



June 2005 - Vol. 3 No. 6

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

In this issue:

Policy & Planning

- ◆ [CTS and sponsors gather to launch Access to Destinations Study](#)

Intelligent Transportation Systems

- ◆ [A better cruise control](#)

Transit & Alternative Modes

- ◆ [Benefits of bicycle facilities examined in new report](#)
- ◆ [National transit news](#)

Transportation Infrastructure

- ◆ [Fly ash research wins CTS Research Partnership Award](#)

Upcoming Events

Policy & Planning

CTS and sponsors gather to launch Access to Destinations Study



Kevin Krizek, postdoctoral researcher Ahmed M. El-Geneidy, David Levinson.

The University of Minnesota must play a leading role in finding new ways to meet the transportation challenges of our region, said CTS director **Robert Johns**, announcing the start of a new interdisciplinary research and outreach study May 11.

The concept of "accessibility" is at the heart of the [Access to Destinations Study](#). Accessibility emphasizes the ability of individuals and groups to satisfy their needs by accessing activities, services, and geographic destinations. Historically, much of the research on regional transportation patterns has focused on the concept of mobility—the ability of people to move around the transportation network. Many researchers today acknowledge that mobility is only part of a complete picture of transportation and development.

Several researchers slated to participate in the new study gave brief descriptions of their projects and answered questions from the audience. **David Levinson**, assistant professor of civil engineering, and **Kevin Krizek**, assistant professor at the Humphrey Institute of Public Affairs, helped design the study; Levinson's initial research will develop performance measures for accessibility, while Krizek will focus on non-automotive

modes of transportation such as public transit, bicycling, and walking. **Gary Davis**, associate professor of civil engineering, and **Panos Michalopoulos**, professor of civil engineering, also presented their research plans.

Joining Johns at the kick-off workshop for the Access to Destinations Study were **Tim Henkel**, director of the [Minnesota Department of Transportation's](#) Office of Program Management, and **Gary Erickson**, assistant county administrator and director of public works for [Hennepin County](#). Both organizations will play key roles in shaping the study and expect to benefit from the deeper understanding of regional transportation issues that the research aims to develop, Johns said.

The Access to Destinations Study, to be led by CTS, will build on the successes of the [Transportation and Regional Growth Study](#), Johns said. That effort, involving researchers from several different academic departments, made important findings about the travel behavior and land use in the Twin Cities—findings that have illuminated new research directions for the new study to explore, Johns continued.

Accessibility is a key component of Mn/DOT's plans for the future, said Henkel. He pointed out that the agency recognizes the importance of both mobility and accessibility in its mission statement. Furthermore, he said, the goal of improving accessibility has already been incorporated into Mn/DOT performance measures used in the planning process for new transportation projects.

Erickson noted that the Access to Destinations Study represents an expanded partnership between Hennepin County and the University of Minnesota. By establishing a more formal working relationship, Erickson said, the county government expects to benefit from the University's research capabilities while contributing a practical perspective on issues like development and public policy.

One part of the Access to Destinations Study that is of particular interest to Hennepin County is measuring the efficiency of county roads. These arterial roadways are an important component of the transportation infrastructure, Erickson said, but there has not been sufficient research performed to fully understand their effect on traffic patterns.

An academic conference, sponsored by CTS in November 2004, served as an informal starting point for the Access to Destinations Study.

Conference attendees discussed recent research on issues such as traffic congestion, the complex relationship between land use and transportation network growth, the role of transit and non-automotive modes, and new ways of financing transportation projects. A proceedings of the conference is now available on the CTS Web site at www.cts.umn.edu/access-study/.

Intelligent Transportation Systems

A better cruise control

Technology is changing the way your cruise control works. By adding a radar range sensor and computer control, Adaptive Cruise Control (ACC) enables a car to automatically maintain a set distance from the vehicle ahead of it. Engineers hope that widespread adoption of ACC systems will eventually enable cars to cruise safely with minimal separation between them, resulting in higher road capacities without traffic disruptions.

However, questions remain about the stability of traffic flow when large numbers of ACC-equipped vehicles travel together under real-world highway conditions. A group of engineering researchers from the University of Minnesota explores this issue in a new report, published by the [ITS Institute](#). Professor **Rajesh Rajamani** of the Department of [Mechanical Engineering](#), Assistant Professor **David Levinson** and Professor **Panos Michalopoulos** of the Department of [Civil Engineering](#), and graduate students **J. Wang**, **Kumaragovindhan Santhanakrishnan**, and **Xi Zou** address the questions of whether the flow of vehicles using a constant-time-gap (CTG) spacing policy is stable under all conditions, including disruption by new vehicles entering the traffic stream, and whether a better spacing policy is feasible.

Under a constant-time-gap spacing policy, all vehicles using ACC maintain a fixed time interval between themselves and the next vehicle ahead of them; as vehicle speeds increase, the distance between vehicles also increases. Using computer simulations, some analyses of this policy have suggested that it can lead to traffic flow becoming unstable, meaning that disturbances in vehicle spacing (such as those caused by new vehicles entering a highway) can propagate upstream, potentially resulting in more serious disruptions.

The researchers examined mathematical models of CTG spacing effects and found that the stability of traffic flow is in fact dependent on boundary conditions—the initial configuration or "state" of vehicles on the highway when a simulation begins. In the real world, this means that certain configurations of vehicles will lead to the emergence of unstable traffic flow.

Having established the conditional instability of CTG spacing, the research team set out to explore the question of whether better spacing policies are possible. Their proposal, the variable-time-gap (VTG) policy, differs from the CTG policy in being a nonlinear, rather than linear, function of vehicle velocity. Models of traffic flow using this policy show that it is able to attenuate density disturbances caused by vehicles entering the highway, and that it leads to overall better traffic performance under many conditions. However, the researchers note that whatever spacing policy is chosen, instability will emerge when traffic density passes a critical limit.

The report, [Adaptive Cruise Control System Design And Its Impact on Traffic Flow](#), is available online at www.cts.umn.edu/publications/reports/reportdetail.pl?id=996.

Transit & Alternative Modes

Benefits of bicycle facilities examined in new report



Bicycling enjoys widespread support as an economical, pollution-free, and healthy mode of transportation. But just what is the return on investment for governmental investment in bicycle facilities and bike-friendly policies? Researcher **Gary Barnes** of the University of Minnesota's [Humphrey Institute of Public Affairs](#) sets out to quantify the benefits of bicycling in Minnesota in a new research report, published by the [Minnesota Department of Transportation](#).

Barnes first developed estimates of the total amount and types of bicycling in Minnesota, based on surveys and other measurements from the state and around the country. These estimates became the baseline for a discussion of appropriate expenditures on bicycling facilities, and for determining the amount and nature of benefits accruing from bicycling.

Building on these estimates, Barnes constructed a theoretical and accounting framework that can be used to structure debates on the benefits of bicycling. The framework draws a distinction between those benefits that result from investment in a specific facility (such as a safer bike path in a high-traffic area) and those more general benefits (such as improved public health) that result from general encouragement of bicycling.

Using these tools, and incorporating available literature, the report goes on to calculate the total general benefits of bicycling in Minnesota. The results, Barnes concludes, indicate that the benefits from even the relatively small amount of bicycling in Minnesota provide a substantial return on investments by state and local governments. Increasing the level of public participation in bicycling—for example, by constructing substantial new bicycling facilities—would likely enhance the value of these investments even further.

Despite the apparent benefits of investment in bicycling facilities, the report cautions that understanding what types of facilities are important to specific rider groups remains difficult, due to a general lack of information. Additional research to understand the influence of facilities on bicycling patterns should be undertaken to address this issue, Barnes says.

[The Benefits of Bicycling in Minnesota](#) (Mn/DOT 2004-50) is available from the Minnesota Department of Transportation Web site at www.research.dot.state.mn.us/detail.asp?productID=1964.

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.

Recent TCRP publications include:

Journal of Public Transportation

The *Journal of Public Transportation*, Vol. 8, No. 1, 2005, published by the [National Center for Transit Research](#) at the University of South Florida, includes these articles, available at www.nctr.usf.edu:

- ◆ The Demand for Rail Feeder Shuttles
- ◆ Using GPS Technology to Measure On-Time Running of Scheduled Bus Services
- ◆ The Demand Performance of Bus Rapid Transit
- ◆ Review of Urban Transportation in India

Transportation Infrastructure

Fly ash research wins CTS Research Partnership Award



Kim Grosenheider, John Siekmeier, Paul Bloom, Roger Olson, Richard Sanders, James Klessig, Laurie McGinnis

When you're building roads, it's not just the pavement that matters—the soil underneath does, too. Fly ash, a byproduct from coal combustion, is valuable for stabilizing poor soils but can retain toxic elements, so road builders haven't known how much to use while still meeting environmental requirements. The recipients of this year's Research Partnership Award studied this issue and created a tool that lets users explore different scenarios and calculate allowable usage. At the March 29 awards ceremony, CTS associate director **Laurie McGinnis** presented this year's award to the partners in a project titled "Fly Ash Screening Tool Investigation 795 Implementation."

"Fly ash is a cheap replacement for more expensive approaches," said Professor **Paul Bloom** of the [Department of Soil, Water, and Climate](#). Working with the [Minnesota Pollution Control Agency \(MPCA\)](#) and many other partners, Bloom's research team developed a worksheet to analyze the risk to human health from different exposure scenarios. The program includes a database of information for much of Minnesota and for various ash choices. Users can do an initial evaluation of their project and then add their own specific data. "It's been a fascinating project," Bloom said.

Project partners included:

- ◆ Tim Andersen, Robert Edstrom, Bruce Johnson, John Jones, James Klessig, Barbara Loida, Roger Olson, Ruth Roberson, and John Siekmeier (Mn/DOT)
- ◆ Paul Bloom, Michael Friend, Kim Grosenheider, and Thomas Halbach (U of M)
- ◆ Jeff Blue (Waseca County)
- ◆ Chuck Donkers (Xcel Energy)
- ◆ Greg Felt (Scott County)
- ◆ Matt Herman and Mike Trojan (MPCA)
- ◆ Steve Juhlin (Barr Engineering)
- ◆ John Rodeberg (City of Hutchinson)
- ◆ Fred Salisbury (City of Waseca)
- ◆ Richard Sanders (Polk County)
- ◆ Mark Sehr (Rock County)

A subcommittee of the [CTS Education/Outreach Council](#) selected the award winners as well as five other projects that received special partnership recognition. The five projects and partners were:

"Fatigue Evaluation of Steel Box-Girder Pier Caps"

- ◆ David Davidson and Daniel Dorgan (Mn/DOT)
- ◆ Professor Robert Dexter (U of M)

"Earth Pressure Behind a Retaining Wall"

- ◆ Joseph Bentler, Paul Bergson, and Arturo Schultz (U of M)
- ◆ Steve Barrett, Jihshya Lin, Gary Peterson, Don Seitz, and Erik Wolhowe (Mn/DOT)
- ◆ Edward Kraemer & Sons, Inc.
- ◆ Progressive Contractors, Inc.

"Accident Prevention Based on Automatic Detection of Accident Prone Traffic Conditions Phase I"

- ◆ Gary Davis, John Hourdakakis, Panos Michalopoulos, and Kyle Wood (U of M)
- ◆ Ted Morris (ITS Institute)
- ◆ Peter Sturm (Minneapolis Public Housing Authority)
- ◆ Craig Anderson (Image Sensing Systems)
- ◆ Diane Reeder (Minnesota State Patrol)

◆ Loren Hill and Nick Thompson (Mn/DOT)

"Properties and Aggregate Potential of Coarse Taconite Tailings: An Evaluation of Five Minnesota Taconite Operations"

◆ Harlan B. Niles, Julie A. Oreskovich, and Lawrence M. Zanko (Natural Resources Research Institute, U of Minnesota Duluth)

"Guidelines for Cost-Benefit Analysis of Investments in Bicycle Facilities"

◆ Gary Barnes, Kevin Krizek, and David Levinson (U of M)

◆ David Loutzenheiser and Don Kidston (Planners Collaborative)

◆ William Hunter (Highway Safety Research Center)

◆ Richard Killingsworth (Robert Wood Johnson's Active Living by Design Program)

Upcoming Events

Mark your calendars for next year's slate of events. Visit the CTS Web site, www.cts.umn.edu/events, for more comprehensive event information. You may also subscribe to e-mail event announcements using our [subscription form](#).

October 5-6, 2005

Minnesota Fall Maintenance Expo, St. Cloud. Call Kathy Warren, 651-351-7432.

October 11-12, 2005

AirTAP Fall Forum, Brainerd. Contact Mindy Carlson at 612-625-1813 or e-mail carlson@cts.umn.edu.

November 16-17, 2005

Toward Zero Deaths Conference, St. Cloud. Call Shirley Mueffelman, 612-624-4754.

May 24-25, 2006

17th Annual CTS Transportation Research Conference, RiverCentre, St. Paul.
