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ADVANCING RURAL TRANSPORTATION THROUGH RESEARCH AND EDUCATION

NEW TECHNOLOGIES EXPAND OPPORTUNITIES FOR ROAD SAFETY RESEARCH

The introduction of new technologies has an immediate impact on scientific and academic research. These advancements give researchers new tools to expand their inquiries into almost any field of study.

Transportation research is no exception. At Western Transportation Institute, new technologies have had a particular impact on our work in the field of road safety. In this issue of the newsletter, you will read about new technologies that lead directly to safety improvements, such as Intelligent Vehicle systems that improve visibility for snowplow operators. Other technologies are helping us test the effectiveness of our research efforts, such as video surveillance trailers that monitor whether drivers adjust their speed after viewing dangerous road condition warning signs.

Another positive trend is that new technologies are enabling safety improvements in remote or rural areas. In the past, many considered cutting edge technologies to be a "luxury" item available only to large metro or statewide agencies with extensive financial resources. Now, advancements in data sharing, remote surveillance, and auto-

ated message signs are facilitating safety improvements in jurisdictions that might not have had the personnel or resources to implement these changes otherwise. Two of our newest projects at WTI are testing the use of Personal Digital Assistants to transfer patient information from the scene of an accident to the receiving emergency room, and investigating automated techniques that will increase the reporting of traffic accidents on Native American reservations.

A final comment on the impact of new technologies is that it becomes continually easier for those of us in the world of research to share our work with one another. An update on our ARTEMIS Clearinghouse Project explains how we are partnering with other agencies to consolidate all of our research findings on wildlife mitigation strategies into a single website. Another article on a Wildlife Crossing Structures Field Course held in Canada tells how the field course notes will be available to everyone online. We hope that you will look into our new information resources, and that you will continue to share your own technological and research advancements with us.

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WTI TO WORK WITH TRIBAL LEADERS TO INCREASE ACCIDENT REPORTING ON MONTANA RESERVATIONS

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WTI is initiating a study to investigate why so few accidents occurring on Native American reservation roadways are reported to the Montana Highway Patrol, and to identify technologies or other methods that might facilitate and encourage increased reporting.

For many years, federal, state, and local governments have reported vehicle accidents into established databases (usually maintained by State Departments of Transportation). This accident data is statistically analyzed and used to establish overall trends in accident history. Government agencies use this information to identify and develop counter measures to reduce accidents and fatalities.

Historically, accident reporting into the Montana Highway Patrol (MHP) statistical database by Bureau of Indian Affairs (BIA) and Tribal Police has been extremely low. Statistics developed on "Montana Indian Fatality Crash Information" prepared by the Traffic Safety Bureau of the Montana Department of



wide fatalities, while the average Native American population of the state for the same period was only 6.1%. Given that traffic accidents from the Reservations are seldom reported into the State database, it is conceivable that the fatality rate may be even higher.

This project will investigate why accident reporting from reservation law enforcement personnel is so low by working with the Tribal Councils and Tribal/BIA police officers directly. Researchers will begin by preparing informational materials for the Tribal Governments that outline the reporting process and address specific concerns such as confidentiality, licensing and registration, and data sharing. Researchers will then schedule meetings with Tribes and police representatives throughout the state.



Transportation (MDT) show that traffic fatalities among Native Americans in Montana are nearly three times that of non-Native Americans. This report shows that from 1991-1999, fatalities among Native Americans averaged 15.6% of the state-

The goal of the meetings is to hear the tribal perspective on why traffic accident data is not reported, and to determine what can be done to improve the reporting process. Questions, problems, concerns, and difficulties that the Tribal Governments and BIA/Tribal Police have in filing accident reports will be documented. Participants will consider policies, procedures, methods and resources required to facilitate better accident reporting.

Another goal of the meetings is to clarify for Tribal Officials the purpose, procedures, and benefit of accident reporting, and to document the position of Tribal Governments on reporting accidents into the MHP database. If a Tribal Government is opposed to accident reporting, its issues will be documented in a report that can be used to assist in resolving concerns. Researchers will also attempt to document if the causes and concerns surrounding low accident reporting vary from one reservation to another.

This project will also consider new or improved technologies that may reduce time, encourage greater commitment, improve efficiency and increase accuracy in the reporting process. WTI will explore the feasibility of using technologies such as Personal Digital Assistants (PDAs), enhanced computer software, reporting via the Internet, and Global Positioning Systems (GPS) interfaces to facilitate prompt reporting into the State database.

To evaluate the effectiveness of this project, accident reports into the MHP database will be tracked for a period of one-year to measure the change in reporting from reservations. Future steps may also include compiling annual statistics to determine the effect the Accident Reporting System has on the number of accidents involving Native Americans.

The problem of low accident reporting on Native American Reservations is not unique to Montana. It is the in-



tent of this project to develop recommendations for improving the reporting process that can be used by Tribes, Reservations and States across the country.

WTI has met with the Tribes at Fort Belknap, Fort Peck, Rocky Boy and Crow. Meetings at Northern Cheyenne, Blackfeet and Salish & Kootenai are being scheduled for this fall. To date, the meetings have been well received by the Tribes, and they have openly expressed their views and concerns about traffic accident reporting at the Tribal level. They have also expressed serious concern about the high accident and fatality rate among Native Americans in Montana (the highest in the Nation) and their desire to develop a proactive plan to reduce injuries and loss of life. They are developing an action plan to correct this disparity among Native Americans and will be seeking the expertise and support of other safety experts in the transportation industry to help them develop this plan to lower the fatalities among Native Americans.

WTI is currently seeking partners to expand this research and demonstration to other Nations across the United States.

PERSONAL DIGITAL ASSISTANTS: A NEW TOOL FOR EMERGENCY RESPONSE PROVIDERS

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Patient information gathered at the scene of an accident or in an ambulance can provide critical, potentially life saving information to physicians at the receiving hospital, but only if it's quickly and effectively transmitted. A new WTI research project will allow emergency response providers to test the effectiveness of using Personal Digital Assistants (PDAs) to transmit patient information from crash scenes to emergency room personnel.

Emergency Medical Service (EMS) agencies and providers are a critical public safety component of transportation systems, as they provide life-sav-

and effectiveness of these devices versus traditional methods.

One of the most persistent challenges facing crash victims, EMS providers and hospital medical personnel in Montana has been the timely and accurate transmission of patient information gathered at the crash scene and in the back of the ambulance to emergency department personnel receiving the patient. The current paper-based form provided by the Montana Department of Public Health and Human Services' EMS Section is more than 25 years old and typically contains information that is of limited value to the receiving medical team, the EMS agency

or the patient. Not only does the lack of timely information interrupt the continuity of care and negatively impact patient outcome, it also creates a void of information that could be useful in the ongoing refinement of transportation systems.

The Montana EMS Section is currently in the final design phases of a scannable paper form and companion desktop software system. The deployment of this system provides an excellent opportunity for a side-by-side comparison of paper-based and PDA collection. This project will compare the effectiveness of the scannable paper-based/

desktop patient information system against a PDA-based/desktop system.



ing services when roadway accidents occur. Many EMS agencies are testing new information technologies, such as PDAs. However, to date there have been few controlled trials concerning the efficiency

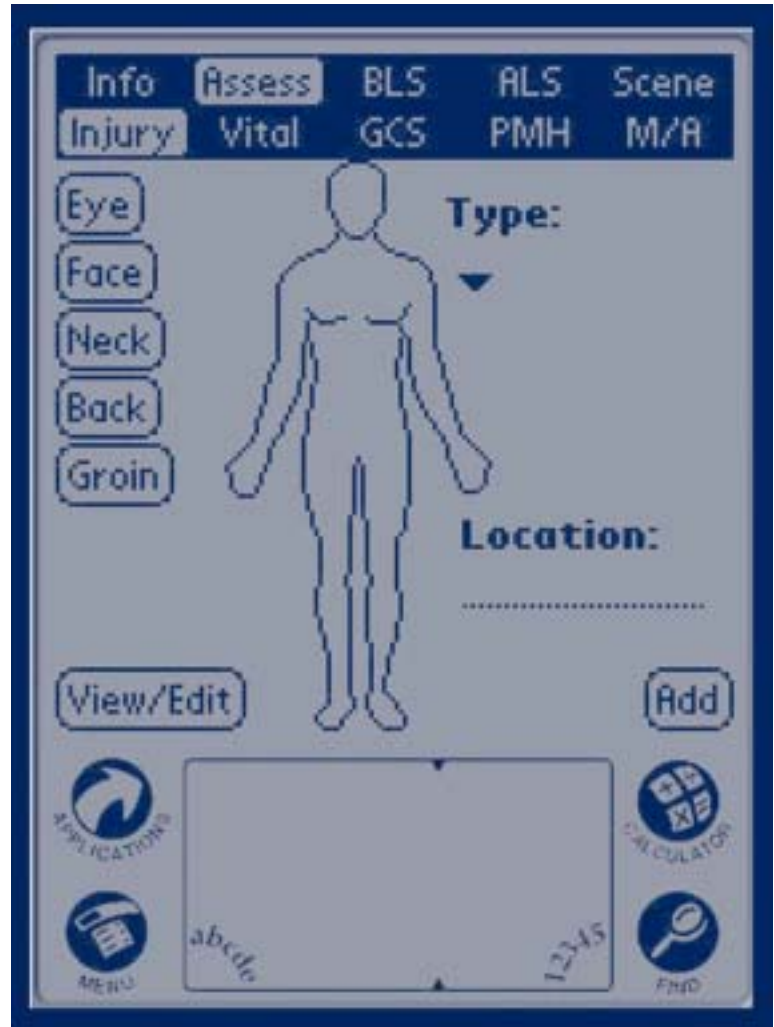
One of the first steps of the project will be the selection of two, similar EMS response areas to participate in the study. Researchers will collect six months of motor vehicle crash response patient records for each area. A four-member panel of medical and emergency response professionals will conduct a review of the documents to determine the presence or absence of the prehospital record, and if present, the legibility and completeness of the prehospital record.

Subsequently, one community will be assigned to the PDA group and the other to the scan sheet group. The two systems will be deployed in each community for a period of one year, after which all hospital records concerning patients of motor vehicle crash responses transported by EMS agencies will be reviewed by the same four-member panel. Once again, they will determine the presence or absence of the prehospital record, and if present, the legibility and completeness of the prehospital record.

Data gathered by the panel will be entered into a database and analyzed. Issues of timeliness, accuracy, completeness and legibility of data will be examined along with the system cost of deployment, training and maintenance. Additionally, user satisfaction data will be measured.

The community selection process was recently completed. Big Horn County (Hardin, Montana) EMS will serve as the PDA site, and Choteau County (Fort Benton, Montana) EMS will serve as the scannable sheet site. The project is expected to run through the fall of 2003.

If Personal Digital Assistants prove to be an accurate and cost-effective tool for EMS providers, future re-



search possibilities are numerous. Other potential applications of PDAs for emergency response include improved response through the use of Global Positioning Systems (GPS)/Geographic Information Systems (GIS), reference databases, and the electronic transmission of scene data such as photos and patient vital signs.

ROADVIEW TECHNOLOGY OFFERS INCREASED SAFETY TO SNOWPLOW OPERATORS

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Transportation researchers from the University of California Davis have developed Intelligent Vehicle (IV) technology specifically for snowplows. WTI has recently completed a study to assess the potential costs and benefits associated with combining conventional snowplow operations with these IV technologies.

The Advanced Highway Maintenance and Construction Technology (AHMCT) Center at the University of California – Davis and the Partners for Advanced Transit and Highways (PATH) Center at University of California – Berkeley originally developed the RoadView Advanced Snowplow (ASP) technology. The RoadView™ system consists of two major components: first, sensors and monitors in the vehicle to provide lane positioning information and obstacle detection to the snowplow operator; and second, magnets placed in the roadway that are read by the sensors in the vehicle, allowing for the lane position information.

Theoretically, the technology utilized by RoadView™ is expected to increase safety by reducing erratic snowplow movements, run-off-the-road incidents and lane departures, snowplow accidents, damage to other vehicles and infrastructure, and injuries to snowplow operators and other vehicle occupants. Increasing the speed of snow removal tasks may also potentially reduce road closures and travel delays, thereby improving both the operational efficiency of snowplows and the mobility of motorists during adverse weather conditions.

The goals of the WTI study are to assess the need for the RoadView™ system and to identify variables that could be used in a cost-benefit analysis of the technology. Research and data collection was conducted in five states:

Idaho, Montana, North Dakota, Wyoming and California.

The needs assessment portion of the study consisted of identifying Measures of Effectiveness (MOEs), collecting relevant data, and data analysis. For the purposes of this study, needs and potential benefits were evaluated based on three main factors: safety, mobility and operations. As a result, MOEs were selected that would analyze safety issues such as the number of snowplow-only accidents and run-off-the road snowplow accidents; mobility issues such as frequency and duration of road closures; and operations issues such as causes of reduced visibility conditions, lane awareness methods, and perceived usefulness of new technologies.

Both quantitative and qualitative data were collected for the needs assessment. For the quantitative data analysis five specific roadway sites (one in each state) were identified, based on criteria such as high traffic volumes, significant truck traffic, frequent low-visibility conditions, documented winter road condition-related accidents, and history of road closures due to snow conditions. Data collected from these sites included snowplow-related accident information, road closure and travel delay figures and weather data.

To collect the qualitative data, WTI conducted a survey of snowplow operators in Idaho, Montana, North Dakota and Wyoming. The information collected by the survey was used to determine (1) equipment and route characteristics; (2) perceived problems with limited visibility snow-removal operations; and (3) current methods used to position the snowplow on the roadway. In addition, snowplow operators were asked about their perceived usefulness of advanced technologies

such as RoadView™, which would assist with lane position information and obstacle detection.

One of the principal findings of the data collection process is that snowplow operators typically lose sight of the roadway they are plowing one to six times during an average snowstorm, for a duration of four or five seconds per event. This is particularly significant because operators also indicated that the top three methods they use for maintaining their position on the road are visual: judging their distance from guardrails, judging their distance from mileposts, and judging their distance from the centerline. Not surprisingly, snowplow operators indicated a high level of perceived usefulness for technology that would help guide their driving. However, other responses indicated that operators still believe that there would be weather conditions, even with advanced technology, in which snowplow operations should be suspended.

The needs assessment concluded that there is a need for advanced snowplow technology that can reduce snowplow-only accidents, and decrease the amount of road closures and reduce their durations. However, the current costs associated with these technologies are a key component in determining areas that may have a positive benefit/cost ratio.

For the benefit/cost portion of the study, an equation was used to calculate annualized benefits and costs associated with full deployment of the RoadView™ system. Annualized benefits (hours gained by reducing road closures; reduction of accidents) are divided by the annualized costs (implementation costs/number of years used, plus annual maintenance). If the ratio is greater than one, the RoadView™ system is consid-

ered to be cost-effective.

Researchers selected five roadways (one in each state) to test the benefit/cost equation. Of the five scenarios, only one – Donner Pass in California – had a benefit/cost ratio of greater than one (the break-even point). This result suggests that at its current cost, the RoadView™ system would only be cost effective in areas with very high traffic volumes and numerous road closures due to winter weather.

The study has also resulted in recommendations for further research and development. During the survey of snowplow operators, respondents were asked to comment on the perceived usefulness of technology to which they were provided no direct exposure. “Hands on” demonstrations of the technology may help operators better assess the capabilities and potential benefits of the system.

The cost/benefit analysis of the study suggests that the Donner Pass area of Interstate 80 is a promising candidate for a full-scale operational deployment of RoadView™. In addition, further testing and experiments may lead to significant cost reductions for both the “in-vehicle” and “in-road” components of the system, which could increase the cost-effectiveness of deployments in other locations in the future.



Photo Courtesy of Montana LTAP

CUSTOM TRAILERS SIMPLIFY LONGTERM VIDEO SURVEILLANCE

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The Western Transportation Institute conducts transportation research throughout the western United States. Many research projects require long-term surveillance of road traffic or other transportation conditions and events. However, the variety of project locations and relative distance to WTI's base in Montana can make this type of ongoing data collection difficult.

For this reason, WTI recently purchased three custom-designed video surveillance trailers. Although initially obtained for evaluation activities connected to the California/Oregon Advanced Transportation Systems (COATS) Showcase project, the trailers will be available for use by all WTI researchers for a broad range of applications. The equipment has the following features:

- Autonomous power, through an integrated solar panel and battery system, to allow for up to 30 days of continuous operation;
- Trailer-mounted, to allow for ease of mobility and adjustment;
- Microwave sensor input, to activate video recording only when vehicles are approaching the camera location;
- A mast-mounted closed-circuit television camera, which can record real-time black-and-white from up to 25 feet (7.6 meters) above ground; and
- A time-lapse VHS-based video recorder, which can record at variable time-base rates up to real-time (30 frames or 60 fields per second).

The equipment also includes a variety of security features, including a lightweight mast that discourages would-be thieves from climbing to steal equipment, keyed locks for the extendable

mast and the cabinet containing the video recorder, special fasteners for the solar panels, and a removable hitch.

WTI successfully used the new trailers to evaluate the effectiveness of an icy curve warning system on the Fredonyer Pass in northern California. The system's goal is to reduce crash frequency by slowing motorists down to more appropriate speeds during icy conditions. As part of the evaluation process, researchers wanted to measure changes in vehicle speeds before and after system implementation.

Most spot speed studies use direct measurement with radar. However, by using the video trailers, WTI researchers were able to overcome many of the obstacles that hinder effective radar surveillance at this location:

- The research team was geographically isolated from the project location, and winter storm events could not be predicted sufficiently in advance to allow research team members to record speed data in person;
- Positioning personnel close enough to the roadway to collect accurate radar data would have created a significant safety hazard to research team members, especially during icy weather or at night;
- Radar measurements can influence vehicle speed when drivers are able to observe people using radar equipment;
- The project location had insufficient shoulder space to safely station human observers with radar guns, especially during winter months when snow is plowed into the shoulder areas.

The results of the Fredonyer Pass project suggest that the video surveillance trailers yield results comparable to radar for studies where speed change is measured. However, this first usage of the trailers also identified suggested areas of improvement. A follow-up project is currently underway to address issues that will facilitate the trailers' use in the future, including:

- Institutional arrangements for shipping, storing and repairing the trailers;
- Development of a comprehensive user manual;
- Expansion of the solar panels to improve re-charge capabilities; and
- Development of a requirements document to assist in procurement of replacement trailers.



EVALUATION OF CALTRANS RWIS RECOMMENDS EXPANSION AND INTEGRATION

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WTI has recently completed a comprehensive, statewide evaluation of the California Department of Transportation (Caltrans) Road Weather Information System (RWIS). The final report highlights the many benefits of the system, and also contains recommendations for increasing its use and improving its effectiveness.

A Road Weather Information System, or RWIS, is a network of weather stations, forecasting services and the supporting infrastructure. Transportation managers use the information to make maintenance and advisory decisions that help reduce the number of incidents during severe weather conditions. RWIS has been widely used in the United States and Canada since the late 1980's. The systems are most commonly used to detect and aid in snow and ice removal efforts from roadways and to help alert motorists to dangerous driving conditions.

Caltrans began implementing RWIS in 1990. Since then, ten of the twelve Caltrans Districts have installed sites. However, California is a large, diverse state, and each District has unique transportation challenges and information needs. As a result, RWIS implementation and use varies widely from district to district.

The goal of this project was to increase the use and improve the effectiveness of Caltrans RWIS. WTI conducted extensive research into RWIS use not only in California, but also nationwide, in order to evaluate the current system and its potential for the

future. The final report contains the findings and recommendations of the project, including:

- State of the Practice – Current Use of RWIS by other states
- Current Use of RWIS by California
- Caltrans Goals for RWIS
- National Standards and Guidelines for RWIS
- Institutional Improvements for Caltrans
- Conclusions and Recommendations

State of the Practice: WTI interviewed transportation officials in nine states with extensive RWIS experience. Researchers were able to compile many lessons learned regarding system design, site selection, purchasing procedures, training and maintenance. One of the significant findings was that the most successful RWIS systems are those that have been embraced by maintenance personnel, the most common end-user. Another important development in RWIS state of the practice is the growth in vendors for products and services, which has resulted in greater selection and cost savings through increased competition.

Current Use of RWIS by California: Researchers found that almost all of the Caltrans Districts and Headquarters use RWIS in some form. Currently, there are 81 operational sites, with approximately 170 more under development. A survey of Caltrans RWIS users helped identify not only how the system is used throughout the state, but how it might be improved. Survey respondents believe the system would be more effective if there were more sites, if some of the current sites were in different locations and maintained better, if the information was easier to interpret, and if staff received more training on the system.



Caltrans' Goals for RWIS: As part of the evaluation process, Caltrans Headquarters established a Technical Advisory Committee to develop a statewide vision for RWIS, which is to “create and maintain a statewide linked road weather information system for road maintenance, traffic operations, and traveler information utilizing the best practices from around the world.” District goals for RWIS echoed this support for an efficient, coordinated system. For example, almost every District chose the implementation of a standard RWIS communications protocol as their highest priority for Caltrans.

National Standards and Guidelines for RWIS: The final report strongly recommends that Caltrans move toward an RWIS system that is compliant with standards developed by the National Transportation Communications for Intelligent Transportation Systems Protocol (NTCIP). NTCIP standards enable RWIS systems to achieve interchangeability and interoperability of system components, which has many benefits including increased longevity of hardware and software, increased choice of vendors, and increased interagency coordination. One of the unique aspects of this report is its extensive technical appendix, which summarizes the most relevant national standards and resources.

Institutional Improvements For Caltrans: The evaluation identified institutional issues that must be addressed for Caltrans to move towards its goal of a fully realized, linked RWIS. These issues include finding an achievable balance between cost and quality, maximizing effective utilization by staff, preventing the deployment of isolated systems in the dis-

tricts, developing systems that meet the needs of varied users, and addressing liability risks.

Conclusions and Recommendations: The fundamental conclusion of the report is that RWIS provides many benefits and has great potential, and therefore California should continue to pursue and develop its system. However, in order to help Caltrans realize its vision of a widely used, fully-linked system, the report also includes extensive recommendations for expansion, integration, and other improvements. A few of these recommendations include:

- conducting benefit-cost analyses of RWIS development,
- including RWIS information and road conditions in traveler information sources,
- establishing a statewide RWIS coordinator,
- establishing an RWIS user group meeting for training purposes,
- procuring equipment and services through the competitive bid process,
- developing partnerships with local agencies, the National Weather Service, universities, and consortiums, and
- developing systems and adding products which allow districts to obtain RWIS data from the field.

Although this evaluation was initiated to identify areas of improvement for California, many of the recommendations may be useful to other locations. In addition, the inclusion of the state-of-the-practice findings, summaries of national standards, and listings of technical resources make this a potentially valuable handbook for any state starting or expanding RWIS.

WTI EVALUATES ITS DEPLOYMENTS AT SISKIYOU PASS

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An evaluation of recent Intelligent Transportation System (ITS) deployments in a mountainous region of southern Oregon and northern California will help WTI assess whether these improvements have had an impact on traveler safety and incident response.

The Siskiyou Pass evaluation is a component of the California/Oregon Advanced Transportation System (COATS) Showcase project, a bi-state partnership to demonstrate and evaluate various ITS technologies throughout southern Oregon and northern California. Siskiyou Pass is located on a rural, mountainous section of Interstate 5, a principal north-south corridor for residents, tourists, and commercial truck traffic. The region faces many transportation challenges, especially in winter. Some of the recurring problems include frequent accidents, travel delays, chain requirements during winter storms, road closures due to weather or accidents, limited cell phone coverage, and incident management communication issues.

In response to these challenges, three goals were established for the project: to improve traveler information, to improve incident management throughout the corridor, and to enhance traveler mobility. ITS solutions were matched to each of the challenges, and numerous ITS elements were deployed or upgraded in the area, including:

- Changeable Message Signs (CMS),
- A Visitor's Center Touch Screen Information Kiosk
- Upgraded road and weather information on the Internet
- An additional closed-circuit television camera (CCTV) near the Siskiyou Pass summit, and
- Traffic Monitoring Stations.

In addition to the ITS deployments, the research team developed an incident management plan for the region. The plan included an operations guide to specifically address the challenges faced in rural mountain passes, and a message guide for creating appropriate and consistent wording for Highway Advisory Radio (HAR) and Changeable Message Signs (CMS).

To measure the effectiveness of the project, WTI developed two principal evaluation tools. The first is a traveler survey to identify traveler characteristics, travel habits, and demographic characteristics of Siskiyou Pass travelers, and evaluate the functionality of recent ITS deployments and upgrades. Three surveys have been distributed on an annual basis; the most effective technique has proven to be distributing mail-back surveys at an Agricultural Inspection Station near the California/Oregon border where all south-bound travelers are required to stop.

Preliminary results of the surveys indicate that the public is generally pleased with traveler information in the area, and consider ITS deployments such as CMS and camera images on the Internet to be useful and accurate. However, many people stated that they didn't know that the less obvious forms of information existed, suggesting a need for greater outreach efforts. This is also evident from survey results that indicate that the two most popular information resources used by motorists continue to be the radio and personal observations of traffic conditions.

The second major component of the evaluation process consisted of surveys and interviews with various agencies having a stake in incident management. Respondents were asked to describe the nature and frequency of their response activities, their assessment of the ITS deployments,

and their evaluation of the operations and message guides.

Results of these surveys and interviews indicate that agency officials believe that incident management in the region has improved over time, and that the ITS deployments and upgrades have been helpful in terms of improving motorist communications and providing additional information sources. A pre-winter season meeting

and by adding a specific response plan with a winter focus.

WTI plans to continue work on the incident management plan and incorporate many of the suggestions from the agency interviews. A final report will also be made available, containing detailed analysis of all of the traveler surveys, and overall recommendations from the entire project.



now held by incident response officials has been particularly helpful in improving regional communication and cooperation. On the other hand, incident management officials believe that ITS is still underutilized, and that the systems could be better integrated. In addition, many respondents commented that the incident management plan could be improved by making it simple and easy to use,

WILDLIFE MITIGATION DATABASES TO BE EXPANDED THROUGH PARTNERSHIPS

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WTI has joined with several national partners to expand and improve the quality of information available to agencies researching animal mitigation strategies.

The interrelations between transportation systems, wildlife, and effective mitigation efforts are important in providing safe roadways for the traveling public. It is estimated that there are 500,000 animal-vehicle accidents each year in the U.S. More than 120 human fatalities and several thousand injuries can be attributed to these collisions. Many innovative countermeasures are currently being tested and evaluated by state departments of transportation and other organizations. Even traditional countermeasures such as signing, fencing, and animal crossings can vary greatly in effectiveness based on the methods being tested. Many agencies attempting to deal with this challenge do not have a good source of information regarding mitigation options and their effectiveness.

In 2000, WTI began the ARTEMIS Clearinghouse project, in order to create a database that would allow other universities, transportation professionals and interested individuals to access a complete reference source focused on animal-vehicle collisions and mitigation options. The original scope of the project included a searchable document library; a cost-benefit database; and a webpage containing a search engine, a discussion forum, current news articles, and relevant links to other websites.

However, during the course of the project, WTI learned that other organizations were developing similar clearinghouses. WTI began meeting with these organizations and decided to coordinate its ARTEMIS project with other national related activities. The ARTEMIS clearinghouse was scaled back to include a cost benefit database and search engine.

Other functions were being completed by other efforts such as the Deer Vehicle Collision Clearing house www.deercrash.com and the Wildlife Fisheries and Transportation Web Gateway at www.itre.ncsu.edu/cte/gateway/index.html.

WTI completed the ARTEMIS Database in July 2002. It contains 62 records referencing 90 literature sources. Records contain information on wildlife mitigation efforts, including location, general description, benefits, costs, issues, and contacts. The database is completely searchable, providing several search options. The database is located at www.wtigis.coe.montana.edu/projects/animal/index.php.

As a next step, WTI is entering into a partnership with the USDA Forest Service and Utah State University. These two organizations are developing a database called The Wildlife Crossing Structures Toolkit, to be located at www.wildlifecrossings.info. The information from ARTEMIS will be converted to the Wildlife-Crossings format and added to that website. (The ARTEMIS Database as it currently exists will remain on the Internet; however it will not be updated or maintained in order to focus efforts on the Wildlife Crossing Structures Toolkit.)

WTI and its partners believe that these coordination efforts represent an innovative way to maximize resources, build synergy, and ultimately create a better, more complete product. Once established, these relationships also build a foundation for ongoing research and information exchange in the field of wildlife mitigation.

WESTERN TRANSPORTATION INSTITUTE HOSTS GREATER BOZEMAN AREA TRANSIT WORKSHOP



On Friday, July 26, 2002 the Western Transportation Institute hosted the Greater Bozeman Area Transit Workshop in cooperation with the Bozeman City Transit Task Force at the Strand Union located on the campus of Montana State University-Bozeman. Twenty-nine people attended the workshop, including the transit directors/managers from four general public transit providers in Montana, and the keynote speaker, Mr. Greg Cook, the Executive Director of the Ann Arbor Michigan Transportation Authority (The Ride).

The workshop was designed to provide information to the task force members, as well as to city and county officials who attended, as the greater Bozeman area contemplates establishing a general public transportation system. The workshop allowed the exchange of information and ideas, and provided lessons learned from those who have been involved in transit systems.

In his presentation, Mr. Greg Cook stressed the importance of building partnerships in the community and coordination among the transportation providers. Mr. Tom Stuber, Planner for the Montana Department of Transportation's Transit Section, then provided an overview of the various transit systems operating in Montana. Following the two speakers, five different group sessions took place, allowing the discussion of various topics, including: governance/funding/public outreach, system design, vehicle options, tation phasing.

Participants agreed that the system should be designed to serve the stakeholder groups who would utilize the system. Everyone also agreed that the University would be a key player in any transit system that may be established in the Bozeman area. It was also noted that in addition to transit, other Traffic Demand Management (TDM) strategies such as car-pooling, could be utilized to provide alternatives to single occupancy vehicle (SOV) trips.

The transit managers from the various systems in Montana pledged their continued support. The officials from the city and county had a chance to hear from



professionals that have been in the transit industry for many years. All who attended commented that the workshop was a tremendous success, and an important preliminary step toward the development of a transit system for Bozeman.

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FIELD COURSE OFFERS FIRST-HAND VIEW OF CANADIAN WILDLIFE CROSSING STRUCTURES

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A recent workshop in Banff National Park provided transportation and resource management officials a unique opportunity to see animal exclusion fencing and crossing structure installation that allow wildlife to safely cross the Trans-Canada Highway, and to learn how wildlife mitigation issues can be successfully incorporated into the transportation planning process.

In September, WTI sponsored the “Wildlife Crossing Structure Field Course” in cooperation with the Federal Highway Administration (FHWA), the Center for Transportation and Environment (CTE) at North Carolina University, and the US Forest Service (NFS). The goal of the course was to give engineers, administrators and resource management professionals examples of the Context-Sensitive Design (CSD) approach to transportation projects. The CSD approach places preservation of historic, scenic, and environmental resources



Sponsors selected Banff National Park as the setting for the field course to learn from Canada’s experience with mitigating wildlife-transportation conflicts on the high traffic volume Trans-Canada Highway, which runs through the park. Over the past 20 years, Parks Canada has installed wildlife fencing in conjunction with 24 wildlife crossing structures of different designs, to allow animals to pass safely under or over the busy highway. This application of mitigation techniques provided participants with a first-hand view of the highest concentration of these structures in the world, and the best example to date of this form of environmental stewardship in transportation.

The Banff crossing structures and fencing are notable because of their success in facilitating safe passage for wildlife across the freeway and significantly reducing the amount of roadkill. Since November of 1996, the Parks Service has recorded 41,700 crossings by eleven large mammal species including deer, elk, moose, bear, wolves and coyotes. Vehicle



such as wildlife, at equal value with mobility, safety, and economic considerations in the development of transportation projects.

collisions with elk, previously the most frequent victim involved in animal-vehicle collisions on the Trans-Canada Highway in Banff National Park, have decreased by 95 percent.

Participants in the three day course attended workshops to learn and discuss the many aspects of incorporating wildlife mitigation into transportation projects. Participants included representatives from FHWA (20; including 7 District Administrators), state DOTs (12), NFS (6), Canadian representatives (5), universities (4), state fish and Game departments (2), non-government organizations (2), the US Fish and Wildlife Service (1), the Transportation Research Board (1), and private consultants (1). Speakers presented on and participants discussed planning and permitting issues; technical considerations such as cost, placement, design, landscaping, and maintenance; and performance monitoring methods of wildlife mitigation projects. Moderators and speakers for the workshops included research ecologists from WTI, and officials from FHWA, NFS, the US Fish and Wildlife Service, Washington State Department of Transportation, and CTE.

The three primary speakers included Dr. Bruce Leeson, Environmental Scientist for Parks Canada; Dr. Anthony Clevenger, independent biologist conducting research on the effectiveness of the crossing structures and fencing in Banff National Park; and Terry McGuire, Highway Service Center Director for Parks Canada. These Canadian representatives shared their experiences with the wildlife fencing and crossing structure installations in Banff National Park. Participants heard detailed presentations on the history, planning process, engineering and effectiveness of the Banff project. Partici-



pants then spent a day visiting and studying the various fencing and wildlife crossing structures, which include creek bridge pathways, metal culverts, box culverts, open-span underpasses, and overpasses.

This course represented the first time a diversified group of transportation and resource managers from outside Canada has come to study the park's highway mitigation system. Sponsors hope to promote not only increased awareness of context sensitive wildlife mitigation, but also the value of technology transfer across international borders. To ensure that the lessons learned and areas for further study in the field of wildlife-transportation interactions are shared with other interested parties, CTE documented the "Wildlife Crossing Structure Field Course" and will be assembling this in-



formation for web distribution. Watch the WTI website www.coe.montana.edu/wti for the release of the web address to access the field course notes.

EDUCATION NEWS



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WTI Partners with the Bridges Program to Introduce Tribal College Students to MSU

On March 29, 2002 fifteen students from Fort Peck Community College together with their tribal college coordinators visited WTI to learn more about educational and career opportunities in the transportation field. WTI Research Engineer, Lisa Ballard, provided an overview of the engineering and transportation fields and introduced the campus visitors to WTI's current research projects. Bridges is a program coordinated by MSU's American Indian Research Opportunities (AIRO) office and is designed to assist tribal students make the transition from two-year colleges to a four-year university. Students accepted into the program perform lab research with faculty and



graduate student mentors, enroll in summer courses, and live at MSU during a seven-week summer program.

WTI Provides Research Opportunity for MAP Student

The Montana Apprenticeship Program (MAP), coordinated by the American Indian Research Opportunities (AIRO) office at MSU, is designed to assist high school students from disadvantaged schools obtain a university experience. MAP students gain hands-on experience in a lab working for six weeks

during the summer on a research project at MSU. At the end of the six weeks, the students present their research work at a symposium. The MAP program is an effective college recruitment tool for primarily Native American students who might not otherwise attend college.

During the summer of 2002, Channa Whiteman from Billings Central Catholic High School worked with WTI Research Engineer Pat McGowen on the ARTEMIS project. Channa, a high school junior, researched various animal detection driver warning systems to summarize and enter into the ARTEMIS Clearinghouse. She also learned to use MS FrontPage for website creation. Channa, who likes horseback riding, basketball and softball, said she enjoyed her time at WTI. She is interested in majoring in either Civil or Mechanical Engineering after high school.

Gear Up Students Learn about Transportation Issues

In May, a group of 17 seventh graders from Pryor, Montana—located on the Crow Reservation—visited WTI as part of MSU's GEAR UP program. The GEAR UP Program (Gaining Early Awareness and Readiness for Undergraduate Programs) encourages disadvantaged young people to pursue high goals, remain in school, and complete coursework suitable for college acceptance. Pat McGowen presented a short workshop for the campus visitors on the field of transportation research.

Expanding Your Horizons

Expanding Your Horizons—an annual workshop held at MSU for sixth through eighth grade girls—is designed to interest young women in science and math careers.

As part of the event, held on April 27 this year, junior high school students learned about transportation planning through an activity using Sim City, a computer simulation program. The girls worked in small groups to improve traffic in a heavily congested city by improving transportation infrastructure. DJ Clark, a WTI Graduate Fellow and ITE Student Chapter member, and Professor Jodi Carson from Civil Engineering ran the workshops for three groups of 12 girls each.

MSU's Institute of Transportation Engineers (ITE) Student Chapter Continues to Shine

MSU's ITE Student Chapter, selected in 1999 and 2000 as the Best Student Chapter in the Nation, will again be competing for that honor this year. It was

selected as best student chapter in District 6 this year, which once again puts them in the competition for best national chapter.

The ITE Intermountain Section Meeting was held in May of this year in Jackson Hole, Wyoming, and WTI covered travel expenses for nine students to attend. WTI undergraduate research assistant, Joey Paskey, won one of the two \$1000 intermountain scholarships offered each year by the Montana ITE Chapter. WTI alumni were also well represented. Former WTI/MSU student Alyssa Reynolds is the new Secretary/Treasurer for the Nevada ITE Chapter.

MONTANA LEADERS DEBATE HIGHWAY FUNDING PRIORITIES

Do highway lane expansion projects lead to positive economic trends? Some experts think that if you build additional lanes, more people will use the route and bring increased business to ailing local economies. On the flip side, others believe that lane expansion in sparsely populated areas is not the best use of limited highway funds. To provide a discussion forum on this topic, WTI co-sponsored the "Highways to the Future" Roundtable with the Wheeler Center on April 16, 2002 in Great Falls, Montana. Approximately 85 lawmakers, business people and other prominent officials including Governor Judy Martz and Dave Galt, Montana Department of Transportation Director attended the one-day event.

One of the main discussion topics was the proposed widening of U.S. Highway 2 from two to four lanes. Many participants stated that the Hi-Line region of northern Montana would benefit from an east-west interstate highway to parallel I-90 and I-94, which cross the southern and far western regions of Montana. However, populations of several communities along these two routes have steadily decreased, with a corresponding effect on the local economic climate.

Participants also discussed the important role federal highway funds play in the state's economy by

ensuring that Montana has a high quality, dependable transportation infrastructure. In a state with such a large geographical area, it is critical to move people, goods and services in an efficient and safe manner. Governor Martz emphasized that every \$1 million spent on highway construction supports 42 jobs, totaling approximately 21,000 highway construction jobs in Montana every year.

Participants were pleased to have the opportunity to discuss these issues in a moderated open forum with so many high level officials, and deemed the Roundtable a success.

The Wheeler Center is located at Montana State University-Bozeman and is a nonprofit, nonpartisan organization that promotes discussion of public policy issues. More information about the Center can be found on the web at www.montana.edu/wheeler.



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