University of Minnesota
Center for Transportation Studies
Research E-News

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

In this issue:

Safety

Rural transportation safety and the Strategic Highway Safety Plan

In 2005, new federal legislation mandated that states develop Strategic Highway Safety Plans to reduce fatalities and serious injuries. SHSPs include a wide range of strategies that include education, enforcement, engineering, and emergency response. State governments have responded by enacting a variety of legislation taking aim at highway safety problems. Researchers supported by the Center for Excellence in Rural Safety (CERS) examined several states' plans to uncover key themes in planning for driver safety today.

CERS director **Lee Munnich**, who also leads the State and Local Policy Program at the University of Minnesota's Humphrey Institute of Public Affairs, and graduate student **Alec More** selected a total of six states representing different regions of the United States: Alabama, Idaho, Maryland, Minnesota, Vermont, and Washington. Their findings are featured in a new report published by CERS.

Munnich and More's research had three main goals:

1. To understand the plan development process and each state's approach to safety planning
2. To examine the extent to which plans address driver behavior, technology, and public policy issues
3. To evaluate each plan's emphasis on rural transportation safety issues

Based on their review of the strategic plans, as well as analyses of supporting documents and interviews with stakeholders, the researchers were able to draw a number of conclusions about the strategic highway safety planning process. Among the common themes were a focus on changing driver behavior, and the importance of state-level political leadership and public involvement in reducing crashes. Measurement-driven approaches, which frequently rely on new technologies or methods of interpreting data, also appeared to play key roles in many plans.

The researchers' final report also offers several suggestions for improvements to the process of plan development, particularly in the areas of public engagement, prioritization, and stakeholder participation.

Rural Transportation Safety and the Strategic Highway Safety Plan: An Examination of Select State Programs and Practices (CTS 08-02) is available from the CERS Web site.

Policy & Planning

New faculty enhance transportation expertise at Minnesota


Nikolas Geroliminis

Two new faculty members have arrived at the University of Minnesota, bringing with them fresh perspectives and expertise in different areas of transportation policy and planning. **Nikolas Geroliminis** (civil engineering) is currently involved in research on performance measurement and macroscopic modeling of traffic flows; **Xinyu (Jason) Cao** (public affairs) has diverse research interests including travel behavior in urban and rural areas, public health impacts, pollution, and congestion.

Nikolas Geroliminis joined the Department of Civil Engineering (CE) this semester as an assistant professor. His research is focused on developing more sustainable transportation systems by improving the use of existing facilities. Specific areas include modeling and estimation of travel times and other performance measures in arterials; location of emergency response vehicles in transportation networks; and urban transportation. His current research focuses on the macroscopic modeling of traffic flow for overcrowded cities.

Geroliminis received his Ph.D. in Civil and environmental engineering, with minors in industrial engineering and operational research and in economics, from the University of California at Berkeley, where he also earned a Master of Science degree in civil and environmental engineering. He earned a master of engineering with a specialization in transportation engineering from the National Technical University of Athens, Greece.


Xinyu (Jason) Cao

Xinyu (Jason) Cao joined the faculty of the Hubert H. Humphrey Institute of Public Affairs as an assistant professor. His research interests include analyzing the travel behavior and residential choices of individuals in urban and rural areas, the relationship between the built environment and public health, and responses to pollution and congestion.

Cao received undergraduate and M.E. degrees from Tsinghua University in Beijing, and M.S. and Ph.D. degrees from the University of California at Davis, where he was honored with an Outstanding Dissertation Award from the Friends of ITS at Davis and the Wootan Award for Outstanding Ph.D. Dissertation in Policy and Planning from the Council of University Transportation Centers. Prior to joining the University of Minnesota faculty in 2007, Cao served as an associate research fellow at the Upper Great Plains Transportation Institute at North Dakota State University.

Transportation and the Environment

Sampling methods target invasive weed control

"Know your enemy" is good advice for agencies charged with controlling invasive weeds on highway rights-of-way. Conducting an effective inventory of weed infestations, however, often proves to be surprisingly complicated. Researchers at the University of Minnesota found that federal and state agencies use a variety of different methods to assess and manage their weed problems.

The researchers, led by **Donald Wyse** of the Department of Agronomy and Plant Genetics, evaluated different sampling and mapping methods, as well as information on weed population dynamics, in order to make recommendations about successful management practices.

Choosing an appropriate sampling method can help ensure that weed populations are properly identified and located so that weed management activities focus on the areas where they will do the most good. That translates to reduced inspection costs and more effective weed control. Additionally, precise sampling and mapping of weed infestations may permit agencies to shift from an area-management approach to a more selective approach based on the presence of weeds in specific sampled locations, the report suggests.

Management Practices For Weed Control In Roadway Rights-Of-Way (Mn/DOT 2007-42) is available from the CTS Web site.

Intelligent Transportation Systems

Report evaluates freight performance measures

The millions of tons of freight moved on America's roadways every year is a crucial component of the national economy. Analyzing how well freight moves on the roads is the domain of freight performance measure (FPM) systems—specialized software packages that crunch data gleaned from vehicle-tracking systems to determine how quickly freight is being moved. In a new report published by CTS, **Chen-Fu Liao** of the Minnesota Traffic Observatory evaluates the FPM system developed by the American Transportation Research Institute (ATRI) and proposes an "ideal" FPM system to support future needs.

The ATRI system processes raw data obtained from the Automatic Vehicle Location (AVL) systems used by many large trucking companies to track freight movements. These data are input into a geospatial database, which in turn is queried via geographic information system (GIS) software, yielding information about the speed of freight movements.

Scalability—the ability of the system to handle large data sets as well as small ones—emerged as a serious issue in the original system, because the GIS software was not designed to handle extremely large data sets such as those produced by monitoring freight movements over a large geographic area. To overcome this limitation, the current ATRI system (dubbed FPMS II) stores its data in a more powerful database that the GIS software can access.

The "ideal" system proposed by Liao fully separates data pre-processing and storage from the applications—such as GIS, mapping, or Web publishing—that rely on the data. Access to the data is mediated by a "middle tier" data manager system, improving flexibility and overall performance.

Freight Performance Measure Systems (FPMS) System Evaluation and Data Analysis (CTS 08-01) is available from the CTS Web site.

Transit, Bicycling, and Walking

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.

Recent TCRP publications include:

- *Guidebook for Mitigating Fixed-Route Bus-and-Pedestrian Collisions* (TCRP Report 125)
- *Guidebook for Measuring, Assessing, and Improving Performance of Demand-Response Transportation* (TCRP Report 124)
- *Understanding How Individuals Make Travel and Location Decisions: Implications for Public Transportation* (TCRP Report 123)
- *Understanding How to Motivate Communities to Support and Ride Public Transportation* (TCRP Report 122)
- *Toolkit for Integrating Non-Dedicated Vehicles in Paratransit Service* (TCRP Report 121)

Transportation Infrastructure

Research analyzes conversion options for four-lane undivided highways


Keith Knapp

Four-lane undivided highways passing through small towns often have poor safety records, characterized by collisions between left-turning vehicles and oncoming traffic in the opposite lanes. Converting to three lanes with a central two-way turn lane is one solution frequently considered by transportation agencies. But while conversion to three lanes can provide advantages to local stakeholders, **Keith Knapp** cautioned that careful planning is necessary to carry out a successful conversion.

Knapp, research manager for the Center for Excellence in Rural Safety, gave an overview of considerations affecting three-lane conversions in a CTS Research Seminar March 20. A video recording of the seminar is available on the CTS Web site, as well as Knapp's presentation slides.

Throughout his presentation, Knapp drew a distinction between feasibility and desirability. While a conversion may be feasible in many locations, he said, careful analysis is required to determine whether a three-lane cross-section is really desirable in the context of local traffic needs.

To help ensure a successful conversion, Knapp said, it is important to match the highway cross-section to the traffic flow characteristics. If the two center lanes of a four-lane undivided roadway are already being used primarily for left turns, for example, converting to a three-lane cross section may result in a safety improvement without much loss of mobility However, if traffic flow is dominated by through traffic with few turning vehicles, a conversion may not yield appreciable benefits.

Knapp summarized case study roadway evaluations in several locations across the country, including Minnesota, Iowa, Montana, California, and Washington. These successful case study and some simulation analysis, Knapp said, indicate that four-lane to three-lane conversions may be feasible for highway sections that carry between 8,400 and 20,000 vehicles per day. The success of conversions also depends on, among many factors, matching the roadway design to the desires of the local community and properly serving through vehicles and trucks.

Conversions to three lanes generally involve a trade-off of slower speeds for fewer crashes. In many cases, the speed reduction may not be onerous for road users, but it is important to understand how changing the roadway cross-section can affect not just the number of crashes, but the type of crashes that occur as well.

A video recording of "Four-Lane to Three-Lane Conversion Case Study: State Highway Through a Small Town," presented by Keith Knapp, is available on the CTS Web site. Additional information on conversions is available in *Safety and Operational Characteristics of Two-Way Left Turn Lanes* (Mn/DOT 2006-25) (PDF 2.2 MB) and the Iowa DOT's Guidelines for the Conversion of Urban Four-Lane Undivided Roadways to Three-Lane Two-Way Left-Turn Lane Facilities (PDF 630 KB).

Upcoming Events

May 20

Greenhouse Gas Seminar: "Transportation Options in a Greenhouse: Alternative Strategies to Lowering Our Carbon Footprint," 19th Annual CTS Transportation Research Conference, St. Paul RiverCentre, Minnesota. Contact Sara Van Essendelft, 612-624-3708, cceconf5@umn.edu.

May 20-21

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