

W77 Western Transportation

Western Transportation Institute Biennial Report 2008-2010

Western Transportation Institute

2008–2010 Biennial Report

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College of Engineering Montana State University



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ABOUT THE **Institute**

At the Western Transportation Institute, based in Southwest Montana, we understand rural in the unique way that comes only with living what you study. We know what rural transportation looks like, what it feels like, how it moves and how central it is to the entire transportation system. That's not to say that our work, such as our studies on intelligent transportation systems or recycled construction materials, doesn't often translate to the urban environment. It certainly does. But rural is what moves us most.

WTI is a leader in research on the concerns of today's transportation networks. With a focus on rural problems, cultural transformation and sustainable road systems, we work with federal agencies, state DOTs, private-sector companies and nonprofits to deliver real-world solutions. WTI is a designated USDOT National University Transportation Center at Montana State University. We work across the country and internationally to raise the bar in transportation research. We use science to address social issues and continually strive to make communities more livable through public transportation and positive community norms.

WTI's primary goal is to conduct collaborative research to discover the safe and sustainable solution to the problem. We are responsive to the needs of the US DOT as we work together to establish and tackle national priorities, and we support the efforts of our partners at state DOTs, because they are on the ground every day dealing with crumbling infrastructure, accidents, icy roads and technology. With our partners, we are committed to building and enhancing a national transportation system that will work when it is needed most. We know it is important to start research with a theory and a lab setting but we take the next step to ensure the research results will solve a real world problem. Our researchers don't offer up attractive theories—they offer implementable solutions.





MESSAGE FROM THE **Director**



American history can be viewed in three transformative ages: starting from the agrarian age, moving through the industrial age, and now shifting into the information age. Transportation has largely followed suit, with the horses, wagons, and sailing ships of the 19th century being replaced by the cars, trains, and airplanes of the 20th century. As we adapt to the new realities of the information age, we must expect that our transportation system will undergo fundamental change as well.

The challenges before us are formidable, but the opportunities are exciting. A modern transportation system must focus on more than moving people and products from point A to point B—a more holistic approach is necessary to incorporate the economic, cultural and environmental changes that are also taking place. As we begin to realize the limits of technology and science, WTI is addressing the human factors that contribute to over 80 percent of traffic incidents. People, themselves hold the key to increasing safety through their daily choices—wearing seatbelts and driving distracted or impaired.

WTI provides a synergistic environment where these systematic changes can take shape and develop. Our programs are designed to nurture and accelerate this transformation:

- **Research** Our research projects increasingly take a collaborative approach, bringing in researchers from different disciplines and institutions or stakeholders with various interests, in order to ensure that multiple ideas and points of view are considered. We also embrace the possibilities presented by new technologies and cultural transformation to address long-standing challenges.
- Education Our educational programs reach out to students across a broad range of ages, backgrounds, and academic interests, in order to expand and diversify the next generation of transportation professionals.
- **Technology Transfer** Our technology transfer programs embrace both extensive stakeholder outreach efforts as well as training tools like webinars to move toward substantially more rapid and widespread implementation of transportation research advancements.

In this Biennial Report, you will read about some of our efforts in each of these three areas that support the concept of long-term change and developing more livable communities.

WTI appreciates the support of all of our national, state, and local research partners who have contributed to our accomplishments over these last two years. We look forward to our ongoing collaborations to reshape where we're going and how we get there.

Stychen Mps Steve Albert, Director

Rural is...

- 83 percent of the nation's land
- 21 percent of its population (50 million people)
- 18 percent of jobs, 14 percent of earnings
- 2,300 of approximately 3,000 counties

RURAL RESEARCH Matters

The Western Transportation Institute has been pioneering rural transportation research since 1994 because rural transportation has a set of challenges that are different from urban but are just as critical to address. Declining populations in some rural areas create funding shortfalls and the inability to preserve infrastructure while rapidly increasing populations due to exurban migration in other areas create an immediate need for new infrastructure. Is the priority to maintain the old for a small population or build new for a growing population? Rail branchline abandonment has reduced rail service leading to increased use of highways for freight movement and these very highways may be in poor condition due to lack of maintenance funding. WTI is working on more sustainable and durable materials so the roads and bridges will last longer. As the national population ages so does the rural population but access to public transit is often scarce and medical services are at greater distances. What happens if you can no longer drive but your doctor is 200 miles away? Researchers at WTI are helping implement public transit systems in low population areas by leveraging existing partnerships in the communities. Making roads safer for all is critical in the rural setting because accidents are more likely to result in fatalities due to the time it takes to detect, respond and transport the long distance to the hospital. Thirty five percent of bicyclist fatalities occur in rural areas for this very reason. What happens if you are in an accident but you have no cell coverage to call for an ambulance? WTI researchers are working on these issues too-keeping the roadway free from snow and ice, reducing animal vehicle collisions and improving communications. Rural is more complex and interrelated than it initially appears and the challenges are what motivate WTI researchers and staff to keep moving forward and looking for implementable solutions.



Each of our research focus areas have many examples of collaborative and innovative research approaches that are transforming the way we look at the problem, which in turn has changed the way we pursue the solution. On the following pages are notable, ongoing efforts drawn from WTI's portfolio of projects. Some projects address issues that will have a long-term fundamental impact on the U.S. transportation system. Others showcase changes to the research process itself, such as creative research team collaborations and development of new research tools or facilities. Both types of projects illustrate how WTI continues to strive to conduct research with implementable solutions in response to the needs of our project partners.

Dear Mr. Cuelho,

I just wanted to compliment you and Steve Perkins on the subject report. I just found it from a Pool Fund posting for "Relative Operational Performance of Geosynthetics Used as Subgrade Stabilization." It is the first report of research that I found to have information about behavior of aggregate—geosynthetic—soft soil system behavior under repeated axle loadings. Some of the things, such as the change in pore pressure, vane shear, and DCP readings are interesting, perhaps because they support my expectations.

Again, I thought it was an excellent piece of work and an excellent report.

Sincerely, Erland Lukanen, P.E. Pavement Preservation Engineer Minnesota Department of Transportation

Safety and Operations—providing a safe and efficient environment for travelers and transportation workers

Enhancing traveler safety and roadway operations has been the cornerstone of WTI research since its inception. Pioneers in the development and deployment of Intelligent Transportation Systems in rural locations, we have broadened our expertise to include human factors, traveler information, multi-jurisdictional coordination of operations, and in-vehicle technologies. WTI has one of the largest research simulator suites in the nation in our state-of-the-art Driver Simulation Laboratory, and we are conducting nationally significant research on rural driver behavior.

Strategic Goal Addressed:

Safety

Challenge Addressed:

Unsafe operations in the patient and driver compartments of an ambulance

Why it matters:

On average, medics are restrained only 42 percent of the time while a patient is being treated in a moving emergency vehicle In this first of its kind project, WTI has partnered with the nonprofit Critical Illness and Trauma Foundation and a major industry provider of emergency medical services, American Medical Response, to observe the conditions of emergency medical personnel while working

in a moving emergency response vehicle. The "Naturalistic Safety Evaluation of a Medic's Work Environment During Rural Emergency Response" project includes the use of onboard monitoring equipment that allows for review and evaluation of movements of medics during emergency response. Based upon research findings, the project will include development of a series of environmental, ergonomic, policy, and training recommendations, designed to mitigate circumstances that cause potentially unsafe operations in the driver's and patient's compartment of an ambulance.

"This groundbreaking study will influence the provision of emergency care at the provider, agency and manufacturing levels. Safer vehicles, interior designs based on reach analysis, agency policies concerning safety restraint use will all contribute to a safer environment for both emergency care providers and their patients."

-Nels D. Sanddal, President, Critical Illness and Trauma Foundation, Inc.

Research Partners: Critical Illness and Trauma Foundation and American Medical Response





Winter Maintenance and Effects-testing new methods to clear roads in all types of weather

The Winter Maintenance and Effects program at WTI develops solutions for transportation agencies who must keep roads open, safe, and well-maintained during and after severe weather events. Using the Corrosion and Sustainable Infrastructure Laboratory as a starting point, researchers can test materials and practices for effectiveness and

Strategic Goals Addressed:

State of Good Repair Environmental Sustainability

Challenges Addressed:

- Provide real-time road treatment guidance customized for each maintenance route
- Achieve better understanding of the interactions between the snow/ice layer, deicers applied, and pavement characteristics

Why it matters:

U.S. uses 20 million tons of deicing salts to keep roads clear of snow and ice each year

durability. Once a new method is lab tested, WTI's outdoor test track in Lewistown, Mont., TRANSCEND, is ready to accommodate road testing, with the capability to create a wintery road scenario on demand. A growing number of projects conducted by WTI will help maintenance personnel select winter maintenance treatments, products and procedures that are also environmentally sensitive.

In 2008 WTI's Winter Maintenance researchers collaborated with the Safety and Operations program to demonstrate the benefits of Maintenance Decision Support Systems (MDSS). MDSS is an integrated software application that provides transportation agency managers and maintenance engineers with realtime road treatment guidance. While the implementation of decision support tools such as MDSS for winter road maintenance has been demonstrated to produce significant benefits for road agencies and users, additional research is needed to better understand the interactions between the snow/ice layer, the deicers applied, and the pavement itself in order to optimize the snow and ice control strategies and tactics. In this context, researchers began work on the Laboratory Testing of Mixed Deicers project in 2009. This project aims to address a knowledge gap in deicer performance and impacts and facilitates the paradigm shift to multi-criteria decision making.

Research Partners: USDOT/Research and Innovative Technologies Administration, FHWA and state DOTs from South Dakota, California, Colorado, Indiana, Iowa, Kansas, Minnesota, New Hampshire, North Dakota and Wyoming

Road Ecology—increasing habitat connectivity through state-of-thepractice crossing structures and the first ever "Fish Olympics"

WTI has emerged as a national leader in the advancement of road ecology. Internally, we have nurtured our staff and technical expertise, and externally we are building an increasing number of innovative partnerships to expand research in this field. WTI plays a leadership role in a project that is attracting new partners to the study of habitat connectivity. As part of the improvement of Interstate 90 over Snoqualmie Pass in Washington State-which will ultimately include numerous wildlife crossing structures-WTI is conducting wildlife monitoring on behalf of the Washington Department of Transportation. The project is expected to have a number of research benefits, such as the identification of barriers to wildlife movement and potential habitat linkages, the detection of rare carnivores that may inhabit the region, and the collection of data that will facilitate ongoing highway mitigation and monitoring efforts. WTI helped recruit a broad spectrum of public and private research partners to work together on this effort and as a result, the project presents a successful example of how identification and integration of common interests can also enhance how research is conducted and advanced. The project not only raises awareness of an emerging issue (habitat connectivity) among a new group of stakeholders, but also provides a funding collaboration model that can be replicated in other regions or for other issues.

Strategic Goal Addressed:

Environmental Sustainability

Challenge Addressed:

Reduce transportation impacts on ecosystem; impacts on mammals by highways, impacts on fish by hydraulic structures like culverts

Why it matters:

28,000 vehicles cross the Cascade Mountains at Snoqualmie Pass on I-90 in Washington State every day

"The Western Transportation Institute's

wildlife monitoring research program will allow WSDOT to understand how our investments in ecological connectivity perform over time and incorporate lessons learned into future phases of design and construction. We turned to WTI because a wildlife monitoring research program of this spatial and ecological scale was beyond our capacity, and we needed a project partner with the skill, expertise and ability to carry out the task. We've been very pleased with WTI's research methods and data, and look forward to continuing our collaboration and partnership with them to deliver a successful project."

-Jason Smith, WSDOT South Central Region Environmental Manager

Research Partners: Washington State Department of Transportation and United States Forest Service (Pacific Northwest Research Station)

Another Road Ecology success story is the Assessment of Fish Swimming Capabilities project, also known as the Fish Olympics. The project was to collect data on native west slope cutthroat and rainbow trout to provide a clearer picture of how aquatic species pass through hydraulic structures such as bridges and culverts and lead to better assessments, designs, retrofits and construction of these structures. What resulted was multiple research specialists—ecologists, biologists, and engineers—attracting diverse public and private funding partners, to create a shared test bed facility that can be used long after the west slope cutthroat and rainbow trout data has been collected. The facility consists of a large flume in which the water speed and temperature can be controlled. The fish enter the flume where their volitional swimming capabilities are tested in a variety of water speeds and temperatures; thus the name "Fish Olympics." A unique feature of the flume is the ability to inexpensively increase the water temperature by utilizing a nearby hot spring, which provides a free source of hot water. Warmer temperatures are needed to test the volitional swimming capabilities of prairie species such as the pallid sturgeon. The investment in the test bed will attract and promote interdisciplinary research and help train engineers, biologists and ecologists, whose collaborations will more effectively solve future problems not only in the mountain west but across the nation.

"The synergy of this project—the contributions of funding, expertise and space to achieve a combined greater effect—was very unique."

-Kevin Kappenman, Bozeman Fish Technology Center of the United States Fish and Wildlife Service

Research Partners: Turner Enterprises, Inc., Bozeman Fish Technology Center of the United States Fish and Wildlife Service (BFTC-USFWS), USDA Gallatin National Forest (USDA-GNF), the Montana Chapter of the American Fisheries Society and the USFWS's Plains and Prairie Potholes Landscape Conservation Cooperative

Infrastructure Maintenance and Materials—creating customized snow removal guidelines and building with recycled materials

As the safety and durability of transportation infrastructure becomes a national priority, WTI's Infrastructure Maintenance and Materials program leads state-of-the-practice research on advanced or recycled materials and innovative design techniques. Increasingly, researchers work across programs and laboratories to address multiple engineering and environmental aspects of infrastructure construction and maintenance.

Strategic Goals Addressed:

State of Good Repair Environmental Sustainability

Challenges Addressed:

Improve understanding of anti-icing principles and effective use Expand use of recycled materials in road infrastructure

Why it matters:

Weather related crashes cost an average of \$42 billion annually in the US while \$2.3 billion is spent to keep roadways clear of snow and ice Approximately 42 million tons of U.S. produced fly ash are dumped into landfills each year

Since 2008, WTI's Infrastructure team has been collaborating with the Winter Maintenance and Effects team on a project establishing best practices for snow and ice removal in California. The objective of this research was to develop guidelines for optimal snow and ice removal operations designed specifically for California highway environments and to comply with recent state legislation mandating reduced salt usage. The research synthesized information regarding winter maintenance best practices, and established a set of preliminary guidelines for safe, effective, environmentally conscious, and fiscally responsible winter maintenance practices in California. These guidelines were established through a carefully crafted laboratory investigation followed by field operational tests at TRANSCEND to predict and verify the viability of selected chemicals under various real world road and weather scenarios. The research results from this project will have an immediate positive impact on the California highway system as the department can make better decisions with respect to reducing the amount of chemicals and cost for snow and ice removal operations while providing safe, reliable winter highways for the traveling public. This project is another successful example of collaboration between multiple research disciplines, laboratories, and stakeholders.

Research Partners: USDOT/Research and Innovative Technologies Administration, California Department of Transportation

Using the Advanced Materials Lab, WTI researchers are developing and evaluating concrete mixes that use fly ash (a recycled material) as substitute for traditional Portland cement and recycled pulverized glass as the aggregate. Concrete is the most widely used construction material in the world and its use is anticipated to continue to expand in response to world population growth. The environmental impacts of using concrete as a construction material are significant, from the CO₂ emitted during its production to the disturbance of virgin land for the production of aggregates and extraction of limestone. There is a compelling need for creating concrete from greener materials such as those already in the waste disposal stream to reduce the environmental impact and reduce the stockpiling of waste products such as glass and fly ash, which is produced by coal fired power plants. A NSF project "Building Green: Development and Evaluation of the Design Properties of an Environmentally Friendly Concrete" hopes to realize both of these benefits by examining fly ashes from power plants across the country, making concrete samples and then testing them for durability. This project will culminate in a large scale demonstration project using conventional construction equipment and techniques.

"The contributions of Montana DEQ and WTI, a balance of finding new markets and testing new materials, creates the perfect partnership. Our work together has allowed us to accomplish great things as we continue to seek and execute beneficial reuses of industrial by-products."

> -Dusti Johnson, Recycling and Market Development Specialist, Montana Department of Environmental Quality

Research Partners: National Science Foundation (NSF), USDOT/Research and Innovative Technologies Administration, Combustion Byproducts Recycling Consortium (CBRC) and Montana Department of Environmental Quality (DEQ)

Systems Engineering Development and Integration—delivering real-time traveler and weather information to rural locations

The deployment of Intelligent Transportation Systems (ITS) in a rural setting has been the cornerstone of WTI's research agenda since its inception. With this emphasis on advanced technologies, the Systems Engineering, Development and Integration program provides software development, systems testing, and other high level technical support across all of WTI's research program areas. The Systems group has developed an advanced laboratory facility, and offers extensive engineering capabilities to WTI researchers as well as research partners from other organizations.

Building on an already solid partnership with an impressive history of delivering intelligent transportation systems to rural areas, WTI and the California Department of Transportation (Caltrans) have been developing the Automated Safety Warning Controller (Controller) device. This roadside system, designed specifically for rural applications, monitors road and weather conditions in remote areas and directly

Strategic Goal Addressed: Safety

Challenge Addressed:

Increase the accuracy of weather and driving conditions information through aggregation of data from multiple existing sources—eliminating the need for additional infrastructure purchases

Why it matters:

Adverse weather is associated with over 1.5 million motor vehicle crashes each year resulting in over 800,000 injuries and 7,400 fatalities

Annually drivers endure over 500 million hours of delay due to fog, snow and ice





updates driver warning systems accordingly by activating changeable message signs or flashing beacons. Successful deployment of the Controller device will aid in improving the accuracy, timeliness and reliability of hazardous condition warnings to the travelling public.

Research Partners: Caltrans and USDOT/Research and Innovative Technologies Administration

WTI is also partnering with (Caltrans) and the Mineta Transportation Institute at San Jose State University to develop an easy-to-use web-based tool for California's airports and heliports, particularly those used for EMS, which provides them with localized and timely weather condition and forecast information. The team has developed and launched a website with a prototype system that displays aviation weather conditions and forecasts for the entire state. In a single location, this tool currently integrates a range of data from numerous sources and displays it on state maps. Users can view current or forecast conditions across a region, or zoom in on a specific location. From there, users can select the specific data they need, such as wind speeds aloft or on the ground, satellite photos, pilot reports, or National Weather Service alerts. The project has the potential to increase safety for both air and surface travelers, without the installation of additional sensors or other major infrastructure.

"With this tool, we will be able to provide a higher level of service to small and rural airports and to enhance the safety and efficiency of our transportation systems across multiple modes without investing in a major expansion of weather station infrastructure. To us, that clearly demonstrates the value of a long-term commitment to research and innovation."

-Mandy Chu, Caltrans Project Manager

Research Partners: Mineta Transportation Institute (San Jose State University), California Department of Transportation, USDOT/Research and Innovative Technologies Administration

Mobility and Public Transportation—making rural communities more livable

In rural and frontier areas, transit is often critically needed to provide mobility for those who lack access to basic services (grocery store, medical care, education, etc.). However, despite the critical need, public agencies have traditionally considered transit systems to be unfeasible and unaffordable in areas with such low population density. WTI's Mobility and Public Transportation program has helped a growing number of rural areas and small communities create or expand public transit options by identifying innovative ways to coordinate services.

Strategic Goal Addressed:

Livable Communities

Challenge Addressed:

Increase access to public transportation for frontier communities

Why it matters:

Two-thirds of rural Americans—60 million people have inadequate access to public transportation

Winner of 2010 Transportation Planning Excellence Award for Planning Leadership and Tribal Transportation Planning, which is a national biennial award sponsored by FHWA and FTA in conjunction with the American Planning Association

WTI assisted a rural Montana community with the foundational steps for creating a transit system. While basic transit services existed in the county seat, the low population density in the outlying areas (1.5 residents per square mile) had previously made it difficult to establish a transit system that would allow residents to access the services. At the request of Opportunity Link, a nonprofit organization based in Havre, Montana that strives to reduce poverty in their region, WTI researchers collected data, developed a coordination plan, made implementation recommendations, and developed the application to the Montana Department of Transportation for funding. In 2009, the North Central Montana Transit (NCMT) became a reality. Connecting small communities across the Hi Line, the fare free service runs between Havre, Harlem, Chinook, and two Native American reservations—Box Elder (Rocky Boy) and Fort Belknap along with service twice per week to Great Falls, where a larger hospital and other services exist. In the first week of operation, NCMT provided 139 rides. After a year in operation, it had provided 18,136 rides, which is equivalent to almost the entire population of Hill and Blaine counties where the system located. Due to this success a fourth route has been added, which speaks volumes about the critical importance of the transit service. Local funding came from partners including Montana State University-Northern, Blaine and Hill counties, Northern Montana Hospital in Havre, and other local agencies/organizations. The success of NCMT has shown how, through partnerships and coordination, public transportation can succeed in rural and frontier areas.

"We've identified accessible regional transportation as an effective means to empower and grow our local economies."

-Barbara Stiffarm, Executive Director, Opportunity Link

"The system's success illustrates how ac-

cess to safe, reliable, and affordable transportation can open up opportunities for low-income and nondriver families that would otherwise be inaccessible. For example, Violet Billy holds a job as an opening supervisor at a Wendy's restaurant in Havre. Before NCMT, the only way she could get to work was to hitchhike. 'If not for the bus,' she says, 'I would probably be unemployed, and very likely on welfare.'"

> -Robert Wood Johnson Foundation, Center to Prevent Childhood Obesity

Research Partners: Opportunity Link

"The WTI partnership is a fantastic

effort that unifies our campuses and provides expanded expertise for both. Instead of building competing organizations we have joined together to capture the synergy of our research and workforce development efforts. This is not only good for MSU and Montana Tech; it is good for Montana, the northwest and the nation."

–Dr. Hal Millegan, WTI's lead on the Montana Tech campus



Montana Safe Routes to Schools

Many communities today struggle with "livability issues," including traffic congestion, increasing pollution emissions, and a growing number of children who are inactive and overweight. The Safe Routes to Schools (SRTS) program is a national initiative to increase the number of children who walk or bike to school and to create safer environments surrounding schools. The SRTS programs are sustained efforts by parents, schools, community leaders and local, state and federal governments to improve the health and well-being of children. The programs examine conditions around schools and conduct projects and activities that improve safety and reduce traffic and air pollution in these areas. As a result, these programs make biking and walking to school a safer and more appealing transportation choice, thus encouraging a healthy and active lifestyle from an early age. More specifically, the Montana Safe Routes to School state program distributes \$1 million per year to competitively selected individual community level programs to help with infrastructure projects such sidewalks, traffic calming, speed reduction and crossing improvements, as well as education and outreach efforts. WTI staff is implementing and coordinating the SRTS program in Montana, on behalf of the Montana Department of Transportation.

Why it matters:

In 1969, 42 percent of students walked or biked to school, by 2001 that number had fallen to less than 16 percent

Montana Tech and WTI Cross-University Campus Integrated and Coordinated Transportation Research and Education

Montana Technology of the University of Montana and the Western Transportation Institute at Montana State University have signed a Memorandum of Understanding to integrate and leverage national, state, and local research and workforce development activities in the area of transportation. The MOU establishes an efficient framework from which transportation research and education can be accomplished cooperatively by the partners, under WTI leadership.

Key Focus Areas:

- Engineering: civil, environmental, geological, geophysical, metallurgical, electrical, mechanical, industrial
- Advanced technologies

- Materials
- Academic education
- Professional capacity building

Centers

Paul S. Sarbanes Transit in Parks Technical Assistance Center

Resource management professionals in public lands are the dedicated stewards of some of this nation's most beautiful and iconic places. Every day, they try to maintain the delicate balance between maximizing access for current visitors and preserving resources for future visitors. Towards that end, the Paul S. Sarbanes Transit in Parks Technical Assistance Center (TAC) was created to help land managers develop and implement successful alternative transportation projects. The TAC, led by WTI, is a one-stop shop for information, training, and technical support designed for resource management professionals who face transportation challenges. The TAC is sponsored by the Federal Transit Administration (FTA) in partnership with other federal land management agencies (Department of the Interior, National Park Service, Bureau of Land Management, U.S. Fish and Wildlife Service, USDA Forest Service, U.S. Bureau of Reclamation, Bureau of Indian Affairs). TAC services are provided by WTI and a nationally recognized team of public and private transportation professionals. This team has extensive expertise on transportation and public lands issues, with "on-theground" knowledge and experience at more than 80 federal land units. In 2010, the TAC launched its core services, including the help desk, Web site, an electronic newsletter and training workshops.

Why it matters:

The federal government owns nearly 650 million acres of land—almost 30 percent of the land area of the U.S.

Center for Health and Safety Culture

Health and safety is impacted by culture. Focusing on single solutions like infrastructure improvements or vehicle design alone is insufficient towards achieving comprehensive safety. The Center for Health and Safety Culture uses a proven process to transform cultures measurably improving health and safety outcomes.

Key issues:

- Transportation Safety
- Workplace Safety
- Substance Abuse Prevention
- Public Health
- Organizational Leadership
- Violence Prevention

"If we want health, we must promote health. The

solution is in the community."

-Jeff Linkenbach, director Center for Health and Safety Culture

Montana Local Technical Assistance Program (LTAP)

LTAP builds on long-standing relationships among partners that include the Montana Association of County Road Supervisors, Montana Association of Counties, Montana League of Cities and Towns, American Public Works Association, National Association of County Engineers, and Montana Department of Transportation.

Key training areas

Safety:

- Work Zone Certification Programs, Work Place Safety Training Workshops Infrastructure Management:
- Roadway Design, Construction, Operations and Maintenance Workshops
 Workforce Development:
- New Skills Development and Certification for Transportation Employees Organizational Excellence:
- Technical Leadership/Crew Supervision, Workforce Summits, Peer Exchanges, MACRS Spring Convention

"LTAP's training programs have helped us improve and maintain the safety of our road system."

-Tom Fairbank, Blaine County Road Supervisor

Laboratories



WTI has a full suite of its own laboratories to support all of the research groups, as well as access to additional laboratories and equipment, such as those on the campus of Montana State University and Montana Tech.

TRANSCEND

Located in Central Montana at the former Lewistown airport, TRANSCEND's research center offers four miles of real-world paved test surface, snow making equipment, and a comprehensive communications, power, and data networking infrastructure. The 230 acre facility offers extensive space for large and custom-designed projects. Some of the projects conducted to date include testing de-icing equipment and techniques, evaluating animal detection systems, and confirming the durability of fly-ash concrete.

Driving Simulator Laboratory

The high-fidelity driving simulation facility includes a suite of driving simulators that enables research capabilities across a full range of fidelity and ecological validity, including: PC-based desktop simulators, a virtual reality nonmotion simulator, and a new state-of-the-art eight channel motion base simulator. This facility provides an ideal setting to collect data on driver performance and behavior in a variety of driving scenarios custom-designed to meet the needs and budgets of transportation research projects. The lab includes equipment to measure eye glance behavior correlated in real time with objects in the virtual environment, and a software configurable dashboard with touch screen and multimodal interface capabilities (visual, 3D sound, pedal, seat and pedal haptic feedback) to develop and test different system interfaces.

Murdock Naturalistic Driving Fleet and Lab

The Murdock Naturalistic Driving Fleet and Lab uses vehicles and sensor systems to help researchers find ways to make rural roads in the U.S. less deadly. The vehicles can be equipped with a variety of data logging and measuring devices to evaluate the driver's performance in real world driving scenarios. Future use of the Murdock equipment includes assessing the validity and transferability of simulated training for teen drivers.

Laboratories

Corrosion and Sustainable Infrastructure Laboratory

The Corrosion and Sustainable Infrastructure Laboratory enables researchers to understand and mitigate the effects of materials corrosion on transportation systems as well as promote the sustainability of transportation infrastructure. WTI uses the lab to conduct problem-driven research in a collaborative manner with emphasis on improved materials integrity, environmentally responsible maintenance and use of advanced technologies.

Materials Laboratories

The Materials labs test the mechanical properties of a variety of innovative materials used in transportation construction, such as geosynthetics or green highway materials like 100 percent fly ash concrete. Using a state-of-the-art servo-hydraulic testing system, researchers are able to simulate traffic loading to accurately study the behavior of these materials when placed in typical transportation environment.

Systems Engineering Development and Integration Laboratory

The Systems lab facilitates engineering, development and integration of Intelligent Transportation Systems, information technology and communications systems for rural areas. The lab serves as a testbed for numerous technologies and provides space and technology for a range of exercises including assembling and testing prototypes, and includes fabrication capability.

TRAIL

The Transportation Research Application and Instrumentation Laboratory (TRAIL) simulates a small urban and rural Traffic Management Center. The lab serves as a comprehensive research and training center for ITS technologies. This facility assists communities with traffic operations and special event congestion management, data acquisition and growth planning by collecting and sharing data for use by various agencies to determine community needs and provide solutions to ongoing problems.

WHERE TRANSPORTATION RESEARCH "MEETS THE ROAD"

Transformative change of a transportation system occurs when research advancements are put into practice not in one place, but on a widespread basis and become standard practice. Technology transfer plays a crucial role in this process, by disseminating research results in formats that practitioners can easily access, understand, and use. The following sections describe some of our major technology transfer initiatives and activities, including a few highlighted success stories.

WTI Kicks Off North American Wildlife Crossing Design Competition

In response to an emerging critical priority for both transportation and natural resource agencies to make highways safer for both motorists and wildlife, WTI and the Woodcock Foundation initiated the North American Wildlife Crossing Design Competition (ARC). The competition will raise international awareness and promote realistic context sensitive solutions for safe, efficient, cost-effective, aesthetically pleasing and environmentally friendly mitigation. Wildlife crossing structures, constructed either over or under transportation corridors, have had demonstrated success decreasing wildlife-vehicle collisions and maintaining connectivity for wildlife. The competition selected a site in Colorado where the expansion of the highway will require a wildlife crossing structure. Competitors are encouraged to explore creative new approaches, materials, and designs that address the fundamentals of transportation engineering and wildlife ecology. The competition engages landscape architects, engineers, ecologists and others, in the interdisciplinary nature of road ecology with a real-time, in-situ application. Five finalists were recently selected and the winner will be announced in January 2011. The competition Web site is www.arc-competition.com.

Nurturing Future Collaborators: WTI mentors New UTCs

As a long-established UTC with a history of successful research collaborations, WTI receives frequent requests to visit or meet with newer UTCs, who wish to learn about WTI's strategic, organizational, and management practices. WTI views this as a valuable mentoring opportunity to nurture productive collaborators, and establish working relationships that will lead to future partnerships. WTI has met with representatives from the University of Alaska, the University of Vermont, Oregon State University and Oklahoma State University, either prior to their federal designation as a UTC or shortly thereafter, in order to assist with their start-up activities.

Several of the UTCs stated that WTI's guidance and recommendations helped get their research programs underway more quickly, while also encouraging them to develop a long-term approach. Mentors believe that the entire UTC system benefits from this process, by building up the national reputation and integrity of the program at large.

World Usability Day

WTI hosted a workshop on November 13, 2008 to mark World Usability Day, an event founded in 2005 by the Usability Professionals' Association to ensure that services and products important to human life are easy to use and can be operated by users to achieve specified goals effectively and safely. Transportation was the focus for 2008. A mode of transportation is considered "usable" if it is easily accessible and safely moves a wide range of people; it must also be sustainable and not conflict with the local ecology. The workshop at WTI, one of over 200 that took place worldwide on that day, included presentations on topics of safety, accessibility, and sustainability within different transportation modes, including road vehicles, public transit, bicycling and pedestrians. In addition to the wide variety of information, participants also toured WTI's suite of advanced driving simulators, which are used to study driver behavior and traffic engineering.

WTI Hosts Webinars

WTI often hosts webinars for research staff, faculty and local transportation professionals. This is an inexpensive way for practitioners to view content developed at a national level. The attendees often stay after the webinar ends to discuss how to work together to apply the strategies at a local level. By hosting a seminar, WTI staff and partner participants can obtain training without paying for travel costs, thus reducing per person expenditures and strengthening relationships within the local transportation community. Some of the webinars hosted by WTI during the last two years include:

- The Association of Pedestrian and Bicycle Professionals (APBP) Webinar: What's in the new AASHTO Guide for the Development of Bicycle Facilities?
- APBP Webinar: Bring SmartTrips Home. SmartTrips programs use individualized marketing to change travel behavior to shift some car trips to walking, bicycling and transit trips.
- APBP Webinar: Building Political Will for Strong Bike/Walk Programs
- Transportation Research Board (TRB) Webinar: Pedestrian and Bicyclist Safety and Mobility in Europe Scan: Findings and Recommendations

Road Dust Management Practices and Future Needs Conference

More than ninety participants, representing three countries, gathered in San Antonio, Texas in November 2008 for the Road Dust Management Practices and Future Needs Conference which was co-sponsored by WTI. As the first conference of its kind, the event brought together researchers, vendors, practitioners, Local Technical Assistance Programs, and environmental groups to present, discuss, and prioritize current and future road dust management best practices and to create a "road map" for the future.

Focused on moving beyond small-scale experimentation and on to full-scale implementation of dust control, the ultimate goal was to generate a plan for achieving wider, environmentally sustainable, and cost-effective implementation of dust control Best Management Practices on unsealed roads and adjacent areas. The conference was a huge success that culminated in the development of a strategic plan including performance measures, protocols, education, outreach, and the formation of a strong network of constituents. The conference will be held again in November 2011.

WTI Hosts 2009 North/West Passage Annual Meeting

In March, the Western Transportation Institute hosted the 2009 North/West Passage Annual Meeting at the WTI offices in Bozeman. Participants included committee members representing departments of transportation (DOTs) from each member state: Washington, Idaho, Wyoming, North Dakota, South Dakota, Minnesota, Wisconsin, and Montana. During the two day event, they discussed and reviewed the strategic plan, program direction, and current projects including the North/West Passage Traveler Information Web site; regional permitting; expanded corridor-wide truck parking facilities; and Rural IntelliDrive, an in-vehicle system that could be used to better inform drivers of safety risks in rural areas.

Western States Rural Transportation Technology Implementers Forum Becomes Annual Event

Based on growing participation by attendees and presenters alike, the Western States Rural Transportation Technology Implementers Forum (WSRTTIF) in Mount Shasta, California has become a highly anticipated annual event. This unique, two-day forum created by the California Department of Transportation (Caltrans) and WTI provides an opportunity for field engineers, maintenance personnel and technicians to share ideas and discuss successes and failures in implementing rural ITS projects. The core of the Forum is to present highly interactive technical presentations on technologies such as vehicle detection systems, Road Weather Information Systems, traveler information systems, and wireless communication tools, with an emphasis on how to effectively deploy them in a rural setting. In addition to the presentations, equipment displays, and technical demonstrations, participants have numerous networking opportunities.

National Rural Summit on Traffic Safety Culture

Montana State University and the Western Transportation Institute, along with the AAA Foundation for Traffic Safety, the Federal Highway Administration, and the Montana Department of Transportation hosted the first annual National Rural Summit on Traffic Safety Culture on June 22, 2009. More than 60 safety researchers, practitioners, and policy makers gathered in Big Sky, Montana to increase their understanding of the role of traffic safety culture on driving behaviors and attitudes. Presenters and panelists from University Transportation Centers, state departments of transportation, and research centers around the country led sessions defining culture, its influence on behavior, and its use to improve traffic safety. Based on the success of the first event, the second annual National Summit for Rural Traffic Safety Culture was held July 11–13, 2010 in Big Sky, Montana. The Summit was once again hosted by the AAA Foundation for Traffic Safety and the Western Transportation Institute, with a growing number of sponsors including the American Traffic Safety Service Association, Centers for Disease Control and Prevention, Federal Highway Administration, and the National Highway Traffic Safety Administration. The attendees developed a list of critical research needs and policy recommendations on rural traffic safety topics. With the growing national interest in these issues, attendees have suggested continuing this forum as an annual event and planning is underway for the 2011 event.

National Rural ITS Conference

Each year, WTI serves as a sponsor for the National Rural Intelligent Transportation Systems conference. This event continues to serve as the premier forum for rural transportation professionals to learn about the latest advancements in ITS and to network with their peers. The 2009 National Rural Intelligent Transportation Systems (NRITS) Conference took place August 23–27 and was hosted by the Oregon Department of Transportation in Seaside, Oregon. Nearly 300 professionals attended the event, with the theme of *Advancing Rural ITS to the Next Level*. Keynote speakers outlined the evolution of rural ITS as well as goals and actions for the future. The 2010 NRITS Conference was hosted by the Nick J. Rahall Appalachian Transportation Institute August 1–4, 2010 in Huntington, West Virginia. This event was attended by over 250 participants and 50 guests from 38 states and Canada. This theme for 2010 was *The Bridge to Success: Engineering the Future of Rural ITS*. One of the highlights of this year's forum was the introduction of the first annual NRITS student paper competition hosted by the U.S. DOT ITS Joint Program Office.

Technology Transfer Success Stories

Speaking Out for Rural America

Part of putting research results into action is bringing attention to unaddressed problems and needs. WTI conducts extensive outreach to champion rural transportation issues to a wide range of audiences. This year, we have several examples of our successful efforts to raise awareness at the regional, state and national level:

- National Rural Summit on Traffic Safety Culture 2009. In 2009, Montana State University and the Western Transportation Institute, along with the AAA Foundation for Traffic Safety, the Federal Highway Administration, and the Montana Department of Transportation hosted the first annual National Rural Summit on Traffic Safety Culture. This event provided an opportunity to bring national attention to the unique transportation safety issues facing rural America, such as the growing level of traffic in these regions and the disproportionate number of fatal crashes that occur on rural highways. Moreover, WTI used the forum to initiate collaborations between transportation agencies and research centers to integrate safety initiatives with the latest research in driving behavior.
- Economic Outlook Seminars. In 2009, WTI Director Steve Albert and Program Manager David Kack served as keynote speakers for the Montana Economic Outlook Seminar, which is presented by The University of Montana and the Bureau of Business and Economic Research (BBER), and cosponsored by local area Chambers of Commerce. Albert and Kack traveled to nine cities around the state to help educate Montana leaders on critical economic issues, including the link between a strong transportation network and a healthy economy. For WTI, it was an opportunity to emphasize the importance of the rural transportation network in Montana, where 80 percent of the roadways are rural highways and serve as the backbone to economic generators such as freight movement and tourism.

China Exchange Program Leads to Research and Education Opportunities

Recent exchange activities between WTI and the Chinese Academy of Transportation Sciences (CATS) are enabling an ongoing partnership to share information and expertise. In October 2009, a four-person delegation from the Chinese Academy of Transportation Sciences (CATS) visited WTI to learn about and discuss road ecology challenges and solutions. After this trip, representatives from both organizations signed a Memorandum of Understanding (MOU), which establishes collaborative research, education, and professional opportunities. Subsequently, in September of 2010, a five-person delegation from WTI spent a week in Beijing with their Chinese counterparts, visiting project sites and exchanging ideas.

These delegation visits have established a foundation for a series of exchange activities with numerous potential benefits:

- The two partners are now developing proposals for joint areas of collaboration including road ecology research projects, PDA/GPS data collection, winter maintenance, and staff training, allowing them to combine resources toward common research goals.
- A WTI graduate student studying road ecology worked as intern at the China Academy of Transportation Sciences (CATS) during the summer of 2010 summer, opening the door for expanded international educational programs for students.
- The exchange program establishes a formal mechanism for sharing technology, data, and expertise across national boundaries, which supports USDOT goals to improve both the domestic and the international transportation system and strengthen U.S. participation in the global economy.

EDUCATING TOMORROW'S WORKFORCE - Professional Development

As the transportation system adapts to the age of information and technology, the professionals who work in the field—as well as those who plan to work there in the future—must adapt, too. WTI provides a synergistic environment where the latest research can enhance education programs, and education programs can attract and train the next generation of researchers.

To meet the needs of a dynamic transportation workforce, the Western Transportation Institute's Education Program supports a multidisciplinary educational environment with an emphasis on rural transportation issues. WTI's approach encompasses a broad spectrum of activities targeted at students of every educational level, including outreach workshops for K-12 students, innovative coursework and research opportunities for undergraduate and graduate university students, and professional development courses for transportation practitioners. Highlights from the past two years are described below.

Professional Development

Road Ecology has become an integral part of the transportation landscape, and as such there is increasing demand from transportation professionals and others for continuing education on this relatively new subject. As a result, the education program takes a proactive approach to providing professional development courses and learning materials on this topic. As one example, WTI videotaped an onsite Road Ecology workshop and disseminated it online to make it accessible to a much broader audience. The workshop was hosted by American Wildlands, the Wildlife Conservation Society and the Yellowstone to Yukon Conservation Initiative to share the latest in highway mitigation science, the successes of public-private partnerships, and recent innovations in road ecology. Workshop content is of interest to practicing transportation professionals, land resource managers, conservation groups, students, and the general public. Viewers have the option of signing up to receive continuing education units (CEUs) for the course.

Students of the Year

Each year, University Transportation Centers select an outstanding student, who receives a \$1000 stipend and the opportunity to attend the Transportation Research Board Annual Meeting in Washington, D.C.

Students of the Year & K-12 Outreach

Mike Sawaya, 2009

For the past eleven years, Mike has been studying bears, cougars and wolves using methods ranging from radio-telemetry to noninvasive genetic sampling. Mike's desire to gain a better understanding of the effects of transportation systems on wildlife populations and developing ways to mitigate those effects led him to pursue a graduate degree through the Road Ecology Program at the Western Transportation Institute. Mike is currently working on his PhD in Fish and Wildlife Biology in the Ecology Department at Montana State University. Mike's research with WTI focuses on evaluating the conservation benefits of wildlife crossing structures for black and grizzly bear populations in the Bow Valley of Banff National Park, Alberta. Mike's drive, energy, professionalism, and dedication to research in this area continually impress his research advisors and collaborators.

Jessica Mueller, 2010

Jessisca is currently pursuing a Master's degree in Industrial Engineering with the Human Factors group at Montana State University (MSU). Jessica received a Graduate Transportation Fellowship award from the WTI to conduct research involving the effects over time of providing defensive training to novice drivers. Jessica contributed to a published paper in the Human Factors and Ergonomic Annual Meeting Proceedings, entitled Effectiveness of a Multistage Driver Education Program for Novice Drivers. Her work on Differences in Subjective and Objective Data was also selected for presentation at the Annual Regional National Occupational Research Agenda Symposium. Jessica Mueller has consistently demonstrated a strong aptitude in both research and academic pursuits and has shared her enthusiasm for her field by mentoring an undergraduate student on an independent project from October 2008 to May 2009.

K-12 Outreach

The Western Transportation Institute hosted two groups of sixteen high school students during the 2009 and 2010 Summer Transportation Institutes (STI) held in June of each year. STI is a two-week intensive summer program on the MSU campus that explores the interdisciplinary field of transportation and introduces participants to a wide range of careers and academic programs available to them after high school. Working with faculty, the students participate in a wide variety of hands-on research activities with construction materials, software tools, driving simulators and other research equipment available on campus. They also visit field research sites and tour many types of transportation facilities.

WTI also sponsored an "Introduce a Girl to Engineering" event during Engineering Week. Over one hundred Girl Scouts participated. The girls spent two hours among a variety of hands-on activities facilitated by MSU engineering student chapter organizations. The activities allowed students to experience the different engineering disciplines.

The WTI Education Program seeks to enhance student experiential learning by increasing the number of students involved in real world transportation research. These activities prepare students for advanced degree programs, as well as careers as researchers or transportation practitioners. WTI hires undergraduate and graduate research assistants to provide support on grant sponsored projects. In 2008–2009, forty-two undergraduate students and nineteen graduate students contributed to transportation research projects at WTI. Research assistants represented a myriad of academic disciplines and student research support added value to thirty-eight different projects. During 2009– 10, 30 undergraduate students and 21 graduate students contributed to transportation research projects at WTI, adding value to 28 different projects.

Undergraduate Research Experience

The Undergraduate Research Experience (URE) program competitively selects four undergraduates each year to participate in a unique academic year-long research opportunity. The program provides a one-on-one mentoring relationship with a professional researcher at WTI; paid hands-on research experience; assistance in developing skills in data collection, analysis, and interpretation; and training in communicating research results to a broad audience. The URE approach has proven successful, with students achieving numerous notable accomplishments, including:

- Andy Creighton and Benji Tornberg from the 2008–09 URE program were invited to present the results of their research to legislators and other state officials during a poster session at the state capitol rotunda in Helena.
- Civil Engineering undergraduate Cody Glasnapp's research paper "Fuel Cost Parameter in Transportation Demand Models," was selected for the Institute of Transportation Engineers (ITE) District 6 best student paper award in 2009.
- Two 2009–10 URE students, Brett Larabee and David Schroeder, will present their research entitled "Building Green: Development and Evaluation of an Environmentally Friendly Concrete" at the American Concrete Institute (ACI) Fall 2010 Convention in Pittsburgh, Pennsylvania.
- Civil Engineering undergraduate Neil DeZort's URE research paper "Development of a Crash Prediction Model for Deer-Vehicle Collisions (DVCs)," was selected for the Institute of Transportation Engineers (ITE) Intermountain Section best student paper award in 2010.
- 2009 URE participants Gordon Nelson and Penny Atkins designed and tested a prototype cyclist sensing device using low power radios combined with GPS units to share location information between cyclists and motor vehicles. In 2010, their

research was featured in Discoveries and Breakthroughs Inside Science (www.ivan-hoe.com/science/story/2010/09/760a.html).

Graduate Transportation Award

At the graduate level, the Graduate Transportation Award provides tuition support and a monthly stipend to students focusing on transportation research in their graduate program. Eight graduate students from three different academic departments were supported by Transportation Awards over the past two years. Three Transportation Award recipients completed their graduate degrees during the reporting period:

- Tiffany Rochelle received her MS in Civil Engineering and now works for 609 Consulting in Sheridan, Wyoming.
- Shaun Durkee received his MS in Industrial Engineering and accepted a position with Boeing in Pennsylvania.
- Zachary Freedman completed requirements for his Masters degree in Civil Engineering this December and currently works as a Research Engineer for the South Dakota Department of Transportation.

Safe Passages Research for Undergraduates Program

The Western Transportation Institute also continued its NSF-funded three-year Safe Passages Research Experience for Undergraduates (REU) Program in both 2009 and 2010. Each year, WTI hosted eight multidisciplinary undergraduate students from eight different colleges and universities nationwide, who represented a broad range of engineering and resource science majors. The students participated in a ten-week summer research program focusing on safety and environmental issues related to U.S. Highway 191 between Bozeman and West Yellowstone, Montana. Participants worked in teams on various projects, which explored topics ranging from safety challenges on mountain roadways to fish passage through culverts. In addition to their project involvement, the students' REU experience was enriched by research seminars, training workshops, and field trips to Yellowstone National Park. The program offers an opportunity to gain research experience and knowledge on topical transportation issues. Two 2009 REU participants presented their research at the 20th Canadian Multidisciplinary Road Safety Conference in Niagara Falls in June 2010.

Extracurricular Activities

WTI actively supports a number of extracurricular activities that build interest in transportation education and careers. Highlights from 2009 and 2010 include:

- WTI and the Montana Department of Transportation (MDT) jointly hosted a presentation and open house for interested MSU students from all majors. Approximately 50 students attended the event, which included tours of WTI's various research labs and the MDT Design Unit.
- WTI participated in the Fall and Spring career fairs at MSU to support multidisciplinary student recruitment efforts to transportation research.
- WTI Research Ecologist, Marcel Huijser, hosted a number of excursions to U.S. Highway 93 in northwest Montana for approximately 75 students from the University of Montana.
- WTI sponsored Janelle Booth's attendance at the WTS Advancing Women in Transportation Annual Conference, held in Washington D.C. in May. Janelle is a graduate student in Public Administration and a graduate research assistant at WTI.
- WTI sponsored the MSU Intelligent Transportation Society-Rocky Mountain Student Chapter (ITS-RM) technical field trip to Salt Lake City, Utah. Ten graduate and undergraduate students representing various academic disciplines had the opportunity to meet with professional staff members and tour transportation facilities at the Utah Department of Transportation's Traffic Operations Center, the Department of Computer Science at the University of Utah, the light-rail and commuter rail control centers at the Utah Transit Authority, and the Fehr and Peers transportation consultancy firm.
- WTI supported the activities of the MSU Institute of Transportation Engineers (ITE) student chapter, which continues to distinguish itself at the regional level. 2009 was particularly noteworthy with the following accomplishments.
- MSU won the ITE Western District Student Chapter Award and the Student Web site Award.
- MSU alumnus, Brian J. Walsh, won the Individual Achievement Award.
- MSU alumnus and past UTC outstanding student of the year, Danielle Scharf, won the Young Professional Achievement Award.
- MSU alumni served as Western District President (Michael Sanderson) and Secretary Treasurer (Alyssa Reynolds who was a UTC Outstanding Student of the Year at WTI).
- MSU student, Brian Church, won the \$2000 Annual Ellis Mathes Scholarship of the Intermountain Section of ITE.

A large number of co-authored publications, project final reports and professional conference presentations are produced each year by both undergraduates and graduates. This is invaluable experience for the students who often produce award winning papers. The number of awards received by WTI students is evidence of the caliber and productivity of WTI's undergraduate and graduate research assistants:

- Graduate Fellow Tiffany Holland received a Dwight David Eisenhower Transportation Fellowship to present her work on wildlife mitigation measures along U.S. Highway 93 at the 2010 Transportation Research Board annual meeting.
- Graduate Fellow Eric Bendick produced a film about transportation effects on wildlife and mitigation measures developed to reduce those impacts. The film "Division Street" has been screened at over 20 locations throughout the country and received a number of awards at film festivals in the U.S. and abroad.
- Justin Krohn, an undergraduate researcher at WTI for several years, was awarded a SMART scholarship by the Department of Defense; he is one of only three students in Montana to receive such a scholarship.
- The Institute of Industrial Engineers (IIE) Western Conference awarded MSU undergraduate Tawny Hoyt Best Technical Paper and Oral Competition Award for her independent research work on "EMS Restraint Feasibility during Emergency Transport." Tawny also received a UTC Graduate Transportation Award to begin her graduate program in Industrial Engineering under Dr. Laura Stanley starting in fall 2010.
- Industrial Engineering graduate student and UTC Graduate Transportation Award recipient Jessica Mueller's paper entitled "Naturalistic Data Collection in Rural Emergency Medical Services Transportation" was selected as the second runner-up for the First Annual National Rural ITS Conference Student Paper Competition.
- Janelle Booth, a graduate student pursuing her Masters of Public Administration degree, won the best student paper competition on the topic "The Role of School Buses in Rural Evacuations" for the 19th National Conference on Rural Public and Intercity Bus Transportation. Janelle also attended and presented "Rural Transportation Infrastructure Assessment for Evacuation" at the TRB Tools of the Trade Transportation Planning in Small and Medium Sized Communities conference in Williamsburg, Virginia this September.
- Ben Dorsey, a Graduate Transportation Award recipient completing his Masters in Land Resources and Environmental Sciences, received a graduate fellowship from the National Science Foundation to pursue a research project on road ecology in China over the past summer. Ben worked in cooperation with researchers at the Center for Transport Environment and Safety at the Chinese Academy of Transportation Sciences (CATS) in Beijing.

RESEARCH, RELATIONSHIPS, **RESULTS**

If rural matters to you, then WTI is your research partner. We work with all types of clients, sponsors and partners to conduct relevant, purposeful research, particularly on projects requiring expertise on rural issues and sustainability concerns. WTI has promoted a culture of leveraging funds and partnering on research which allows us to meet common research goals, efficiently expand the scope of research projects, maximize the

value of the research dollar and address the needs of various research sponsors. Often we work with the same partner on multiple projects as shown in the chart below as repeat sponsors.

From California to Canada and now even China, WTI research is shaping transportation networks across the United States and beyond. We work with a variety of clients and sponsors including government agencies such as state departments of transportation and federal transportation entities. WTI serves private sector businesses and works as a subcontractor on large projects. We also conduct research for non-profit

Annual Funding

organizations and foundations. WTI builds dynamic relationships not just with and between its clients and sponsors but also with other research organizations. We partner with universities, consortiums and other groups to further the field of transportation research. A broad base of research funding is essential to maintain efficient operations, continuity of staffing levels and highly functional research labs. Under this model of diversity, if one source of funding is decreased or ends other sources remain viable.

