

# LTAP MATTERS

Montana's Answers To Technical Education of Roads & Streets  
Vol. 26, No. 2

Spring 2008





# From the Director

Springtime is slowly making its way to Montana. Keep survival kits updated and as summer approaches, plenty of water on hand, as road crews head out to grade and reshape roads.

Last fall LTAP started development of a planning calendar for new and existing county road supervisors. Throughout the winter, several experienced road supervisors provided input. We appreciate any further comments in developing this calendar to assist all with the safety of Montana roads.



*As always, drive safely,  
Steve Jenkins,  
Director,  
Montana LTAP*

January	February	March	April	May	June	July	August	September	October	November	December
Winter Maintenance	Winter Maintenance	Winter Maintenance								Winter Maintenance	Winter Maintenance
									Winter Preparation	Winter Preparation	
Planning	Planning						Mowing	Mowing	Mowing		Planning
		Culverts Ditches	Culverts Ditches	Culverts Ditches	Culverts Ditches						
			Grading Reshaping	Grading Reshaping	Grading Reshaping			Grading Reshaping	Grading Reshaping		
					Surface Grading Smoothing	Surface Grading Smoothing					
							Signing Safety	Signing Safety			
			Dust Control	Dust Control	Dust Control	Dust Control					
							Large Earth Work Projects	Large Earth Work Projects	Finish Large Earth Work Projects		
			Any Down Time	Gravel	Culverts	Signing	Equipment Maintenance				
Road Supervisor Annual Calendar										Montana LTAP 4/2008 1-800-541-6671	

LTAP Matters is published by the Local Technical Assistance Program at Montana State University, Bozeman, Montana. LTAP is housed under the Department of Civil Engineering, College of Engineering.

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On our website, we list upcoming training courses, registration forms, library information, our contact information, newsletters, various links, and MACRS information. Please go to:  
[www.coe.montana.edu/ltap](http://www.coe.montana.edu/ltap)

The Local Technical Assistance Program/ Tribal Technical Assistance Program (LTAP/TTAP) is a nationwide network of 58 centers - one in every state, seven serving Native American tribal governments and one in Puerto Rico.

The LTAP/TTAP Mission is to foster a safe, efficient, and environmentally sound surface transportation system by improving skills and increasing knowledge of the transportation workforce and decision makers.



U.S. Department  
of Transportation  
**Federal Highway  
Administration**



Cover & Inside Photo: Thanks to  
lonemanphotography.com

# Highways for Life: MacDonald Pass

Permission was granted to reprint this article from MDT Solutions, Winter 2008.

The Montana Department of Transportation (MDT) was awarded \$320,000 through the Highways for LIFE (HfL) program sponsored by the Federal Highways Administration through the SAFETEA-LU highway bill.

The purpose of Highways for 'LIFE' is to advance Longer-lasting highway infrastructure using Innovations to accomplish the Fast construction of Efficient and safe highways and bridges, (thus the acronym LIFE). And it's innovation that is the key to finding our way out the highway challenge. Innovations is an inclusive term used by HfL to convey all of the following: technologies, materials, tools, equipment, procedures, specifications, methodologies, processes or practices used in the financing, design or construction of highways. The three goals of HfL are to:

- Improve safety during and after construction,
- Reduce congestion caused by construction, and
- Improve the quality of the highway infrastructure.

Specifically, HfL is focused on accelerating the adoption of innovations in the highway community.

This project involves retrofitting dilapidated corrugated steel pipe (CSP) with culvert liners on US 12, MacDonald Pass in Powell County. By lining the existing culverts with plastic and polymer compound liners rather than excavating and replacing them, the work will lengthen the useful life of the culverts while requiring one day's closure of a single lane of the four-lane highway. Traditional culvert replacement requires the closure of half of the highway for four days. The plan reduces construction time by 70 percent. This practice will minimize the potential vehicle conflict between opposing traffic, work zone equipment, and personnel.



*Deteriorated Culvert*



*Polymer Culvert Lining During Curing*



Specifically, this project involves the use of compact multiple diameter directional drilling equipment to install two different types of culvert lining. The first method being investigated uses new directional drilling techniques with the installation of a plastic lining into the existing culvert.



*Culvert After*

The second method involves a polymer compound curing process to line the existing culvert. The polymer is cured using either hot water or steam. The culvert lining provides structural integrity, preventing the potential for catastrophic failure of corroded culverts. By preventing culvert failure the roadway surface life will be prolonged. The expected life of both culvert linings is in excess of 50 years.

Contact Craig Abernathy at [cabernathy@mt.gov](mailto:cabernathy@mt.gov) or 406-444-6269 for more information.

## ADVISORY COMMITTEE MEMBERS

The Advisory Board meets annually to make recommendations and evaluate the effectiveness of the Montana LTAP program.

Debbie Arkell  
City of Bozeman

Bob Burkhardt  
Federal Highway  
Administration

Kelly Elser  
Town of Sheridan

Fred Hansen  
MACo

Jim Rearden  
City of Great Falls

Russ Albers  
Teton County

Thomas Danenhower  
MMIA

Eric Griffin  
Lewis and Clark County

Russ Huotari  
Richland County

Sue Sillick  
Montana Dept of  
Transportation

Alec Hansen  
Montana League of  
Cities & Towns

Lynn Miller  
Montana Dept of  
Transportation



## Records Set at MACRS 2008 Conference in Helena



*Genevieve Albert, Montana LTAP*

The 2008 MACRS Conference held in Helena, Montana, set record attendance by participants and vendors. “I was impressed by the increase from last year’s numbers. There were 30 additional participants and 15 more vendor individuals, with a total of almost 300 attendees,” said Genevieve Albert, Montana LTAP Conference Coordinator.

“We were very fortunate to have a free pre-conference on Monday morning by Harold Blattie, MACo, discussing budgeting for counties,” outgoing President Jim McCarthy commented. “It was well attended in spite of the snow storm that hit the western portion of the state.”

The afternoon pre-conference highlighted promotional speaker DJ Vanas, Native Discovery, Inc., who offered participants numerous ideas of how to work with others, as well as set and attain goals for themselves with insightful examples.

The Tuesday session included a visit from Governor Brian Schweitzer, as well as field representatives and comments from Senator Baucus, Senator Tester, Representative Rehberg, and Director Jim Lynch from the Montana Department of Transportation. The afternoon session dealt with funding possibilities and the importance of collecting road condition inventories.



*DJ Vanas, Native Discovery, Inc.*



*Full Lunch Room*

During Wednesday sessions several attorneys discussed the importance of road standards. Steve Jenkins, Montana LTAP, presented on the “Prism” in road standards. The afternoon focused on county roads and growth and implementation of county road standards.



*Steve Jenkins, Montana LTAP*

On the Wednesday evening banquet agenda, twenty-two Roads Scholars were announced and came forward to receive their certificates and Roads Scholar jackets. Retiring member Jack Knorr, a former MACRS President and active member on the MACRS Executive Board, graciously accepted a plaque honoring his dedication in helping the MACRS organization.



*L to R: Richard Miller, Beaverhead County; Eric Griffin, Lewis & Clark County; Jim McCarthy, Butte-Silver Bow; and Jack Knorr, Retired Sweet Grass County*

The evening entertainment was Vince Yannone, Wildlife Biologist, who brought in a variety of mounted Montana fish species, each with an interesting story. After pulling on long leather gloves, Vince produced a raven from one of the cages that had a tether to keep the bird from flying away. From the other cage, he handled a Great Horned Owl that had been injured and told several anecdotal stories about birds he had doctored back to health.



At the MACRS business meeting on Thursday morning, the mission statement that had been developed over the past two years by Russ Huotari, MACRS Training Committee Representative, passed:



Russ Huotari, Richland County

**“The Montana Association of County Road Supervisors mission is to facilitate education, and to share ideas; thus helping to enable a safe, efficient, and consistent transportation system for each County throughout the State of Montana.”**

The business meeting concluded with the election of officers and representatives for 2008-2009:

**PRESIDENT**  
Wayne Waarvik  
Road Superintendent  
Valley County  
PO Box 1024  
Glasgow, MT 59230-1024  
(406) 228-4233  
Fax: 406-228-4231  
vcroads@hotmail.com



**1ST VICE PRESIDENT & SECRETARY/TREASURER**  
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5125 Valley Drive East  
Miles City, MT 59301-1142  
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j.forman@co.custer.mt.us



**2ND VICE PRESIDENT**  
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Road Foreman  
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PO Box 655  
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randbroad@rangeweb.net



**DISTRICT #5**  
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Road & Bridge Foreman  
Yellowstone County  
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Billings, MT 59101  
(406) 256-6812  
kimpeterson@co.yellowstone.mt.gov  
tmiller@co.yellowstone.mt.gov



**More Photos from MACRS Activities**



Mo getting ready for the big "5 - 0"



Russ Albers, Chouteau County, and Tom Gossack, T&E



Ladies ready to depart for the Helena Trolley Tour



# LTAP 2008 Annual Training Calendar

## 45th Annual Petersen Asphalt Research Conference July 14-16, 2008 Laramie, Wyoming

The conference will present current research aimed at understanding and improving asphalt pavement performance, with topics ranging from fundamental compositional research to applied field engineering. Participants will also have the opportunity to participate in an open-mike discussion session. The conference is organized by the Western Research Institute (WRI). Contact: Steve Salmans at WRI, 307-721-2306 or e-mail at [ssalmans@uwyo.edu](mailto:ssalmans@uwyo.edu); or Ernie Bastian at FHWA, 202-493-3075 or e-mail at [ernest.bastian@fhwa.dot.gov](mailto:ernest.bastian@fhwa.dot.gov). Information is available online at [www.petersenasphaltconference.org](http://www.petersenasphaltconference.org).

## 2008 Pavement Performance Symposium July 16-18, 2008 Laramie, Wyoming

Hosted by WRI, in cooperation with FHWA, the symposium will focus on recycled and warm-mix asphalt pavements. Contact: Steve Salmans at WRI, 307-721-2306 or e-mail: [ssalmans@uwyo.edu](mailto:ssalmans@uwyo.edu) or Ernie Bastian at FHWA, 202-493-3075 or e-mail: [ernest.bastian@fhwa.dot.gov](mailto:ernest.bastian@fhwa.dot.gov). Information is also available at [www.petersenasphaltconference.org](http://www.petersenasphaltconference.org)

January 2008	February 2008	March 2008																																																																																																																																						
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*Some dates and locations are subject to change. Call Genevieve Albert, LTAP, 1-800-541-6671 to confirm.*



# Calendar of Events 2008

## Montana LTAP Workshops:

**Workforce Development** April 28 - 30, 2008

**Glasgow, MT**

**Day 1 & 2: Gravel Roads**

**Day 2 PM: Forklift Certification**

**Day 3: Safety Engineering, Summer Survival, & Leadership**

To register for any of these classes, contact Genevieve Albert, Montana LTAP Conference Coordinator, at 1-800-541-6671. Information and brochures are on-line at [www.coe.montana.edu/ltap](http://www.coe.montana.edu/ltap).

## For those Planning Ahead:

### 2009 MACRS

#### Annual Conference

March 30 - April 2, 2009

Heritage Inn

Great Falls, MT

**More information coming this fall 2009**

## Fall Conferences

### 19th Annual Equipment Operator Training & Snow Rodeo - Great Falls, MT

**September 3 and 4, 2008**

For questions, please contact Genevieve Albert, Montana LTAP Conference Coordinator, at 1-800-541-6671. Information and brochures will be available July 2008 at [www.coe.montana.edu/ltap](http://www.coe.montana.edu/ltap).

### MACo Annual Conference - Hamilton, MT

**September 21-25, 2008**

To register for the MACo Conference, please contact Montana Association of Counties, 2715 Skyway Drive; Helena, MT 59602-1213 - Email: [maco@maco.cog.mt.us](mailto:maco@maco.cog.mt.us) - Phone: 406-444-4360 - FAX: 406-442-5238

### League of Cities and Towns - Missoula, MT

**October 8-10, 2008**

Montana League of Cities and Towns 208 N. Montana Avenue - Suite 201  
Helena, Montana 59601 - 406-442-8768; P.O. Box 1704; Helena, Montana 59624-1704  
E-mail: [mlct@mt.net](mailto:mlct@mt.net)

The Hilton Garden Inn has been selected as the Conference Hotel. Room reservations can be made with the Hilton Garden Inn Missoula, 3720 North Reserve Street, at (406) 532-5300.

## Big Sky Bicycling

Just out from MDT is the 2008 *Bicycling the Big Sky* map. The most recent traffic data as of July 2007 is in this new edition.

Highway features of interest to bicyclists include traffic volumes, shoulder width, and rumble strips. There is also Montana bicycle laws, safety recommendations and contact information.

Pam Langve-Davis, MDT's bicycle and pedestrian coordinator can be contacted at 406-444-9273 or e-mail at [plangve-davis@mt.gov](mailto:plangve-davis@mt.gov). *Bicycling the Big Sky* is also available at MDT offices or bicycle shops.

For more information on bicycle and pedestrian program information, go to <http://www.mdt.mt.gov/travinfo/bikeped/>. Pamphlets and other safety resource materials include Montana bicycle and pedestrian laws, Share the Road bumper stickers and posters, *Walk and Ride Safe* brochures for parents and children, helmet fitting information, the *A to Z by Bike* booklet and traffic safety coloring books.

## Out of State Conferences

### Pacific Northwest Snowfighters Winter Maintenance Conference

**May 20-22, 2008**

**Kennewick, Washington**

[capps.wsu.edu/conferences/pns](http://capps.wsu.edu/conferences/pns)

### Pacific Northwest Bridge Maintenance Conference

**October 7-8, 2008**

**Seaside, Oregon**

[capps.wsu.edu/bridge](http://capps.wsu.edu/bridge)



# 2008 Montana Roads Scholars



At the 2008 MACRS Annual Conference, twenty-two Roads Scholars were honored with a Level I Roads Scholar certificate and jacket. For more information about Roads Scholars, visit [www.coe.montana.edu/ltap/pages/roads.htm](http://www.coe.montana.edu/ltap/pages/roads.htm).

1. Abreu, Tina - Stillwater
2. Bacon, Kim - Wibaux
3. Beery, Joe - Dawson
4. Boysun, Grant - Custer
5. Bramsen, Calvin - Missoula
6. Gorder, Shane- Richland
7. Guenther, Randall - Sheridan
8. Haines, JR - Rosebud
9. Iverson, Greg - Flathead
10. Keyes, Dow - Beaverhead
11. Longmire, Mike - Missoula
12. Mohn, Jim - Flathead
13. Perkins, Steve - Custer
14. Richetti, Rick - Lewis & Clark
15. Rosaaen, Allen - Richland
16. Salisbury, Preston - Dawson
17. Satterthwait, Virgil - Rosebud
18. Schaak, Duane - Treasure
19. Stevens, Randy - Missoula
20. Stokes, John - Pondera
21. Tolan, Dennis - McCone
22. Tucker, Tom - Stillwater



*"As the first woman in Montana to receive a Roads Scholar, I just want to thank MACRS and LTAP for providing safety training for county road crews."*

*Tina Abreu, Stillwater County*

## A Few Comments from Some of the 2008 Roads Scholars:

"LTAP training is like having a ripper on a blade. When you hit a hard spot you rip it up. Problem solved. LTAP gives you some of the tools to take care of the hard spots."

*Joe Beery, Dawson County Road Department*

"I have found the training programs provided by the LTAP program to be very beneficial in my day-to-day work. A better understanding of the physical characteristics of different road construction materials and the effects of mixture and application practices of them has helped me to be better able to prepare durable road surfaces. The interaction with other, more experienced operators allows a good interchange of work practices and ideas to address a number of environment changes."

*Preston Salisbury, Dawson County Road Department*

"It is great to put to use what we learn at the LTAP programs that are offered to us. Attending the Winter Survival class in Glendive last spring, and also the 2007 Snow Conference taught me things that I now use every day. It does not matter if you are an "Old Timer" or just starting out, this information is a valuable tool that everyone can use."

*Randall Guenther, Sheridan County Road Department*

"I have worked for Treasure county for the past eleven years. The training I received from LTAP has been very beneficial not only to me, but to the County and the people that live here. The training provided me with information that helps me daily at work."

*Duane Schaak, Treasure County Road Department*

"I have been in road construction and maintenance for 20+ years. The various seminars I have attended I found insightful and useful in real life applications. The discussion with other operators at these seminars gives me an opportunity to exchange fresh ideas and unique techniques to unusual situations."

*Tom Tucker, Stillwater County Road Department*

"Over the past 24 years I have worked for McCone County. With the assistance and training of LTAP, I have learned the importance of using the right materials and size of gravel to provide not only the technology of keeping roads packed for dust control and washboarding but also the importance of keeping a good crown on gravel roads."

*Dennis Tolan, McCone County Road Department*

"I have been with Missoula county for nine years. Prior to that I worked for the City of Missoula Street Department. The LTAP training classes have been really beneficial at providing a lot of extra knowledge on gravel roads and safety to me and the whole crew at Missoula County. I look forward to attending more classes in the future."

*Randy Stevens, Missoula County Road Department*

"There are a lot of important factors to building a road to make it safe. I work on Richland County's road rebuilding crew. What I have learned over the past five years at the many LTAP courses is that the proper crown in a road, correct shoulders, backslopes, drainage, and graveling are all key in the maintenance of a road. I have the information to fix visibility problems, like blind corners and blind hills. I also have an understanding of an accurate speed limit on super curves. I encourage LTAP training for everyone."

*Shane Gorder, Richland County Road Department*



# Impaired Driving Assessment Center Takes to Montana Roads

*Permission was granted to reprint this article from Montana Department of Transportation,  
Charity Watt Levis, Public Information Officer, MDT, 444-7205*

The Montana Department of Transportation and the Montana Highway Patrol unveiled Montana's newest weapon against impaired drivers last June, 2007. The Mobile Impaired Driving Assessment Center (MIDAC) is used by MHP and other local law enforcement agencies as an efficient way to process DUI arrests. MIDAC is deployed to areas during events associated with a prevalence of alcohol or drug consumption and impaired driving.



"The Department of Transportation is pleased to have this partnering opportunity with the patrol," said Jim Lynch, MDT director. "Getting impaired drivers off the road is about saving lives, and with Montana having the highest rate of impaired driving fatalities in the nation, we have our work cut out for us."

MDT funded the \$250,000 Center using a grant from the National Highway Traffic Safety Administration. The MHP will own, operate and maintain MIDAC. It will be available for local and tribal law enforcement to process impaired drivers when the Center is being used in or near their jurisdictions.

MIDAC is a self-propelled vehicle that, at a length of 39 feet and width of almost 8 feet, resembles an over-sized moving truck. Officers can fully evaluate the impairment level of people who have been detained for impaired driving. MIDAC is outfitted with an Intoxilyzer 8000 (blood alcohol content testing equipment), portable breath testing devices, a fully digital monitoring/surveillance system (cameras, DVD recorders), state of the art computers/data collection system and communication capability, refrigeration for storing blood evidence and a bathroom.

"Using MIDAC will help get law enforcement back on the road after arresting an offender," said Col. Paul Grimstad of the MHP. "In the past it's taken hours to process each arrest. MIDAC will allow us to quickly get back on the road to enforce Montana law and keep drivers safe."

MIDAC reduces the time arresting law enforcement officers spend transporting alleged impaired drivers to the nearest jail. With the Center in close proximity to enforcement activities, officers can process suspects then return to the road to continue traffic enforcement and safety activities.



Preliminary data shows 119 of the 263 fatalities last year on Montana roads involved an impaired driver. Additionally, injuries in crashes involving an impaired driver were at the highest percentage of all crash injuries since 1994, tallying 19.2 percent. In 2006 alone, the economic loss due to crashes involving impaired drivers exceeded \$193 million.



## Montana LTAP Library

Welcome to the LTAP Lending Library where publications, videos, DVD's, and software may be borrowed for two weeks and then returned to the Library. These resources are for use by Montana county, city, and state departments. Up to three videotapes or DVD's may be checked out from the LTAP Lending Library rent-free for two weeks. Some publications are free or for a nominal charge upon request.

Information or checkout procedures, call Genevieve Albert or Michele Beck, LTAP, 1-800-541-6671.

If you have computer access, please e-mail us at [mtltap@coe.montana.edu](mailto:mtltap@coe.montana.edu).

You will find the latest lists for the library publications, software, DVD's, and videos at our web site: [www.coe.montana.edu/ltap](http://www.coe.montana.edu/ltap). You can also keep track of upcoming workshops, past and present newsletters, and "What's New" items that change periodically.

### Publications

**p-284 Clay Seam Mapping With Electromagnetic Induction (FHWA Nov 2005)** This report summarizes multi-phase geophysical demonstrations using various electromagnetic induction (EMI) methods on SR537 near Dulce, New Mexico. The road has had extensive surface rehabilitation due to the presence of swelling clay-rich zones in the road base. Using electromagnetic geophysical methods with rapid acquisition procedures provided a means of detecting the location of potential swelling clay-rich zones. This information was used to guide the soil boring program, thus greatly reducing the risk of missing a clay-rich zone during the site characterization planning stage and thus preventing or minimizing cost-overruns during the reconstruction phase. (94 pages)

**p-428 Long-Life concrete Pavements in Europe and Canada (August 2007) FHWA & AASHTO** This scanning study identified design philosophies, materials requirements, construction procedures, and maintenance strategies used in Europe and Canada to build long-life concrete pavements. (69 pages)

**p-520 Roadside Weed Management (2007) FHWA** This publication contains information on each State's weed law, and weed resources, policy, and more. (369 pages)

**p-565 Promoting Geosynthetics Use on Federal Lands Highway Projects (December 2006) FHWA** This study aims to develop recommendations to identify, promote, and advance the use of geosynthetic materials across the FLH in the Roadway, Bridge/Structures, and Geotechnical areas. (103 pages)

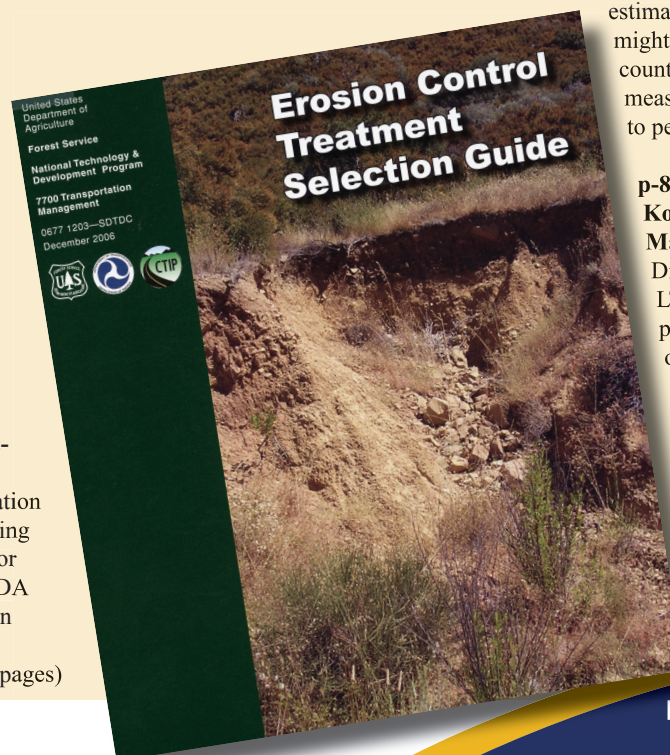
**p-607 Erosion Control Treatment Selection Guide (December 2006) USFS** This guide presents a strategy and information to assist professional judgment in developing cost-effective erosion control treatments for conditions commonly encountered on USDA Forest Service lands. This guide focuses on erosion control treatment and does not specifically address sediment control. (53 pages)

**p-609 Environmentally Sensitive Maintenance for Dirt and Gravel Roads (March 2006) Gesford and Anderson** The manual will provide insight into using natural systems and innovative technologies to reduce erosion, sediment and dust pollution while more effectively and efficiently maintaining dirt and gravel roads. The manual will address the environment of forests, mountainous terrain, and rolling hills. (310 pages)

**p-720 Surface-Aggregate Stabilization with Chloride Materials (December 2006) USFS** This publication provides Federal, State, county, and local road managers information on the performance and cost effectiveness of road-mixing high applications of calcium and magnesium chloride that are applied in a one-time construction process. The purpose of this project was to develop guidelines for chloride-stabilization and aggregate-surfacing materials in various environments. (23 pages plus CD)

**p-808 Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes (September 2007) FHWA** This issue brief documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to pedestrian crashes (4 pages)

**p-839 Ready for the Road by Joe Kolman (Jan/Feb 2008) Montana Magazine** This article interviews Director Steve Jenkins, Montana LTAP, with regards to being prepared when driving the roads of Montana, be it winter or summer. (Pages 64-68)





**p-852 Safe Routes to School Guidebook (June 2007) Montana Dept. of Transportation**

This guidebook discusses elements of successful Safe Routes To School programs and shows how Montana's SRTS Program can help you make a difference in the quality of life for children and in school neighborhoods. (115 pages)

**p-853 Evergreen Schools, Safe Routes to School Study (May 2007) Robert Peccia & Associates**

The development of this study, coupled with the recommendations to improve student safety, are the primary subject matter included within this report. It is the hope and desire of the MDT, and the author, that this short yet succinct report will serve as a blueprint for improving student safety at the Evergreen Schools (Kalispell) over the coming years. (105 pages)

**p-866 Accessible Public Rights-of-Way, Planning and Designing for Alterations (July 2007) PROWAAC**

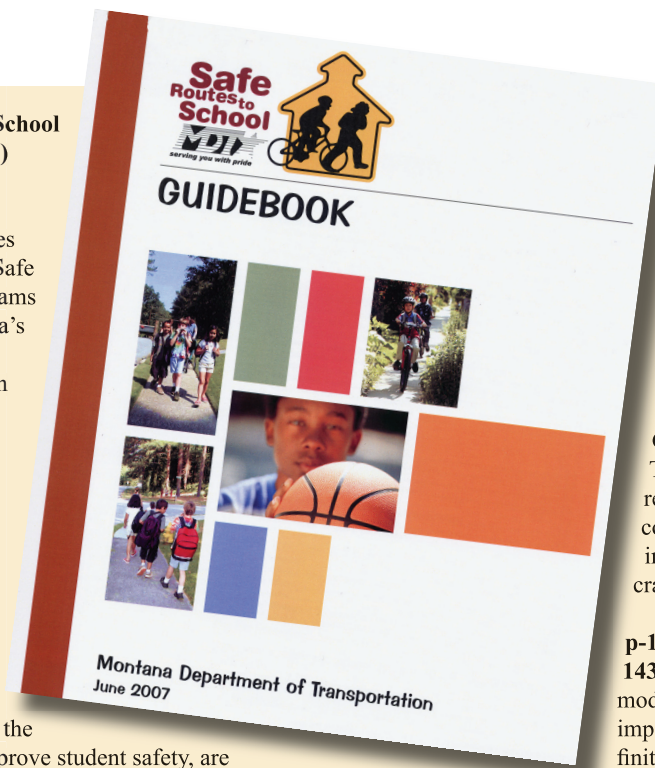
This technical assistance publication has been developed to provide guidance in the planning and design of pedestrian improvements constructed as part of an alteration project. Its text, illustrations, and case studies aim to expand the reader's body of knowledge in accessible right-of-way design. (107 pages)

**p-912 Traffic Signals (September 2007)**

**FHWA** The introduction to this issue brief provides an overview of traffic signals (purpose, warrants for signal installation, advantages, disadvantages, and factors to consider) followed by an introduction to the contents of this issue brief (crash reduction factors, presentation of the crash reduction factors, and using the Tables). (7 pages)

**p-961 Commercial Motor Vehicle Size and Weight Enforcement in Europe (July 2007) FHWA**

This scanning study evaluated procedures and technologies for enforcing commercial motor vehicle size and weight laws in Belgium, France, Germany, the Netherlands, Slovenia, and Switzerland. (100 pages)



**p-965 Toolbox of Countermeasures and Their Potential Effectiveness for Intersection Crashes (September 2007)**

**FHWA** This issue brief documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to intersection crashes. (14 pages)

**p-970 Toolbox of Countermeasures and Their Potential Effectiveness for Roadway Departure Crashes (September 2007) FHWA**

This issue brief documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to roadway departure crashes and other non-intersection crashes. (14 pages)

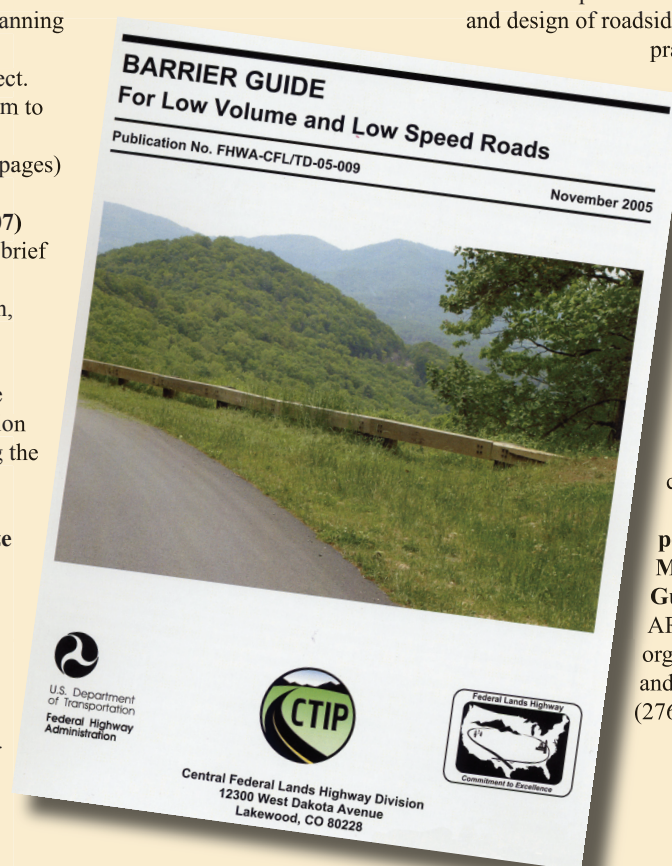
**p-1039 Manual for LS-DYNA Wood Material Model 143 (August 2007) FHWA**

An elastoplastic damage model with rate effects was developed for wood and was implemented into LS-DYNA, a commercially available finite element code. This manual documents the theory of the wood material model, describes the LS-DYNA input and output formats, and provides example problems for use as a learning tool. Companion report is Evaluation of LS-DYNA Wood Material Model 143 (August 2005)-p-1038 in Montana LTAP's library. (163 pages)

**p-2010 Barrier Guide For Low Volume and Low Speed Roads (November 2005) FHWA**

This guide is intended to provide assistance in the warranting, selection, and design of roadside barriers. The guidelines present

practical and useful guidance for common conditions and situations encountered in the design of roadside barriers for Federal Lands Highway projects. (152 pages)



**p-3119 2008 NHI Catalog, Training the Transportation Workforce National Highway Institute**

This is the National Highway Institute's 2008 catalog listing all courses available from them, course title, outcomes, target audience, training level, fee, length, class size. (280 pages)

**p-3130 2008 ARTBA Membership Directory & Buyers' Guide**

This publication lists ARTBA member firms and organizations, elected leaders and the association's operations. (276 pages)



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LTAP welcomes contributions to *LTAP MATTERS*. Those wishing to submit relevant material to be published in the next newsletter can submit their ideas and articles to:

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