Western Transportation Institute
Montana State University
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Advancing rural transportation through research and education...

Message from the Director:

NRITS Travels Full Circle Back to Montana

In August, the Western Transportation Institute will host the 2006 National Rural ITS Conference (NRITS) in Big Sky, Montana. I'm proud to welcome NRITS back to Montana.

In 1997, WTI spearheaded and hosted the very first NRITS conference, which we then called the Rural Advanced Transportation and Technology Systems (RATTS) conference. While other important national and regional transportation forums existed, none of them focused on the unique challenges faced by transportation agencies and researchers trying to implement new technologies in rural locations. "Will that technology work in a mountainous location with limited communication infrastructure?" "Is this system cost-effective on a road with low AADT?" In the days when ITS technologies were mainly deployed in urban areas, there were few answers to our questions.

Our idea was to create a forum where professionals with similar needs – as well as similar obstacles – could share ideas, resources and technical expertise, and then work together to get functional ITS systems in the ground. I believe NRITS has been effective in meeting that goal. This year, more than 300 attendees have registered for the conference; they will be able to choose from nearly 30 concurrent sessions, one super session, and a pre-conference training session. The technical content also promises to be top-notch, as the planning committee received a record number of 119 abstracts.

In the decade since we last hosted NRITS, WTI has really grown and developed as well. In this issue of the newsletter, you'll read about our refined research focus areas, which we will use to integrate our rural research efforts with national initiatives. You'll also find descriptions and photos of our new laboratory facilities, which have greatly expanded our on-site research and testing capabilities.

I hope many of you reading the newsletter plan to join us this summer at NRITS; I look forward to talking to you not only about how far we've come, but also about where we're going in the future.

Steve Albert
WTI Director

MONTANA STATE UNIVERSITY
College of ENGINEERING

WTI Integrates Research to Meet Rural Challenges and Advance National Priorities

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In 2005, the federal highway funding bill (SAFETEA-LU) once again designated WTI as a University Transportation Center. First attained in 1998, this designation has helped WTI achieve a national reputation for research on rural transportation issues. Through the reauthorization, WTI will continue to receive federal funding to further build its research efforts and educational programs.

The renewed four-year grant also provides an opportunity to conduct longer term research planning. WTI is striving to design a strategic research plan that will not only meet the transportation challenges of rural America, but also advance national priorities and initiatives. In terms of issue identification, WTI recently completed an extensive review of SAFETEA-LU legislation to understand federal priorities and identify research opportunities. These issues were further examined relative to how well they correspond to rural transportation challenges, resources available at WTI (such as onsite laboratories and affiliated faculty), and the specialized expertise of staff. Through this process, WTI has refined its research areas to focus on topics that match the most relevant transportation needs to the organization's strongest capabilities.

For example, USDOT has named environmental stewardship as a national strategic goal and included specific research opportunities related to wildlife protection in the SAFETEA-LU legislation. Preventing animal-vehicle collisions is an important issue in rural areas, where large animals such as deer and elk are more likely to live near roadways. WTI's staff includes research scientists who have conducted pioneering studies on the effectiveness of wildlife crossing structures and roadway warning systems. As a result, WTI has expanded its research and staff in the field of Road Ecology, and in June, FHWA selected WTI to conduct a national study aimed at reducing collisions between animals and vehicles. "This study once again puts Montana State University at the forefront of road ecology, the rapidly emerging science that combines engineering, biology and planning to create a future where safe and efficient human mobility is effectively combined with protecting nature," said WTI Road Ecology Program Manager Rob Ament.

Further examples of the relationship between national goals and WTI research topics are shown in the table on the next page.

Integration is also a key component of WTI's approach to conducting the research itself. Through the years, WTI has grown and developed its research program through effective leveraging of resources, primarily through collaborative research partnerships with federal and state agencies, other universities and research institutes, and even private sector organizations and vendors. In particular, WTI has found success through "repeat" partnerships: working with sponsors on consecutive projects to build on previous efforts and established relationships. "This coordination with external agencies helps us

link our research to real-world challenges and applications," said Jerry Stephens, Research Director.

WTI's commitment to multidisciplinary research inherently supports an integrated approach to problem identification and solution. With a location on the Montana State University campus, WTI frequently works with faculty from the College of Engineering, in such diverse disciplines as economics, political science and statistics to study broad impacts and develop comprehensive solutions. WTI's newly expanded laboratory facilities *(see related article on page 4)* will provide onsite testing facilities where researchers from various fields can work side-by-side on cooperative research.

WTI's refined research focus will provide long-term strategic guidance to the selection of individual research projects, the enhancement of education programs, and the development of technology transfer activities and publications. "The integration of our activities with national strategic goals will ensure that our activities will not only address specific rural problems, but also have a broad, important impact on the national transportation system as a whole," concluded Stephens.

NATIONAL STRATEGIC GOALS	RURAL CHALLENGES	WTI FOCUS AREAS
Safety	• Crash Prevention and Security - 60% of fatalities • Operation and Maintenance - local responsibility • Emergency Services - 30% longer response	• Safety and Operations • Infrastructure Maintenance and Materials
Mobility	• Rural Transit and Mobility - 38% w/o service • Traffic Management - limited detection and need for coordination	• Mobility and Public Transportation
Global Connectivity	• Travel and Tourism - economic viability, high visitation, limited services • Freight – heavy truck traffic, inter-modal connections	• Logistics and Freight Management • Transportation Planning and Economics
Environmental Stewardship	• Surface Transportation and Weather - dynamic condition, life threatening • Ecological Impacts – maintenance practices, growth, habitat, wildlife	• Winter Maintenance and Effects • Road Ecology
Security	• Border crossing, institution relations and inter-operability • Man-made and natural disasters	• Systems Engineering Development and Integration

New Laboratory Facilities Offer Expanded Research Opportunities

In December 2005, WTI moved into a newly renovated building with more than 16,000 square feet of space for research and administrative staff. The building includes 6,000 square feet of dedicated space for on-site research laboratories. Five laboratories are now equipped and operational, and ready to focus on emerging needs in rural transportation.

Driving Simulation Laboratory

The high-fidelity driving simulation facility provides an ideal setting to collect data on driver performance and behavior in a variety of customized scenarios.

Capability:

The DriveSafety DS500C Vection driving simulator features five visual channels providing approximately 140-degrees of perspective, rear-view and side mirrors, and speakers that provide a realistic sound environment. Using the HyperDrive software system, driving scenarios are custom-designed to meet the needs of specific research projects.

Situated next to the simulator, the operator station allows the researcher to develop and control research scenarios and to collect a broad range of data on driver performance. A separate control room is used for participant reception, test monitoring, and graduate student research.

A new "eye-tracker" system will soon be added to the driving simulator to test participants' reaction to visual stimuli. This new device will continuously track and record the drivers' eye position to determine where they are looking in the vehicle and along the road. The driving simulation facility also contains a large high-bay area designed to accommodate a planned full motion driving simulator that will allow test participants to experience the sensation of bumps, forward and backward acceleration, and other sensory related movements.

Carefully constructed research and laboratory facilities such as this one allow researchers and engineers to test and evaluate road designs and vehicle innovations before they are actually deployed. Potentially, millions of road construction dollars can be saved and many lives spared through a proactive approach to safety.

The simulator has been used on projects to:

- Compare the most effective type of animal warning signs
- Evaluate the effectiveness of safety innovations
- Test the use of cellular phones and their impact on driver behavior
- Examine highway improvements in the lab before construction

Past and Present Partners:

- State Transportation Departments
- Equipment designers and manufacturers

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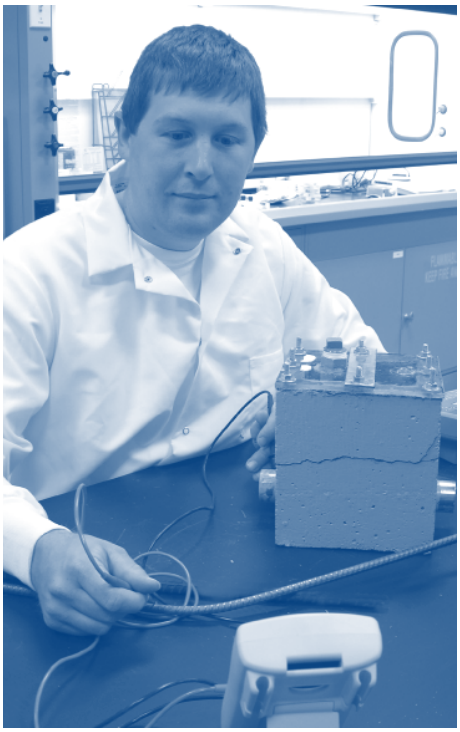
Corrosion and Electrochemistry Laboratory

The objective of this lab is to research and mitigate corrosion and winter effects on the surface transportation system through innovation and multi-disciplinary partnerships.

Capability:

The newly constructed laboratory has been equipped with an environmental chamber, ventilation hoods, a corrosion testing machine, potentiostats, advanced electrochemical systems, and



modeling software applications. A multi-disciplinary team operates the lab and features a diverse combination of expertise including corrosion science and engineering, electrochemistry, polymer chemistry, environmental science, and civil engineering.

This laboratory has been used on projects to:

- Conduct accelerated chloride ingress tests, gravimetric and electrochemical corrosion tests, and electrochemical engineering experiments
- Study environmentally friendly concretes and cement-based composites
- Analyze the behavior and effectiveness of corrosion mitigation measures for highway bridges, earth-retention systems, and pipelines in cold regions
- Research and develop polymers to mitigate the winter effects on concretes, asphalt binders, biodiesel, and fuel cells

Past and Present Partners:

- U.S. Federal Highway Administration
- California Department of Transportation
- Montana Department of Transportation
- Washington State Department of Transportation
- Colorado Department of Transportation
- Pacific Northwest Snowfighters Association
- CC Technologies Laboratories, Inc.
- Southwest Research Institute
- Image and Chemical Analysis Laboratory (ICAL), MSU
- Civil Engineering Department, MSU
- School of Materials Science & Engineering, Tianjin University

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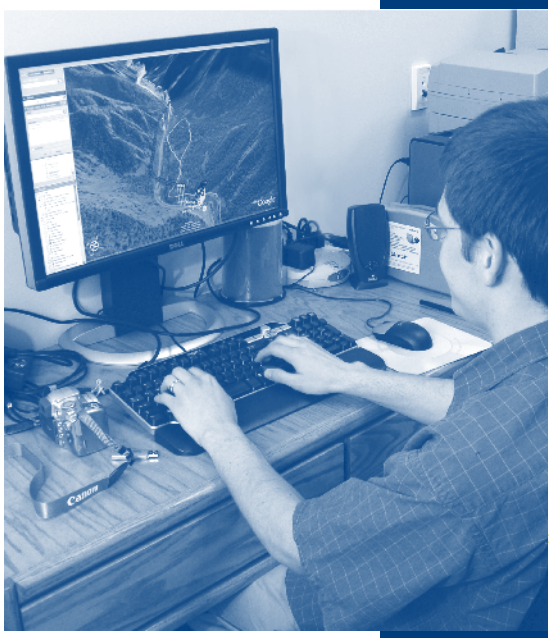
Systems Engineering, Development, and Integration Laboratory

The goal of this lab is to facilitate the application of systems engineering best practices to the engineering, development, and integration of intelligent transportation systems, information technology, and communications systems.

Capability:

This laboratory consists of sophisticated, state-of-the-art equipment, and infrastructure enabling the Systems Group staff to test and develop hardware and software. Within the lab there is sufficient space for the assembly and testing of prototype systems as well as systems-related demonstrations and educational trainings for small groups. A flexible cabling system facilitates the testing and demonstration of various wired and wireless communication technologies. Servers and worksta-



tions are equipped with "virtualization" and development software that allows staff to rapidly configure, develop, and test diverse software applications using multiple operating systems. GIS and mathematical analysis software are used by staff to model, analyze, and visualize systems and their characteristics. Multimedia gear such as digital cameras, camcorders, and a projection system assist staff in the development of demonstrations and training tools.

This laboratory has been used on projects to:

- Integrate satellite and cellular communication equipment with mobile computing devices
- Aggregate and disseminate sensor readings into a database to indicate weather changes
- Test systems and algorithms for triggering warnings to drivers in workzones via variable message signs
- Visualize and compare the coverage of communication systems in rugged terrain
- Process input from hand-held field devices regarding animal-vehicle collisions, rock slides, and other incidents that impact travelers and roadways

Past and Present Partners:

- CALTRANS
- State Transportation Departments
- Local and regional agencies

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Geosynthetic Materials Laboratory

The aim of this lab is to test the properties and quantify the benefits of geosynthetic materials in relationship to the surrounding pavement structure.

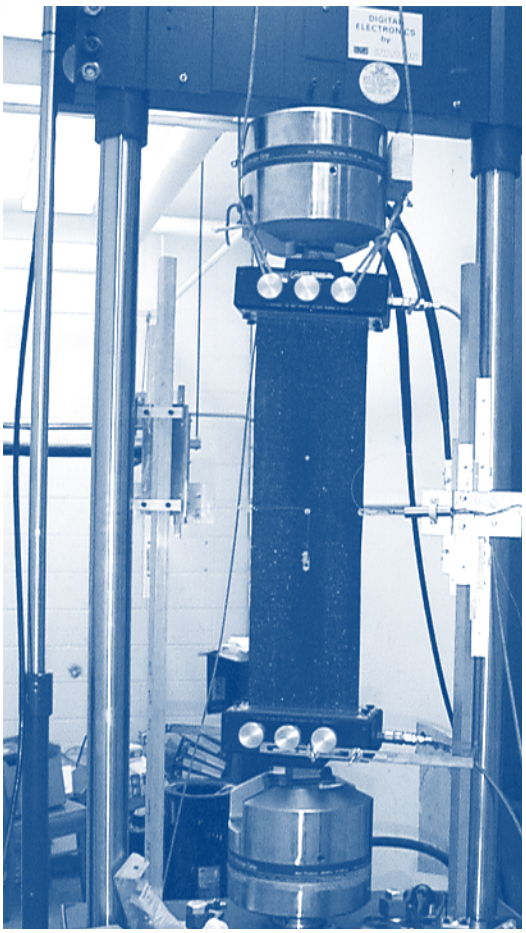
Capability:

The primary goal of this lab is to meet a growing need for geosynthetic material tests to define mechanical properties pertinent to working load conditions within pavement structures. These new design and analysis solutions are essential for the growth of safe and reliable use of economical reinforcement products for construction and repair of our transportation infrastructure. The research performed in this laboratory will help fulfill this critical need by providing testing equipment and associated test protocols that can be used to determine material properties needed in pavement design and analysis.

The geosynthetic lab is in the process of acquiring a servo-hydraulic system to enhance its existing pullout device and a servo-hydraulic uniaxial tension device. This new equipment will make it possible to conduct research and evaluate the benefit of geosynthetics in new and rehabilitated highway structures.

This laboratory will be used on projects to:

- Develop test methods to determine material properties for mechanistic-empirical reinforced pavement design
- Investigate the properties of new and unique geosynthetic products
- Support projects involving the modeling and design of reinforced pavements



Past and Present Partners:

- American Society of Testing and Materials (ASTM)
- Ryan Berg and Associates (Consultant)
- Barry Christopher (Consultant)
- Departments of Transportation (DOTs)
- Drexel University
- Federal Highway Administration (FHWA)
- Mirafi Construction Products
- Naue Fasertechnik
- Norwegian University of Science and Technology
- Tensar Earth Technologies, Inc.
- University of Illinois
- University of Maryland

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Transportation, Research, Applications, and Integration Laboratory (TRAIL)

The purpose of this lab is to simulate a small urban and rural Traffic Management Center (TMC) and to serve as a comprehensive research center for Intelligent Transportation Systems (ITS) technologies.

Capability:

The TRAIL lab serves as a testbed for Intelligent Transportation Systems (ITS) technologies, Traffic Management Systems (TMS) communications, traffic management, traveler information, and incident response. Currently, the lab is deploying ITS technologies such as sensors and video surveillance cameras in heavily traveled corridors to gather data with the intention of enhancing safety. The lab provides an environment for ITS evaluation and workforce development, as well as a setting for local and state government agencies and transportation departments to observe the benefits of a Traffic Management Center (TMC).

The physical lab is equipped with two fifty inch high-definition plasma monitors that display various types of data currently collected by sensors and video cameras. This laboratory assists communities with future growth plans by collecting and sharing data that can be used by various agencies to determine community needs and provide solutions to ongoing problems.

This laboratory will be used on projects to:

- Identify problematic winter road conditions
- Collect and analyze data pertaining to vehicle speeds, counts, classifications, and pavement conditions
- Evaluate ITS technologies and communications schemes
- Enhance workforce development

Potential Partners:

- State Transportation Departments
- Local governments

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NOVIS Project Tests Vehicle Detection Technologies

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WTI has recently completed testing of new technologies that may increase safety on a narrow, rural highway in Northern California.

US Route 199, which runs between Crescent City, California and Grants Pass, Oregon, serves as a connector between US Route 101 and Interstate 5 with a significant volume of through and truck traffic. The roadway is characterized by narrow lane widths, minimal or no shoulders, tight-radius curves, and a nearly vertical rock cut slope on one edge of the road. These characteristics are focused in an area called "The Narrows," where the absence of shoulders combines with substandard lane widths and dramatic turns to create difficulties when vehicles meet each other. Trucks with long or wide loads are unable to negotiate the road if a vehicle is coming from the other direction at the same time.

Working closely with California Department of Transportation (Caltrans) District 1, WTI is developing the Narrows Oversize Vehicle Identification System (NOVIS), funded as a part of the California/Oregon Advanced Transportation Systems (COATS) Showcase program, to test and deploy technologies that can mitigate the challenges caused by these oversize vehicles. The project consists of a three-phase approach:

- the deployment of changeable message signs (CMS) with static messages (Phase 1);
- the procurement, deployment, testing and evaluation of alternative technologies to measure vehicle width and length (Phase 2); and
- the design, installation and evaluation of a full-scale integrated detection and warning system related to oversize vehicles (Phase 3).

During Phase 1, CMS were installed in the Narrows with a static warning and had a positive effect on traveler safety. Phase 2 (evaluating technology alternatives) has been more challenging. The definition of "oversized" trucks in California is unique, involving a combination of width and kingpin to rear axel length, which are both difficult to measure in real time. Initially, researchers identified and evaluated numerous detectors that proved to be unreliable or inaccurate.

Recently, however, researchers have identified a detector that proved to be reliable and accurate. The Autosense 825 detector from OSI LaserScan is self-contained and durable. During the evaluation, it detected every vehicle and correctly classified 74 percent of the vehicles. The detector can also accurately calculate vehicle length and has the capability of calculating a reasonably accurate width, although further refinement of the width algorithm is needed.

Based on these results, WTI is recommending that the project be continued to the final phase, a demonstration site in the Narrows. "There will be some challenges to the design and implementation of a test site, primarily power and communication in this mountainous area," said Principal Investigator Pat McGowen. "However, a successful deployment could lead to numerous benefits," he added, "such as a system that provides accurate and useful information to the traveling public, and that can be replicated in other rural areas."

Installation of AutoSense on U.S. 101 for testing

WTI Researcher Identifies High Animal-Vehicle Collision Zones on Montana Highway 83 in the Seeley-Swan Valley

One of the most scenic highways in Montana, Highway 83 through the Seeley-Swan Valley, is also known for the high number of animal-vehicle collision rates – approximately 2.8 times the state average for this road type. In addition, 26.1% of all road accidents on MT 83 involved wildlife while the state average was 17.2% for this road type. Almost 95% of all reported road-killed animals were white-tailed deer. Because of this high incident rate, the Montana Department of Transportation (MDT) asked WTI to identify and rank high-frequency zones for animal-vehicle collisions; identify road and landscape characteristics associated with animal-vehicle collisions; identify and rank habitat linkage zones; and identify and document additional research and resource needs.

MDT obtained information on collisions from the Montana Highway Patrol (MHP) and carcass removal data which confirmed animal-vehicle collisions occurred along almost the entire length of the transportation corridor; however, certain sections of MT 83 had a higher frequency of deer collisions than other sections. Changes in land use, management and supplementary feeding of wild animals including deer are thought to have led to a concentration of deer or a higher deer population size along MT 83. In addition, at least part of the white-tailed deer population is thought to have abandoned seasonal migration. The increase in the number of deer present along the transportation corridor and the year-round exposure to traffic is likely to have contributed to an increase in deer-vehicle collisions.

In addition to identifying collision zones and habitat areas, the WTI report developed recommendations for future research and mitigation. To further improve the quality and usefulness of AVC data, researchers suggest creating a predictive model for high frequency white-tailed deer-vehicle collisions on the central section of MT 83, as well as a spatial modeling of important habitat and habitat linkage zones.

Potential mitigation measures, especially wildlife crossing structures, should preferably be based on an integrated approach that includes the traffic, road, right-of-way, and the lands adjacent to the transportation corridor. This may require partnering with natural resource management agencies and private landowners and land users to initiate a discussion on the current and future habitat types, land use and land management in a zone adjacent to MT 83 and how this may ensure the long term effectiveness of potential mitigation measures.

The WTI report is available at the following website:
www.coe.montana.edu/wti/wti/display.php?id=165

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COATS Project Enters Third Phase to Improve Rural ITS Planning

The third phase of the California and Oregon Advanced Transportation Systems (COATS) project is under way, continuing to promote bi-state cooperation and communication that will develop, deploy and coordinate cost-effective and environmentally agreeable intelligent transportation systems (ITS).

From 1998 until 2001, WTI worked with the California and Oregon Departments of Transportation in the first phase of COATS. The project was designed to encourage regional, public and private sector cooperation between California and Oregon organizations to better facilitate the planning and implementation of ITS in a rural bi-state area. The study area for COATS focuses on roadways between Eugene, Oregon and Redding, California.

The second phase of the project, COATS Showcase, resulted in a number of research and evaluation activities that improved the performance of existing ITS elements and also provided data to justify, support, or direct future deployment of ITS in the COATS study area.

The current phase of COATS will foster cooperation and communication between the two states, promote technology transfer, assist in ITS planning, and provide assistance to mainstream deployment of field-tested technologies.

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Driving Simulator to Replicate a Montana Highway and Test Planned Improvements

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Imagine you're a traffic engineer, staring at highway reconstruction blueprints and trying to decide between two locations for placement of a dynamic message warning sign. Wouldn't it be nice, you think to yourself, if you could try out both spots and see which one is more effective?

Using the WTI Driving Simulation Laboratory, the Montana Department of Transportation will soon have such a tool for testing infrastructure improvements **before** they are installed on a state highway.

Using computer simulation in transportation is not a new approach. In aviation, it is an integral part of designing new aircraft, and it is increasingly used in developing new marine, rail, and roadway vehicles. Driving simulators have been used to test elements of large transportation improvement projects prior to construction. "Simulation is a time-tested way to 'get it right' before committing to a final plan and deployment," said WTI Principal Investigator Mike Kelly.

The Montana Department of Transportation is currently planning to install numerous safety improvements on U.S. 191, including curve, ice, and excessive speed warnings. Through this project, WTI will create and test a simulation capability to quickly and inexpensively evaluate these proposed deployments.

WTI has just installed the first visual "tiles" for the Simulator that replicate key sections of the highway. To create the realistic driving environment, WTI researchers filmed video of the highway segments where improvements are planned, and gave it to the simulator manufacturer. Using a combination of the video images, MDT's highway blueprints, GPS coordinates, and topographic maps, the manufacturer developed an accurate recreation of Highway 191.

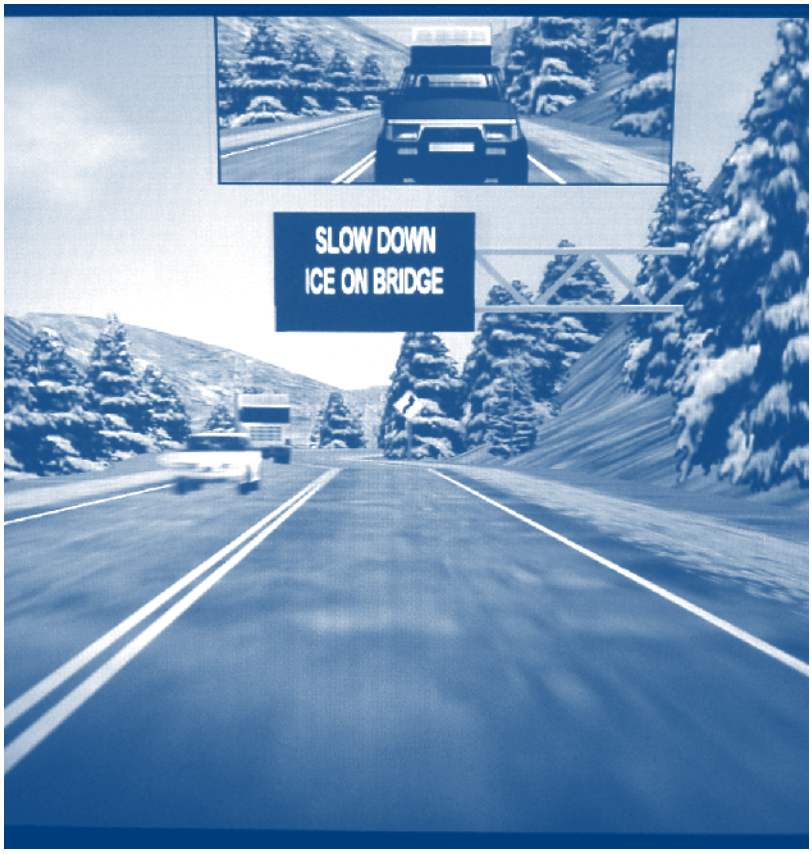
With the tiles in place, WTI researchers can create scenarios that replicate typical driving conditions at these locations (traffic patterns, weather, etc.), and include the proposed safety improvements. "What's unique is that we're doing this for a specific road, in order to help with the design of that specific road," said Kelly.

WTI will use the simulation to recommend and test safety improvements on the highway and allow traffic engineers to experience how the improvements will help the driver. One test of the simulation will be a speed study, which will help MDT evaluate how well drivers adhere to posted speed limit signs on Highway 191. Approximately 35 test subjects will drive through the scenarios; they will then complete a written survey or interview about their reactions to the signage. The simulator also automatically collects data about their actual driving speed throughout the test.

If the simulation capability proves effective, it can be used for a variety of proposed enhancements. MDT can evaluate a proposed deployment and make alterations, such as changing the location, visibility or message set for a roadway warning system. If changes in the systems are suggested, the simulation can be easily altered to represent the new specifications and the refinements can be further evaluated.

This project will allow MDT to test and improve safety projects at an early stage in the design and evaluation process. "Changes at this point may involve only a 'click and drag' operation on a computer interface, or rewriting a few lines of code," said Kelly; "if this works well, it can save DOTs tens of thousands of dollars on every highway improvement project."

Eventually, video of simulated highway improvement projects could also provide transportation agencies with a valuable community relations tool. "Once this process is refined, MDT could take a video [of the simulation] out to a public meeting and say 'Here's what it's going to look like,'" Kelly added.



Field Test Underway for Caltrans Mobile Data Communication

WTI is moving into the second phase of a project that ultimately will result in a mobile data and communication system to give incident responders the means to report data accurately and efficiently.

The field test project currently under way with the California Department of Transportation (Caltrans) is the bridge between phase one and phase two of the Redding Responder Project. The first phase of the project developed the data elements, performance, and functional requirements for the pilot deployment of an at-the-scene incident data collection system that provides for the digital transmission of data to the Redding, California, Traffic Operations Center.

In this field test phase, a Tablet PC, cellular modem and integrated GPS have been purchased by Caltrans, and WTI has modified the Responder application software to work on the new hardware. The system will be field tested by Caltrans, and feedback from this testing will be reviewed in the second phase of the project to further help develop the system for production use.

By moving forward with the field test, said Principal Investigator Douglas Galarus, Caltrans will have the early opportunity to use the working model mobile data collection and communication system.

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Effectiveness of Animal Detection System to be Evaluated

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A prototype animal detection system installed in Yellowstone National Park is being modified and evaluated by WTI researchers.

The evaluation is the second phase of a WTI project that is one of the first studies to collect data on the effectiveness of animal detection systems. Phase One of the project resulted in the development and installation of a prototype animal detection system along US 191 in Yellowstone National Park, Montana. This system was found to reliably detect large animals that approach the roadway. However, several blind spots were identified, and they have to be addressed before the warning signs can be attached and system effectiveness can be evaluated.

Phase Two will improve the system by addressing these blind spots; this may require removing or relocating stations. Furthermore, some system components will be repaired or replaced, the communication system will be improved and remote access through a satellite link will be provided.

Once the modification or repairs have been completed and the warning signs have been activated continuously for three months, an evaluation of the effectiveness of the system will get under way. Criteria used in the evaluation will include reductions in vehicle speed and animal-vehicle collisions.

Motorists will be interviewed to document their opinions of and experiences with the system, including their reaction to the warning. The ease of operation and maintenance of the system will be determined through discussions with personnel at the Montana Department of Transportation who are responsible for these aspects of the system.

WTI Examines Animal-Vehicle Collision Data Collection Practices

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With more than one million deer-vehicle collisions in the United States every year, there is a growing need to reliably identify locations that may require countermeasures. Systematically collected road-kill data allows for prioritization and focusing of mitigation efforts to avoid or reduce collisions. However, not all transportation agencies, road maintenance crews or law enforcement agencies record road-killed animals or details on reported animal vehicle accidents. These reporting gaps cause difficulties with data integration and interpretation and ultimately with the usefulness of the data.

The Transportation Research Board of the National Academies has selected the Western Transportation Institute to document how Departments of Transportation and natural resource management agencies in the United States and Canada collect and manage information on animal-vehicle collisions and animal carcasses found along the road. Marcel Huijser, Ph.D., Research Ecologist for WTI, will report on the status and highlight innovative and successful practices for the collection and use of animal-vehicle collision data as well as lessons learned and potential additional information needs.

WTI looks forward to contributing to better animal-vehicle collision data practices which will eventually help reduce animal-vehicle collisions in the United States and Canada. Initial research has been completed and the first draft of the synthesis was submitted to TRB in June.

WTI Conducts First Study on Ecological Impact of Median Barriers

Despite the widespread use of highway median barriers to improve motorist safety, there is little information available on the effects of these barriers on the movement and mortality of wildlife. According to WTI researcher Anthony Clevenger, the lack of information to properly assess environmental impacts of median barriers is causing significant project delays and increasing transportation project costs.

Clevenger is the principal investigator of a WTI study for the California Department of Transportation that is the first attempt to gather, study, and synthesize information on median barriers and their designs for mitigating habitat connectivity and increasing driver safety.

Clevenger and Research Associate Angie Kociolek will survey the current practices of DOTs in the United States and Canada to obtain the most up-to-date information on practices and knowledge that transportation agencies have in planning projects with highway median barriers. From this information, Clevenger will identify future research needs and priority issues as they relate to highway median barriers, their design, performance criteria, and assessments of their effect on habitat connectivity for wildlife and motorist safety.

Results of the study will be presented at the Transportation Research Board annual meeting and the International Conference on Ecology and Transportation.

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WTI Researcher Helping to Restore Habitat Connectivity Across Transportation Corridors in Bulgaria

Considerable efforts are underway to reconstruct and add new road segments to the transportation network in Bulgaria, because the Eastern European country is a candidate member state of the European Union (EU). By joining the EU, Bulgaria's transportation corridors will be integrated into the Trans-European Transportation Network allowing for improved human mobility and freight transport in Eastern Europe. In addition, Bulgaria's natural areas that are of European importance are to be integrated into the Pan-European Ecological Network (PEEN). Until now there were no plans to mitigate the negative effects of the expansion and upgrading of Bulgaria's transportation network on the environment.

The institute "Alterra", a part of Wageningen University and Research Centre in the Netherlands, has extensive experience with measures and planning tools to mitigate the negative effects of transportation infrastructure on the environment. The Dutch government awarded funds to Alterra to help restore habitat connectivity across transportation corridors and to help preserve biodiversity in Bulgaria, which puts into action the Dutch Ministry of Agriculture, Nature and Food Quality's plan of conservation and sustainable use of biodiversity in Central and Eastern Europe. Alterra invited Dr. Marcel Huijser, research ecologist at WTI to review and monitor the quality of the work conducted.

This project is expected to result in an improved understanding of the extent of habitat fragmentation by transportation corridors; an overview and prioritization of locations for de-fragmentation in both the existing and future national transportation networks in Bulgaria; and recommendations for the design and dimensions of de-fragmentation measures. In addition, a long-term National Program for de-fragmentation in Bulgaria will bring awareness and improved collaboration among policy makers, transportation planners and the EU community, allowing for a more permanent exchange of knowledge and best-practices along with a better understanding of the importance of sustainable ecological networks.

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Summer Institute Introduces Teens to Transportation Career Opportunities

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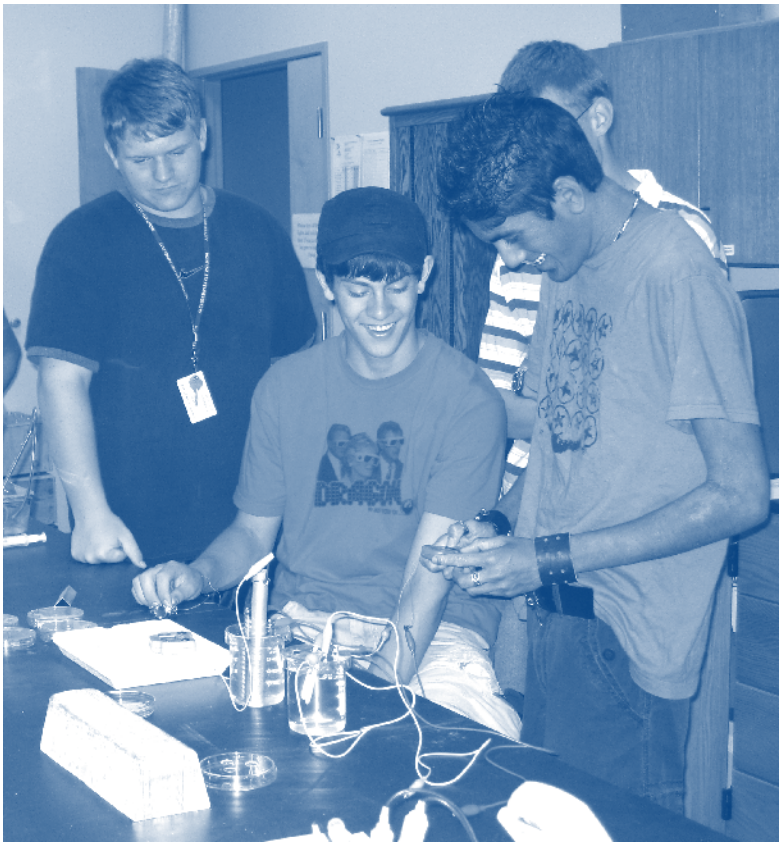
The Western Transportation Institute hosted fifteen high school students on the MSU campus for the 2006 Summer Transportation Institute (STI), which was held June 18 to July 14. STI brings students in grades 10 to 12 to campus for a four-week program designed to introduce them to career opportunities in the transportation field. The students participate in a number of hands-on activities, demonstrations, and field trips; in addition, professional guest speakers present career opportunities in a wide range of transportation fields, including traffic engineering, road ecology, safety, infrastructure design, aviation, and automotive design.

This year's program attracted students from far and wide. Participants arrived from all corners of Montana, including Kalispell, Thompson Falls, Missoula, Florence, Helena, Billings,



STI students make electricity in the WTI Corrosion Lab.

Students explore fish passage through culverts on Mulherin Creek.

Ashland, and Scobey. One student traveled all the way from Nashville, Tennessee in order to participate. The students lived on-campus and participated in an evening sports and recreation program. By program end, they had a good feel for college life and have gained invaluable college preparation and career planning guidance. The goal of STI is to increase the number of qualified persons pursuing transportation related careers.

The Summer Transportation Institute is a national program funded by the Federal Highway Administration. Additional program offerings were made possible through partnerships with public and private agencies. This year's participants received a stipend to offset lost income from summer jobs, thanks to contributions from WTI and a generous sponsorship provided by Morrison-Maierle, Inc. Summit Aviation contributed free "discovery flights" on its Cessna training plane, so the students could take the aviation knowledge they gained in the classroom to the skies. The Montana Department of Transportation hosted a lunch and tour of their facilities in Helena for the students. Finally, MSU faculty and staff contributed considerable time and effort to the program in order to give the participants a well-rounded introduction to the diverse transportation field. WTI appreciates the support of all the partners and contributors who have helped develop and enhance this educational opportunity for students.

STI student gets some first hand flying experience.

WTI hosts Council of University Transportation Center Summer Meeting

In June, WTI hosted the Summer Meeting of the Council of University Transportation Centers (CUTC) in Big Sky, Montana. Nearly 100 people attended the event, including representatives from the U.S. DOT Research and Innovative Technology Administration (which administers the UTC program) and Directors from University Transportation Centers around the country. The meeting offered an opportunity for UTC staff members to come together to discuss common issues and challenges, to mentor directors and staff from new UTCs, and to work together to perform at their highest potential.

Topics of the working sessions included "Business/Finance Administration" with an overview of best practices for managing resources, and "Education/Technology Transfer" which addressed innovative methods to disseminate research results, as well as programs to develop the next generation of transportation professionals. The final session on "Leveraging Dollars" outlined partnership sources of applicable state and private sector/industry matching funds. The subsequent discussions at these meetings allowed CUTC members to design effective new programs and address old and new issues within their respective centers.

"This year's meeting was an excellent opportunity for the Research and Innovative Technology Administration to describe how the U.S. DOT intends to implement the newly reauthorized UTC program in a way that will strengthen research collaboration with the Department and continue to educate the next generation of transportation professionals," said Thomas Marchessault, Acting Director of the University Transportation Centers Program at the Research and Innovative Technology Administration (USDOT); "we are grateful to CUTC for the opportunity to describe our vision for this important program, and for the opportunity for UTC managers to share firsthand knowledge on how to run a successful program. Congratulations to CUTC and the meeting host, the Western Transportation Institute, for an excellent, well-organized program that was of mutual benefit to U.S. DOT and the participating UTCs."

Training Course Offered on Mitigating Transportation Impacts on Wildlife and Fisheries

Road ecology is a rapidly emerging discipline that grapples with America's surface transportation infrastructure and the subsequent impacts on the environment. In an effort to bring science and solutions together, the WTI seeks to provide new educational opportunities and workshops for a diverse mix of constituencies. With this in mind, WTI's own Dr. Anthony Clevenger, Wildlife Biologist, Dr. Marcel P. Huijser, Research Ecologist, Amanda Hardy, MSc, Research Wildlife Biologist, Matt Blank, MSc Hydrologist/Research Scientist, and others, will present a one and-a-half-day course focusing on the elements involved in incorporating

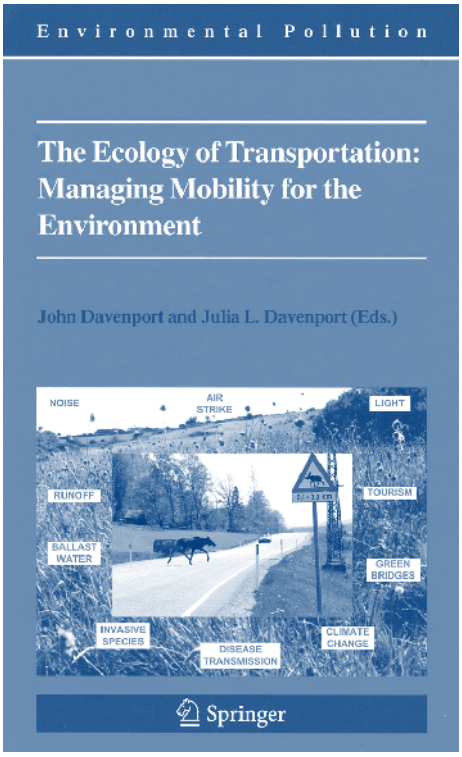
highway mitigation for wildlife and fisheries in transportation programming, using the Trans-Canada Highway in Alberta's Banff-Bow Valley as a case study.

This course is scheduled for October 12 – 13, 2006 at the Banff Centre, Alberta, Canada, and is designed for decision makers and transportation professionals. It will offer guiding principles for planning, designing, evaluating and maintaining highway mitigation aimed at reducing animal –vehicle collisions and increasing habitat connectivity for wildlife and fisheries. To register follow the link: www.banffcentre.ca/conference_registration/2006/transport_impacts

WTI Researchers Co-author New Book on Transportation and Ecology

Transportation has considerable ecological effects, many that are detrimental to environmental sustainability. A book recently published by Springer titled *The Ecology of Transportation: Managing Mobility for the Environment* features a chapter written by Dr. Marcel Huijser and Dr. Tony Clevenger of the Western Transportation Institute. All contributing authors are international experts from a variety of disciplines including ecology, sociology, and planning sciences.

The book reviews the ecological effects of road, rail, ship and aircraft transportation and



identifies threats as well as mitigation measures to minimize environmental degradation. Because this book considers transportation effects in all environments and ecosystems, it will appeal to specialists interested in new or emerging topics, as well as those interested in the historical perspective, encompassing the past, present and future of the effects of human transportation.

Technology Forum Promotes Peer-to-Peer Information Exchange

In June 2006, WTI and the California Department of Transportation (Caltrans) sponsored the Western States Rural Transportation Technology Implementers Forum in Mount Shasta, California. The goal of the one-day meeting was to allow rural ITS technology practitioners to exchange detailed technical information about how solutions are designed, engineered, integrated and implemented. The event was attended by state and local transportation professionals, including field engineers, maintenance staff, systems engineers, and communications technicians.

To promote a high level of technical content, each presentation focused on a specific solution or application that had actually been deployed in the field. Topics included:

- Fiber Optic Network/Topology Design on State Highways
- Microwave Communications for Rural ITS Applications
- The Redding Responder Project: Mobile Data Communication Challenges and Solutions in Remote Rural Areas
- Caltrans District 9 Mountain Pass Signs
- Web-Based ITS Field Element Control

Each presentation was followed by an extensive discussion period, to encourage detailed technical descriptions and candid recommendations. "Engineers want to hear about the successes as well as the failures, so they know what doesn't work and why," said WTI Research Engineer and Forum organizer, Chris Strong.

Sponsors were pleased with attendee participation and response, and are considering a similar forum for next year. "I think this event was well-received by the participants and is a good kickoff for future forums of this nature," said Sean Campbell, Senior Transportation Electrical Engineer and Specialist from the Caltrans Division of Research and Innovation.

For information about the next Western States Rural Transportation Technology Implementers Forum, contact Chris Strong at chriss@coe.montana.edu or (406) 994-7351.

WTI Welcomes New Research Associate

WTI welcomes Michelle Akin, E.I.T., as a Research Associate. A recent graduate with a Masters of Science in Civil Engineering complementing her Bachelor of Science degree in environmental resource engineering, Michelle has quickly become invaluable to the Infrastructure Maintenance and Materials Program Area. Her main role will be to help organize the design, construction and implementation of the new Cold Region Rural Transportation Research Facility in Lewistown, Montana. "Michelle has already made a great impression on everyone, and has also proven to be a tremendous asset on the projects she is involved with," said Eli Cuelho, Program Manager.

Michelle, who hails from California, is a familiar face at WTI as she spent the summer of 2003 as an REU student working on a fish passage project specifically studying the hydraulic roughness of streams. After completing her undergraduate degree, she decided to return to Montana to complete her Master's degree. In her spare time Michelle and her husband Craig will be landscaping their recently constructed home. Michelle enjoys road trips, and recently drove 5,000 miles visiting family and historical places. Eventually, she hopes to travel extensively throughout Spain. You can reach Michelle at michelle.akin@coe.montana.edu or (406)-994-6356.

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