

# MTC

# MTC

2010-2011 ANNUAL REPORT

IOWA STATE UNIVERSITY  
Institute for Transportation



The Midwest Transportation Consortium is one of 10 competitively awarded Tier 1 University Transportation Centers sponsored by the Research and Innovative Technology Administration (RITA) of the U.S. DOT

# About the MTC

The mission of the University Transportation Centers (UTC) program is to advance U.S. technology and expertise in the many disciplines comprising transportation through the mechanisms of education, research, and technology transfer at university-based centers of excellence. The Midwest Transportation Consortium (MTC) is a Tier 1 University Transportation Center that includes Iowa State University, the University of Iowa, and the University of Northern Iowa. Iowa State University, through its Institute for Transportation (InTrans), is the MTC's lead institution.

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# Acknowledgments

We would like to thank the U.S. Department of Transportation's Research and Innovative Technology Administration (RITA) for funding the Midwest Transportation Consortium. We would also like to thank the Iowa Highway Research Board and the Iowa Department of Transportation (DOT), especially the director of the Iowa DOT's Research and Technology Bureau, Sandra Larson, for continued support of the MTC and its mission. We would also like to thank all the participants in our numerous events and other activities this past year for their time and energy.

Finally, we would like to extend a note of appreciation to our advisory board for their expertise and guidance:

- Tom Welch, State Transportation Safety Engineer, Iowa DOT (retired in 2010)
- Tom Granda, Team Leader, Human Centered Systems Laboratories, Turner-Fairbank Highway Research Center, Federal Highway Administration (FHWA)
- Peter Kissinger, President and CEO, AAA Foundation for Traffic Safety
- Barry Stephens, Senior Vice President Engineering, Energy Absorption Systems, Inc.
- Jerry Roche, Transportation Engineer, Iowa Division, FHWA
- Shashi Nambisan, Director, Institute for Transportation, Iowa State

# Director's Message



This annual report of the Midwest Transportation Consortium (MTC) is its fourth and final report as a Tier 1 program under the current University Transportation Centers (UTC) grant. During 2010–2011, the MTC continued to leverage UTC funding to support progressive transportation safety research, undertake aggressive outreach activities, and educate many bright and talented students.

In summary, during year four, the MTC

- Awarded four new competitive research projects and completed several initiated in previous years,
- Supported dozens of graduate students, providing financial assistance, hands-on research experience, face-to-face time with nationally prominent transportation professionals, opportunities to present at the Transportation Research Board and other venues, and small-group workshops to help them get the most out of their graduate-level program,
- Distributed research results through presentations at many national and international events; papers published in a variety of refereed journals; and online, downloadable reports and technical summaries,
- Actively reached out to potential future transportation professionals through continued support of the online magazine, *Go!*, which introduces teens to opportunities in transportation, and
- Engaged youth in transportation through the Taking the Road Less Traveled, A Career Conference for Girls, which exposes girls to careers in science, technology, engineering, and math; and through a workshop at the annual Iowa 4-H Youth Conference that featured our MiniCym driving simulator

On a bittersweet note, in summer 2010 Reg Souleyrette, associate director of the Institute for Transportation (InTrans) and the MTC's research coordinator, accepted a position as professor of transportation engineering at the University of Kentucky, allowing Reg and his wife Rosemary to return to their Kentucky roots. Recruited to Iowa State University in 1993 by the late Tom Maze, Reg partnered with Tom to build a world-class transportation safety program with a focus on data collection, analysis, and display to support engineering decision-making. Reg's work was instrumental in building InTrans's national reputation for excellence in transportation research and scholarship and in positioning Iowa State to win the Tier 1 UTC grant. Even as we miss his energy, vision, intellect, and friendship, we wish Reg and Rosemary the very best in their old Kentucky home.

I am proud to reflect on the MTC's overall accomplishments and eager to continue building on them. As usual, on behalf of everyone at the MTC, I would like to thank the staff at the U.S. DOT's Research and Innovative Technology Administration, whose guidance has been critical to the MTC's success.

And, finally, I want to thank Reg, Chris, Jan, Paul, Tim, Judy, Nadia, and Marcia, who help run the MTC, as well as the many gifted faculty, staff, and students who are the nuts and bolts of the MTC's research, education, and outreach activities.



Director  
Midwest Transportation Consortium



# The MTC at a Glance

In October 2010, the Midwest Transportation Consortium (MTC) began its fourth year as a Tier I University Transportation Center (UTC). Our theme, “Transportation Safety through Improvements in Management Information Systems,” continues to reflect a strong emphasis on safety.

The MTC is composed of Iowa’s three Regent universities: lead organization Iowa State University (ISU), the University of Iowa (Iowa), and the University of Northern Iowa (UNI). Located in a largely rural region, the MTC focuses its activities primarily on intercity/rural traffic safety for motor vehicles.

All three universities conduct traffic safety research, each within a specific niche:

- ISU – Crash statistics and analysis to support safety in the design and operations of roadways
- Iowa – Human factors to improve safety
- UNI – Geographic information systems (GIS) and statistical tools to conduct safety analyses

The complementary nature of research activities at the member universities and their physical proximity to each other and to the Iowa DOT, the MTC’s major match funding partner, have facilitated efficient and productive partnerships for many years.

The vision of the UTC program is to “serve as a vital source of leaders who are prepared to meet the nation’s need for safe, efficient and environmentally sound movement of people and goods.” The MTC is very proud of the students we have supported at the three schools over the years as they prepare to become the transportation workforce of tomorrow.

MTC students represent a variety of disciplines, including civil and environmental engineering, public policy, urban and regional planning, statistics, computer science, geography, technical communications, psychology, industrial engineering and technology, information systems, graphic design, and human-computer interaction.

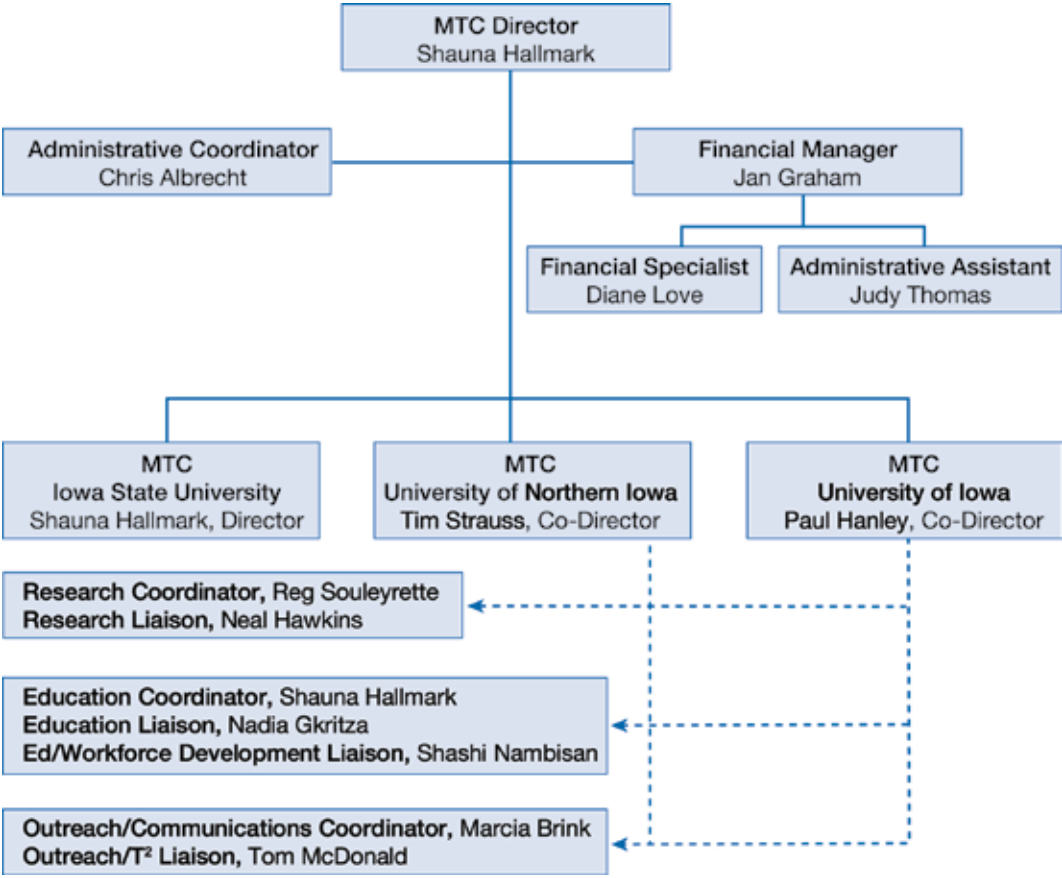
Through our continued research, coursework, and many opportunities for professional development, the MTC continues to produce young men and women who take a multi-disciplinary education to an equally diverse transportation industry.

## Hallmark Receives Safety Honor

Shauna Hallmark received the 2011 Commissioner’s Special Award for Traffic Safety from the Iowa Governor’s Traffic Safety Bureau. She was given this honor for her outstanding service to the cause of reducing injuries and loss of life in traffic crashes in Iowa.

# Organizational Structure and Key Personnel

The MTC is housed in ISU's Institute for Transportation (InTrans). All MTC personnel, beside Dr. Hanley and Dr. Strauss, are InTrans staff on partial appointment to the MTC. The MTC's organizational structure is illustrated below, and key personnel and their roles are described on the next page.





**Shauna Hallmark**, MTC director and principal investigator for the MTC's Tier 1 grant, as well as education coordinator. In these roles, she is responsible for MTC's overall research, outreach, and educational activities and expenditures and directly leads its educational and student recruitment. She is also an associate professor of civil, construction, and environmental engineering at ISU, with a specialization in transportation engineering. In her role as a transportation engineer at InTrans, Dr. Hallmark is principal investigator or co-principal investigator on numerous projects.

**Paul Hanley** and **Tim Strauss**, co-directors of MTC, responsible for administering MTC activities at the University of Iowa and UNI, respectively. Hanley is the director of transportation policy research at the University of Iowa's Transportation Policy Center and associate professor of urban and regional planning. Strauss is associate professor of geography at UNI.

**Chris Albrecht**, MTC administrative coordinator. He administers MTC's annual research solicitation, tracks performance measures to meet UTC reporting requirements, helps recruit students and tracks their activities, oversees logistics for the MTC's spring seminar series, and handles several other administrative tasks. He is a transportation research specialist at InTrans.

**Reginald Souleyrette**, MTC research coordinator. He oversees the MTC's annual solicitation and award of research projects. He is a professor of civil, construction, and environmental engineering at ISU and associate director of InTrans, leading the institute's research and outreach initiatives in geospatial safety information systems.

**Marcia Brink**, MTC outreach coordinator. She is responsible for disseminating MTC-related information via its website and other media and for editing, publishing, and distributing electronic and paper MTC-funded research reports and technical summaries. She is a communications specialist at InTrans.

# MTC Research

The MTC funds research in two ways:

- 1) **Sponsored projects** - Research projects selected through MTC's competitive proposal process, which are monitored by the MTC director, administrative coordinator, and financial manager.
- 2) **Match projects** - Research projects related to the MTC's safety theme, selected on a case-by-case basis by the MTC director in consultation with the research and administrative coordinators, for which MTC provides some level of support, such as partial funding of a student or a partnering relationship.

During year four, the MTC awarded four new sponsored projects:

- **Development of a Bridge Safety Information System for the Saylorville Reservoir Bridge: Structural Response due to Wind Events**
- **Risk Mitigation Strategies to Improve Safety of Transportation Operations and Maintenance Activities**
- **A Study of the Factors that Contribute to Motorcycle Conspicuity**
- **Evaluation and Guidance on Effective Traffic Calming for Small Communities**

Summaries of recently completed and ongoing projects, both sponsored and match, follow. Details of all MTC research can be found online at [www.intrans.iastate.edu/mtc/projects/](http://www.intrans.iastate.edu/mtc/projects/).

## Recently Completed Sponsored Projects

### Behavior Study of Merge Practices of Drivers in Work Zone Closures

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Smart Work Zone Deployment Initiative

The purpose of this project was to identify and document the driver behaviors that are the most detrimental to work zone traffic flow and safety. Behaviors identified included forced merges, tailgating, queue jumping, and lane straddling. Forced merges, which are often discussed as operational problems, are also safety problems, because a driver behind a forced merge has to slow or, in some cases, take some evasive action to avoid colliding with the merging vehicle. Queue jumping also compromises safety, because it creates forced merges and often resulted, in this study, in aggressive actions by other drivers. Lane straddling can also compromise safety by creating forced merges that may not have otherwise occurred. Lane straddling also resulted in several other safety-compromising behaviors: drivers using the shoulder to pass lane-straddling vehicles, drivers attempting to merge into the space previously occupied by the lane-straddling vehicle and resulting in the lane-straddling driver attempting to physically block the merging vehicle, and, in one case, drivers racing abreast until reaching the arrow board, where a forced merge occurred. The project resulted in the development of recommendations for future actions that could be tried to address the operational and safety work zone challenges identified.

### Safety and Mobility Impacts of Winter Weather – Phase 1

Principal Investigator: Zach Hans, Iowa State University

Match Funds: Iowa DOT

This project investigated opportunities for improving traffic safety on state-maintained roads in Iowa during winter weather conditions. The primary objective was to develop several preliminary means for the Iowa Department of Transportation to identify locations of possible interest systematically, with respect to winter weather-related safety performance based on crash history. Specifically, metrics were developed to assist in identifying possible habitual, winter weather-related crash sites on state-maintained rural highways. In addition, the current state of practice, for both domestic and international highway agency practices, regarding integration of traffic safety- and mobility-related data in winter maintenance activities and performance measures were investigated. This investigation also included previous research efforts. Finally, a preliminary work plan, focusing on systematic use of safety-related data in support of winter maintenance activities and site evaluation, was prepared.



## Applicability of Road Assessment Program Methods to Metropolitan Safety Planning

Principal Investigators: Reg Souleyrette and Konstantina Gkritza, Iowa State University

Match Funds: Iowa DOT

The primary objective of this research was to demonstrate the applicability of the usRAP risk mapping protocol to small area urban safety planning. Results show that all four usRAP-style risk maps can help local transportation staff identify the high-risk locations and improve safety features of roads with limited funds, ultimately achieving the highest benefit-cost ratio for both motorists and the general public. More specifically, the usRAP-style maps 1 and 2, which show the crash density and crash rate, respectively, can be used to identify top high-risk locations. The usRAP-style map 3 compares the relative total crash rate for road segments to the average crash rate for similar segments. This map can be used to identify road segments that may not be performing as well as similar roads. The usRAP-style map 4, which shows the potential crash savings, is based on the number of total crashes saved per mile in seven years for each road segment if the crash rate were reduced to the average crash rate for similar segments. This map can be used to identify road segments that may have the opportunity for safety improvements by applying countermeasures, such as infrastructure modifications or enforcement programs.

## Evaluating the Effectiveness of Red Light Running Camera Enforcement in Cedar Rapids and Developing Guidelines for Selection and Use of RLR Countermeasures

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT

The goal of this research was to assess the safety effectiveness of red light running cameras in Cedar Rapids, Iowa. This was accomplished by collecting violations and other data before the cameras were ticketing and then for three time periods after. Violation rates were compared by approach for the before to after period, with decreases noted for all three after periods. Violations were also compared for time of day, with results suggesting that the cameras may be more effective during the daytime. In addition, a negative binomial model was used to evaluate whether red light running violations increased or decreased over time. The model indicated that for each additional month at a given intersection, a 9.3% decrease in violations is predicted. The next analysis assessed whether cameras are effective in reducing late red light runners. Violation rate by time into red was compared by intervals: 0 to less than 1.0 second, 1.0 second to less than 3.0 seconds, and 3.0 or more seconds into the red. Results suggest that the cameras are effective in reducing late red light running. A toolbox for other red light running countermeasures was also developed.



## Horizontal Curve Identification and Evaluation

Principal Investigator: Zach Hans, Iowa State University

Match Funds: Iowa DOT

Under this research effort, methodologies for identifying curves and measuring safety-related parameters on two-lane highways in Iowa were developed. Horizontal curves on all high-speed, paved two-lane roads, and multilane divided roads were identified. Measurements were validated by comparison with data from design plans. The sensitivity of curve safety performance prediction to measured parameters was reported.

## Recently Completed Match Projects

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### Promotion of the Safety Edge

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT and FHWA

The Iowa DOT and the FHWA commissioned this project to develop educational materials and market the Safety Edge to Iowa counties. The Safety Edge is a design feature that creates a fillet along the outside edge of the paved section of a roadway, allowing vehicles that have left the paved travel lane to safely remount the pavement. The team identified upcoming resurfacing projects, held open houses at select locations so that nearby agencies could attend and obtain information about the Safety Edge, and assisted agencies who had questions about the application.

### Improving Traffic Safety Culture in Iowa – Phase 1

Principal Investigators: Konstantina Gkritza and Chris Albrecht, Iowa State University

Match Funds: Iowa DOT

This project involved revisiting safety culture from the diverse perspectives of several disciplines, including public health, education, public policy, social psychology, enforcement, and civil engineering. Specifically, this study summarized the best practices and effective laws for improving safety culture in the United States and abroad, then solicited the opinions of experts in several disciplines. As a result of this work, 11 high-level goals were developed, each in line with Iowa's CHSP and with specific actions to support its success.

## **A Transportation Safety Planning Tool for the City of Ames**

Principal Investigator: Konstantina Gkritza, Iowa State University

Match Funds: Iowa DOT and City of Ames

Transportation planning software helps evaluate safety alternatives for specific corridor segments, but it cannot be applied for screening a network to identify and rank sites for safety improvements or used to assess safety impacts of future changes in population and school density. Therefore, the main objective of this research was to examine the applicability of existing models/tools for forecasting in small and medium-sized communities given changes in socio-demographics, traffic demand, road network, and countermeasures. This research investigated the applicability of three safety analysis methodologies for small-area planning agencies, where the lack of guidance is particularly challenging.

## **Utilization of Remote Traffic Monitoring Devices for Urban Freeway Work Zone Assessment**

Principal Investigator: Zach Hans, Iowa State University

Match Funds: Smart Work Zone Deployment Initiative

There were two primary objectives for this project: to assess urban freeway work zone impacts through use of remote monitoring devices, such as radar-based traffic sensors, traffic cameras, and traffic signal loop detectors, and to evaluate the effectiveness of using these devices for such a purpose. Two high-volume suburban freeway work zones located on Interstate 35/80 through the Des Moines, Iowa, metropolitan area were evaluated at the request of the Iowa DOT.

## **Safety Analysis of Low-Volume Rural Roads in Iowa**

Principal Investigator: Reg Souleyrette, Iowa State University

Match Funds: Iowa DOT

Objectives for this project included identifying common site characteristics that may impact safety performance and creating a system-level, generalized linear model for secondary, low-volume road crashes by isolating crash, driver, and/or roadway variables that are the best predictors of low-volume road crashes. Using descriptive statistics, a test of proportions, and crash modeling, various classes of rural secondary roads were compared to similar roads on the state system in crash frequency, severity, density, and rate for numerous selected factors that could contribute to crashes. The results of this study allowed the drawing of conclusions as to common contributing factors for crashes on low-volume rural roads, both paved and unpaved. Due to identified higher crash statistics, particular interest was drawn to unpaved rural roads with traffic volumes greater than 100 vehicles per day. Recommendations for addressing these crashes with low-cost mitigation are also included.



## Evaluation of Rumble Stripes on Low-Volume Rural Roads in Iowa

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT

The objectives of this research were to install and evaluate the performance of edgeline rumble stripes at six high-crash test locations in Iowa. The first phase of the project found that, in general, the wear of paint markings in the rumble stripes' grooves was similar to the wear on regular surfaces. In addition, research found that design of the milling machine should be modified to allow for use on horizontal curves and to ensure predictable alignment and mill depth. The long-term assessment of pavement marking performance, with preliminary crash assessments and an evaluation of lane keeping, was completed in 2011. Due to low sample size, results of the crash analysis were inconclusive. Lateral position was also evaluated before and after installation of the treatment to determine whether vehicles engaged in better lane keeping. Pavement marking wear was also assessed.

## PONTIS Implementation and Operation

Principal Investigator: Omar Smadi, Iowa State University

Match Funds: Iowa DOT

The objective of this project was to provide support to the Iowa DOT to implement and operate AASHTO's PONTIS software, an integrated bridge asset management system that will enable the Iowa DOT to make objective, cost-effective, and timely decisions regarding bridge maintenance, rehabilitation, and replacement.

## Ongoing Sponsored Projects

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### Use of Crash Surrogate Measures to Assess the Impact of Systematic Improvements and Other Countermeasures on Rural Roadway Safety

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT and Iowa Highway Research Board

The goal of this research is to provide better information about the effectiveness of rural roadway countermeasures for improving traffic safety, with a specific focus on lane departures. The project has three major emphasis areas: summarizing known information about rural lane departure countermeasures, evaluating effectiveness of edge line rumble stripes in reducing lane deviations, and evaluating the effectiveness of horizontal curve treatments in reducing lane deviations.



## Development of a Bridge Safety Information System for the Saylorville Reservoir Bridge: Structural Response Due to Wind Events

Principal Investigator: Travis Hosteng, Iowa State University

Match Funds: Iowa DOT

The objective of this research is to collect structural performance data and environmental data on the Saylorville Reservoir Bridge near Polk City, Iowa. The overall purpose of the research is to develop a self-contained/reporting safety information management system to alert bridge engineers, and more importantly the public, of high wind events and direct/divert traffic to an alternate route should conditions for bridge passage be deemed unsafe based on the collected data. The research will provide critical structural performance data in conjunction with wind speed data to allow the bridge engineers to correlate the measured strains and accelerations of the bridge elements with high-wind events such that the effect of these wind events on the structure may be better quantified.

## Risk Mitigation Strategies to Improve Safety of Transportation Operations and Maintenance Activities

Principal Investigator: Kelly Strong, Iowa State University

Match Funds: Iowa DOT

The objective of this research is to investigate the application of integrated risk modeling to operations and maintenance activities, specifically moving operations such as pavement testing, pavement marking, painting, snow removal, shoulder work, mowing, etc. The ultimate goal is to reduce the frequency and intensity of loss events (property damage, personal injury, and fatality) during operations and maintenance activities.

## The J-Turn Intersection for Rural Expressways: Computer Simulation and Conflict Analysis

Principal Investigator: Reg Souleyrette, Iowa State University

Match Funds: Iowa DOT

The primary objective of this research is to provide improved design guidance for J-turn intersections by learning more about the safety and operational consequences of including or excluding certain geometric design features under various traffic volume conditions. The methodology is to use the VISSIM micro-simulation software package in conjunction with FHWA's Surrogate Safety Assessment Model (SSAM).





## Evaluation and Guidance on Effective Traffic Calming for Small Communities

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT and FHWA (Accelerating Safety Activities Program)

The main goal of the research is to provide tools that agencies can use to design transition zones from high-speed to low-speed roadways. In a previous phase of this research, the team evaluated several traffic calming treatments that were appropriate for small rural communities. Since traffic calming in rural communities is relatively unknown in the U.S., there are several other treatments that may have been effective but could not be evaluated in the first phase. In the current project, the effectiveness of additional low-cost treatments at the entrance to small rural communities is being evaluated. The focus is on the main road within a small community which also serves as a major state or county highway outside the community. The objective of rural community traffic calming is to remind drivers traveling along major state or county highways that they are entering a community and need to adjust their speed accordingly.

## Low-Cost Strategies to Reduce Speed and Crashes on Curves

Principal Investigator: Shauna Hallmark, Iowa State University

Match Funds: Iowa DOT, FHWA, and Iowa Highway Research Board

The objective of this research is to conduct a national field evaluation of dynamic speed signs on rural roadways in six states. The goal is to provide traffic safety engineers and other professionals with additional tools to more effectively manage speeds and decrease crashes on horizontal curves on rural roadways. The team is working with Texas, Pennsylvania, Washington, Florida, Arizona, and Iowa to select high-crash curve locations on two-lane rural roadways, install dynamic speed feedback signs, monitor speeds, and evaluate the reduction in crashes. The team is also identifying and evaluating several low-cost curve treatments for additional evaluation in Iowa.

## A Study of the Factors that Contribute to Motorcycle Conspicuity

Principal Investigator: Dawn Marshall, University of Iowa

Match Funds: Iowa DOT

The three principal objectives of this research are (1) to investigate the impact of modulating headlight, helmet, and torso clothing color on motorcycle conspicuity in daylight, (2) investigate the impact of modulating headlight, helmet, and torso clothing color on motorcycle conspicuity in dusk/dawn, and (3) investigate differences in driver awareness of motorcyclists by age (young and old drivers).



## Asset Management and Safety: A Performance Perspective

Principal Investigator: Omar Smadi, Iowa State University

Match Funds: Iowa DOT and Iowa Highway Research Board

The primary objective of this research is to develop a relationship between operational asset performance conditions (roadway lighting, signage, pavement marking, and pavement condition expressed in roughness and rutting) on safety performance. As a secondary objective, the research team is investigating the feasibility of developing a methodology to prioritize safety improvements based on a benefit-cost analysis relating to individual asset condition (investing in signs versus marking or lighting, for example).

## Ongoing Match Projects

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### Improving Traffic Safety Culture in Iowa – Phase 2

Principal Investigators: Konstantina Gkritza and Chris Albrecht, Iowa State University

Match Funds: Iowa DOT

This project involves continued investigation of traffic safety culture in Iowa and the high-level goals and specific actions that were developed under the first phase. This phase will investigate public opinion concerning the safety culture issues identified in the first phase.

### Spatial Analysis of Teenage Driver Crashes from the Teen Driving Experiment

Principal Investigator: Dan McGehee, University of Iowa

Match Funds: Iowa DOT and University of Iowa

This project involves the spatial analysis of crash locations of teenage drivers who were part of an ongoing videocam teen driving experiment. The locations of the crashes are being analyzed for clustering and related to environmental and driver effects.

### Evaluation of the Safety Edge in Iowa-Phase 2

Principal Investigators: Shauna Hallmark, Tom McDonald, and Robert Sperry, Iowa State University

Match Funds: Iowa DOT

This project involves providing technical assistance to agencies that want to implement the Safety Edge for the first time in paving projects. Locations where the Safety Edge has been applied in Iowa for the 2011 construction season were also recorded so that a future crash analysis can be conducted at these locations.

## **Modeling Driver Behaviors and Vehicle Attributes in Truck Crashes Involving Hazardous Materials**

Principal Investigator: Paul Hanley, University of Iowa

Match Funds: University of Iowa

This project involves the investigation of the physical and environmental attributes that have led to truck crashes involving release of hazardous materials. The project relates several public source datasets from federal agencies that record hazardous materials, releases, and crashes. The combined dataset is the basis for a summary model of the likelihood a crash will occur with a hazardous release and its ultimate direct cost.

## **Accuracy of Weather Station for Crash Reduction in Storm Events**

Principal Investigator: Wilfrid Nixon, University of Iowa

Match Funds: University of Iowa

This project involves the investigation of the maximum spatial coverage away from existing National Weather Stations at which there is a high correlation to actual ground conditions on roadways.

## **The Adoption of In-vehicle Technologies by Teenagers and Twenty-Year-Olds**

Principal Investigator: Miwa Matsuo, University of Iowa

Match Funds: University of Iowa

This research project involves the investigation of the adoption of technology by teenagers and twenty-year-olds and how the technology could be used to reduce crashes.

## **Redevelopment of SAVER**

Principal Investigator: Michael Pawlovich, Iowa DOT

Match Funds: Iowa DOT

SAVER is the acronym for the Iowa DOT's Safety Analysis, Visualization, and Exploration Resource Software. SAVER was developed to serve Iowa's safety communities by enabling them to access, visualize, and explore Iowa's crash dataset via a GIS interface. SAVER generates output map displays, a wide variety of reports, and collision diagrams. Users can specify a location and/or query the dataset prior to requesting the aforementioned output. Redevelopment of SAVER within a freely distributable, open source GIS is ongoing, with periodic distribution of the current version to established SAVER users.

## **Driver Choice Under Uncertain and Ambiguous Driving Conditions**

Principal Investigator: Paul Hanley, University of Iowa

Match Funds: University of Iowa

This project involves the investigation of drivers' decision making under both uncertain and ambiguous conditions as it effects route choices when forced to detour from known routes due to road closures.

## **Adverse Weather Effects on Safety and Mobility**

Principal Investigator: Wilfrid Nixon, University of Iowa

Match Funds: University of Iowa

This project involves the analysis of how Medicaid consumers altered their travel to medical and non-medical trips in Iowa. The study is based on travel data collected from 2,500 Medicaid members and correlates their trip making efforts with concurrent weather conditions.

# Education and Workforce Development

The MTC continues to focus a significant share of its resources and energy on developing “human capital” — strategic educational activities for graduate and undergraduate students and workforce development activities for K–12 students.



## Graduate and Undergraduate Education Activities

For many years, the MTC has taken great pride in providing support for graduate and undergraduate students' academic preparation for professional careers in transportation. Toward this end, the MTC funds graduate student research assistantships plus a variety of educational, research, and professional enrichment activities.

MTC students study in a variety of disciplines as diverse as the transportation industry. These include civil engineering, community and regional planning, statistics, technical communications, geography, and the interdisciplinary transportation degree program.

### Research Assistantships

The majority of MTC funding is devoted to graduate student research assistantships, advancing both the MTC's educational and research missions. Qualifying students receive assistantships to work on safety-related research projects (either MTC sponsored projects or MTC match projects). In addition to conducting successful research, students are expected to participate in the Tom Maze Transportation Spring Seminar Series and submit quarterly research progress reports to MTC.

### Educational and Professional Development Activities

The MTC organizes educational events and provides student funding for conference attendance, student meetings, and other professional development activities.

***Student of the Year.*** Every year one student is selected as MTC Student of the Year based on their overall record in terms of research, presentations, publications, student activities, and course grades. Justina Kotek was chosen to represent the MTC in this role in 2010 and received a fully paid trip to the Transportation Research Board (TRB) annual meeting in Washington, D.C., in January 2011. Justina graduated in May 2011 with a master's degree in psychology from the University of Northern Iowa. In addition, the MTC recently selected Nicole Oneyear as 2011 Student of the year. Nicole recently graduated from Iowa State University with a master's degree in civil engineering and is now pursuing her Ph.D. at the same university. She will be recognized during the upcoming 2012 TRB annual meeting.



***Attendance at TRB.*** As has been a tradition for many years, several students received partial funding from MTC to attend the 2011 annual meeting of the TRB in Washington, D.C. Students attended numerous sessions, poster events, and committee meetings.

**Tom Maze Transportation Spring Seminar Series.** Each spring semester, the MTC sponsors a weekly transportation seminar and hosts speakers from around the country. The seminar provides students with a broad picture of regional, national, and international transportation issues with a focus on transportation safety. Students and faculty at the University of Missouri-Columbia and University of Missouri-St. Louis, former region 7 UTC consortium member universities, also participated this year. In addition, researchers and professional staff from Iowa DOT and FHWA, Iowa Division, regularly attend the seminar series.

In spring 2011, 14 presentations were made, as listed in the following table.

<b>Date</b>	<b>Speaker</b>	<b>Topic</b>
January 14	Chris Albrecht, Iowa State University	Introduction to the Tom Maze Transportation Seminars
January 21	Rema Nilakanta, Iowa State University	Go! Magazine: Extending Transportation to K-12
February 4	Dan McGehee, University of Iowa	Driver Distraction: Definitions and Data
February 11	A.J. Million, Missouri DOT	Seven Strategies for Search
February 18	Chuck Taylor, Awake! Consulting	Logistics and the Supply Chain Industry
February 25	Jeremy Vortherms, Iowa DOT	Safety Focus in Iowa
March 4	Wilfrid Nixon, University of Iowa	Sustainability in Winter Maintenance
March 11	Rick Kaufmann, City of Columbia, Missouri	Roundabouts and Traffic Problems
March 25	Ken Warbritton, Missouri DOT	Implementing Design-Build
April 1	Rhonda Hamm-Niebruegge, Lambert-St. Louis International Airport	Operations at Lambert-St. Louis International Airport
April 8	Peter Appel, U.S. DOT - RITA	RITA Mission and National Transportation Policy
April 15	Kent Lande, The Louis Berger Group	The Role for Engineers in Nation Building
April 22	Forrest Van Schwartz, Global Transportation Consultancy	High Speed Rail in China
April 29	Carlos Sun, University of Missouri	Is Robo-Cop a Cash Cow?

#### The MTC Welcomes RITA Administrator Peter Appel

On April 8, 2011, Peter Appel, administrator of the U.S. DOT's Research and Innovative Technology Administration (RITA) was the guest lecturer at the MTC's Tom Maze Transportation Seminar, where he spoke about national transportation policies and priorities. During a fast-paced and, in his words, "uplifting day", Appel toured the Institute for Transportation (InTrans), the MTC's administrative home, met with students about their research projects, and got an up-close-and-personal look at the new MiniCym mobile driving simulator. Appel noted the breadth and depth of MTC/InTrans activities and of its partnerships and collaborations both within the university and with agencies such as the Iowa DOT and industry. He said he was impressed by "the passion that so many . . . students and faculty exhibited toward advancing research in transportation safety," as well as the "insight and academic rigor" that MTC students bring to their research projects.

## MTC Student Awards

Many MTC-sponsored students have received special recognition for their research and studies in the last several years.

During the past year alone, two MTC students received Dwight David Eisenhower Graduate Fellowships through FHWA. Steve Lavrenz and Jian Gao both received 2011 fellowships that helped fund their thesis research and will allow them to attend the 2012 TRB annual meeting.

In addition, another MTC graduate student received a significant honor during year four. Nicole Oneyear received the Dean's fellowship through the Iowa State University College of Engineering.

Ms. Oneyear was also awarded first place in the student poster competition at the 2011 Midwest ITE Annual Meeting, which was held in Dubuque, Iowa.

Also at the 2011 Midwest ITE Annual Meeting, the Iowa State University Transportation Student Association (TSA) received a first place award for outstanding student chapter report, as well as a 5th place score (out of 10 teams) for the Jeopardy-style Traffic Bowl competition.

Finally, Steve Lavrenz, MTC graduate student in civil engineering, was honored in February 2011 by ISU's Engineering Student Council as its Outstanding Member for 2010–2011. This award recognized his extensive contributions to the Transportation Student Association (TSA), not only as vice president but also, as stated in the nomination submitted by fellow MTC graduate student Teng ("Alex") Wang, for being a "great spokesman and all-round go-to person."



## MTC Students Earning Degrees

During year four, the MTC supported dozens of students. The MTC sees this support as one of its most important investments. During this year, 15 students completed their master's degrees at MTC member universities, while four students finished a PhD. The recent graduates are as follows:



***Basak Aldemir-Bektas***

PhD, 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

***Corey Bogenreif***

MS, 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

***Brad Bybee***

MA, 2011, Public Policy, UNI, Cedar Falls, Iowa

***Urvashi Chakraborty***

MS, 2011, Urban and Regional Planning, University of Iowa, Iowa City, Iowa

***Saravana Chellappan***

MS, 2011, Computer Science, ISU, Ames, Iowa

***Dan Cook***

MS, 2010, Civil Engineering (Transportation), ISU, Ames, Iowa

***Huishan Duan***

MS, 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

***Nick Hatz***

MS, 2011, Civil and Environmental Engineering, University of Iowa, Iowa City, Iowa

***Justina Kotek***

MA, 2011, Psychology, UNI, Cedar Falls, Iowa

***Maria Silvina Lopez-Barrera***

MArch, 2010, Architecture, ISU, Ames, Iowa

***David Neyens***

PhD, 2010, Industrial Engineering, University of Iowa, Iowa City, Iowa

***Nicole Oneyear \* (also ongoing PhD candidate pursuing degree at ISU)***

MS, 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

***Massiel Orellana***

PhD, 2011, Plant Breeding, ISU, Ames, Iowa

***Souhail Saad***

MS, 2011, Industrial Technology, UNI, Cedar Falls, Iowa

***Lei Sun***

MS, 2010, Urban and Regional Planning, University of Iowa, Iowa City, Iowa

***Evan Vencil***

MS, 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

***Teng Wang***

MS, 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

*Elizabeth Westlake*

MS, 2010, Urban and Regional Planning, University of Iowa, Iowa City, Iowa

*Lora Yekhashatyan*

PhD, 2010, Industrial Engineering, University of Iowa, Iowa City, Iowa

## MTC Students Pursuing Degrees

At the end of year four, the following students continue to pursue their degrees:

*Tika Adhikari*

PhD, expected in May 2015, Geography, University of Iowa, Iowa City, Iowa

*Kristen Appleson*

MS, expected in May 2013, Urban and Regional Planning, University of Iowa, Iowa City, Iowa

*Ben Dow*

MS, expected in December 2011, CAD-Research Engineering, University of Iowa, Iowa City, Iowa

*Haoran Du*

MS, expected in May 2012, Urban and Regional Planning, University of Iowa, Iowa City, Iowa

*Sourabh Dawar*

MS, expected in May 2012, Information Systems, ISU, Ames, Iowa

*Jian Gao*

MS, expected in May 2012, Civil Engineering (Transportation), ISU, Ames, Iowa

*DeVeon Harris*

MA, expected in December 2011, Geography, UNI, Cedar Falls, Iowa

*Joshua Hochstein*

PhD, expected in December 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

*Nicole Hollopeter*

MS, expected in December 2011, Industrial Engineering, University of Iowa, Iowa City, Iowa

*Yu-Yi Hsu*

PhD, expected in December 2011, Statistics, ISU, Ames, Iowa

*Asha Khokale*

MS, expected in December 2011, Computer Science, ISU, Ames, Iowa

***Steve Lavrenz***

MS, expected in December 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

***Yunna Li***

MS, expected in May 2012, Urban and Regional Planning, University of Iowa, Iowa City, Iowa

***Suyun Ma***

PhD, expected in May 2015, Civil and Environmental Engineering, University of Iowa, Iowa City, Iowa

***Jay Mathes***

MS, expected in May 2013, Construction Engineering, ISU, Ames, Iowa

***Britta Mennecke***

MA, expected in May 2012, Graphic Design, ISU, Ames, Iowa

***Luke Miller***

MA, expected in May 2012, Geography, UNI, Cedar Falls, Iowa

***Abhisek Mudgal***

PhD, expected in December 2011, Civil Engineering (Transportation), ISU, Ames, Iowa

***Joseph Olsen***

BS, expected in May 2012, Civil and Environmental Engineering, University of Iowa, Iowa City, Iowa

***Nicole Oneyear***

PhD, expected in May 2014, Civil Engineering (Transportation), ISU, Ames, Iowa

***Yu Qiu***

MS, expected in May 2013, Statistics, ISU, Ames, Iowa

***Archit Saraf***

MS, expected in December 2011, Computer Science, ISU, Ames, Iowa

***Mohammed Shaheed***

PhD, expected in May 2014, Civil Engineering (Transportation), ISU, Ames, Iowa

***Nikhil Sikka***

PhD, expected in May 2012, Civil and Environmental Engineering, University of Iowa, Iowa City, Iowa

***Adam Sorelle***

MA, expected in May 2012, Public Policy, UNI, Cedar Falls, Iowa

***Bennett Stone***

MS, expected in May 2012, Human Computer Interaction, ISU, Ames, Iowa

*Jeff Von Brown*

MS, expected in December 2011, Transportation, ISU, Ames, Iowa

*Bo Wang*

MS, expected in May 2012, Civil Engineering (Transportation), ISU, Ames, Iowa

*Hai Yu*

PhD, expected in May 2015, Civil and Environmental Engineering, University of Iowa, Iowa City, Iowa

## **K-12 Education Activities**

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In addition to supporting university-level education, the MTC funds several activities focused on guiding younger people into transportation education and careers. Following is a list of a few of these activities:

### **Taking the Road Less Traveled**

Every year the Program for Women in Science and Engineering at ISU sponsors one-day conferences—Taking the Road Less Traveled—to expose girls in grades 6 through 12 to career paths in science, technology, engineering, and math (STEM). It is held twice a year, and approximately 2,500 girls from Iowa participate annually. During the conference, different career tracks in STEM fields are presented by faculty or working professionals. A career track on transportation and civil engineering was previously developed using MTC resources. MTC Director Shauna Hallmark and graduate student Nicole Oneyear presented in 3 sessions in the fall of 2010 and 3 sessions in the spring of 2011 to approximately 30 girls per session.

### **Go! Magazine**

MTC is the major sponsor of *Go!*, an innovative online magazine designed to attract teens to careers in transportation. *Go!*, a workforce development project of InTrans, has been making steady headway since its inception just a few years ago. During the past year, the MTC continued its increased support, funding students and staff presentations at career fairs and conferences. With the support of the MTC and its other major sponsor, the FHWA, *Go!* accomplished the following in year four:

- *Go!* initiated exciting improvements, based on user feedback and taking advantage of the technology savvy of its young audience. These improvements included an energetic new website design that premiered in December 2011 – the first step in transforming *Go!* from a basic website to a more engaging experience. The goal of this change was to expand *Go!*'s impact by getting

more and more young people across the country active in its development and content, with the potential to be a cornerstone tool in the national transportation workforce development effort.

- *Go!* joined TSA at Engineering Day in Spring 2011 and the Engineering Ames Middle School Day in Fall 2011.
- Staff presented *Go!* at the “Teaching with Energy” class offered by the Center for Energy and Environmental Education at ISU.
- Staff presented a session on *Go!* at the 2011 American Society for Engineering Education conference in Vancouver, and at the Iowa World Language Association on the *¡Vamos!* collaboration.
- Since its redesign last Fall, *Go!* has published feature stories that include interviews with women in transportation, like former Iowa DOT Director Nancy Richardson and truck driver Lisa Kelly (Ice Road Trucker), and articles and blogs on distracted driving and public transportation.
- Also, *¡Vamos!* now has its own url ([www.vamos-explora-trans.org](http://www.vamos-explora-trans.org)) and is on its way to becoming an independent magazine.
- Staff initiated the “*¡Vamos!* ¡A Traducir! Spanish 499 Translation Internship” for students in the Spanish program at ISU established in Fall 2011. Students in the Spanish program now work as *¡Vamos!* translators.
- *Go!* has interns from the Greenlee School of Journalism and Drake University.
- *Go!* was highlighted in the May-June 2011 edition of TR News from TRB.



## Toying With Technology<sup>SM</sup> (TWT)

Toying with Technology (TWT) is a program developed by two Iowa State University engineering professors to provide technology literacy to education majors in non-technical fields and expose them to science, engineering, and technology. Part of the course involves developing, executing, and participating in actual lesson plans incorporating engineering and technology. One aspect of the class that has been difficult to address was engineering resources. The MTC sponsors a 1-credit seminar course (Trans 691) which requires a class project. This class, under the direction of MTC Director Shauna Hallmark, teamed up with the TWT class in Spring 2011 to combine engineering student expertise with education expertise. Trans 691 students presented several transportation engineering topics to their team and then worked with the education students to develop lesson plans. Class requirements included developing an objective, co-curricular standards, lesson plans, unit learning assessment, and resources for the unit such as worksheets. Topics presented included transportation and the environment, design of roadway signs, using maps, how bicycles work, hybrid vehicles, and red light running cameras.

## 2011 Iowa 4-H Youth Conference

On June 29 and 30, 2011, MTC and Go! staff participated in Iowa's statewide 4-H youth leadership conference. MTC sponsored two workshops on each day. The first workshop featured the InTrans MiniCym driving simulator. During each 1.5 hour session, 16 students (32 over the 2 days) took turns in the simulator in a scenario that tested their ability to respond to cognitive distractions, including attempting to respond to text messages. In addition to the MiniCym, students in this workshop participated in a broader classroom discussion focused on distracted driving and traffic safety. The event was held just prior to implementation of official penalty (ticketing/enforcement) under Iowa's distracted driving law. The second workshop involved a hands-on classroom setting where students were able to test their general transportation knowledge after calculating fuel savings for utilizing hybrid bus technology.



## Other STEM Curriculum Development

MTC-sponsored programs have been developing STEM curricula for teachers in K-12 in order to engage students in transportation. The benefit of this approach is two-fold. First, students are exposed to the field and, second, they are learning important concepts that will benefit them when they begin formal college or trade training. Two of these efforts are as follows:

- *Go!* Curriculum Connections (ISU): *Go!* provides a tool to develop and support an informal STEM education curriculum. Content is hosted on *Go!*'s website along with other transportation-related curricula (<http://go-explore-trans.org/go/gonew/?/categories/curriculum>)
- Developing Energy Education Curriculum (ISU in conjunction with the Iowa Office of Energy Independence): Math and chemistry curriculum content focusing on energy is being developed for high school students based on two MTC-funded projects (one on hybrid school buses and the other on biodiesel).

## Collaborative Workforce Development Activities

The MTC has partnered with a number of groups to develop the transportation workforce of tomorrow. Over the years, MTC's primary partners have been the Iowa DOT and the FHWA, but several private associations work with the MTC on these activities as well.

In just the past few years, the MTC has been actively involved in the national effort to assess the need for and develop tomorrow's transportation workforce. In 2010, a two-day regional transportation workforce development summit was hosted by the MTC and InTrans at ISU. The purpose of this regional summit was to assess the educational and training needs of the future transportation workforce in the upper Midwest and identify strategies and best practices to address those needs across various career paths. This event was one of several regional summits sponsored by the US DOT RITA's UTC Program and the FHWA.

Building on the experience and momentum from the 2010 event, MTC has been involved in planning the National Transportation Workforce Summit. Both Shashi Nambisan, director of InTrans, and Shauna Hallmark serve on the planning team for the summit to be held in April 2012. The national event will bring findings from the various regional events together into a national workforce development plan of action. The MTC is a gold sponsor for the conference.

# Outreach and Technology Transfer

Outreach activities during year 4 were very diverse, including traditional dissemination of MTC research through our newsletter and website, sponsorship of conferences and workshops, dissemination of research reports and technical briefs, and subject area experts working directly with communities locally and internationally. Also during this year, the MTC continued working closely with Iowa Local Technical Assistance Program (LTAP) staff to identify partnering opportunities for translating safety-focused research findings into practice for Iowa's cities and counties.





## Newsletter and Website

Two issues of the *MTC Bulletin* covering major MTC activities and accomplishments were printed and distributed during year four. They can be found online at [www.intrans.iastate.edu/mtc](http://www.intrans.iastate.edu/mtc). The MTC website, which was completely redesigned in early 2011, continues to showcase the breadth of activities sponsored by the MTC.

## Sharing Research Results

Abstracts of current projects are provided on the MTC website. When a research project is completed, a full final report and a short technical summary, plus any related articles or guidelines, are published online for downloading and/or printing.

## Project Advisory Committees

Every MTC sponsored (competitively selected) research project must have an advisory committee. Practitioners who participate in these committees learn about the project and the MTC and often become champions in implementing project results.

## Selected Outreach Activities

MTC has long supported research conferences and participation by its staff and students, as well as numerous other technology transfer and outreach activities. The MTC was involved in several successful events in the past year. Following are a few examples:

### 2011 Mid-Continent Transportation Research Symposium

As part of InTrans, MTC partners with the University of Wisconsin-Madison's Midwest Regional UTC to host the Mid-Continent Transportation Research Symposium in alternate years. The symposium provides a regional venue for presenting research in a TRB-like track format. The tenth annual event was hosted by InTrans and MTC in Ames on August 18-19, 2011. Several ISU researchers and students presented. The University of Wisconsin will host the symposium in Madison in 2012.



## Safety Edge Outreach

Shauna Hallmark (ISU), Tom McDonald (ISU), Bob Sperry (ISU), Jerry Roche (Iowa Division, FHWA), and Keith Knapp (Director of Iowa LTAP) presented “Marketing and Outreach for the Safety Edge” at the USDOT Sponsored Research Demonstration and Exhibit on April 6, 2011. The session highlighted the impact of university research to the USDOT. Potential exhibits were submitted as part of a rigorous application process. Of roughly 70 entries, only 27 were chosen for display. The session was held at the USDOT Headquarters in Washington, D.C.

## I-WALK Safe Routes to School Webinar

Chris Albrecht, MTC program coordinator, has worked with the Northeast Iowa Food and Fitness Initiative (NIFFI) to help guide the group toward a shared vision of the built environment that encompasses this seven-county area. In March 2011, Chris was asked to present in a webinar focused on safe routes to schools improvements for the region.

## Iowa Traffic Safety Data Service (ITSDS)

ITSDS provides agencies with the most readily available crash data analysis resources in Iowa. It was created to fill the gap between the safety data users can gather for themselves and the data they can obtain from experts. ITSDS uses the latest in geographic information systems technology developed by the Iowa DOT. The service provides free crash data analyses and mapping services for anyone who needs to examine crash data to make decisions about funding, improving roads, implementing enforcement, writing reports, designing presentations, or increasing traffic safety awareness. It is jointly sponsored by InTrans, the MTC, the Iowa DOT, and the Iowa Governor’s Traffic Safety Bureau.

## Corridor Management Activities

Chris Albrecht continues to serve as one of Iowa’s primary resources for access management-related research. In addition to serving in an advisory role to Iowa DOT personnel, Chris provides access management expertise to stakeholders along southeast Iowa’s Heartland Highway Corridor. During the past year, he gave numerous informational presentations and helped solidify a corridor management agreement among the many jurisdictions. In addition, he worked with the Highway 61 Coalition in eastern Iowa in a similar capacity.

## Mapping Services for U.S. Road Assessment Program (usRAP)

Initiated in 2004 by the AAA Foundation for Traffic Safety (AAAFTS), the usRAP pilot program assesses crash risk on U.S. roads and provides the risk information to highway agencies. The MTC is a technical partner to the Midwest Research Institute (MRI). When state or local-jurisdiction crash data are not available or adequate for creating risk maps, MTC students trained as usRAP technicians use video logs to populate a database of roadway design and traffic control features, then correlate the features with crash risk and assign ratings to segments. Agencies can use the results to develop safety improvement programs. In addition, MTC students have been instrumental in creating star ratings maps for countries in Latin America through the International Road Assessment Program (iRAP). A partnership with a multinational navigation mapping corporation has been initiated to explore automation of the video reduction process.

## International Activities

Several MTC personnel are involved in research and technology transfer activities with an international impact. During the past year, MTC staff participated in the following activities:

- Shauna Hallmark presented research on sustainable speed management in rural communities at the IEEE Forum on Integrated and Sustainable Transportation Systems in Vienna, Austria in July 2011.
- Chris Albrecht has been active in the international winter maintenance and road weather communities for several years. He was recently quoted in the October-November 2011 issue of *Traffic Technology International* in an article about integrated weather-related technologies that support and enhance the efficiency of pavement maintenance activities and more. In the article, Albrecht discusses the potential value of mobile sources for filling in data gaps, as well as the promise of weather-related technologies for supporting road work in all seasons.
- Omar Smadi, principal investigator on several MTC projects, has traveled extensively abroad to present the latest on infrastructure management research that has drawn heavily from projects sponsored by the MTC. In August 2011, he was the keynote speaker at the International Conference on Road and Airfield Pavement Technology conference in Bangkok, Thailand, where he spoke on asset management and decision-making. Dr. Smadi also presented information on SHRP 2 program data collection and the Naturalistic Driving Study at the 2011 Developments in Pavement Assessment meeting in Birmingham, UK.



## Journal Papers and Papers in Conference Proceedings

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Refereed journal papers and papers published in conference proceedings during year four include the following:

- Gkritza, K., M. Baird, Z. Hans. “Deer-vehicle Collisions, Deer Density and Land Use in Iowa’s Urban Deer Herd Management Zones”, *Accident Analysis and Prevention*, 42(6), 1916–1925 (November 2010).
- Isebrands, Hillary N., Shauna L. Hallmark, and Wen Li. Safety Impact of Roadway Lighting at Rural Intersections. *ASCE Journal of Transportation Engineering*. Volume 136, Issue 11. November 2010. pp. 949-955.
- Anastasopoulos, P.C., B. G. McCullough, K. Gkritza, F. L. Mannering, and K. C. Sinha, “Cost savings analysis of performance-based contracts for highway maintenance operations”, *ASCE Journal of Infrastructure Systems*, 16(4): 251-263 (December 2010)
- Hallmark, Shauna, Massiel Orellana, Eric J. Fitzsimmons, Thomas McDonald, and David Matulac. Evaluating the Effectiveness of an Automated Red Light Running Enforcement Program in reducing Crashes in Iowa using a Bayesian Analysis. *Journal of the Transportation Research Board*. Vol. 2182. 2010. pp. 48-54.
- Boeckenstedt, R., K. Gkritza, R.R. Souleyrette, and S. Nambisan, “Implications of Bio-economy-based Fuel Production to the Transportation Infrastructure in Iowa”, *Transportation Research Record, Journal of the Transportation Research Board*, 2191: 84-89 (2010)
- Gkritza, Konstantina, Caroline R. Kinzenbaw\*, and Shauna Hallmark. An empirical analysis of farm vehicle crash injury severities on Iowa’s public road system. *Accident Analysis and Prevention*. *Accident Analysis and Prevention*. Vol. 42, No 4. 2010. pp. 1392-1397.
- Hallmark, Shauna L., Eric Fitzsimmons, Hillary Isebrands, and Karen Giese. Evaluating the Traffic Flow Impacts of Roundabouts in a Signalized Corridor. *Journal of the Transportation Research Board*. Vol 2182. 2010. pp. 139-147.
- Nambisan, S. S. and G. J. Karkee, Do Pedestrian Countdown Signals Influence Vehicle Speeds? *Transportation Research Record #2149, Journal of the Transportation Research Board, National Academy of Sciences*, pp 70-76, 2010.
- V. Vasudevan and S. Nambisan, Analysis of Effects of Cafe Standards, Hybrid and Alternative Fuel Vehicles on Fuel Tax Revenues, Paper Number 11-2381, CD-ROM Preprints of the 90th Annual Meeting of the Transportation Research Board, National Academy of Sciences. Washington, D.C., January 23-27, 2011.
- V. Vasudevan, S. Pulugurtha, S. Nambisan, and M. Dangeti. Evaluating the Effectiveness of Signal-based Countermeasures on Pedestrian Safety, Paper Number 11-1511, CD-ROM Preprints of the 90th Annual Meeting of the Transportation Research Board, National Academy of Sciences. Washington, D.C., January 23-27, 2011.

- Wei Zhang, Konstantina Gkritza, Nir Keren, Shashi Nambisan. Evaluation of Iowa's Driver Improvement Program, Paper Number 11-0663, CD-ROM Preprints of the 90th Annual Meeting of the Transportation Research Board, National Academy of Sciences. Washington, D.C., January 23-27, 2011.
- G. Karkee, S. Nambisan, and S. Pulugurtha, Motorist Actions at a Crosswalk with an In-Pavement Flashing Light System, *Traffic Injury Prevention Journal*. Vol. 11, No. 6, pp 642-9, 2010.
- Nambisan, Shashi, Rema Nilakanta, and Shauna Hallmark. "Benefits and Challenges of Go!: An Innovative Online Publication to Attract Teens to Transportation." 118th ASEE Conference and Exposition. June 2011.
- Hallmark, Shauna and Abhisek Mudgal. Comparison of Emissions at Roundabouts Compared to Traditional Traffic Control. Proceedings of the 2011 Annual Meeting of the Air and Waste Management Association. Orlando, Florida. June 2011.
- Mudgal, Abhisek and Shauna Hallmark. Evaluation of Emissions Due to Driver Variability. Proceedings of the 2011 Annual Meeting of the Air and Waste Management Association. June 2011.
- Hallmark, Shauna, Abhisek Mudgal, and Bo Wang. Comparison of Speed-Acceleration Profiles for Roundabouts Compared to Traditional Traffic Control: Implication for Emissions. 2011 Annual Meeting of the Air and Waste Management Association. June 2011.
- Nambisan, Shashi, Rema Nilakanta, and Shauna Hallmark, Benefits and Challenges of Go!: An Innovative Online Publication to Attract Teens to Transportation, Proceedings of the Annual Conference of the American Society for Engineering Education, Vancouver, BC, Canada. Reference number AC 2011-1849. June 26-29, 2011.
- Sanford-Bernhardt, Kristen, Rhonda Young, Andrea Bill, Steven Beyerlein, Michael Kyte, Kevin Heaslip, David Hurwitz, and Shashi Nambisan. A Nationwide Effort to Improve Transportation Engineering Education, Proceedings of the Annual Conference of the American Society for Engineering Education, Vancouver, BC, Canada. Reference number AC 2011-1528. June 26-29, 2011.
- Hallmark, Shauna and Neal Hawkins. Sustainable Speed Management in Small Rural Communities. IEEE Forum on Integrated and Sustainable Transportation Systems. Vienna, Austria. July 2011.
- Hallmark, Shauna, Abhisek Mudgal, and Bo Wang. In-Use Fuel Economy of Hybrid-Electric School Buses in Iowa. *Journal of the Air and Waste Management Association*. Vol. 61. pp. 504-510. 2011.
- Hallmark, Shauna, Yu Qiu, and Linda Boyle. Assessing the Likelihood of a Lane Departure Event using Naturalistic Driving Study Data. 3rd International Conference on Road Safety and Simulation. September, 2011. Indianapolis.

- Abhisek Mudgal, Kasthurirangan Gopalakrishnan, and Shauna Hallmark. Prediction of Emissions from Biodiesel Fueled Transit Buses Using Artificial Neural Networks. *International Journal of Traffic and Transport Engineering*. Vol. 1, No. 2. pp. 115-131. 2011.
- Gkritza, K., M.G. Karlaftis, and F.L. Mannering, “Estimating multimodal transit ridership under a varying fare structure”, *Transportation Research Part A*, 45(2): 148-160 (2011)
- Rentziou, A., C. Milioti, K. Gkritza, M.G. Karlaftis, “Urban Road Pricing: Modeling Public Acceptability”, *ASCE Journal of Urban Planning and Development*, 137(1): 56-64 (2011)
- Wu. D., D.C. Aliprantis, K. Gkritza, “Electric Energy and Power Consumption by Light-Duty Plug-in Electric Vehicles”, *IEEE Transactions on Power Systems*, 26(2): 738-746 (2011)
- Gkritza, K., I. Nlenanya, W. Jiang, R. Sperry, D. Smith, “Infrastructure Impacts of Iowa’s Renewable Energy”, *Transportation Research Record, Journal of the Transportation Research Board*, 2205: 238-246 (2011).
- Zhang, W., K. Gkritza, N. Keren, S. Nambisan. “Age and Gender Differences in Conviction and Crash Occurrence subsequent to being directed to Iowa’s Driver Improvement Program,” *Journal of Safety Research*, Volume 42, Issue 5, pp. 359-365, 2011.
- Hallmark, Shauna, Yu Qiu\*, and Linda Boyle. Assessing the Likelihood of a Lane Departure Event using Naturalistic Driving Study Data. 3rd International Conference on Road Safety and Simulation. September, 2011. Indianapolis.
- Hallmark, Shauna L., Neal Hawkins, and Omar Smadi. Assessment of the Effectiveness of Adding Reflectorized Treatments to Existing Chevrons on High Crash Curves. 90th Annual Meeting of the Transportation Research Board. Paper Number: 11-3476. 2011.
- K.K. Knapp. Reducing Crash Fatalities on Rural Roadways: Estimating Impacts of Legislation-Based Safety Improvement Measures. In the *Transportation Research Record* 2213. Transportation Research Board, National Research Council, Washington, D.C., 2011.

## **Presentations at Conferences/Workshops**

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During year four, several MTC staff and students presented research sponsored by the MTC or related to the MTC’s theme. Selected presentations include the following:

- Hallmark, Shauna L. and Neal Hawkins. Effectiveness of Traffic Calming for Speed Management in Small Rural Communities to Enhance Safety and Quality of Life. *Transportation Systems for Livable Communities Conference*. Washington, DC. October 2010.
- Hallmark, Shauna and Nicole Oneyear. Use of Red Light Running Camera Enforcement in Iowa. *ASCE Transportation Conference*. Ames, Iowa. November 2010.

- Nambisan, Shashi S., Robert Sperry, and Erin Breen. Enhancing Road Safety through Education and Outreach. 5th International Road Federation Regional Conference on Institutional Arrangements for Reduction of Road Fatalities, New Delhi, India. November 25-26, 2010.
- Hallmark, Shauna, Bob Sperry, and Abhisek Mudgal. Fuel Economy Benefits of Hybrid Electric School Buses in Iowa. Iowa Energy Center 20th Anniversary Conference. Ames, Iowa. November 2010.
- K.K. Knapp. Transportation Research Board Annual Meeting. Washington, D.C. Improving Safety on Rural Roads: A Data Deficient Environment. January 2011
- K.K. Knapp. Transportation Research Board Annual Meeting. Washington, D.C. Minnesota Local County Safety Plans – An Overview. January 2011.
- Hallmark, Shauna, Tom McDonald, Bob Sperry, Jerry Roche (Iowa Division FHWA), and Keith Knapp. Marketing and Outreach of the Safety Edge in Iowa. US DOT Sponsored Research Demonstration and Exhibit – April 6, 2011. Washington, DC.
- B. Stone, R. Nilakanta, S. Nambisan, and S. Hallmark. Evaluation of the Effectiveness of an Online Transportation Workforce Development Tool, 22nd Annual Transportation Research Conference, Center for Transportation Studies, University of Minnesota, St. Paul, MN. May 24-25, 2011.
- Oneyear, Nicole and Shauna Hallmark. Evaluating the Effectiveness of Red Light Running Camera Enforcement in Cedar Rapids, Iowa. Mid-Continent Transportation Research Symposium. Iowa State University. Ames, Iowa. August 2011.
- Nambisan, Shashi, Rema Nilakanta, and Shauna Hallmark. Go! Magazine. Mid-Continent Transportation Research Symposium. Iowa State University. Ames, Iowa. August 2011.

# Funding Sources and Expenditures

## Sources

As illustrated below, the US DOT’s UTC program has funded 46 percent of the MTC’s Tier 1, \$6.5 million program to date, and the following match partners have funded 54 percent to date:

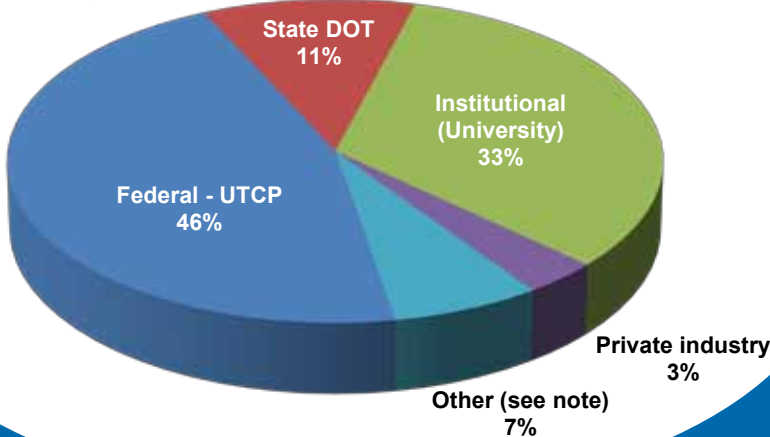
- 33 percent institutional
- 11 percent Iowa DOT
- 3 percent private industry
- 7 percent other

## Expenditures

The three universities that comprise the MTC have expended approximately \$6.5 million in federal and match funding since the start of its Tier 1 grant. The expenditures originated at the partner universities as follows:

- 83 percent at ISU, the lead university
- 12 percent at University of Iowa
- 5 percent at UNI

**Sources of Funds 10/1/07 - 9/30/11**  
\$6.5 million



\* “Other” is research funding from U.S. DOT DTFH61-07-H-00022 (Legislative Authority for funding: Section 5203 (c) Technology Deployment Program – Section 503 (c) of title 23, US Code of SAFETEA-LU), an allowable source per UTC General Provisions.

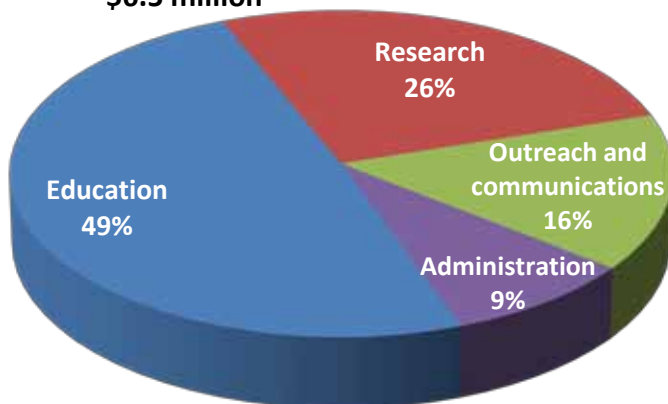


As shown in the figure below, approximately half of all expenditures to date were for the educational component of the program. However, since all MTC-supported students are expected to participate in research and work on projects, approximately a third of the educational expenditures could also be considered to be part of the research component.

The general breakdown of expenditures is as follows:

- 49 percent direct educational support for students, including
  - Stipends, fringe benefits, tuition, registrations and professional development travel and student events
  - Faculty and staff coordinating the educational program, mentoring and advising students
  - Hosting the spring semester seminar (speaker and technical support, luncheon meetings with visiting speakers and professionals)
  - Partial support of *Go!* magazine
- 26 percent MTC sponsored research and MTC match projects
- 16 percent technology transfer/outreach, including MTC newsletters and other publications, web development and maintenance, project reporting, conference and webinar sponsorship and participation, etc., in addition to the usRAP outreach activity
- 9 percent computer support, event coordination, and departmental administration

**Uses of Funds** 10/1/07-9/30/11  
\$6.5 million





2010-2011 Annual Report

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