LTAP MATTERS

Montana's Answers To Technical Education of Roads & Streets

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Winter 2009

MONTANA STATE UNIVERSITY

From the Director

I certainly want to thank Greg Schertz, FHWA, for sharing his valuable retroreflectivity powerpoint with LTAP centers in July at the National LTAP conference. This latest technical information for Montana's county road workforce was one of the topics I covered at the recent 2008 Fall MACRS District meetings. My travels in October included workshops in Lewistown, Havre, Glendive, Bozeman, and Polson to present this important information as well as Sign Placement for low-volume roads according to the Federal Highway Administration's Manual on Uniform Traffic Control 2003, and updated sections.

The Retroreflectivity module covered vital points such as:

- •What is RETROreflection
- •Understanding the light reflectivity equation
- •Different Types of Sign Sheeting materials:
  - -What Works & Sheeting Specifications required

During this course, my demonstration with a flashlight in a darkened room showed how different sheeting materials reflected a light source. Discussion followed about understanding why the cone size of the light was important. Each participants used a provided penlight to view how a passenger car driver would see a sign reflection versus a large truck driver by holding the penlight next to their eye (car) or under their chin (truck).

Understanding the key elements of visibility involved head lamp illumination and sign material retroreflectivity as well as older driver's perception of luminance. Other factors included sign location, varying head lamp luminance, driver's visual capabilities, and vehicle size.

One of the most important changes for local governments is the need to have some type of assessment or management method to maintain sign retroreflectivity at or above the minimum levels in the following table.

Sign Color	Sheeting Type (ASTM D4956-04) ①				Additional Criteria
	Beaded Sheeting			Prismatic Sheeting	
	I	II	III	III, IV, VI, VII, VIII, IX, X	
White on Green	W* G ≥ 7	W* G ≥ 15	W* G ≥ 25	W ≥ 250; G ≥ 25	Overhead
	W* G ≥ 7	W ≥ 120; G ≥ 15			Ground-mounted
Black on Yellow or Black on Orange	Y*; O*	Y ≥ 50; O ≥ 50			②
	Y*; O*	Y ≥ 75; O ≥ 75			③
White on Red	W ≥ 35; R ≥ 7				④
Black on White	W ≥ 50				—

① The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/m² measured at an observation angle of 0.2° and an entrance angle of -4.0°.
②For text and fine symbol signs measuring at least 1200 mm (48 in) and for all sizes of bold symbol signs
③For text and fine symbol signs measuring less than 1200 mm (48 in)
④Minimum Sign Contrast Ratio ≥ 3:1 (white retroreflectivity red retroreflectivity)
* This sheeting type should not be used for this color for this application.

The other module covered at this workshop was Part 5 of the MUTCD relating to low-volume road signage. A low-volume road means less than 400 AADT (Annual Average Daily Traffic). I explained where to use particular types of signs, when to use the signs, why not to use too many signs, placement of signs, and understanding a ball bank indicator for placement of horizontal alignment signs.

Equipped with an understanding of retroreflectivity and federal regulatory mandates, county road departments know how to stay informed on sign requirements. I discussed several liability suits against counties to help participants understand the importance of keeping records and staying informed of changes in these mandates. For our field exercise, we went out on a county road and used the ball bank indicator on curves. Each county that participated in this workshop received a ball bank indicator for their sign use and placement.

Be sure to call me if you have questions about signage,

Steve Jenkins

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

We can be reached at the following:

Phone: (800) 541-6671
(406) 994-6100

FAX: (406) 994-5333

E-Mail: MTLTAP@coe.montana.edu

Local Technical Assistance Program

Steven Jenkins, P.E.
Director
stevenj@coe.montana.edu

Genevieve Albert
Administrative Associate/
Conference Coordinator
galbert@coe.montana.edu

Michele Beck
Graphic Designer/
Librarian
mbeck@coe.montana.edu

Kali Vergeront
Student Assistant

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

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

Front Page Photo:
Ronald D. Tabler, See Page 3

Are your new and existing signs bright enough?

By Lloyd H. Rue, P.E., P.T.O.E.,Program Development Engineer, Federal Highway Administration,Helena, MT 59601 Lloyd.rue@dot.gov

Don't get surprised. Check into the new guidance that affects your highway signs. Don't encounter a set-back in two or three years. Understand today so that the new replacement signs being purchased are cost effective in meeting the new minimum retroreflectivity standards. Understanding and managing toward the new standards will help with your budgeting and sign management practices.

New National Requirements

The Manual on Uniform Traffic Control Devices (MUTCD) is the national standard for all traffic control devices on any street or highway open to public travel.

The MUTCD requires signs to be either illuminated or made with retroreflective sheeting materials. Most signs in the U.S. are made with retroreflective sheeting materials, which degrade over time and therefore have a limited life. Until now, there has been little information available to determine when signs need to be replaced based on retroreflectivity.

Adding Flexibility

The MUTCD now requires that agencies maintain traffic signs to a set of minimum levels but provide a variety of maintenance methods that agencies can use to be in compliance with the new MUTCD requirements. The FHWA believes that the new MUTCD language will promote safety while providing flexibility for agencies to choose a maintenance method that best fits their specific conditions.

The minimum retroreflectivity requirements do not imply that an agency must measure every sign. Rather, the new MUTCD language describes methods that agencies can use to maintain traffic sign retroreflectivity at or above the minimum levels.

Retroreflective Sheeting Materials

ASTM D4956 describes the types of retroreflective sheeting materials that can be used on traffic signs. The new MUTCD minimum retroreflectivity requirements refer to sheeting types as defined in ASTM D4956. Sheeting types that can be used according to the new requirements are as follows (current as of March 2008):

Agencies have until January 2012 to establish and implement a sign assessment or management method to maintain minimum levels of sign retroreflectivity. The compliance date for meeting the minimum retroreflectivity requirements on regulatory, warning, and ground-mounted guide signs is January 2015. For overhead guide signs and street name signs, the compliance date is January 2018.

All prismatic sheeting materials may be used for all signs.

High Intensity Beaded (Type III) and Super Engineer Grade (Type II) may be used for all signs except for the white legend on overhead guide signs.

Engineer Grade (Type I) may be used for all signs **except** for:

- the white legend on guide signs,
- the white legend on street name signs, and
- all yellow and orange warning signs.

Even though a particular type of sheeting might initially meet the minimum retroreflectivity levels when new, it might quickly degrade to below the minimum retroreflectivity levels.

TIP: The use of higher performance sheeting, even though it has a higher initial cost, might provide a better life-cycle cost for the agency.

It's All About Safety

Providing retroreflective delineation and signing is important as a means of reducing the higher nighttime crash rates. Signs that have sufficient retroreflectivity during nighttime conditions are especially beneficial to older road users. Safe and efficient highways are a benefit to the motoring public and the health and viability of a community.

More Information

Additional information regarding nighttime visibility can be found at: http://safety.fhwa.dot.gov/roadway_dept/retro/.

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

Russ Albers
Chouteau County

Bob Burkhardt
Federal Highway Administration

Thomas Danenhower
MMIA

Kelly Elser
Town of Ennis

Eric Griffin
Lewis and Clark County

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Montana League of Cities & Towns

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MACo

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Montana Dept of Transportation

Jim Rearden
City of Great Falls

Sue Sillick
Montana Dept of Transportation

Controlling Snow with Snow Fences

How to control blowing and drifting snow with snow fences and road design.

By Ronald D. Tabler

Permission was granted by Mr. Tabler to reprint the following information from this report prepared for the National Cooperative Highway Research Program, Transportation Research Board of the National Academies. Mr. Tabler, principal with Tabler and Associates, can be reached at tabler@sprynet.com. Copyright © 2003 by Ronald D. Tabler. All rights reserved.

In exposed windy locations, snow blowing onto a road adds greatly to the cost of snow and ice control. Although costs vary widely, mechanical snow removal typically costs about $3 per 2,205 lb. For comparison, a snow fence 4 ft tall can retain 4.2 tons of snow per ft. Snow drifts can cause loss of vehicle control, reduce sight distance on curves and at intersections, obscure signs, cause ice formation, reduce effective road width, and render safety barriers ineffective.

Blowing snow is the primary cause of icy roads in wind exposed areas—melting extracts diurnal solar radiant heat stored in the pavement and substratum, and the quantity of snow blowing across a road can be hundreds of times greater than direct snowfall. Studies on I-80 in Wyoming indicate that over the last ten years, up to 25 percent of all crashes occur during blowing snow in areas without snow fences, compared to 11 percent in areas protected by fences.

Aerial view shows the snow fence system at Wyoming I-80 Mile 280.8.

Drifts contribute directly to pavement damage by blocking ditches, drains, and culverts, and serving as a source of water infiltrating under pavement. Snow removal equipment can also damage road surfaces. Current drift control technology is based primarily on research conducted by the U.S. Forest Service in the 1960s and 1970s. Results from that research were used to solve a severe drifting problem on a newly completed section of I-80 in Wyoming the year after it was first opened to traffic in 1970. The I-80 application provides the only documented quantitative evaluation of the effectiveness of snow control measures. The background and results of the I-80 study summarized here have and will continue to justify snow control projects on other highways.

The route selected for I-80 closely followed U.S. 30 across southern Wyoming. Between Laramie and Walcott Junction; however, a new location was selected along the foot of the Medicine Bow Mountains to save nearly 15 miles.

No snow fences were in place when this new 77-mile section of I-80 was first opened to traffic in October 1970. Three months later, snowdrifts up to 16 ft deep encroached on traffic lanes at 27 different locations, and six bulldozers were working 24/7 to remove these drifts. Winds averaged more than 30 mph for days at a time, and the road had to be closed for a total of ten days because of poor visibility, ice, and crashes. Because of the first winter's experience, snow fences were designed to protect all of the locations where drifts reached the road. The initial contract consisted of 11.4 miles of snow fence ranging in height from 6 to 12.4 ft and built at a cost of $480,000.

Careful monitoring of these first fence systems during the 1971-1972 winter proved their effectiveness in preventing drifts, but the improved visibility and road surface condition in fence-protected areas were even more impressive because these ancillary benefits were unexpected. The dramatic effectiveness of those first fences led to many more being installed over the next 18 years.

As of 2001, the system on this same section of I-80 consisted of 39.5 miles of fence protecting about 40 miles of highway, built at a total cost of about $2.3 million. Ten years after the first fences were built, a study was undertaken to quantify their effectiveness. The results of that original study, updated to incorporate an additional five years of data, are reported here.

Although an economic assessment of winter maintenance operations was complicated by changes in staffing, equipment, and maintenance standards over the period, expenditures were reduced by at least one-third to onehalf. More importantly, the gradual increase in fence protection afforded a unique opportunity to quantify the reduction in crashes. In a winter with average snowfall and 1980 traffic volume, the original study concluded that the fencing in place in 1980 prevented 54 accidents and 35 injuries.

Incorporating an additional five years of data, and adjusting for 2001 traffic and current average injury rate, it is projected that the fences now in place are preventing 78 crashes and 36 injuries over a winter with average snowfall. The savings in injuries and property damage alone could amortize the capital expenditure for this snow fence system within two years. With the added savings accruing from reduced road closure time and the savings in snow removal costs, it seems clear that the cost of replacing these snow fences could be recovered within a year's time.

Figure 1. Transition from frozen slush to wet pavement corresponds to the beginning of the area protected by a 12.4-ft snow fence located about 500 ft upwind.

Effects of Snow Fences on Ice and Slush

Snow fences can also dramatically reduce the formation of slush and ice. By reducing the mass of snow reaching the roadway, diurnal solar radiant heat can accumulate in the pavement and substratum instead of being lost to melting snow that blows onto the road (Figure 1).

It is common to observe surface temperature differences as great as 15° F in areas protected by snow fences compared to adjacent areas with active blowing snow. Many successful projects have proven that properly engineered snow fences are effective. One example is Wainwright, AK, where 15-ft snow fences 2,600 ft long eliminated drifts that previously damaged buildings and made streets impassable to conventional wheeled vehicles. The benefits of snow fences can also extend for considerable distances downwind.

This is in part attributable to the pressure gradient from the wake region to the outer undisturbed flow, which retards the influx of snow into the wake. As a result, the boundaries between protected and unprotected areas may be visible for great distances downwind. The deposition of blowing snow behind a fence increases the eroding capability of the wind, resulting in a tendency for snow to be scoured out downwind of the fence. The advance of this snow erosion "front" extends the effect of the fence downwind.

Benefit-to-Cost Analyses for Snow Fences

Snow fences can effectively prevent snowdrifts, improve visibility, and reduce slush and ice. Benefits include reductions in:

- Snow and ice removal costs
- Vehicle crashes
- Road closures
- Pavement maintenance costs

Conditions at Wyoming I-80 Mile 280.8 before the construction of snow fences.

Also at Wyoming I-80 Mile 280.8, conditions as they have appeared throughout the 31 years after building snow fences.

It is possible to determine benefit/cost ratios for snow fence projects. For the 60-mile study section of Wyoming I-80, it is projected that with current traffic volume, the fences now in place are preventing 78 crashes and 36 injuries over a winter with average snowfall. According to the report *Economic Impact of Motor Vehicle Crashes 2000* (U. S. Department of Transportation, National Highway Traffic Safety Administration, Report No. DOT HS 809 446), the unit cost of "property damage only" crashes is $2,532, and the comprehensive unit cost of the average injury crash (including fatalities) is $46,422. This implies an average annual return of about $1.8 million on the original capital investment of $1.9 million.

If the fences were replaced at current prices, and traffic volume remained constant, the benefits accruing from the reduced injuries and property damage alone would yield a benefit-to-cost ratio of 4.2:1. This calculation is based on the following conservative assumptions:

- Cost of replacing fences at current prices: about $4.2 million
- Interest rate: seven percent
- Physical project life: 35 years
- Annual maintenance cost:
  five percent of initial capital investment ($209,100)

Another important benefit of snow fences can be reduced traffic delays. In Wyoming, mandatory road closures are imposed when warranted by crash blockages or severe weather conditions. Because numerous factors affect road closures, including administrative changes in closure criteria, the relationship between road closure time and fence protection for the I-80 study is not statistically significant with the limited years of data. The effect of the fences on road closure can be inferred, however, from the statistically significant relationship that exists between annual road closure time and ground blizzard crash rate.

The economic benefits of fences on winter maintenance operations include savings in overtime, contract equipment and services, operating costs for rotary plows and loaders, and sand and chemical usage for ice control. Although potential savings for a specific location must be determined from historical accounting records, their magnitude can be illustrated by considering snow removal savings to be proportional to the reduction in the quantity of blowing snow arriving at the road.

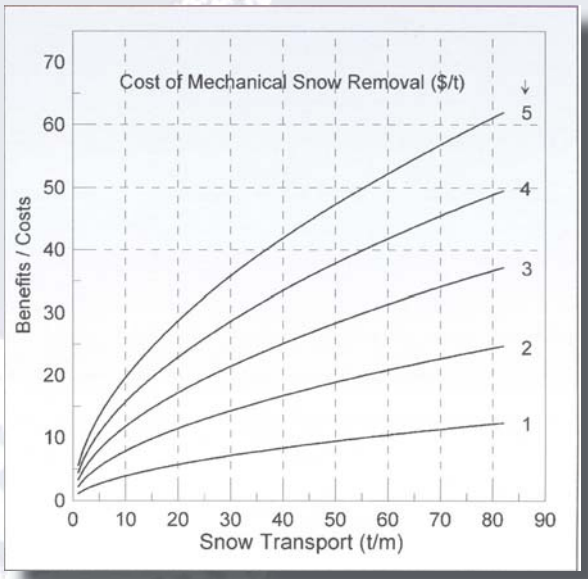

Figure2. Benefit-to-cost ratios for permanent snow fences in relation to seasonal snow transport and costs for mechanical snow removal.

Figure 2 shows how the benefit-to-cost ratio for snow fences varies with the cost of mechanical snow removal, and with the seasonal snow transport—the quantity of blowing snow that is transported by the wind in the first 15 ft above the ground, per unit of width across the wind. The following assumptions were made for this analysis:

- Total cost for snow fence equal to $1.39 per sq ft of fence frontal area
- 35-year amortization
- Seven percent interest rate
- Annual cost of fence maintenance equal to five percent of initial capital investment
- Design capacity equal to the quantity of blowing snow expected over an average winter.

Because costs for easements or right-of-way acquisition vary, these are not included in this analysis. (The nominal cost of a perpetual easement paid by the Wyoming Department of Transportation is $1 per ft of fence length.) Although costs for mechanical removal vary widely, $3 to $5 per ton is typical, and similar to costs for earth excavation and wasting. ***. . .Continued on Page 8***

LTAP 2009 Annual Training Calendar

TRB
Transportation Research Board
88th Annual Meeting
January 11-15, 2009
Washington, D.C.

The TRB Annual Meeting program covers all transportation modes, with more than 3,000 presentations in nearly 600 sessions addressing topics of interest to all attendees—policy makers, administrators, practitioners, researchers, and representatives of government, industry, and academic institutions. The spotlight theme for 2009 is Transportation, Energy, and Climate Change.

For more info:
http://www.trb.org/meeting/2009/default.asp

2009 NACE Conference
April 19-23, 2009
Peoria, Illinois

Each spring over 350 NACE members and other attendees gather for the NACE annual conference. The NACE 2009 Annual Meeting and Management & Technical Conference, "Think Anew, Act Anew" will be hosted by the Illinois Association of County Engineers in Peoria, Illinois from April 19-23, 2009.

For more info:
http://www.countyengineers.org/

For hotel reservations:
http://hotelperemarquette.com.

January 2009

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

13-15: MACO - Loss Control Conference, Helena, MT
14: Steve Jenkins Presents

February 2009

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1	2	3	4	5	6	7
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2: Work Zone Tech: Helena, MT
3-4: Work Zone Supervisor, Helena
5: Train the Trainer, Helena, MT

9-11: MACo MidWinter Conference, Helena, MT

March 2009

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29	30	31				

2: Flagging: Glendive/Missoula
3: Flagging: Kalispell/Miles City
5: Flagging: Great Falls
6: Flagging: Bozeman
30-April 2: MACRS Spring Conference, Great Falls, MT

April 2009

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			1	2	3	4
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26	27	28	29	30		

March 30-April 2: MACRS Spring Conference, Great Falls, MT

May 2009

S	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
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24	25	26	27	28	29	30
31						

4-5: Gravel Roads: Dillon, MT
11-12: Gravel Roads, Lewistown, MT
13-14: Gravel Roads, Hardin, MT
27: MACRS Executive Mtg, Bozeman
28: LTAP Advisory Board Meeting, Bozeman, MT

June 2009

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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

2-4: LTAP Regions 8 & 9: Kansas City

July 2009

S	M	T	W	Th	F	S
			1	2	3	4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

27-30: Nat'l LTAP Conference; Pittsburgh, PA

Training on Request:
Equipment Safety
Personal Preparedness

August 2009

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23	24	25	26	27	28	29
30	31					

Training on Request:
Forklift
Sign Safety
Road Audits

September 2009

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20	21	22	23	24	25	26
27	28	29	30			

2-3: Snow Rodeo - Location: TBA

Training on Request:
Slips, Trips, Falls
Hand Safety

October 2009

S	M	T	W	Th	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

MACRS District Meetings:

7,8,9: 78th League of Cities & Towns:
8: Public Works Directors, Great Falls, MT

MACRS Planning Meeting - TBA

November 2009

S	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Training on Request:
**Winter Maintenance*
**Winter Survival*

26 & 27: Thanksgiving Day Holiday

December 2009

S	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Training on Request
**Winter Travel-Survival*
**Winter Maintenance*
**Leadership*

24 & 25: Christmas Holiday

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

Calendar of Events 2009

MACo's Loss Control Conference **January 13-15, 2009** **Helena, Montana**

Presented by: Montana Association of Counties, Local Technical Assistance Program and Montana Sheriffs and Peace Officers Association

Tentative Agenda:

January 13: MACo Safety Topics

January 14: Road Track

Sign Reflectivity: Steve Jenkins, Montana LTAP
Signing Basics: Steve Jenkins, Montana LTAP
Liability: Jack Knorr, MACo
Road Safety Reviews: Lloyd Rue, FHWA
Monthly Safety Meetings, Hearing, Sight, & Smell: Steve Jenkins, LTAP

January 14: Law Enforcement Track

January 15: Disaster & Emergency Services

Registration will be through MACo. Please contact Karen Houston, 406-444-4375;by e-mailing khouston@mtcounties.org. MACo's website: www.maco.cog.mt.us.
Any other questions, please contact Genevieve Albert, Montana LTAP Conference Coordinator, at 1-800-541-6671. This information will also be available on-line at www.coe.montana.edu/ltap.

LTAP Work Zone Safety Classes - February 2009 - Red Lion Colonial Hotel - Helena, MT

Work Zone Technician	February 2, 2009	Noon - 5pm
Traffic Control Supervisor	February 3 & 4, 2009	Full Day
Train the Trainer	February 5, 2009	Full Day

Pre-registration is required for all courses listed above. Registration information is available on LTAP's website: www.coe.montana.edu/ltap. If you questions, please contact Genevieve Albert, Montana LTAP Conference Coordinator, at 1-800-541-6671.

LTAP Flagging Certification Classes - March 2009

Monday March 2, 2009 **Missoula, MT** Instructor: Steve Jenkins
Location: Ruby's, 4825 N. Reserve

Monday March 2, 2009 **Glendive, MT** Instructor: Bart Kraus
Location: Jordan Inn, 222 N. Kendrick Avenue

Tuesday March 3, 2009 **Kalispell, MT** Instructor: Steve Jenkins
Location: Red Lion, 20 N. Main Street

Tuesday March 3, 2009 **Miles City, MT** Instructor: Bart Kraus
Location: Miles City Community College, 2715 Dixon Street

Thursday March 5, 2009 **Great Falls, MT** Instructor: Steve Jenkins
Location: LaQuinta, 600 River Drive South

Friday March 6, 2009 **Bozeman, MT** Instructor: Steve Jenkins
Location: Comfort Inn, 1370 North 7th Avenue

Pre-registration is required for all courses listed above. Registration information is available on LTAP's website: www.coe.montana.edu/ltap. If you questions, please contact Genevieve Albert, Montana LTAP Conference Coordinator, at 1-800-541-6671.

MACRS 29th Annual Conference, March 31 - April 2, 2009
Best Western Heritage Inn, Great Falls, Montana

Pre-registration is required for this conference. Registration information is available on LTAP's website: www.coe.montana.edu/ltap. Please contact Genevieve Albert, Montana LTAP Conference Coordinator, at 1-800-541-6671, regarding any questions.

Road Scholar Quote:
"Every LTAP training program I have attended has given me some insight or information to help me do the job I do as a blade operator. Whether it was a sign training or a gravel roads training, I've gained something out of all of them."
Allen Rosaaen, Richland County Road Dept

ATSSA Traffic Expo Convention
San Jose, CA
February 1-5, 2009
www.atssa.com

60th Annual Road Builders' Clinic
March 3-5, 2009
Coeur d'Alene, Idaho

This Clinic is a two and a half day continuing education program of technical and managerial topics for engineers and road superintendents who are responsible for design, construction, operation, and maintenance of roads and bridges. Sponsors include Washington State University and University of Idaho

This year's clinic will incorporate sustainability into each topic:
•Cost Effective Design
•Bridges
•Environmental Issues
•Construction Solutions & Innovations
•Local Issues/Asset Management
•Research & Technology

For more information: www.capps.wasu.edu/rbc

Warm-Mix Asphalt Debuts in Yellowstone National Park

Permission was granted to reprint this article from FOCUS April 2008 published by the Federal Highway Administration

A section of the East Entrance Road to Yellowstone National Park in Wyoming was paved in August 2007 using warm-mix asphalt.

The successful deployment of warm-mix asphalt on roadways in Yellowstone National Park in August 2007 provided valuable experience in using this environmentally beneficial technology for the Federal Highway Administration's (FHWA) Federal Lands Highway (FLH) division and representatives from State and local transportation agencies, contractors, the National Park Service, and other organizations. "The project allowed Federal Lands to evaluate the viability of the technology as a standard construction practice for Federal Lands projects," says Brad Neitzke, FLH Materials Engineer at FHWA.

Mix production for warm-mix asphalt can typically be done at temperatures of 10 °C (50 °F) to 37 °C (100 °F) below the standard hot-mix temperatures of 149 °C (300 °F) to 176 °C (350 °F), reducing air emissions and fuel consumption. Another benefit is improved workability of the mix, resulting in easier compaction. FHWA identified warm-mix asphalt as a promising technology based on its 2007 International Scan on Warm-Mix Asphalt, which was cosponsored by the American Association of State Highway and Transportation Officials and the National Cooperative Highway Research Program.

> "This was the first time warm-mix asphalt had been used in Yellowstone, and the process went very well."

FLH laid 28,000 metric tons (30,864 tons) of asphalt on 11.2 km (7 mi) of the East Entrance Road to Yellowstone National Park in Wyoming, starting on August 21, 2007. The asphalt was placed in two equal lifts, for a total pavement depth of 100 mm (4 in). Advera was used as a warm-mix additive for 8,164 metric tons (9,000 tons) of asphalt, while 6,804 metric tons (7,500 tons) used Sasobit as the warm-mix additive. The remaining section was constructed as a control section using traditional hot-mix asphalt. "This was the first time warm-mix asphalt had been used in Yellowstone, and the process went very well," says Neitzke. "Both the contractor and Federal Lands were very pleased with the outcome. We were able to drop the temperature down to 250 degrees Fahrenheit and achieved the proper density with minimum impact."

Benefits included the contractor saving 20 percent in fuel costs at the asphalt plant. While the overall cost of the warm-mix asphalt was a little higher than a conventional mix, contractors may realize more savings with increased plant output. The reduced compaction effort needed can also lower costs.

. . .Continued on Page 9

MACRS President Wayne Waarvik Invites All to Spring Conference

This year's Montana Association of County Road Supervisors' spring conference will focus on time, value, and money. Our keynote speaker, Mark Wilmarth, will provide a great kickoff for this event. Look forward to seeing you March 30 - April 2, 2009, in Great Falls! *(Registration information at http://www.coe.montana.edu/ltap/pages/training.htm - also see Calendar section on Page 7 in this newsletter)*

Snow Fence (cont'd from page 5)

It has long been recognized that proper road design can be effective in preventing snowdrifts. However, this method of drift control cannot be expected to improve visibility and road surface conditions to the extent possible with fences. Although roads should be designed for drift-free conditions to the extent possible, this control method should not be construed as eliminating the need for snow fences. Snow fences are invariably a less expensive and more effective solution to snow drifting problems than reconstruction to change the cross-section of an existing road.

Conclusion

The potential for eliminating drifts, improving visibility, and reducing slush and ice, are compelling reasons for controlling drifting snow. The evidence of how effective fences can be is irrefutable, and it is incumbent on public officials to apply this technology to improve the safety and convenience of the public. As summarized in the previously cited reference, proper application requires attention to engineering detail.

For further information and a detailed 246-page snow fence report, please go to Ron Tabler's website: http://www.tablerassociates.com/

Warm-Mix Asphalt (cont'd from page 8)

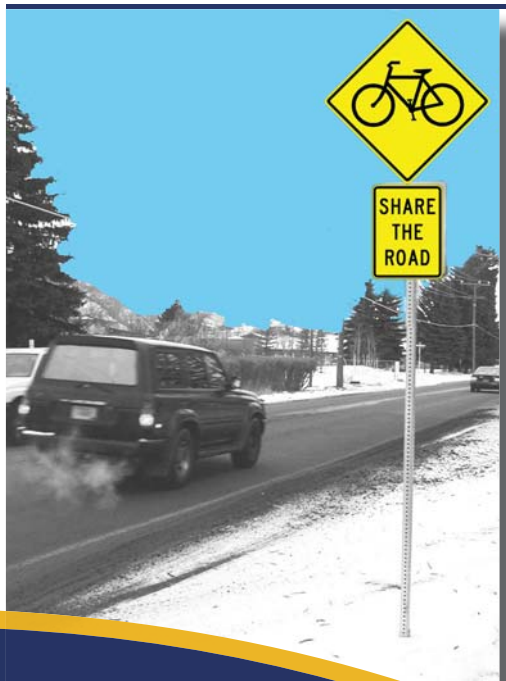
Neitzke notes that the warm-mix asphalt handled similarly to a conventional mix, with workers reporting no handling difficulties. The warm-mix additives did not affect the mix design, and nor was moisture sensitivity an issue. In an important environmental benefit, the paving was accomplished without the warm-mix asphalt generating any smoke.

FLH offered two onsite opportunities to view the project, with nearly 30 representatives from 12 State, local, and Federal agencies and contractors attending. "We wanted people to come out and see the technology," says Neitzke.

FLH is currently monitoring performance data for the project, with more testing to be done on such variables as volumetrics and rutting. The Western Research Institute in Laramie, Wyoming, is also reviewing the project data, while FHWA's Mobile Asphalt Lab staff is evaluating results from a suite of tests performed at the project site. While FLH does not yet have any warm-mix asphalt work planned, it is seeking to use this technology on more projects to help further define the benefits of warm-mix technology.

For more information about the Yellowstone warm-mix asphalt paving project, contact Brad Neitzke at FHWA, 360-619-7725 (email: brad.neitzke@fhwa.dot.gov). To learn more about warm-mix asphalt, visit www.fhwa.dot.gov/pavement/asphalt/wma.cfm. The International Scan report is available online at http://international.fhwa.dot.gov.

Warm-mix asphalt is placed on Yellowstone's East Entrance Road. The asphalt handled similarly to a conventional mix.



A Guide for Reducing Collisions Involving Bicycles

A Guide for Reducing Collisions Involving Bicycles, Vol. 18 of the NCHRP Report 500 Series on Implementation of the AASHTO Strategic Highway Safety Plan has been released. It provides strategies such as improved visibility, signal timing and detection, signing, pavement markings, and geometry at intersections.

Other strategies involve restricting right-turn-on-red movements, designs that can accommodate bicyclists at roundabouts, and the use of an over- and under-passes.

Strategies also are provided on ways to reduce bicycle crashes along roadways and at midblock crossings; methods to reduce motor vehicle speeds; improvements in safety awareness and behavior; the use of bicycle safety equipment; and ways to reduce the effects of hazards.

To obtain a copy of the full report, go to http://onl inepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_500v18.pdf.

Montana LTAP Celebrates 25 Years!

Our name use to be "RTAP" for Rural Technical Assistance Program back in 1982 when Montana State University was one of the first ten university sites selected to house this program. It was developed to answer a pressing need for training and technical assistance at the local level by the Federal Highway Administration.

We became "LTAP," Local Technical Assistance Program, in 1991 as the Intermodal Surface Transportation Efficiency Act (ISTEA) widened the program's scope to include urban areas with populations over 50,000. At this time, the Tribal Technical Assistance Program (TTAP) was also created. Together, these programs help local agencies build, maintain, and operate America's transportation system by delivering targeted training and technical assistance to local and tribal governments.

The LTAP/TTAP network consists of 58 individual centers: one LTAP center in each State and Puerto Rico, and seven regional TTAP centers that serve tribal governments. Our mission: To foster a safe, efficient, and environmentally sound surface transportation system by improving the skills and increasing the knowledge of the local and tribal transportation workforce.

"With a focus on supporting local transportation professionals, LTAP and TTAP centers improve the quality and safety of local and tribal roadways through training, technology transfer, and information exchange," says LTAP/TTAP Program Manager Denise Saunders in the FHWA Office of Professional and Corporate Development (OPCD). "We provide a one-stop shop for local and tribal government needs."

The LTAP/TTAP centers serve more than 38,000 local agencies. Customers include local road agencies, public works agencies, public officials, tribal governments, county and municipal engineers, and State departments of transportation.

In 2006, LTAP and TTAP centers offered nearly 5,000 affordable training sessions, reaching 136,000 participants. (See above inset to see Montana LTAP's workshops taught in 2008.) "The technology transfer program is all about sharing knowledge and best practices," says Donna Shea, director of the Connecticut LTAP center. "An important aspect of our program is the face-to-face, hands-on training that enables participants to learn from our instructors and have the opportunity to share issues and solutions with their peers. For many local agencies, we are the primary source of professional development for their transportation staff."

Over the next decade, the need for training, technology transfer, and implementation of best practices throughout the transportation community will be considerable. "A strong relationship with FHWA, the National Highway Institute (NHI), and other national transportation partners will provide us with the opportunity to better meet these needs," Shea says.

Adds FHWA's Saunders: "Projections are that nearly half the current transportation workforce will be eligible to retire by 2010. It is crucial that we provide technical assistance and training programs that are timely and relevant so that we can build a strong transportation workforce for the future."

Montana LTAP Director Steve Jenkins is proud to be part of this "LTAP family." He reminds the Montana's transportation workforce that Montana LTAP is here to serve them and provide quality training for their specific needs.

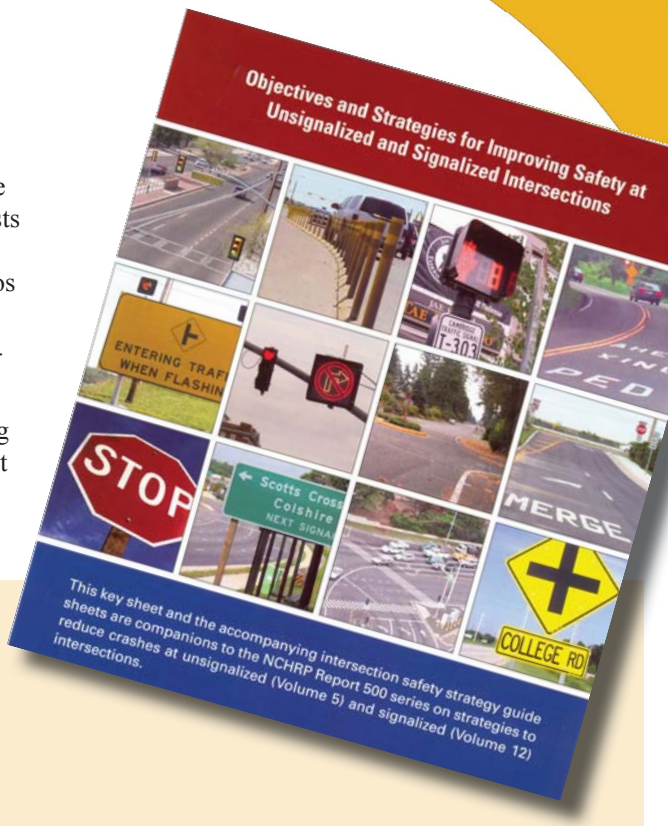
Montana LTAP Library

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. 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: mtltap@coe.montana.edu.

We recently reorganized the library and have the new lists for the library publications, software, DVD's, and videos at our web site: www.coe.montana.edu/ltap.

At this website, you can also keep track of upcoming workshops, past and present newsletters, and "What's New" items that change.



New Publications

p-232 Advanced Surveying and Mapping Technologies: Systems Overview & Applications (FHWA 5/2008) This report presents a study, with resulting conclusions, to investigate emerging surveying and mapping technologies, and their applicability to typical assignments of the Office of Federal lands Highway (FLH) of the FHWA. (42 pages)

p-705 Road Stabilizer Product performance: Buenos Aires National Wildlife Refuge (FHWA 10/2005) The primary objective of this project was to evaluate a number of road stabilizer products for potential use on FLH projects for dust control and surface stabilization. (78 pages)

p-781 Roundabouts: A Safer Choice (FHWA 2008- Brochure) An educational resource on roundabout circular intersections.

p-954 Objectives and Strategies for Improving Safety at Unsignalized and Signalized Intersections (FHWA September 2008) Brochure identifying 77 intersection safety countermeasures described in NCHRP Report 500, volumes 5 & 12, with individual guide sheets sited in brochure. (Notebook style 78 pages)

p-2725 Specification Writers' Guide (FHWA 5//2008) This document contains guidelines to help writers develop specifications for the Federal Highway Administration's Federal Lands Highway program. Topics addressed include specification writing style, organization and format, proper terminology and phrasing, capitalization and abbreviation, and punctuation and grammar rules. (44 pages)

p-3118 2009 National Highway Institute Catalog This is the National Highway Institute's 2009 catalog listing all courses available from them, course title, outcomes, target audience, training level, fee, length, class size.(272 pages)

New DVD's

DVD175 Skid Steer – Pre-Operation Inspecition (Vista Training, Inc. 2001) This DVD covers how to complete an inspection, what to inspect, skid steer capacities, and work situations and other workers. (12 minutes)

DVD176 Skid Steer: Safe Operating Techniques (Vista Training, Inc. 2001) A partner program to DVD175, the safety information covered in this movie includes:

- A small but very dangerous machine. Learn safe operation.
- Blind spot and backing
- Weather (mud/snow)
- Safe hauling (terrain and slopes)
- Ten tips from experienced operators.

(14 minutes)

MONTANA STATE UNIVERSITY
Local Technical Assistance Program

Montana LTAP
Faculty Court Unit 22
PO Box 173910
Bozeman, MT 59717-3910

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Editorial Contributions Welcome

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

Michele Beck
Local Technical Assistance Program
Faculty Court Unit 22
PO Box 173910
Montana State University-Bozeman
Bozeman, MT 59717-3910

(800) 541-6671 or (406) 994-6100
Fax: (406) 994-5333
email: mbeck@coe.montana.edu

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This newsletter is designed to keep you informed about new publications, techniques, and new training opportunities that may be helpful to you and your community.

Present and past issues are available at www.coe.montana.edu/ltap or by calling 1-800-541-6671.

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LTAP attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program or activity. Alternative accessible formats of this document will be provided upon request.

Please send us any comments or concerns you may have regarding this newsletter with your name and address in order that we may respond in a timely manner.