisition only through the lens of recent rapid increases in land value. Historically, the value increases that have characterized the past decade appear to be unique, with no comparable effect seen in the preceding 50 years. While it is easy, after the fact, to point to instances where land has greatly increased in value, it is not always possible to predict these unusual increases using information available at the time when early acquisition is being considered.

The report also notes that early acquisition is only one of the right-of-way preservation tools available to transportation agencies; conversely, early acquisition may be a desirable option for reasons other than financial value. A full analysis of these factors lies beyond the scope of the researchers' current work, which, they caution, is not intended to provide a definitive answer to the question of whether right-of-way should be acquired early, but rather to suggest the information and analytic techniques that would be required to provide such an answer.

*The Financial Benefits of Early Acquisition of Transportation Right-of-Way* (Mn/DOT 2005-35) represents a thoughtful and systematic approach to a difficult question facing transportation agencies nationwide. The report will be of interest to policymakers and transportation planners engaged in charting the future course of development for the surface transportation system.

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## Intelligent Transportation Systems

### Research helps fans escape convention center congestion

As soon as the final buzzer sounds, the spectators at the big game begin to move en masse to their cars and out of the parking lot, clogging the streets around the stadium with a massive volume of traffic. Getting caught in these special-event traffic jams is an annoyance that many people have learned to live with, not only at sporting events but whenever large numbers of people gather in the same place and leave at the same time. **Jiann-Shiou Yang** of the [University of Minnesota-Duluth](#) is studying the dynamics of special-event traffic around the Duluth Entertainment and Convention Center (DECC), with an eye to improving local traffic management.

In the area near the convention center, acute traffic problems are often created by university-related sporting events, graduation ceremonies, and public concerts. While regular fluctuations in traffic flow (such as morning and afternoon rush hours) can be predicted and to some extent mitigated by traffic control strategies, special-event fluctuations are less well understood and therefore more difficult to manage effectively.

Yang's [previous work](#) on the problem involved analyzing traffic data from key intersections around the DECC after special events; this enabled him to develop a new plan for traffic signal coordination to reduce intersection delays and move vehicles out of the area more efficiently. In the second phase of his research, documented in a newly published report, Yang used multiple "probe vehicles" equipped with Global Positioning System units to gather data on vehicle movements and travel times directly. Travel time, and the predictability of travel time, are important measures of travel quality for both travelers and transportation analysts.

Another component of Yang's recent work was the development of techniques for predicting travel times in the study area. In addition to serving as the basis for many intelligent transportation systems applications such as traffic management and in-vehicle route guidance, accurate travel time prediction can be useful to motorists in planning alternate routes to avoid congestion, or in selecting alternative modes of transportation such as public transit. Yang's prediction technique, explained in his report, is based on processing historic and real-time travel data using a recursive, discrete-time Kalman filter algorithm.

The results of this work, Yang says, should help the City of Duluth and the Minnesota Department of Transportation's District 1 office improve traffic management around the convention center. In addition, the travel time prediction techniques can be adapted to different locations in order to monitor the quality of traffic flow, and to provide information for Advanced Traveler Information Systems.

*Duluth Entertainment Convention Center (DECC) Special Events Traffic Flow Study Phase II: Mobility Monitoring and Performance Measure via Dynamic Travel Time Prediction* (CTS 05-09) is available from the Center for Transportation Studies Web site.

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## Transportation Infrastructure

### Strengthening bridge pier caps with fiber-reinforced composites

No one likes to see cracks in a bridge, so when excessive cracking was reported in a pair of relatively new reinforced-concrete highway overpasses near the Twin Cities, the Minnesota Department of Transportation (Mn/DOT) was keen to investigate. In addition to its own inspection personnel, Mn/DOT called on the expertise of Associate Professor **Carol Shield** and Professor **Catherine French** of the University of

Minnesota's [Department of Civil Engineering](#) to investigate the causes of the cracking and explore potential remedies.

The flexure and flexure/shear cracks were located in pier-cap overhangs, at the ends of reinforced concrete beams supporting the road deck, and were large enough to be seen by passing motorists on the highway below. The engineers knew that cracking in reinforced concrete structures is more than just an aesthetic concern—it can expose the steel reinforcing rods inside to corrosion from water and road salt. Corrosion byproducts can also cause concrete spalling because they take up more space than the original steel. Shield and French found that similar cracking in concrete pier caps had been documented throughout the country by several other researchers.

Shield and French investigated the construction standards applicable to concrete pier caps, and determined that a cracked but otherwise undeteriorated pier cap would not be prone to structural failure. They further calculated that the depth of overhangs would have to be increased by approximately 20 percent to prevent the occurrence of similar cracking.

However, analysis of the load-bearing capacity of the concrete beams showed that the observed cracking would not make the pier caps unsafe in the absence of deterioration. Shield and French estimated the initial cracking load of the pier-cap overhangs, in order to determine what design changes would be required to prevent cracking; they found that the depth of the overhangs would have to be increased by approximately 20 percent.

To strengthen the cracked pier caps and help prevent expansion of the existing cracks, Shield and French investigated the use of fiber-reinforced polymer (FRP) composite materials. These materials have become increasingly popular for retrofitting to concrete structures in recent years due to their high strength-to-weight ratio and corrosion resistance; however, the most effective ways to use these materials have not yet been established in many applications. The researchers studied several different materials and adhesive compounds, as well as different methods of applying the materials to concrete test sections in the laboratory, including direct mounting of sheets on concrete surfaces and installation of FRP elements in channels routed into the concrete. The results of these experiments suggest ways to use FRP composites in order to take maximum advantage of their properties.

Combining a thorough evaluation of the design standards for concrete pier caps with experimental data on new methods of structural reinforcement, Shield and French's final research report contributes to our understanding of bridge engineering. *Retrofitting Shear Cracks in Reinforced Concrete Pier Caps Using Carbon Fiber Reinforced Polymers* (MN/RC 2005-13) is available online from Mn/DOT at [www.lrrb.org/pdf/200513.pdf](http://www.lrrb.org/pdf/200513.pdf).

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## Transit & Alternative Modes

### National Transit News

#### TCRP research publications available online

The federal [Transit Cooperative Research Program \(TCRP\)](#), administered by the [Transportation Research Board](#), provides practical transit research to address technical and operational issues. TCRP emphasizes putting research results into the hands of organizations and individuals that can use them to solve problems. TCRP publications may be viewed at [www4.trb.org/trb/onlinepubs.nsf/web/crp](http://www4.trb.org/trb/onlinepubs.nsf/web/crp).

Recent TCRP publications include:

- ◆ [A Guidebook for Developing and Sharing Transit Bus Maintenance Practices](#) (TCRP Report 109)
- ◆ [Car-Sharing: Where and How It Succeeds](#) (TCRP Report 108)
- ◆ [On-Board and Intercept Transit Survey Techniques](#) (TCRP Synthesis 63)
- ◆ [Integration of Bicycles and Transit](#) (TCRP Synthesis 62)
- ◆ [Implementing New Technologies in Maintenance Systems and Departments in Europe](#) (TCRP Research Results Digest 71)
- ◆ [Trademarking and Licensing for Transit Providers](#) (TCRP Legal Research Digest 21)

#### Journal of Public Transportation

The *Journal of Public Transportation*, Vol. 8, No. 5, 2005, published by the [National Center for Transit Research](#) at the University of South Florida, includes these articles, available at [www.nctr.usf.edu](http://www.nctr.usf.edu):

- ◆ Social Marketing Applications and Transportation Demand Management: An Information Instrument for the 21st Century
- ◆ The Role of UK Local Authorities in Promoting the Bus
- ◆ Public Transport Reforms in Seoul: Innovations Motivated by Funding Crisis
- ◆ A Regression Model of the Number of Taxicabs in U.S. Cities
- ◆ Parking Policy for Transit-Oriented Development: Lessons for Cities, Transit Agencies, and Developers

## Upcoming Events

Here are selected events related to transportation research. Visit the CTS Web site, [www.cts.umn.edu/events](http://www.cts.umn.edu/events), for more comprehensive event information. You may also subscribe to e-mail event announcements using our [subscription form](#).

#### February 9, 2006

**CTS Winter Luncheon** with Leonard Evans, Radisson Hotel Metrodome, Minneapolis. Contact Julie Grazier, 612-624-3044, [conferences5@cce.umn.edu](mailto:conferences5@cce.umn.edu).

#### February 16, 2006

**Minnesota Pavement Conference**, Saint Paul. Contact Teresa Washington at 612-624-3745 or e-mail [twashing@cce.umn.edu](mailto:twashing@cce.umn.edu).

#### March 2, 2006

**CTS Transportation Career Expo**, Minneapolis. Contact Mindy Carlson, 612-625-1813, [carlson@cts.umn.edu](mailto:carlson@cts.umn.edu).

**April 17, 2006**

**Information Session: Graduate Certificate in Transportation Studies.** 6-7 p.m. at 215 Humphrey Center, 301 19th Ave. S., Minneapolis.

**May 24, 2006**

**CTS Spring Luncheon** with Thomas DeCoster, Saint Paul RiverCentre. Contact Julie Grazier, 612-624-3044, [conferences5@cce.umn.edu](mailto:conferences5@cce.umn.edu).

**May 24-25, 2006**

**17th Annual CTS Transportation Research Conference**, Saint Paul RiverCentre. Contact Julie Grazier, 612-624-3044, [conferences5@cce.umn.edu](mailto:conferences5@cce.umn.edu).

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