



Message from the Director:

## Transportation and the Environment

Transportation and the environment are sometimes viewed as conflicting needs. Some have assumed that the choices must be “build roads OR protect wildlife,” “more cars OR clean air,” and so on.

At WTI, we have always taken a more holistic approach to transportation and the environment. We believe that the transportation system can be improved at the same time that the environment is protected, if a collaborative approach to planning and research is adopted.

WTI strives to provide leadership in this area. For example, in 2002 we were one of the sponsors of a national workshop on “Context Sensitive Design,” which promotes the development of transportation facilities that fit their physical settings and preserve environmental, scenic, historic and aesthetic resources. In the same year, WTI added a new research focus area - “Transportation System Wildlife Interactions” - to address animal-vehicle issues, which are a particular concern in rural areas.

WTI now boasts three full time researchers with nationally and internationally recognized expertise in road ecology. They have become an invaluable resource to all of our research. Whether we are evaluating the relative benefits of road maintenance practices, investigating options to relieve congestion in our National Parks, or testing new advancements in safety, we want to ensure that environmental considerations have been taken into account.

This multi-disciplinary approach will be evident in this issue of our newsletter, as you read about:

- The development of short courses on road ecology and wildlife crossing structures for the continuing education of transportation professionals;

- Using native grass sod as a protective ground-cover along highways to reduce erosion while enhancing the aesthetic value of highway sites;

- A study to consider the viability of using alternative fuels in Montana Department of Transportation’s fleet vehicles, including research into the impact on pollution emission standards;

- Using portable computing devices in new ways, including on-site collection of animal-vehicle collisions; and

- Transportation planning in the ski resort town of Big Sky, designed to ease congestion issues in a fast-growing area;

WTI provides a perfect environment (excuse the pun) for collaborative projects that bring together our research engineers, scientists, and ecologists on staff, as well as diverse faculty from the Montana State University campus. In yet another example, one of our road-wildlife ecologists is currently working with our research engineers to design highway safety studies in our Driving Simulation Laboratory.

By encouraging a more cohesive view and cooperative study, WTI hopes to stay at the leading edge of research that advances important goals in both transportation development and resource conservation. In addition, we are able to offer comprehensive research and specialized technical expertise to our partners and sponsors. If you would like to discuss collaborative opportunities that integrate transportation and environmental issues, please contact me at (406) 994-6114 or [stevea@coe.montana.edu](mailto:stevea@coe.montana.edu).



# Data collection goes high-tech for more efficient operations

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Technology is playing an important role in the efficiency of transportation systems -- providing more accurate, timely and consistent information for those who need it. Several studies are under way by WTI researchers that will determine how mobile computing devices, wireless data communication, and Global Positioning Systems (GPS) can be used for more useful and effective data collection and reporting.

## Using PDA/GPS System to Collect Roadkill Data

It is estimated that between 725,000 and 1.5 million crashes between vehicles and ungulates occur each year. These collisions result in more than 200 human fatalities and \$1 billion in property damage. In addition, wildlife populations can be negatively impacted by these incidents.

Not all DOTs or DOT districts record animal-vehicle collision data; those that do use inconsistent methods for reporting and recording the data. This project, led by Principal Investigator Marcel Huijser, is focusing on developing a national standard for recording data relative to animal-vehicle collisions using PDAs with a GPS.

A national standard for the reporting of animal-vehicle collisions should encourage DOTs and other organizations to collect these data and allow for a better integration and analyses of the data. More accurate and consistent data will also help transportation and wildlife managers to prioritize and focus efforts to reduce collisions.

Though the technical framework for the system has been developed, Doug Galarus, technical director of the project, said he would like to adapt the system to a more "rugged" PDA that is weather and shatter resistant. Once that is complete, the researchers will work with agencies to field-test the data collection system.

## Redding District Incident Management Responder Study

The California Department of Transportation (Caltrans) has contracted with WTI to develop and implement an at-scene data collection and incident support system to transmit data, including photos, from incidents to the Redding Traffic Operations Center (TOC).

When DOT maintenance personnel respond to incidents in rural areas with sparse communica-

tions coverage, it can be difficult to accurately convey the extent of the situation to those involved in managing the incident scene, said Doug Galarus, a WTI researcher working on the project. Existing data collection measures can require several trips to the scene by different responders who have to assess the situation.

With driver safety and traffic flow at stake, it is important to be able to expeditiously collect, track and share incident information with at-scene responders, the TOC and secondary incident responders.

Galarus is developing a framework for collecting and sharing this information using a Tablet PC, GPS,



and satellite telephone or cellular modem. Once a responder arrives at an incident scene, he will use a Tablet PC that will communicate with a GPS to determine location and display aerial photos and



topographic maps. The system will also have the capability of downloading weather forecasts and conditions using the satellite telephone or cellular modem to establish a wireless connection to the Internet. If digital photos are taken at the scene, the photos can be uploaded to the PC and a pen can be used to highlight certain points in the photo. All of this information can then be transmitted to the TOC, where managers can make immediate decisions on what needs to be done.

“This system would allow them to clear the incidents much more quickly,” Galarus said. “As a byproduct, it will automatically generate incident documentation in electronic form.”

Galarus will be demonstrating the technology to Caltrans in May to get feedback from those who will be using it.

### **Tribal Automated Accident Reporting System**

Similar to the efforts that Caltrans is making to generate more accurate and consistent incident data, WTI is working on ways to improve accident reporting with the application of advanced technologies.

Galarus has developed a prototype using a Tablet PC and GPS to collect and record data at accident scenes. Initially, researchers had hoped to develop a prototype using a Pocket PC coupled with a GPS unit. Limited screen space, however, made it difficult to implement complex form elements. Further development was done on a desktop PC with the intent of making it compatible with a notebook or

tablet mobile computing system.

The Tablet PC platform focused on making it more user-friendly and accurate. In addition, the use of a pen allows text to be handwritten, typed or entered using an onscreen keyboard. Hand-drawn incident sketch capability also was implemented.

WTI intends to target Native American reservations as a place to test and implement this technology. There is currently minimal accident reporting done on reservations, which has been attributed to a lack of clearly established policy on the traffic accident process.



## Driving simulator provides key data in transportation research

WTI's Driving Simulation Laboratory, which has been up and running just over a year, played a critical part in a recently completed research project which used the simulator to gauge driver performance and awareness while using a cell phone.

Subjects completed the study with each group using a different telephone setup - a hands-free cellular phone, hand-held cellular phone, or no cell phone at all (for the control group). Those interacting with the automated travel information system were given



Several studies over the past decade have analyzed the effects of using mobile telephones while driving. Anecdotal reports from these studies have indicated that those who use cell phones while driving may add a significant increment of risk to the driving task. Some studies have found that making a call while driving can triple the risk of a crash.

The study recently completed by WTI analyzed driving performance and situational awareness while drivers used a cellular phone to access an automated travel information system. Using WTI's Driving Simulation Laboratory, subjects drove a series of four scenarios which replicated urban and rural driving situations. Three groups of 12 sub-

jects completed the study with each group using a different telephone setup - a hands-free cellular phone, hand-held cellular phone, or no cell phone at all (for the control group). Those interacting with the automated travel information system were given

Laura Stanley, a Ph.D. candidate on a fellowship with WTI, conducted the tests and analyzed the results -- some of which were unexpected. "I was expecting that the primary driving task would be affected . . .

but the results showed the contrary," Stanley said. The data found that the primary task of driving, including lane-keeping and speed control, was not affected by cell phone use, whether hand-held or hands-free. However, Stanley noted that driving tasks which required urgent attention - such as

### Drivers needed for driving simulation study

WTI is currently looking for drivers who are interested in getting paid to participate in a driving simulation study. The following are the requirements for driving subjects:

- Must be between 18 and 65 years of age
- Must have a valid driver's license
- Commitment of two hours
- Must not be susceptible to motion sickness.

If you are interested, contact the WTI office at (406)994-6114.

responding to unexpected traffic conflicts to avoid a collision - were negatively impacted by the use of a cell phone, regardless of whether or not it was a hands-free system.

Hand-held cell phone users had higher numbers of collisions and more braking responses than those using hands-free systems or no cell phones. It also appeared that drivers became less aware of their surroundings while driving and using a cellular phone to access the traveler information system. "The increased crash risk of the phone users in our study (3.0 - 3.8) was very comparable to that reported by earlier studies of the risk of cell phone conversations," Stanley said.

The driving simulator, the only one of its kind in the Pacific Northwest, allows testing of driver

performance and behavior in the safety of the lab's controlled environment. The "car" used in the simulator is a converted 1996 Saturn sedan that operates just like a regular car but the controls are connected to the computer. With visual simulations that are created, test subjects drive through scenarios that include roads, traffic signs and signals, other vehicles, buildings, trees, rain, snow, fog and animals in the road. Speakers put out a realistic sound environment including engine noise, wind, traffic, sirens, tire screeches and horns.

A project currently under way by WTI will use data collected from the driving simulator to support research on ways to increase driver alertness to mitigate vehicle collisions with wildlife.

## WTI assists burgeoning Big Sky with transportation issues

For the third consecutive year, WTI is working with the Big Sky Transportation District in Big Sky, Montana, to help refine the area's transportation system to accommodate the needs of the growing resident and tourist populations.

As in the past, WTI principal investigator David Kack will assess feedback on the current routes and schedule for the Snow Express, the area's transportation system, and then make appropriate changes to serve the needs of the community. "[David Kack] has been the most valuable thing that has happened to the Big Sky Transportation District since 1991 when it started," said Meg O'Leary, chairman of the District.

Kack will analyze ridership data from the previous year, as well as analyze the surveys of customers and non-customers of Snow Express. Once a proposed new schedule and routing system is drafted, a public meeting will be held to ask for feedback on it. After the

new routes and schedule have been implemented, WTI will conduct a survey to gauge the level of satisfaction among customers, and analyze ridership data to determine if the routes were successful.

A new component of the partnership this year is WTI's assistance with developing a Transportation Development Plan (TDP) for the area. Kack said that the plan, which is required for the District to receive federal funding for the Snow Express service, will address future transportation needs of the area. Currently Snow Express operates only during the ski season; however, the TDP will look at the need for it to run all year.

It is anticipated that the Big Sky Transportation District will contract with WTI for additional work next year on the Snow Express system, making this relationship one of the longest in WTI's history.



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## Biodiesel Policy Alternatives Developed for Montana State Legislature

In 2003, the Transportation Committee of the Montana House of Representatives heard testimony on House Bill 502, which proposed that all diesel fuel sold in the state for on-highway use contain at least 2 percent biodiesel fuel by volume. The bill was discussed but tabled by the committee because of “unanswered questions surrounding this relatively new technology.”

The House Transportation Committee then asked the Montana Department of Transportation (MDT) to investigate the viability of biodiesel as an alternative fuel in Montana. WTI conducted the study for MDT, which was implemented in two phases. The first phase consisted of a review of relevant literature regarding the performance of biodiesel in motor vehicles. Principal findings of the literature review included:

- Using biodiesel does not appreciably degrade engine performance
- Cold temperature has a negative impact on the properties of higher blends of biodiesel, but is not an issue for formulations less than 20 percent
- Biodiesel generally produces lower emissions than conventional diesel
- There is no documented literature which suggests engine performance is degraded through long-term use of biodiesel. The only exception is the possibility of engine damage when high grades of biodiesel are used in older engines with rubber components.

The second phase of the project started with a field test using MDT vehicles. Three MDT vehicles housed near Missoula and three housed in Havre used a B20 biodiesel blend (20% oil seed-based biodiesel, 80% conventional diesel) for a period of six months. The test was conducted primarily during the winter months to emphasize cold weather properties and use. Researchers collected and evaluated performance data for both test and control vehicles, with particular attention to fuel economy and maintenance. WTI also surveyed MDT vehicle operators and maintenance personnel regarding their experiences in maintaining, fueling and driving vehicles with and without biodiesel.

The field test produced promising results. Driver reports and routine maintenance activities did not

show any major issues with biodiesel. “There were no problems in the field test that could be conclusively linked to the use of biodiesel,” said Principal Investigator Chris Strong. Strong also indicated that personnel using the vehicles did not express significant opposition to its continued use: “While they did not express an overwhelming desire to switch to biodiesel, there was a near consensus in their willingness to use the fuel in the future.”

Since neither the literature review nor the field test produced any significant reasons against biodiesel implementation, WTI continued its study by examining broader issues related to increased use of the fuel in Montana. These topics included microbial growth, engine technology change, and possible evasion of Montana fuel by long-distance truck drivers.

Researchers used all of the findings from the two phases of the project to develop a set of potential policy alternatives that could encourage biodiesel use in the state, including:

- Consumer-based policies to strengthen demand for biodiesel fuel, such as mandating a minimal level of biodiesel use or reducing the state tax on biodiesel fuel.
- Producer-based alternatives to increase the supply of biodiesel, such as tax incentives for the creation of production facilities.
- Retailer-based alternatives to encourage sale of biodiesel, such as offsetting the cost of equipment modifications or providing a tax credit on alternative fuels that are sold.

For each policy alternative, WTI identified the economic advantages and disadvantages for consumers, retailers, distributors, feedstock producers, biodiesel producers, and the government. In addition, researchers considered other potential impacts to the environment, the business climate, and Montana’s leadership role in the development of alternative fuels.

The final report from this project (available at [www.coe.montana.edu/wti](http://www.coe.montana.edu/wti)) and the policy alternatives will provide guidance to the Montana Department of Transportation (MDT) and the State Legislature as they consider the future of biodiesel usage in the state.

## New Research

### Yellowstone Park and WTI address traffic problems on U.S. 89

The ever-increasing numbers of people who are visiting Yellowstone National Park, combined with the growth of communities along the northern route to the park, are creating operational challenges along the U.S. Highway 89 transportation corridor.

With limited room for infrastructure expansion on this stretch of highway, WTI is working with Yellowstone Park representatives and the Montana Department of Transportation to come up with innovative solutions to address the existing problems.

People traveling from the I-90 exit at Livingston, Montana, to the north entrance of the park in Gardiner currently do not have access to real-time weather updates, details on alternative routes in case of bad weather or sudden road closures, or other transportation options available to travel U.S. 89. The long distance between alternate routes makes it particularly important for motorists to be made aware of this information before they actually reach critical decision points, notes Principal Investigator David Kack of WTI.

One of the major components of this three-year project includes the possible installation of dynamic message signs (DMS), one just south of Livingston near the I-90 exit and the other near

the park entrance in Gardiner. If installed, these signs could provide travelers with roadway information that would impact their travel. Other traveler information sources that will be explored by those involved in the project include the Internet, Highway Advisory Radios, and the 511 system. A related WTI project is exploring the creation of an automated database so that current YNP travel information will be available on Montana's 511 system.

A second major component to the U.S. 89 project involves measures to reduce the number of single occupancy vehicles on the roadway. One solution, Kack says, is the creation of a ride-sharing program to encourage carpooling, particularly among the park employees who commute to work from Livingston. One idea under discussion is the development of a Web site that will provide a listing of all transportation options along the U.S. 89 corridor, and a ride-sharing component that will allow individuals to find other people who are interested in carpooling.

Another task of the project team will be coordinating the major transportation providers that use this stretch of highway - charter companies, YNP employee shuttles, school buses, etc. - to increase effectiveness and efficiency.

### Yellowstone and Glacier travel information will soon be accessible on 511 systems

More than four years ago, when the Federal Communications Commission (FCC) designated 511 as a national telephone number for traveler information, it was intended to provide up-to-date information on travel conditions. Most national parks, however, which draw thousands of tourists, don't have an automated way to collect real-time information that can be accessed by the 511 system.

WTI is partnering with Yellowstone National Park, Glacier National Park, Montana DOT and Idaho Transportation Department to automate the data collection of traveler information for Yellowstone and Glacier National Parks, so that updated information will be available to travelers who call

511 in Montana and possibly Idaho. Principal Investigator Jaime Eidswick said the project will also enable the Parks to collect and archive important information into a database.

The first step in the project is to collect information related to Montana and Idaho's 511 systems and other data warehouses that have been created so the project team can determine what configurations will be required for the states' current 511 phone systems to accommodate a data warehouse. Once this groundwork is complete, a database will be developed for Yellowstone and Glacier's use. (Glacier currently has a database which may be adapted for Yellowstone.) After a 60-day test period,

*New Research continued on page 8*

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## **New Research** *continued*

the public will have access to Yellowstone and Glacier road and travel information.

Montana's 511 system was deployed in January 2003 to provide travelers with updates on road conditions, weather forecasts, emergency travel restrictions and construction. Enhancements to the system that have been added include an alerts system for fires, Amber alerts, and homeland security informa-

tion. Enhancements currently under development include tourism information.

Idaho's 511 system is scheduled for deployment in fall 2005 to provide travelers with updates on incidents, road and lane closures, road weather advisories, work zone status, AMBER alerts, and tourism information.

### **Major overhaul planned for Glacier Park's Going-to-the-Sun Road**

For most of the 1.7 million people who visit Montana's Glacier National Park each year, the 52-mile Going-to-the-Sun Road is the only way to travel - literally. This is the main road across the park's one million acres and its 52 miles offer some of the most spectacular vistas of mountains, glaciers, prairies, lakes and forests. Annually, about 1.4 million visitors travel across the road, one of only two roads in the United States designated as a National Historic Landmark, and the vast majority of visitors access the road in their private automobiles.

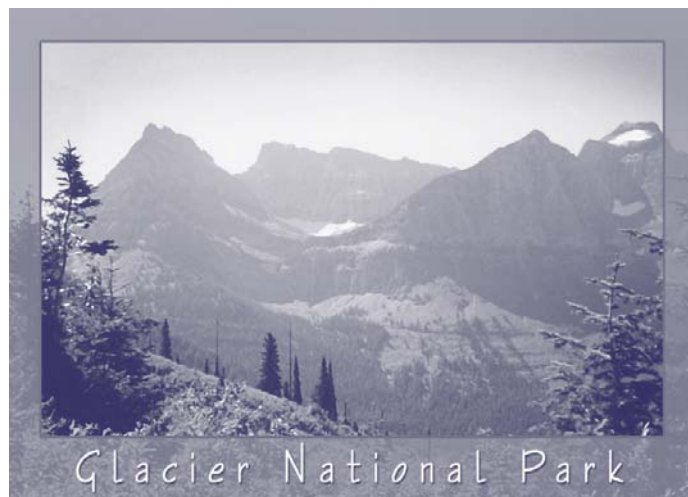
In 1999, the National Park Service (NPS) concluded that the Going-to-the-Sun Road (GTSR) needed rehabilitation due to major structural deterioration from high traffic volumes, harsh weather conditions, and inadequate maintenance. Federal legislation was passed to accommodate the GTSR project, reallocating \$1 million in transportation funds to conduct an Engineering Study, Socio-economic Study, and a Transportation and Visitor Use Study, with oversight from a Citizens Advisory Committee.

The NPS preferred a phased approach to the rehabilitation project over a seven- to eight-year period. A key part of the plan to mit-

igate the impacts of the rehabilitation project on visitors and local communities calls for operation of a park transit system during the road rehabilitation effort. It is expected that congestion on the road will be significantly reduced if a transit system can take just a small percentage (10-15%) of traffic off of the GTSR. Using Intelligent Transportation Systems (ITS) was also identified as a mitigation measure to help inform visitors of construction and alternative activities during GTSR reconstruction.

Glacier National Park will be planning the transit system and ITS simultaneously, through a Transit System Plan and an ITS Deployment Plan with contractors. The park will coordinate with WTI and other consultants to conduct public outreach for these two plans.

Chris Strong, a WTI researcher working on the project, said that WTI met with the park and other stakeholders in the fall of 2004 to strategize on the mitigation outreach effort. WTI will moderate the next meeting among stakeholders, slated for April 2005, to introduce the project and receive input on transit, visitor use improvement, and ITS needs.



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## Native grass sod: a potential solution to erosion problems along California highways?

Highway construction projects and newly constructed water conveyance features often contribute large amounts of sediment to nearby aquatic resources and pose a potential threat to the water quality in California. The erosion that occurs as a result of such activities, particularly in areas with steep slopes, is causing sediment deposits in lakes, streams and wetlands, according to Dr. Xianming Shi, a research scientist with WTI. This sediment displacement has created an urgent need for the California Department of Transportation (Caltrans) to further develop or refine best management practices (BMPs) to treat stormwater runoff from highway surfaces and BMPs for erosion control.

Dr. Shi, in collaboration with researchers from the departments of Plant Sciences & Plant Pathology and Land Resources & Environmental Sciences at Montana State University, is leading a WTI research project that will look at the use of native grass sod as a protective groundcover to

reduce sediment yield and runoff while enhancing the aesthetic value of highway sites. Several methods have been tried to establish native grass on highway project sites but none have resulted in adequate root development, which Shi says is essential to holding the soil together and thus preventing erosion. Another problem with past methods to establish native plants is the non-native weed species that take over in the abundant bare soil. These fast-growing weeds, some of which are noxious, require considerable resources to control.

This three-year research project, which began in December 2004, offers a unique opportunity to evaluate the effectiveness, efficiency and cost of

using reinforced native grass sod for erosion and sediment control on land near the California highway system. Some research has shown that the use of sod for erosion control is 99 percent effective in removing sediment in runoff. It is anticipated that the use of reinforced native grass sod will facilitate quick vegetation establishment and soil reinforcement, reduce the risk of non-native weeds and fire hazards, and thus reduce the use of herbicides. In addition, the native grass sod is expected to minimize the amount of maintenance and water treatment needed for the vegetation management.

The first task for Shi and his research team is to identify the appropriate plant species for a

sod product and then propagate and establish this sod for the first field demonstration site in California Grassland, one of six eco-provinces in the State of California. Plant species will be tested in greenhouse experiments to determine which are most suitable for each California eco-province. Other factors that will

be considered are how easy it is to transport, how the sod establishes after transportation to new sites, the use of available water in the soil, and prevention or competition from weed seeds in the soil below the sod. Due to the diversity of the State, three sod products will be field tested and monitored in three eco-provinces in the California highway system, respectively.

While using reinforced native grass sod is more expensive in the short term, it is likely to be more cost effective over time when the lower maintenance, herbicide and water treatment costs are taken into account, Shi said.



*Native Grass Species along a Rural California Roadway*

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## Brandy Sularz selected as “Student of the Year”

Each year at the Transportation Research Board annual meeting in Washington, DC, the U.S. Department of Transportation Research and Special Programs Administration honors the most outstanding student from each University Transportation Center (UTC). The UTC Students of the Year are selected based on their accomplishments in research, academics, professionalism, and leadership. The Western Transportation Institute selected Brandy Sularz as its 2004 Outstanding Student.

Brandy Sularz received her Master's of Science Degree in Civil Engineering in December 2004 from Montana State University, where she also received her B.S. in Civil Engineering. Her graduate work at MSU was supported by a Graduate Fellowship from the Western Transportation Institute (WTI). As a fellowship student, Brandy researched measures of effectiveness for evaluating Intelligent Transportation Systems (ITS) in California National Parks. From a previous study conducted at WTI, ITS components were selected to be implemented in two California National Parks, Sequoia and Kings Canyon National Parks and Golden Gate National Recreation Area, on a case study basis. Phase 2 of the project

involved the evaluation of the ITS components after a specific time period. “National parks are showing an increasing interest in ITS, and Brandy developed a workable approach for how to evaluate ITS projects in a national park,” says Research Engineer Chris Strong. “She did an excellent job of synthesizing what has been learned at the national and international levels and making it relevant to national parks.”

During her final semester Brandy was also a teaching assistant for two transportation courses. She is a member of Chi Epsilon, the National Civil Engineering Honor Society, and the Institute of Transportation Engineers (ITE), and a participant in WTI's

K-6 engineering outreach program. Brandy started work in January 2005 with DKS Associates in Portland, Oregon, a private consulting firm specializing in all aspect of transportation, including ITS, signal management and operations, and transit and transportation planning. She attributes much of her success to ITE and plans on remaining active in the Oregon Chapter.

*Congratulations Brandy!*



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### Summer Transportation Institute: Ready For Take-Off

In a quest to increase the number of qualified persons pursuing transportation related careers, the Western Transportation Institute will host the first Summer Transportation Institute (STI) for high school students at Montana State University - Bozeman. The Summer Transportation Institute is funded by the Federal Highway Administration and administered by the National Summer Transportation Institute Resource Center at South Carolina State University.

Fifteen high school students will be selected to live on the MSU campus for four weeks, with all hous-

ing and food expenses covered by the program. The program will include classroom instruction, hands-on demonstrations, field trips, guest speakers and group and individual projects. Students will have an opportunity to explore all areas of transportation from driving simulators to airplane design. The comprehensive program will ensure that high school participants develop research, analytical, and leadership skills while learning about transportation-related educational and career opportunities. The first STI program will run from June 12 - July 8th, 2005.





# MSU Students Lead Engineering Week Activities

February 20 - 26, 2005 was National Engineers Week. To mark the occasion, two events were held for pre-college youth at Montana State University. On Thursday, more than 230 area sixth graders visited MSU campus for the "Engineerathon." The middle school students learned about different engineering disciplines as they rotated between hands-on engineering booths developed and facilitated by MSU College of Engineering student chapter organizations. The Institute of Transportation Engineers (ITE) demonstrated the importance of crash attenuators using a ramp, a toy truck, and a crash-test egg. Other engineering activities included a demonstration of gear ratios in auto and bike design by the Society of Automotive Engineers (SAE) student chapter; a demonstration of how tension and compression act together in loaded bridge beams by Chi Epsilon, the Civil Engineer-



ing student honor society; and an oil pipeline project facilitated by the American Indian Science and Engineering (AISES) student chapter. In all, over fifty MSU engineering students participated in the event from nine different student chapters.

MSU engineering students also hosted area Girl Scouts on Saturday to commemorate "Introduce a Girl to Engineering Day," as part of the National Engineers Week. The Girl Scouts earned their "Making it Matter" engineering badge by exploring different engineering concepts with the MSU students. Badge Day was organized and sponsored by the Western Transportation Institute in cooperation with the MSU College of Engineering.



## Professional Courses Developed from Road Ecology Research

A growing interest in recent research and publications by WTI staff about road ecology and wildlife crossing systems has led to the development of two university-based short courses on these topics for industry professionals. Dr. Anthony Clevenger, a research scientist for WTI, is writing the curriculum for both of the courses which will be offered this spring. Clevenger is a co-author of the book "Road Ecology: Science and Solutions," which looks at how roads impact the environment and the techniques being applied to mitigate these impacts on wildlife, land, water, and plant ecosystems.

Using the Rocky Mountains as a case study, the eight-hour course "Road Ecology: Concepts and Applications for Resolving Wildlife and Transportation Conflicts," addressed the fundamental aspects of conservation of natural landscapes and wildlife

populations, and explored the means of meeting the dual needs of animals to cross roadways with reduced hazard to motorists and wildlife. Clevenger, Dr. Marcel Huijser and Amanda Hardy of WTI taught the course during the engineering festival at Montana State University-Bozeman in March, 2005.

The second professional development short-course is an offshoot of another WTI project, sponsored by FHWA, called "North American Wildlife Crossing Design Guidelines," in which Clevenger compiled guidelines for planning and designing functional wildlife fencing and crossing structures. The information that was assembled in this project will make up the content of the professional development course targeting transportation practitioners and biologists.

## Snowbelt States Seek Advancements in Corrosion Testing Protocols

WTI Research Scientist Xianming Shi hosted a corrosion forum in December 2004 at Montana State University, Bozeman. Dr. Shi assisted Dan Williams at Montana Department of Transportation to organize the two-day meeting facilitated by the Pacific Northwest Snowfighters (PNS) Association. The forum was attended by professional research engineers and chemists from both public and private industry, representing state departments of transportation (Idaho, Montana, Washington, Minnesota), FHWA, Analytical Laboratories, Redmond Minerals, Envirotech, Dow Chemicals, Levelton Engineering, U.S. Environmental Resources, Pacific Northwest National Laboratory, and WTI.

This collaboration, felt to be the first of its kind in the United States, was created to review the current corrosion testing standard, a modified NACE Corrosion Test used by PNS. The focus was to identify potential improvements to the existing NACE/PNS protocol, in terms of test time,

reproducibility, metal type, etc. Dr. Shi presented his research in establishing an electrochemical corrosion test protocol, which allows for faster, more reliable testing, and in-situ monitoring of corrosion rate. The research results are expected to assist in evaluating the corrosiveness of anti-icing and deicing chemicals. The forum attendees also visited the WTI Corrosion Laboratory and the Image and Chemical Analysis Laboratory at Montana State University.

By establishing communication and creating a network of shared information and research needs, Dr. Shi and his peers will create more awareness of winter maintenance needs throughout the snowbelt region. In a related research project, Dr. Shi is working with PNS and the Washington Department of Transportation to synthesize the information on two winter highway maintenance techniques: anti-icing and pre-wetting.





## DOT Officials View Animal Detection System Installations

On December 15 and 16, 2004, representatives from the FHWA and 15 Departments of Transportation (DOT's) met at WTI office in Bozeman to discuss a project that evaluates the reliability and effectiveness of two experimental animal detection systems: one along Hwy 191 in Yellowstone National Park, MT and one along Hwy 22/322, about 35 mi. northwest of Harrisburg, PA. Animal-vehicle detection technologies are relatively new, and both systems have experienced substantial technological challenges since their installation. However, a recent evaluation of the system along Hwy 191 in Yellowstone National Park indicates substantial progress and promising results in terms of performance and reliability.

WTI investigated the reliability of the system along Hwy 191 in Yellowstone National park throughout the past winter. Interpretation of the detection data saved by the system suggests that at least 55% of all detections were related to animals

approaching or crossing the road. This percentage is viewed as a minimum estimate, because many of the "unclear" detections (28%) may also relate to animals that approached or crossed the road.

Data collected by the system, such as distribution of animal crossings over the day and the direction of their travel, match local knowledge of the behavior of the elk. The system performance has also been validated through daily snow tracking sessions. Detailed analyses indicated that the system detected at least 72% of all elk crossings recorded through snow tracking.

The patterns in the detection data and the comparison to the snow tracking data confirm that the system detects elk that approach and cross the road. WTI believes that the detection system demonstrated an effective ability to detect large animal passages during the evaluation period.

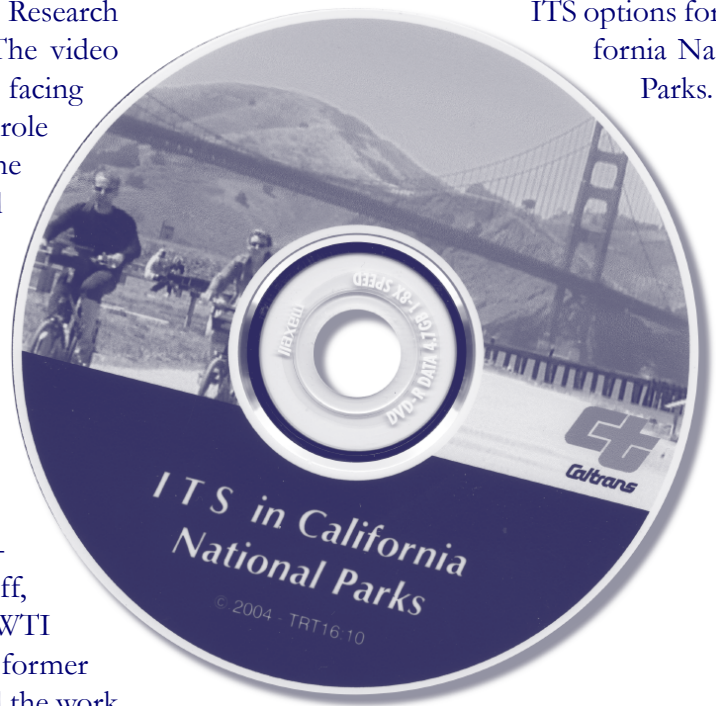


*Representatives of 15 DOT's, FHWA, Yellowstone National Park, two vendors, and WTI-MSU visited the animal detection system along Hwy 191 in Yellowstone National Park on December 15, 2004.*

## New Video Highlights ITS In California National Parks

The ITS Applications in California National Parks video, funded by the California Department of Transportation (Caltrans) Division of Research and Innovation, was recently released. The video highlights the transportation challenges facing national parks today and the potential role for ITS in resolving those challenges. The video includes both rural (Sequoia and Kings Canyon National Parks) and urban (Golden Gate National Recreation Area) parks to show relevant ITS applications, including electronic access and fee payment systems, real-time arrival information for transit vehicles within the park, parking lot monitoring, and campground reservations. The video will be used as an educational tool with the intended audience being national park staff, county staff, government officials, and the public. WTI Research Associate Jamie Eidswick and former student Yvonne (Wachutka) Tomascak led the work

in developing the video, which was based on the findings of a WTI study to identify viable ITS options for California National Parks.



## Transportation Research Positions Available

WTI currently has openings for research engineers and research associates at all levels of experience. We are especially interested in applicants with experience and interests related to transportation systems engineering, safety, infrastructure maintenance, and public transportation planning. The following positions are available:

**Senior Research Engineer:** Provides senior technical oversight of project research and evaluation in areas of transportation systems engineering, transportation planning, advanced transportation technologies, safety, infrastructure design and maintenance, and institutional issues. Candidates must have a Master's Degree or Doctorate in an appropriate field related to transportation research and development and 10 years of progressively responsible experience.

**Research Engineer:** Directs and performs research and evaluation in areas of transportation systems engineering, transportation planning, advanced transportation technologies, safety, infrastructure design and maintenance, and institutional issues. Candidates must have a Master's Degree or Doctorate in an appropriate field related to transportation research and development.

**Research Associate:** Supports research and evaluation in areas of public transportation planning, transportation systems engineering, advanced transportation technologies, safety, infrastructure design and maintenance, and institutional issues. Candidates must have a Master's Degree in an appropriate field related to transportation research and development.

For more information about these positions and WTI, visit our website at [www.coe.montana.edu/wti](http://www.coe.montana.edu/wti)





## Come to the “Last Best Place” for the 2006 National Rural ITS Conference

The Western Transportation Institute, located in Bozeman Montana, would like to invite you to the 2006 National Rural ITS Conference, to be held in Big Sky, Montana August 13 - 16, 2006.

With the majestic backdrop of the Rocky Mountains and Lone Mountain, the 2006 National Rural ITS Conference will provide opportunity for transportation professionals to obtain information on current rural transportation issues, exchange valuable ideas and

information regarding the challenges faced in rural transportation. In addition participants will be given the opportunity to sharpen networking skills while visiting the scenic areas of Big Sky Resort, the town of West Yellowstone and Yellowstone National Park, all within a one hour drive of the conference site. One look at our many outdoor opportunities including mountain biking, white water rafting, hiking, golf, fly fishing and horseback riding, and you will see why you can't help but mix business with pleasure in Big Sky.



*This conference is not to be missed, we look forward to seeing you in Montana, “The Last Best Place” in the summer of 2006.*





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