

Western Transportation Institute

Montana State University

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Message from the Director:

WTI Earns University Transportation Center Status for a Second Time

On August 10, 2005 President George Bush signed into law the federal highway funding bill, he once again designated WTI as a University Transportation Center.

WTI was first named as a UTC in 1998. Through this U.S. Department Of Transportation program, we receive \$2 million a year for our research and educational program. As one of only 35 UTC's in the country, this designation has helped WTI achieve a national reputation for our specialized research in the field of rural transportation. To be designated a national UTC a second time is especially gratifying, because it means that we are developing effective solutions to the real transportation challenges facing rural America.

We are also pleased that our federal support will grow under the new bill, in part because some of our high priority projects have been granted earmarked funding. For example, the Western Transportation Institute will receive \$4 million from the new federal highway bill to establish a Cold Region Rural Transportation Research Testbed in Lewistown, Montana. Montana has the opportunity to be a national and international leader in cold region and rural transportation research by creating a test facility to study highway design, maintenance and operations using closed runways, taxiways, and other underutilized assets at the Lewistown airport. The testbed will examine such issues as impacts of winter road maintenance practices on the environment, roadway infrastructure, and vehicles; commercial vehicle operations during winter conditions; rural highway safety; age-related driver performance; work zone training and safety; and animal-vehicle interaction. To begin this effort, partnerships are being sought from other states or countries in cold regions that perform winter-related maintenance and operations on their

highways. The Montana Department of Transportation and the Washington State Department of Transportation have already expressed their enthusiastic support for this effort.

Other federal funding legislation will provide WTI with a second important earmark. WTI will take the lead in conducting a major study on Transportation Funding Alternatives. For the most part, costs of our highway system are covered by resources drawn from the Highway Trust Fund. As needs are far outpacing available resources, alternative funding sources must be researched. WTI will establish the state-of-the practice both nationally and internationally, then analyze each alternative to determine its advantages and disadvantages, forecast increased revenues, assess its applicability/viability and address institutional and technical issues. We will partner with leading economists and the private sector to examine a wide range of alternatives that are applicable to rural state needs. As a result, we also hope to engage research partners from as many state DOTs as possible.

The reaffirmation of our University Transportation Center status, combined with our increased federal funding, will allow WTI to build on our research in each of our focus areas. Many of the research topics in which we have developed extensive expertise are reflected in the themes of the federal highway bill, an indication that WTI is at the leading edge of research on issues of national priority.

Weather and Winter Mobility: The transportation bill creates a Road Weather Research and Development Program to maximize use of available road weather information and technologies, similar to efforts

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Advancing rural transportation through research and education...

we have deployed on a regional basis in rural Northern California. WTI has a robust weather research program that also encompasses such topics as the corrosive impacts of deicers and pilot tests of AVL systems on snowplows.

Rural Applications of Advanced Technology: U.S. Department Of Transportation will be conducting a major feasibility study on how to improve wireless communications along rural corridors. In collaboration with the Department of Electrical and Computer Engineering at MSU, WTI has already begun work on a prototype wireless system for rural areas.

Highway Infrastructure Design and Maintenance: The Innovative Bridge Research and Deployment Program in the transportation bill is designed to promote new designs, materials and construction methods that will prolong the life of highways, work that is well underway at WTI through our materials-related laboratories and individual projects like our Saco Bridge Instrumentation project.

Public Transportation and Mobility: The highway bill creates a Center for Transportation Advancement and Regional Development to assist with the development of transportation systems in small metropolitan and rural areas. WTI, working

with the Montana Transportation Partnership, developed a coordinated transportation handbook that provides this type of technical support to every community in the state.

Transportation System Wildlife Interactions: U.S. Department Of Transportation is directed to conduct a national study on methods to reduce wildlife-vehicle collisions. WTI has been at the forefront of this issue: synthesizing all available information, testing innovative warning systems, evaluating crossing systems, and perhaps most importantly, getting this information into the hands of transportation practitioners through the development of targeted websites and professional short courses.

In this issue of the newsletter, you will read about our latest research in each of our focus areas. Thanks to our continued partnership with the federal government, we look forward to building on our previous research and strengthening our expertise in each of these fields.

Our ongoing success is dependent on our collaboration with many other research partners as well. I am confident that many opportunities lie ahead to make real improvements to America's transportation system, and I look forward to hearing from you about how we can work together to make that happen.

RESEARCH ————— Weather & Winter Mobility

Benefits of UDOT Weather Operations/RWIS program to be evaluated

Weather poses significant threats to motorists in the United States. In 2001, there were 1.4 million weather-related vehicle crashes reported that resulted in 6,900 deaths. State transportation agencies are continually trying to provide more timely, accurate, reliable and user-friendly road and weather information to reduce weather-related traffic accidents.

The UDOT established the Weather Operations/Road Weather Information System (RWIS) Program in the 1990s to more strategically manage all aspects of transportation as it relates to weather. Utah's Weather Operations/RWIS program is unique in that it assists the DOT operations, maintenance, and construction functions by providing detailed and customized weather forecasts.

WTI researchers are currently working with UDOT to assess the Weather Operations/RWIS and its overall benefits. Xianming Shi, the principal investigator on the project, said this evaluation will look at issues such as the accuracy and reliability of the information that is provided through the program, and whether it changes driver behaviors, the value to UDOT personnel who use it, and the impact on UDOT's goals and objectives.

The Utah Weather Operations/RWIS Program has two main components. One is the Weather Operations division which has four staff meteorologists who are stationed in the Traffic Operations Center (TOC). They provide year-round weather information for maintenance, construction projects, plan-

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New report focuses on innovative methods of winter highway maintenance

To combat icy roads, maintenance crews commonly use substantial amounts of solid and liquid chemicals, along with abrasives, to accelerate melting of ice and snow and provide traction on the winter roadways.

While such techniques are essential to maintaining driver safety, the growing use of chemicals has raised some environmental concerns. A case study a few years ago found that highway runoff containing sediment can result in a decrease in diversity and productivity of aquatic ecosystems. Other research has indicated that the chemicals used for snow and ice control may cause corrosion in reinforced concrete structures, pavements, and motor vehicles.

At the request of the Pacific Northwest Snowfighters Association and Washington Department of Transportation, WTI is investigating new techniques that are designed to reduce the need for chemicals and abrasives for winter road maintenance. Xianming Shi has recently completed a comprehensive synthesis of information on these new techniques.

A principal finding of the report is that an approach called “anti-icing,” which is the early application of chemicals to help prevent black ice and prevent or weaken the bond between ice and the roadway surface. Anti-icing is a proactive approach to winter driver safety. When used in conjunction with available weather information, anti-icing reduces the amount of chemicals and abrasives required.

Another innovative practice in winter road maintenance is “pre-wetting,” which is the addition of a liquid chemical to an abrasive or solid chemical before it is applied to the road. Pre-wetting has shown to increase their performance and longevity on the roadway surface, thereby reducing the amount of materials required. If cold, the pre-wet abrasives will quickly refreeze to the road surface and create a sandpaper-type surface, which can cut abrasive use by 50 percent in cold temperatures. If warm, chemicals can accelerate the break-up of snowpack while providing a traction aid.

Anti-icing and pre-wetting have seen increased implementation in North America over the last decade. “Our research indicates that when compared with traditional methods for snow and ice control, anti-icing and pre-wetting lead to decreased applications of chemical products and abrasives, decreased maintenance costs, improved roadway friction, and lower accident rates,” said Shi.

The information in this report will serve as important reference material for maintenance personnel and transportation officials who seek to better understand improved winter maintenance technologies, identify areas for improvement within their own jurisdiction, and learn about related experiences from other agencies. WTI is also preparing an informational brochure for the Pacific Northwest Snowfighters to distribute to the public, to answer frequently asked questions regarding snow and ice control methods.

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ning, the highway avalanche safety program, TOC operations, risk management, training, and incident management. The second component is intelligent transportation systems (ITS), which includes 48 RWIS stations and expert systems such as bridge spray systems, high wind alerts, and fog warnings.

WTI's evaluation will be conducted in phases, with the first phase focusing on the direct benefits of the forecasting services provided by the program to maintenance and construction departments. Subsequent phases will look at other benefits such

as better traveler information, accident reduction, value added to UDOT training and risk management, and benefits to programs outside UDOT.

This research will allow UDOT to evaluate its investment in the program and determine how it can be improved to meet customer needs, providing a model that other states may also want to adopt.

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Researchers to Conduct Evaluation of Alaska 511 system

After 18 months in operation, the Alaska 511 system will be evaluated by WTI researchers this year to determine whether the traveler information tool is accomplishing its goals and objectives.

Alaska implemented its traveler information phone service and Web site in 2003, becoming part of a 15-state 511 coalition that coordinates information to keep motorists abreast of up-to-date road conditions, weather forecasts, and ferry information. The Alaska Department of Transportation and Public Facilities have contracted with WTI to survey customers regarding their use of the 511 phone system and web site. The researchers then will evaluate the feedback to determine who is using the system, what marketing strategies have been successful, and ideas for improvements. The project will also evaluate internal users' perceptions on the database that feeds the phone and Web site.

The customer survey will be sent to 3,000 Alaska residents, commercial vehicle operators, and those involved in the tourism industry to determine their

awareness of the system, how useful they think the information is, the number of people who actually use it and how it might be improved. The internal survey will target users such as DOT employees and Alaska state troopers to find out the types of information that they are reporting into the database, what features of the database are used or not used, and their suggestions for enhancements.

The nationwide 511 traveler information system, established in 2000 by the Federal Communications Commission, was designed to be used by Departments of Transportation to provide motorists with automated, real-time information on weather and road conditions, road closures and delays, and transit service information. Some states, via the 511 system, also offer information on food and lodging, tourist attractions, current events and trip routing. "The best way to assess the level of service provided to customers is to evaluate the system and identify areas for improvement," said Jaime Eids- wick, WTI's principal investigator on the project.

Defensive driving course for teens may reduce accident rates

Research has shown that teen-aged drivers have more accidents than any other group of drivers. The driver education courses typically designed for young drivers rarely teach them how to react to skids, panic stops, driving off the pavement and other situations that often lead to an accident, according to Michael Kelly, a senior research scientist at WTI.

Kelly is the principal investigator for a multi-phase project to develop a one-day defensive driving course to train novice drivers how to deal with conditions that cause the greatest number of driving crashes in Montana. For this effort, WTI is partnering with both the Montana Department of Transportation (MDT) and the Montana Office of Public Instruction.

While there is considerable anecdotal evidence that such training, combined with standard driving instruction, results in a more capable novice driver, only one systematic study of its effect on the safety of young drivers has been completed. This project,



in its entirety, will compare two matched groups of novice drivers in and near Lewistown, Mon-

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New STARS project to collect updated data on overweight vehicles

Nearly five years ago, Montana activated its high-tech tracking system that was designed to aid the Montana Department of Transportation with a variety of functions such as vehicle weight enforcement, road design, and transportation planning. Since then, valuable information about commercial vehicle activity on the state's highways has been collected from sensors embedded in the roads.

According to a project that measured the effectiveness of the State Truck Activities Reporting System (STARS), the number of vehicles operating overweight was reduced by 20 percent. As experience with STARS has grown, transportation officials have identified issues that need further investigation to assure that the STARS data is being used to its maximum potential.

WTI will be researching a number of issues that MDT has determined will create more effective weight enforcement activities. These issues include 1) refining the data collection methods to identify permitted overweight vehicles; 2) determining how infrastructure damage attributed to overweight vehicles can be quantified to account for changes in traffic volume; 3) investigating how level of enforcement effort can be factored in to the STARS database; and 4) exploring how STARS-based data on overweight vehicle activity can become a part of the federal weight enforcement plan and certification process.

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tana, to determine the effects of defensive vehicle handling training on novice driver safety. Approximately four hundred teens enrolled in driver education were solicited to participate, half of whom received a one-day classroom and behind-the-wheel workshop six months after they completed driver education. For three months, these students will be encouraged to log on to a Web site for weekly refresher information.

The teens will be tracked for four years following the project to compare accidents, violations and driving experience of those who participated in the defense driving course with the approximately 200 students who did not get the additional training. The differences between the two groups will reflect the safety benefits, if any, of the advanced training for novice drivers.

The first phase of this project consists of developing a curriculum for the advanced course

and recruiting the 400 teens who will be involved in the study. The second phase, currently underway, will be the actual presentation of the advanced driver training and the final phase will be the evaluation component. The entire project is expected to be completed in 2009.



The Skid Monster™ enables a driving instructor to simulate skid conditions while travelling at lower speeds and without altering the driving surface.

Montana receives assistance from WTI to upgrade traveler information database

Traveler information is a key service that Departments of Transportation (DOT) provide to the traveling public. Through a variety of technologies-Highway Advisory Radio, Dynamic Message Signs, traveler information telephone numbers like 511, and Web sites-travelers are alerted to information on weather, road conditions, construction, detours and other travel-related issues.

Behind the technologies that provide traveler information, there are database systems that collect, store and disseminate the data. For the information to be transmitted efficiently, timely and accurately, a

fully integrated database system is required. Currently, two separate systems-one each for summer and winter reporting-are used by the Montana Department of Transportation (MDT) to feed information to the traveler information sources.

WTI is collecting and analyzing information about various database systems. Researchers will provide recommendations to MDT for a single system that will improve the efficiency of how the traveler information is transmitted and will be flexible for future enhancement.

Montana DOT contracts with WTI to create more efficient statewide operations

Several states have implemented Transportation Management Centers (TMC) to enhance the statewide operations of their transportation departments. This is one of the options that WTI researchers will address in their development of a Concept of Operations for the Montana Department of Transportation (MDT) in its quest to operate more effectively and efficiently.

Although WTI expects to provide MDT with several alternative concepts for its statewide operations, the TMC concept is one that will be researched extensively, since it has been successfully implemented in other states. "TMCs perform a wide variety of functions and activities, however, the corresponding costs, benefits and operations issues need

to be considered," said Suzanne Lassacher, WTI's principal investigator on the project.

The research and data collection process will include interviews with MDT internal stakeholders and visits to TMCs in other states such as Oregon and Arizona.

A report with several alternatives for a statewide operations center (SOC) will be submitted to MDT, addressing components that include SOC functions, staffing, hours of operation, roles and responsibilities of stakeholders, and facility location. Based on feedback from MDT and an appointed Technical Advisory Committee, the most functional concept for Montana will be selected and WTI will create an implementation plan.

Snow plow-mounted AVL sensors being researched for Montana

Automated vehicle location (AVL) technology has been used in the transportation industry in recent years to improve management and tracking of vehicle fleets. Typically this technology, which uses global positioning system (GPS) coordinates, has been used by trucking firms to gather accurate, real-time information of vehicle location and activity to assist in routing and dispatch operations. This method of tracking has improved efficiency and reduced operating costs.

A WTI project under way in Montana is looking at the best AVL technology to use on snow plows,

particularly for providing timely and precise information to travelers. The Montana Department of Transportation (MDT) received funding to help improve traveler information in the state and a portion of the funding was allotted for a pilot test of AVL.

WTI researchers will review data from other DOTs that use AVL on maintenance vehicles, particularly snow plows, and look at how it was used (e.g. to track snow plow activities on roadways), the costs and benefits, and the system goals. According to WTI principal investigator Chris Strong, "We will focus our efforts on other rural, mountainous states

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Which road maintenance techniques work best in Montana?

Traffic and weather conditions are critical factors when it comes to highway wear and tear. There are many treatments for preventative maintenance on paved roads; however, not all of them have been specifically tested in Montana's climate, soil types, traffic levels, or construction and design techniques. The Western Transportation Institute (WTI) will be conducting research tailored to the characteristics and environment of the Montana highway system, in order to better quantify the benefits of maintenance preservation in terms of increased pavement life, serviceability, and reduced overall costs.

Currently, millions of dollars are spent each year to maintain nearly 24,000 lane-miles of pavement throughout Montana, according to WTI's Eli Cuelho, a principal investigator of the project. Cuelho, along with Robert Mokwa (an assistant

professor in the MSU Civil Engineering Department) and a student research assistant will review and synthesize past and ongoing research on preventative maintenance technologies such as foamed asphalt, cold in-place recycling, whitetopping, crack sealing, and chip sealing.

After the information is synthesized, a final report will be submitted to MDT in early 2006 offering conclusions and recommendations applicable to Montana's highway management system. "This should provide a concise, informative synopsis that can be used as a stepping stone for future planning," Cuelho said.

MDT is funding most of this research project with some matching funds provided by WTI and the MSU Civil Engineering Department.

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Researchers look for effective measures to mitigate steel corrosion in concrete

Concrete normally provides both chemical and physical protection for the steel reinforcement embedded in concrete. There are environments, however, that can allow corrosion to occur when these two elements interface.

Deicer and marine settings have been proven to compromise the durability of concrete in bridge structures, leading to corrosion. Extensive research has been done to investigate the mechanisms of steel corrosion in concrete when chloride is present; however, it has not yet led to a solution to the problem.

WTI is conducting further research on the corrosion inhibition mechanisms at the steel/concrete interface. Researchers, led by Xianming Shi, will simulate the steel/concrete interface by physically depositing a submicron layer of iron on a concrete surface.

Then, experiments will investigate the corrosion that results from the presence of chloride at the steel/concrete interface. The effect of various corrosion-inhibiting chemicals on the interface will also be tested.

With the combined use of electrochemical and surface analytical techniques, Shi says it is possible to further the understanding of the localized corrosion of carbon steel in concrete and to unravel the corrosion inhibition mechanisms of various types of corrosion inhibitors.

"Such knowledge would contribute greatly to searching for effective measures to mitigate steel corrosion in concrete and to protect concrete structures in a chloride-containing environment," Shi said. The research is scheduled to be completed in 2006.

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with significant winter maintenance, so we can provide comparable applications to match Montana's geographical challenges."

Researchers will then look at the state's current inventory of maintenance vehicles to determine which may be compatible with various AVL platforms. Vendors which sell AVL technology will then

be contacted to see if their products will work with the MDT vehicles.

WTI will provide MDT with recommendations for a pilot test of the AVL on snow plows followed by an evaluation summarizing the results of the pilot test. The evaluation is expected to help MDT decide on future investments in AVL for its snow plows.

New method may replace decades-old soil density test

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WTI researchers are studying a new method for measuring the density of construction soils, possibly replacing the decades-old Proctor tests.

The popular Proctor tests are commonly used to determine the maximum dry density and optimum moisture content of soils that are used in civil structures such as highways, reinforced slopes, dams, and foundation materials. Although compaction methods in the field have changed dramatically, the Proctor tests have remained relatively unchanged for decades, according to Eli Cuelho, WTI research engineer.

A major shortcoming of the Proctor, Cuelho said, is that it uses impact loads to compact the soils, which does not accurately reflect field compaction. Soil density in the field comes from a combination of kneading, vibration, and increased normal pressures, which are difficult to reproduce in the lab. Furthermore, the Proctor hammer, with its sharp impact, tends to disturb the soil sample which may reduce its density, especially when granular soils are used. Consequently, a more appropriate method of compact-

ing soils in the laboratory is needed to more closely resemble in-place field densities.

As part of the Strategic Highway Research Program, a device called a gyratory compactor was created in the early 1990s to predict in-place asphalt densities. Gyratory compactors simultaneously use static compression and a shearing action to compact asphalt mixtures. Static compression is achieved by a load placed on the soil surface using a hydraulic ram. Shearing occurs when the sample mold is gyrated through an angle as the static pressure is applied.

Thousands of gyratory compactors are used in the United States to test asphalt density. Because the gyratory compactor accurately predicts in-place asphalt densities, this project will look at using this method to do the same with construction soils. WTI researchers will use the Superpave gyratory compactor owned by the Montana State University Civil Engineering Department to conduct the testing.

RESEARCH

Transportation System Wildlife Interactions

Road ecologists to study wildlife connectivity on Snoqualmie Pass

WTI's expertise in improving wildlife connectivity on roadways will help the Washington Department of Transportation develop a design plan on a portion of Snoqualmie Pass that has created barriers for wildlife crossings.

The I-90 corridor through Snoqualmie Pass is positioned between a number of important wilderness areas and National Parks that provide refuge for wildlife. A substantial portion of the 15-mile project corridor is within the Snoqualmie Pass Adaptive Management Area, a special study area in the Wenatchee National Forest, which is subject to federal planning requirements.

With the surrounding wilderness areas and parks, the existing highway has created barriers to ecological connectivity. The Washington Department of Transportation (WSDOT) developed several design solu-

tions that would improve connectivity throughout the corridor. A Mitigation Development Team (MDT) was appointed to establish connectivity goals, evaluate how WSDOT's design solutions met the goals, and submit a Recommendation Package to guide the final project design.

WTI will provide WSDOT with a third-party expert peer review of some of the biological reports that have been produced in relation to the Snoqualmie Pass East project and will make design recommendations regarding connectivity structures within the project area. WTI experts will also review the Recommendation Package and provide WSDOT with a sufficiency analysis that will reveal any data gaps that need to be addressed.

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Interagency Review Team to Develop an Ecosystem Based Mitigation Plan for Highway 93 Corridor

US Highway 93 traverses 288 miles of western Montana from the Canadian to Idaho borders. Due to rapid population growth, economic development, and increases in traffic, US Highway 93 is one of the busiest highways in Montana with higher-than-average accident and severity rates. In addition, the highway passes through large, mostly intact, natural areas that provide habitat for grizzly bears, gray wolves, Canada lynx, wolverine, bull trout and a wide variety of other wildlife/fish species that are important economic and aesthetic resources. There are numerous improvement projects underway or planned for the next 20 years on this corridor, with one important project between Evaro and Polson, Montana.

If traditional approaches to environmental assessment and mitigation planning and design are followed, the number of planned projects will require repetitive environmental analysis. The resulting fragmented ecological mitigation measures may not make the best use of highway funds, and this time-consuming project-by-project approach will likely result in the unavoidable loss of irreplaceable ecosystem elements given the rapid rates of development of Montana's private lands. The FHWA Montana Division, with the cooperation of the Montana Department of Transportation, State resource agencies, and Federal agencies, have joined together in an Interagency Review Team Working Group (IRTWG) to develop a methodology for implementing a more flexible and comprehensive mitigation strategy that encompasses ecosystem wide considerations, rather than being limited to the highway corridor. By broadening the opportunities for mitigation and looking for new alternatives, the agencies have concluded that

better mitigation values will be obtained, and important ecosystem functions protected and conserved, while enhancing and streamlining the highway project development and environmental permitting process. The goal of this effort is to develop an integrated approach to mitigating impacts of the highway program to ecosystem functions. Objectives to meet this goal include the following:

- Conserving, enhancing and/or connecting essential habitats and natural landscapes
- Creating a crediting and debiting system applicable to multiple highway projects and ecosystem conservation
- Prioritizing opportunities and timeliness for ecosystem conservation
- Reducing project development times and increasing predictability program delivery requirements
- Improving cost benefit efficiency
- Formalizing the approach in a Memorandum of Agreement (MOA) including a conflict resolution process between agencies

WTI has been contracted to facilitate the process of developing an ecosystem-based approach, including the establishment of a credit and debit system associated with valuation of project effects and mitigation measures, the drafting of a Memorandum of Agreement (MOA) outlining the agreed-upon process, and the development of a public involvement plan.

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Montana Communities Expand Transit Options Through Coordination

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Thanks to a pro-active partnership of human service agencies and transportation providers, coordinated transportation plans have recently been completed for two Montana communities.

The Real Choices Systems Change Grant project was a three-year effort in Montana to provide “systems change” in three areas: housing, individualized services, and transportation. The overall goal of the transportation component was to develop two coordinated transportation systems in Montana, gather lessons learned and best practices, and share that information with providers in the rest of the state, and nationally.

While there was an emphasis to ensure that the transportation changes met the specific needs of people with disabilities, it was anticipated that improved service would be available to the entire community. The project was administered on behalf of the Montana Department of Public Health and Human Services (DPHHS) by the Montana Transportation Partnership (MTP). The Partnership, which was formed in 1999, includes members from DPHHS, human service agencies, Montana Advocacy Program, transportation service providers, tribal organizations, the Veterans Administration, the Job Training Partnership, and other stakeholders concerned with improving access to transportation. The Western Transportation Institute (WTI) provided technical support for the project.

The project began with the job of selecting two communities in the state. Together, MTP and WTI developed a list of criteria that would be used to select communities for the project. Proposals were solicited from fifteen communities in Montana, fourteen of which already had a public transportation system operating (FTA Section 5307 or 5311). The City of Helena and Ravalli County (Hamilton) were ultimately selected to receive funding and technical assistance.

In order to bring change to the transportation systems in Helena and Ravalli County (Hamilton), MTP and WTI developed a list of tasks to be accomplished as the project progressed. These included

developing and implementing a coordination plan that provides quality and efficient service in Helena and Ravalli County and developing a statewide reporting system to collect and disseminate data on transportation services provided to persons with disabilities. The final tasks involved evaluating the system and providing sustainability reports that can be shared with other communities throughout Montana.

The general goals in Helena and Ravalli County were to assist individuals dependent on public transportation, increase the general public’s use of the transportation system and increase efficiency. In Helena, working through the Transportation Advisory Committee, many providers worked together to initiate service to a new area (East Helena/East Valley) and to increase efficiencies by combining resources and increasing coordination. In Ravalli County, these goals were met by implementing a flex route (checkpoint) service for Hamilton and the surrounding area, and changing a law to increase the flexibility of providers to implement changes to their transportation systems so that they may better serve the needs of their clients.

The results of the Systems Change Grant project in Helena and Ravalli County are significant. In Helena, the new bus or transit service to East Helena now provides over 700 rides per month. In addition, a continuation of efforts may lead to further coordination, which may increase the amount of funding for transportation in the greater Helena area. This could lead to additional transit services where no service currently exists.

The results from the Ravalli County area are yet to be fully realized as many of the changes planned as part of the Systems Change Grant project in Ravalli County could not be fully implemented until a law was changed. House Bill 273, which was signed by the Governor in March 2005, allows BitterRoot Bus in Ravalli County to have greater flexibility to implement services that meet the needs of its customers. Because the law was not changed until six months before the Systems Change Grant project ended, the true impacts of the project are yet to come.

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Research Staff appointed to leadership roles on TRB committees

WTI researchers lend their expertise to a wide range of issues on the Transportation Research Board (TRB), thanks to an increasing number of appointments to membership and leadership positions on TRB committees.

In 2005, Amanda Hardy, Marcel Huijser, and Pat McGowen were selected to co-chair the subcommittee on animal-vehicle collisions (ANB20-2). This subcommittee, which falls under the parent committee of Safety Data and Analysis, submitted one of only 12 TRB syntheses that the National Cooperative Highway Research Program (NCHRP) selected to pursue this past summer. Amanda and Marcel are also active members of the Taskforce on Ecology and Transportation, which is campaigning to become a full committee in 2006.

Xianming Shi was invited to join three TRB committees in 2005. All three committees are related to his expertise in corrosion science and engineering: Committee on Basic Research and Emerging Technologies Related to Concrete (AFN10); Committee on Polymer Concretes, Adhesives, and Sealers (AHD40); and Committee on Corrosion (AHD45).

Thanks to the TRB Young Member policy, graduate students are also eligible to participate at TRB. WTI fellowship student and doctoral candidate Laura Stanley was recently appointed as a Young Member to Committee on Vehicle User Characteristics (AND10).

Many other WTI researchers continue their active participation on a number of TRB committees, including:

- Task Force on Transportation Needs of National Parks and Public Lands - Steve Albert, Chris Strong (Friend), Jaime Eidswick (Friend)
- Native American Transportation Issues - Chris Strong
- Safety Data and Analysis - Chris Strong (Friend)
- Dynamics and Field Testing of Bridges - Eli Cuelho
- Environmental Analysis in Transportation - Amanda Hardy (Friend)

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Project sponsors anticipate that the benefits from the Systems Change Grant project will extend beyond the two pilot communities. Passage of House Bill 273 not only affected the operation of BitterRoot Bus, but applies to other providers elsewhere within Montana. In addition, the results of the Systems Change Grant project - including lessons learned and best practices - are going to be shared with transportation providers, local

governments and state agencies. "We hope that other communities will be able to put these recommendations to use in their own efforts to expand transportation options through coordination," concluded David Kack, who directed WTI's component of the project.

WTI Researcher First to Receive New ITE Award

At the District 6 Institute of Transportation Engineers (ITE) annual meeting in Kalispell, Montana, ITE honored Western Transportation Institute's own Chris Strong with the Best Annual Meeting Paper by a Young Professional. Given for the first time, this award recognizes an author under the age of 35 who is judged to have presented the best technical paper at the ITE District 6 Annual Meeting. The award is based on the paper's value to everyday transportation engineering, with key criteria including ability to easily understand the subject; material which provides innovative, unique or creative information to ITE members; and quality of the presentation. District 6 is the largest in ITE, encompassing Montana, Wyoming, Colorado, New Mexico and all states west including Alaska and Hawaii. Approximately 300 ITE members attended the annual event with over 100 presentations given.

Chris' paper, co-authored by Steven Torgerson and Bob Snyder, was titled Development of Criteria to Identify Locations for ITS Development. The research team identified criteria and data sources that could be used to help prioritize potential locations for variable message signs (VMS) and closed circuit television (CCTV). These guidelines can help Oregon Department of Transporta-

tion (ODOT) to deploy these technologies in a way that provides optimal benefit to both the general public and ODOT personnel. Because they are based on how the technologies would be used, these guidelines also provide an excellent foundation for other jurisdictions looking for rational guidance on deploying similar systems.

Chris Strong, a Research Engineer with the Western Transportation Institute since 1999, has over ten years of public and private sector transportation planning, analytical and research experience in transportation problems. During this time, he has gained experience on several types of studies, including intelligent transportation systems (ITS) planning and evaluation, transportation planning and modeling, interchange traffic and revenue studies, geographic information systems (GIS)

analysis, travel demand management, air quality analysis, data collection, and traffic engineering studies. His current research focus is ITS planning and evaluation in rural areas with an emphasis on travel and tourism.



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 horse-back 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.

WWW.2006NRITS.ORG



Research Experience for Undergraduates

Summer is an excellent time for students to gain experience in their prospective career fields through internships or other employment opportunities. It is also a great time to travel and explore new areas. Seven undergraduates took ten weeks out of their summer this year to do both. A diverse group of Research Experience for Undergraduates (REU) participants traveled to Bozeman in June from their home universities in Pennsylvania, Arkansas, Virginia, Utah and Minnesota. One had just unpacked and repacked having recently completed a semester abroad in China, India, and New Zealand this spring. Another arrived from Pennsylvania in a car packed with gear—climbing, biking, camping—having traveled a circuitous route that hit a number of outdoor hotspots along the way. The students also represented a mix of academic majors, including Civil Engineering, Industrial Engineering, Environmental Science, Computer Science, and Meteorology. Nevertheless, despite their diversity of backgrounds and interests, they all arrived in Bozeman sharing one goal: to experience transportation research while exploring everything Montana has to offer.

The seven students each pursued an independent transportation research topic at WTI under the mentorship of a profes-

sional researcher or faculty member. The research topics covered a wide range of transportation issues from human factors to infrastructure maintenance. In August, each student presented the findings of his or her respective project at a final research symposium.

In addition to research experience, the REU participants were exposed to transportation career opportunities during field trips to the Montana Department of Transportation headquarters in Helena and to the Institute of Transportation Engineers (ITE) District 6 annual meeting in Kalispell. They also had the opportunity to visit sites of historical significance. The students took a ferry ride on the Missouri River, following Lewis and Clark's journey through the Gates of the Mountains. After camp-

ing out in Glacier National Park, they boarded the park's red "jammer" buses for a tour of the Going-to-the-Sun-Road.

WTI's 2005 REU participants have now returned home to complete their degrees at their respective home institutions. However, the research they conducted and the personal connections they made over the summer will continue to enrich the educational program at WTI and their own academic experience.



REU Students on the Going-to-the-Sun Road in Glacier National Park



Students don hard hats and safety glasses to explore the Trident Cement Factory

Summer Transportation Institute for High School Students a First for Montana

This year, nine Montana high school students had the chance to do something different with their summer vacation. The students traveled to Bozeman from as far away as Sidney and Valier to spend four weeks on the MSU campus as participants in WTI's first annual Summer Transportation Institute (STI). The STI is a unique on-campus experience for students in grades ten through twelve. Over the four week program, STI participants learn about the field of transportation through field trips, guest speakers and hands-on activities. For example, participants not only learned about highway design, they were able to build and test their own asphalt pucks, concrete cylinders, balsa wood bridges, and reinforced soil walls. They also saw the same products being produced and utilized on a larger scale during field trips to a cement factory, gravel pit and asphalt production facility, and a number of bridge construction projects.

STI students were exposed to a wide array of different transportation careers and modes. Participants traveled up the Missouri River in a ferry and, after hearing about careers in aviation from a licensed pilot, they visited the Gallatin Field airport, tower, and fire and rescue facilities. They also learned about aerodynamics and competed with each other in a team glider project. After counting cars at a busy intersection in Bozeman, the students entered their data into a traffic simulation program to discover how traffic engineers use computers to optimize traffic signals. They also took "a spin" in WTI's driving simulator in order to better understand how researchers safely explore human reactions and behavior while driving.

Beyond transportation, STI participants gained basic skills and knowledge about applying for college, selecting a major, succeeding in college, choosing a career, and developing a resume. Living

in the dormitories for four weeks also gave them a taste of what college life is like.



STI Student testing WTI's driving simulator.

For students, the best part about the STI is that it is also designed to be fun! The students learn through hands-on experiential projects and field trips, and in the evenings they can enjoy sports and recreation activities ranging from movies to natural hot springs. At the end of the four weeks, all of the participants had built close friendships with students from all over Montana.



STI Student riding a Segway

The Summer Transportation Institute is a national program sponsored by the Federal Highway Administration's Office of Civil Rights to expose pre-college aged students to career opportunities in transportation. Fifty-one institutions in thirty-one states currently host Summer Transportation Institutes. WTI's program was the first STI hosted in Montana.



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