

# LTAP **MATTERS**

Montana's Answers  
To Technical Education  
of Roads & Streets  
Vol. 26, No. 3

Summer 2008



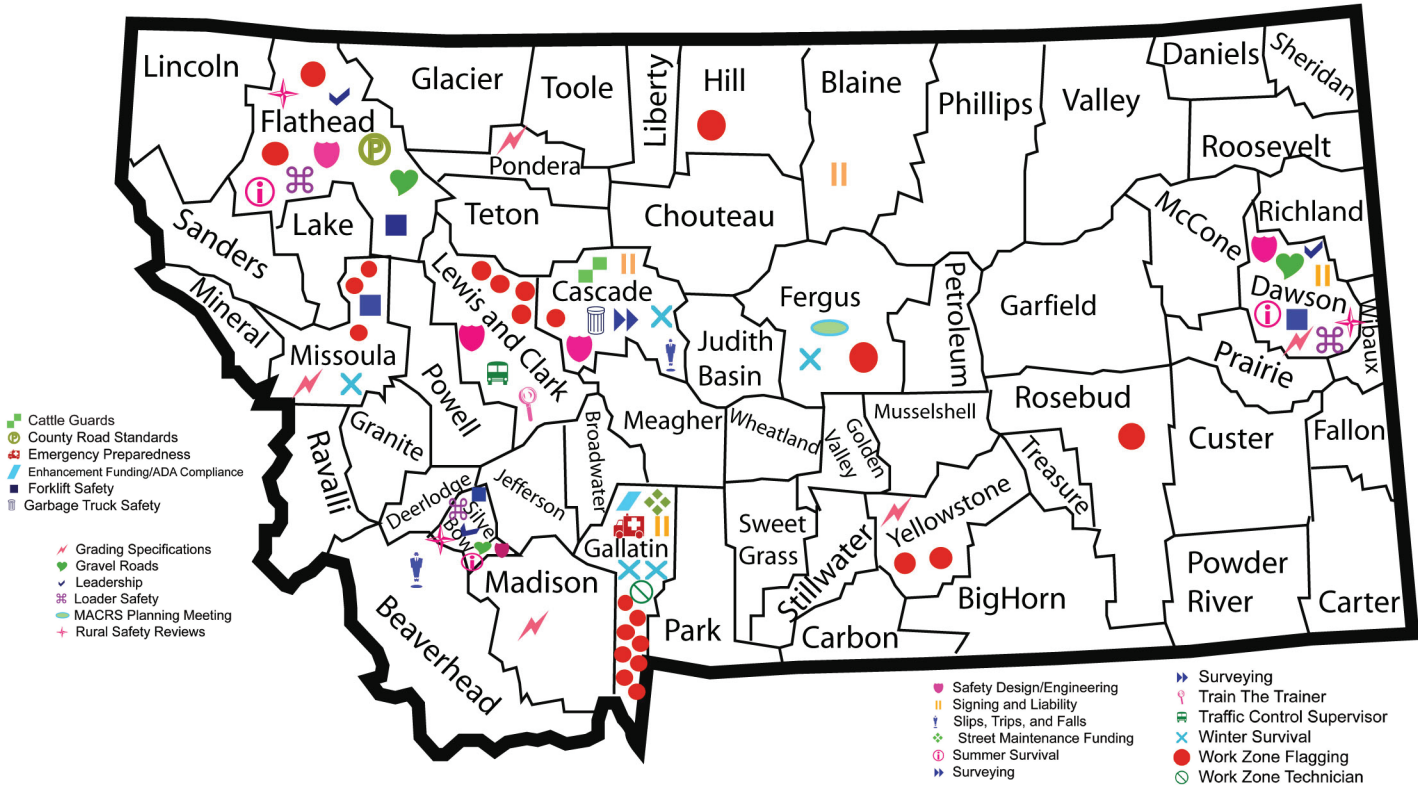
## From the Director

The map below indicates that fifty-six LTAP workshops were taught across the state in 2007. There were twenty-three different topics with a total of 2,864 participants attending these workshops. Each symbol indicates where the workshop took place. Topics included were cattle guard design and maintenance; county road standards; emergency preparedness; forklift safety; gravel roads design and maintenance; safety design and engineering regarding signs, sign posts, and MUTCD regulations; summer and winter survival; surveying; and work zone flagging, work zone technician, and traffic control supervisor courses. We plan training each year with our constituents in order to transfer

new transportation technology. With Montana being 559 miles across and 321 miles north to south, this planning allows city and county road departments to set up their annual calendars to attend the various training venues such as the APWA Snow Rodeo, the League of Cities & Towns conference, MACRS fall district meetings and their annual spring conference. The Spring Workforce Development Weeks also meet these training needs.

As always, safe traveling,

*Steve Jenkins, Director  
Montana LTAP*



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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Front Page Photo:  
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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**



## NACE President Sue Miller Writes MACRS

I would just like to take this opportunity to say hello to the Great State of Montana. Over the past few years, the National Association of County Engineers (NACE) has sought to extend the benefits of NACE membership to the MACRS community. A common and legitimate response was “how does just another membership fee on an already stretched budget benefit my county.” After hearing this response from many of the rural counties in several states, the NACE Board of Directors has taken the message to heart and is responding with a value added approach....what should NACE be doing in these tough times that truly benefits the county road manager.

NACE provides a number of benefits to those of us charged as county road managers from large urban counties to small rural counties like my own Freeborn County, Minnesota. And it doesn't matter what our title is as NACE members are not only engineers, but superintendents, public works directors, supervisors, etc. The mission is the same – providing a safe and efficient transportation system and NACE provides a network of creative solutions for our shared problems.



*Sue Miller, NACE President*

Just one of those solutions to shared problem is the NACE/3M Partnership grant for improving the safety on your roads. NACE is launching an education and companion grant program aiding members in replacing traffic signs to meet new federal retroreflectivity standards recently released by the Federal Highway Administration (FHWA).

Counties will be able to apply for one-time grants to significantly reduce the cost in their effort to improve reflective brightness of traffic signs and meet this important safety standard. To learn more, please visit our web site at [www.countyengineers.org](http://www.countyengineers.org).

Finally, MACRS is a strong state association and like MACRS, our national association can only be as strong as our membership. I invite anyone who is not already a NACE member to join us. We need all of you with your ideas, suggestions, involvement and yes, even the problems to work collectively together for a strong local county system in all states.

I would like to extend a complimentary subscription to NACE News so you can learn more about the benefits of NACE membership. Just contact me at:

[sue.miller@co.freeborn.mn.us](mailto:sue.miller@co.freeborn.mn.us)

If there is ever issues or ideas to share....do not hesitate to contact me by email or by phone at (507) 377-5188.

I sincerely appreciate all you do for your counties.

*Best Wishes,*

*Susan G. Miller, P.E.*

*Freeborn County Engineer and  
NACE President*

## MACRS Past President Retires

To all of my Friends and Associates at MACRS and LTAP,

I would like to take this time to inform you that I have been fortunate enough to reach my goals and will be retiring at the end of June 2008. It is with bittersweet emotions that I leave Butte Silver Bow County after thirty-five years of service.

This was a hard decision. I feel grateful that I had the opportunity to work with everyone at MACRS and LTAP. I am even more honored to have served as President this past year.

I will always remember the folks from the association, the goals we have fostered, and the progress we have achieved. As a retired member, I will continue to be part of the MACRS association and look forward to attending the annual conferences. It would be a privilege to help in anyway that I can. I will continue to support and praise its benefits.

Thank you again, for all of your support.

*Sincerely, Jim McCarthy, Road Foreman*

### 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 Ennis

Fred Hansen  
MACo

Jim Rearden  
City of Great Falls

Russ Albers  
Chouteau 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

## Bring It With You - To The 2008 Snow Rodeo

At the upcoming 19th Annual APWA Equipment Operator Training and Snow Rodeo, held in Great Falls on September 3 and 4, 2008, LTAP is requesting county road departments bring their creative designs that help

make life safer and time savers when working around equipment and safety innovations when working on county roads. The following photos and descriptions are examples of these "Bring It With You" designs.

### Scarifying Blades - Missoula County

**Problem:** There is the need to reshape a gravel road periodically to restore overall shape and drainage. The material is primarily recovered gravel that can be used on the road. When cutting gravel road surfaces, cutting edges wear unevenly.



**Solution:** The bits of these scarifying-blade systems are easily replaced and are made of carbide steel for greater resistance to abrasion. These large picks allow for deep cutting with less wear. They require less horsepower to pull. Scarifying blades perform better where there is embedded shelf rock.



*Continued on Page 5...*

## Bring It With You - Cont'd from Page 4

### Sign Truck - Chouteau County

**Problem:** The importance of signage and sign replacement was brought to the attention of Chouteau County Road Department Supervisor Russ Albers when attending his first Safety Congress sponsored by LTAP. His problem was transferring signs, a generator, miscellaneous sign equipment, and a drill to different trucks when installing or replacing signs in a timely manner.

**Solution:** Assign one truck with all equipment components and thereby have other vehicles available for other jobs. Keeps all sign equipment organized and ready to go at all times.



### Temporary Sign Post - Hill County

**Problem:** When repairing roads Hill County Road Supervisor Jerry Otto knew the importance of temporary traffic control signs to keep his crew members safe and to warn the traveling public of an existing work zone. His problem was the wind blowing the signs down.

**Solution:** Given that repairs take place on gravel roads, Hill County devised a rod on the warning sign that could be driven into the ground thereby keeping the sign upright during the temporary road repair job.



# LTAP 2008 Annual Training Calendar

## Farewell from Jack Knorr

To my friends at MACRS, Montana Association of County Road Supervisors-- what a group!

Our 2008 conference is over and was another resounding success. Thanks to Jimmy and Wayne and their staffs. I want to take this opportunity to tell all of my friends at MACRS and LTAP just how much I appreciated your tribute at the 2008 conference. I was truly humbled to think that this group would recognize my feeble efforts. Thank you!

Since my retirement, I have missed only one thing regarding our business--the friends that I have made at MACRS. In all the years that I was active in my career, I have never been involved with a better group of people. I consider myself lucky to have known you all and I have benefited from your experiences. You are all good friends.

It appears that I will be able to stay involved with the county road departments on a limited basis. MACO and I have agreed to a limited position to visit all of you and help out when needed. I look forward to seeing you in the future. Until then, Tina and I are busy in our greenhouse and enjoying our new freedom. Please feel free to contact us when you like.

To all of our friends at MACRS, I say once again, thank you for all you have given me through the years.

*Keep the wind in your face,  
Jack Knorr  
Retired Sweet Grass  
Public Works Director*

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

## 19th Annual Equipment Operator Training & Snow Rodeo - Great Falls, MT September 3 & 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). Tentative Agenda:

### September 3:

- 7:30 am Sign In
- 8:00 - 9:30 am **Trenching & Shoring Safety** - Steve Jenkins, MT LTAP and Kurt Smith, State of Montana OSHA
- 9:30 am Break
- 10:00 am - Noon **Crane & Rigging Safety** - Tom Jones, Cat Rental
- Noon - 1:00 pm **BBQ Lunch Provided**
- 1:00 pm **"Bring It With You"** - County & City Shop Designed Equipment to Assist Crew Members - Steve Jenkins, Moderator
- 1-5:00 pm **Walk Around Inspection/Hands-on Training**  
Time with T&E Trainers Kevin Sedgewick and Mike Cook

### September 4:

- 7:00 am Sign In
- 8:00 am Opening Ceremony & Orientation
- 8:30 am Rodeo Competition Begins
- Noon Lunch Provided
- 4:00 pm Awards

## 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

### Montana LTAP Workshops:

#### MACRS Fall District Meetings - Proper Sign Practices

<b>September 30, Tuesday</b>	<b>Lewistown</b>
<b>October 1, Wednesday</b>	<b>Have</b>
<b>October 2, Thursday</b>	<b>Glendive</b>
<b>October 7, Wednesday</b>	<b>Bozeman</b>
<b>October 9, Thursday</b>	<b>Polson</b>

To register for any of these classes, contact Genevieve Albert, Montana LTAP Conference Coordinator, at 1-800-541-6671. Information and brochures will be mailed out in August. This information will also be available on-line at [www.coe.montana.edu/ltap](http://www.coe.montana.edu/ltap).

### Tentative Agenda:

- Morning** Sign Retroreflectivity  
Sign Placement  
Warning Signs  
Advisory Speed
- Noon - Lunch Provided**
- Afternoon** Field Operations  
Sign Installation  
Curve Sign  
Use of Ball Bank Indicator

### For those Planning Ahead: 2009 MACRS

#### Annual Conference

March 30 - April 2, 2009  
Heritage Inn  
Great Falls, MT

More information coming this  
fall 2008

### Montana League of Cities & Towns 78th Annual Conference Missoula, MT October 8-10, 2008

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 (406) 532-5300.

Public Works Directors:  
October 8, 2008  
Tentative Agenda

- Storm Drain Panel
- Street Maintenance Funds
- Hot Topics:
  - Reducing Our Carbon Footprint
  - Watershed
  - Water Treatment
  - Water Conservation
  - Clean Streams
- Water Rights
- MDT Agreements:  
Signals, Signing,  
Stormwater, Sidewalks,  
Road Projects

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

# Guidance for Improving Roadway Safety:

## Understanding Minimum Retroreflectivity Standards

Source: Federal Highway Administration website for Minimum Reflectivity: <http://www.minimumreflectivity.org/index.asp>

MUTCD minimums establish a means to improve the nighttime visibility of traffic signs to promote safety, enhance traffic operations and facilitate comfort for drivers of all ages and abilities. (1)

MUTCD standards for sign retroreflectivity or illumination have remained essentially unchanged for 45 years. (2) In the 1980's, the FHWA began nighttime sign visibility research and in 1993 Congress directed the FHWA to revise the MUTCD to include minimum levels. (12) That ruling has produced minimums for critical traffic signs with a table of specific requirements and implementation (see Table 2A-3).

### FHWA Standard

One or more of the following assessment or management methods shall be used to maintain sign retroreflectivity above the minimum levels:

- Visual nighttime inspections
- Measured retroreflectivity
- Expected life
- Blanket replacement
- Control signs

Minimum retroreflectivity standards also apply to Private Roads:

- Effective January 17, 2007, MUTCD regulations apply to "all roads open to public travel."
- Includes toll roads and roads within shopping centers, parking lots, airports, sports arenas, and other similar business and recreation facilities that are privately owned but where the public is allowed to travel without access restrictions.
- Owners or parties responsible for such private roads have two years from the date of the ruling (January 17, 2007) to bring traffic control devices into compliance with the MUTCD and other applicable State Manuals.

Source: (13)

The FHWA-published table of minimum retroreflectivity values establishes standards of compliance. These values are considered minimums. The agency may decide to use higher values based on their own replacement criteria.

• Determines the ratio of retroreflective contrast and sign size ("Conditions"). For example, white-on-red retroreflective signs such as Stop or Do Not Enter signs require a 3:1 (white:red) contrast ratio. When the

Table 2A-3. Minimum Maintained Retroreflectivity Levels<sup>①</sup>

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

① The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/m<sup>2</sup> measured at an observation angle of 0.2° and an entrance angle of -4.0°.

② For text and fine symbol signs measuring at least 1200 mm (48 in) and for all sizes of bold symbol signs

③ For text and fine symbol signs measuring less than 1200 mm (48 in)

④ Minimum Sign Contrast Ratio ≥ 3:1 (white retroreflectivity ÷ red retroreflectivity)

\* This sheeting type should not be used for this application.

Bold Symbol Signs		
<ul style="list-style-type: none"> <li>• W1-1, -2 – Turn and Curve</li> <li>• W1-3, -4 – Reverse Turn and Curve</li> <li>• W1-5 – Winding Road</li> <li>• W1-6, -7 – Large Arrow</li> <li>• W1-8 – Chevron</li> <li>• W1-10 – Intersection in Curve</li> <li>• W1-11 – Hairpin Curve</li> <li>• W1-15 – 270 Degree Loop</li> <li>• W2-1 – Cross Road</li> <li>• W2-2, -3 – Side Road</li> <li>• W2-4, -5 – T and Y Intersection</li> <li>• W2-6 – Circular Intersection</li> <li>• W3-1 – Stop Ahead</li> </ul>	<ul style="list-style-type: none"> <li>• W3-2 – Yield Ahead</li> <li>• W3-3 – Signal Ahead</li> <li>• W4-1 – Merge</li> <li>• W4-2 – Lane Ends</li> <li>• W4-3 – Added Lane</li> <li>• W4-5 – Entering Roadway Merge</li> <li>• W4-6 – Entering Roadway Added Lane</li> <li>• W6-1, -2 – Divided Highway Begins and Ends</li> <li>• W6-3 – Two-Way Traffic</li> <li>• W10-1, -2, -3, -4, -11, -12 – Highway-Railroad Advance Warning</li> </ul>	<ul style="list-style-type: none"> <li>• W11-2 – Pedestrian Crossing</li> <li>• W11-3 – Deer Crossing</li> <li>• W11-4 – Cattle Crossing</li> <li>• W11-5 – Farm Equipment</li> <li>• W11-6 – Snowmobile Crossing</li> <li>• W11-7 – Equestrian Crossing</li> <li>• W11-8 – Fire Station</li> <li>• W11-10 – Truck Crossing</li> <li>• W12-1 – Double Arrow</li> <li>• W16-5p, -6p, -7p – Pointing Arrow Plaques</li> <li>• W20-7a – Flagger</li> <li>• W21-1a – Worker</li> </ul>

Fine Symbol Signs – Symbol signs not listed as Bold Symbol Signs.

Special Cases
<ul style="list-style-type: none"> <li>• W3-1 – Stop Ahead: Red retroreflectivity ≥ 7</li> <li>• W3-2 – Yield Ahead: Red retroreflectivity ≥ 7; White retroreflectivity ≥ 35</li> <li>• W3-3 – Signal Ahead: Red retroreflectivity ≥ 7; Green retroreflectivity ≥ 7</li> <li>• W3-5 – Speed Reduction: White retroreflectivity ≥ 50</li> <li>• For non-diamond shaped signs such W14-3 (No Passing Zone), W4-4p (Cross Traffic Does Not Stop), or W13-1, -2, -3, -5 (Speed Advisory Plaques), use largest sign dimension to determine proper minimum retroreflectivity level.</li> </ul>

contrast ratio is lower, the sign should be replaced.

- Indicates with an "\*" where ASTM I (engineer grade) should not be used such as black on orange/yellow signs. Sheeting material for white-on-red signs should not fall below an RA (coefficient of retroreflection) of 35 measured in candelas per lux per meter squared. (For more information on these calculations, see the "Retroreflective Science" tab at website listed above)
- Provides some exclusions for signs such as Parking, Walking, Adopt-A-Highway, Bikeway, etc.

1 Morse, K., Proposed minimum requirements for maintaining traffic sign retroreflectivity, Illinois Interchange, Fall/Winter 2004

2 Night Lights...lighting the way (Answering Your Questions about Traffic Sign Retroreflectivity), U.S. Department of Transportation, Federal Highway Administration

12 Texas Transportation Researcher, TTI, Vol 48, No. 1, 2004

13. Notice of proposed amendment: maintaining traffic sign retroreflectivity; FHWA Office of Safety Retroreflectivity Team PowerPoint



## Guidance (Cont'd from page 8)

### Sign system should be assessed and managed:

Traffic signs are an essential transportation asset. MUTCD Section 2A.09 provides assessment or management methods to “maintain sign retroreflectivity above the minimum levels identified in FHWA’s ‘Maintaining Traffic Sign Retroreflectivity.’” While not required by the final rule, an inventory system would be helpful and should be considered in the assessment of your signage. Assessment and management methods include:

- Assessment Methods (to determine inventory quality)
- Visual assessment...using nighttime visual inspections (22)
- Measured retroreflectivity...using a retroreflectometer
- Management Methods (to execute change-outs)
- Expected sign life...tracking the age of signs and alert replacements
- Blanket replacement...based on previous deterioration experience or manufacturer’s warranty periods
- Control signs...using samples to represent different sign types for alerts to change-outs by type

### Sign system retroreflectivity should be maintained:

MUTCD Section 2A.22 stipulates that “All traffic signs should be properly positioned, clean, and legible, and should have retroreflectivity levels as indicated in Section 2A.09.”

### Best practices include:

- Maintenance records... to maximize life cycle at retroreflective minimums
- Sign inventory... that locates, identifies and monitors each sign
- Incident report... to collect contemporary information and respond effectively

### Assess current processes:

An agency’s initial step is to determine how to improve processes by reviewing and integrating and considering the following best practices (23):

- Develop a comprehensive sign inventory
- Acquire sign management system software
- Alter sign fabrication practices
- Add codes to each sign (for example, date stamping)

- Change the process for procuring materials
- Contract some or all of the sign field work
- Link to other asset management practices

### A comprehensive implementation system of best practices is needed (24):

In choosing an inventory system, an agency should consider factors including:

- Agency requirements
- Computer capabilities
- Availability of trained staff to support the system and keep it current
- Improving accuracy and production using laptop computers for field operations

To develop the system one should include input from management, office staff, work crew supervisors, sign workers and other affected offices.

### Sign Compliance May Reduce Potential Liability Exposure

Conformance with MUTCD standards provides a better position to defend against litigation.(22)

The cost of each traffic fatality is currently more than \$1.1 million and each disabling injury exceeds \$50,000 (per individual, not per crash).(36) In increasing numbers, citizens are suing public agencies over road deficiencies that can include traffic signs and markings or failure to comply with the MUTCD.(37)

- Claims have grown at a rate of 16% per year since 1972(38)
- State and local agencies are experiencing dramatic increases in tort litigation involving claims of personal injury and property damage(39)

The FHWA notice of proposed amendments states “Public agencies and officials that implement and follow a reasonable method in conformance with the national MUTCD would appear to be in a better position to successfully defend against tort litigation involving improper sign retroreflectivity than jurisdictions that lack any method.”(22)

Higher costs for maintenance generally produce a lower percentage of non-compliant signs.(14)

Research offers several conclusions relative to sign management and maintenance.(14)

- Visual inspection is one cost-effective sign maintenance strategy.
- Regular daytime sign inspections can reduce the number of damaged signs between nighttime inspections.
- Sign crews need training to bring their visual assessments in line with the new FHWA standard.
- With training, a 10% increase in sign costs could reduce non-compliant signs from 19% to less than 10%.
- NCDOT costs analyses in 2006 determined an average maintenance cost of \$3.78 per sign to yield 91% compliance (9% non-compliant).

14 Harris, E.A., *Road sign deterioration and management, 2006 NCDOT Traffic Engineering Conference for Operations and Safety*

22 FHWA, DOT, *Supplemental notice of proposed amendments (SNPA); request for comments, Federal Register: May 8, 2006 (Volume 71, number 88)*

23 [http://safety.fhwa.dot.gov/roadway\\_dept/retro/sign/imp-improve.htm](http://safety.fhwa.dot.gov/roadway_dept/retro/sign/imp-improve.htm)

24 *Inventory systems for traffic control devices (2001) found on <http://www.ctre.iastate.edu/PUBS/itcd/inventory.pdf>*

36 *Estimating the costs of unintentional injuries, 2005, National Safety Council at <http://www.nsc.org/lrs/stat-info/estcost.htm>*

37 [http://personalweb.smcvt.edu/vermontlocalroads/FactSheet%20files/reducing\\_the\\_risks\\_of\\_tort\\_liabi.htm](http://personalweb.smcvt.edu/vermontlocalroads/FactSheet%20files/reducing_the_risks_of_tort_liabi.htm)

38 Turner, D.S. et al, *Effects of tort liability on roadway design decisions, TRB Issue 1512*

39 Smith, J.L, et al, *Transportation tort law, TRB, TR News, issue 205*

*Federal Register, January 2, 2008: <http://a257.g.akamai.net/7/257/2422/01jan20081800/edocket.access.gpo.gov/2008/pdf/E7-24863.pdf>*

**“Conformance with MUTCD standards provides a better position to defend against litigation.”**

**The cost of each traffic fatality is currently more than \$1.1 million and each disabling injury exceeds \$50,000 (per individual, not per crash).”**

# ANSI/ISEA 107-2004 MADE EASY: A Quick Reference to High-Visibility Safety Apparel

*Material Reprinted With Permission From 3M*

Until the release of the 2003 edition, the MUTCD provided only general guidelines for worker visibility in work zones, requiring that flaggers wear garments visible from 1,000 feet away. Historically, MUTCD focused on visibility from the driver's perspective: the use of traffic cones, barrels, and signs to provide motorists with visual cues and clear channels of traffic. In the 2003 edition, the writers specify requirements for use of high visibility apparel compliant with ANSI/ISEA 107 by both flaggers and other roadway workers, and in doing so, place the focus on visibility from the worker's as well as the driver's perspective.

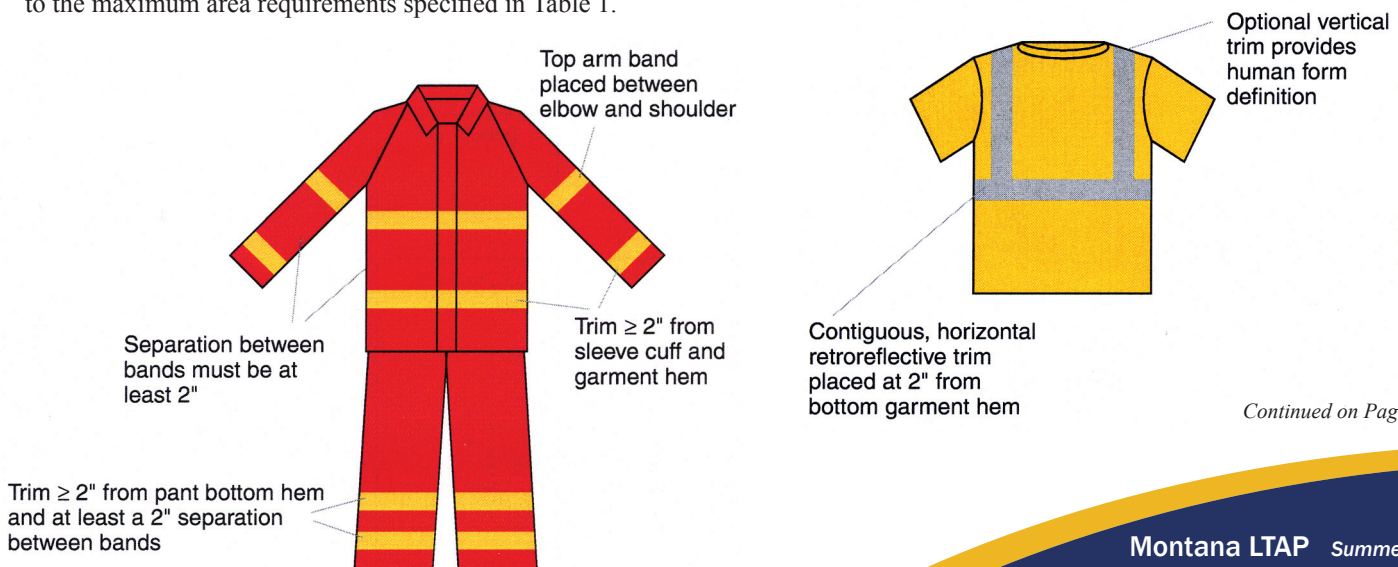
Table 1. Minimum Areas of Visible Material					
ANSI/ISEA 107-2004					
	Performance Class 3	Performance Class 2	Performance Class 1	Performance Class E	Headwear
Background material	1240 in <sup>2</sup> (0.80 m <sup>2</sup> )	775 in <sup>2</sup> (0.50 m <sup>2</sup> )	217 in <sup>2</sup> (0.14 m <sup>2</sup> )	465 in <sup>2</sup> (0.30 m <sup>2</sup> )	78 in <sup>2</sup> (0.05 m <sup>2</sup> )
Retroreflective or combined-performance material used in conjunction with background material	310 in <sup>2</sup> (0.20 m <sup>2</sup> )	201 in <sup>2</sup> (0.13 m <sup>2</sup> )	155 in <sup>2</sup> (0.10 m <sup>2</sup> )	108 in <sup>2</sup> (0.07 m <sup>2</sup> )	10 in <sup>2</sup> (0.0065 m <sup>2</sup> ) Level 2
Combined-performance material used without background material	NA	NA	310 in <sup>2</sup> (0.20 m <sup>2</sup> )	NA	78 in <sup>2</sup> (0.05 m <sup>2</sup> ) Level 2 or 1
Minimum width of retroreflective material	2 in. (50mm)	1.375 in. (35mm)	1 in. (25mm) or 2 in. (50mm) combined-performance material (without background material)	2 in. (50mm)	
Minimum number of yards per retroreflective material width	4.3 yds. of 2 in. (50mm) width	4 yds. of 1.375 in. (35mm) width  2.8 yds. of 2 in. (50mm) width	4.3 yds. of 1 in. (25mm) width  3.1 yds. of 1.372 in. (35mm) width  2.15 yds. of 2 in. (50mm) width	1.5 yds of 2 in. (50mm) wide	
Photometric performance	Level 2 (Table 5) or Level 1 (Table 6)	Level 2 (Table 5) or Level 1 (Table 6)	Level 2 (Table 5) or Level 1 (Table 6)	Level 2 (Table 5) or Level 1 (Table 6)	Level 2 (Table 5) or Level 1 (Table 6)

*Note: Consult the ANSI/ISEA 107-2004 Standard for Tables 5 and 6.*

## Retroreflective Material Placement

Class 1 and 2 garments, such as vests and T-shirts, and Class 3 garment designs, such as vest with pant (Class E) ensembles, coveralls, outerwear and rainwear should achieve the following:

- Use of retroreflective band widths appropriate for the garment class. (Refer to Table 1.)
- 360° visibility with at least one retroreflective band encircling the torso.
- Appropriate separation distances of vertical and horizontal bands placed on the torso, sleeves and trouser areas.
- Appropriate horizontal gaps in retroreflective band placement and garment design.
- In addition to trim, retroreflective patterns, such as logos, design icons, or identification text may contribute to the maximum area requirements specified in Table 1.



*Continued on Page 11...*

# 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 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 website: [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.

## New Publications

**p-86 Bridge Evaluation: Quality Assurance in Europe (FHWA March 2008)** (43 pages)

**p-284 Clay Seam Mapping With Electromagnetic Induction (FHWA Nov 2005)** (94 pages)

**p-307 Long Term Pavement Performance Computed Parameter: Moisture Content (FHWA March 2008)** (95 pages)

**p-447 Drilled Shaft Foundation Defects: Identification, Imaging, and Characterization (FHWA October 2005)** (124 pages)

## Ladder Safety

The front page photo of this newsletter reminds us of ladder safety and here's a few items to remember:

1. Proper ladder for job: Make sure your waist is not higher than the top rung. Do not stand on the top two rungs.
2. Those bottom rails should have slip-resistant pads when working on hard surfaces.
3. Do a "walk around" your ladder--check for cracks and damage; rungs free of mud, oil, debris.
4. Think before you climb -- are your boots or shoes appropriate for good footing when you climb up the ladder?
5. Common sense says put your foot firmly on each rung, no need to race up a ladder. Face the ladder going up or down.

6. Carry any tools on a belt or raise them with a rope. Keep those hands for the "three-point contact" as you climb up the ladder--one hand + two feet or two hands + one foot.

7. When using an extension ladder, make sure both siderails are contacting the building or surface.

8. Use the 4 to 1 Rule: The base of the ladder should be one foot out for every four feet you go up. The ladder should be three feet above point of contact when accessing a roof.

9. Keep objects away from base of ladder to keep a clean work area.

10. When moving ladder, watch above for any electrical lines.

For more information: <http://www.osha.gov/SLTC/etools/construction/falls/4ladders.html>

## ANSI/ISEA 107-2004 (Cont'd from Page 10)

### Care Labeling, General Marking and Instructions for Use

Once all materials have been tested against performance requirements and certificates of compliance from a third party testing laboratory have been issued, apparel manufacturers then assemble garments according to the design guidelines in Section 6 of the standard for the appropriate class of garment. Only after all the materials' performance and design requirements have been met, can a garment be labeled ANSI/ISEA 107-2004 compliant. Garment labeling, general marking and instructions for use are described in Sections 10 to 12 of the standard.

Specific Marking - Marking includes the following information:

- Name, trademark, or other means of identifying the manufacturer or authorized representative.
- Designation of the product type, commercial name or code.
- Size designation.
- Number of this specific ANSI/ISEA standard (ANSI/ISEA 107-2004).
- Pictogram showing the garment Class and Level of performance for the retroreflective material.
- Care labeling with FTC symbols and maximum cycles for the cleaning process.
- Instructions for use (if applicable).

XYZ Manufacturer  
ANSI/ISEA 107-2004  
100% Polyester  
Reflective Material  
Model #: abc  
Size: Large



Class 2  
Level 2

Washing Instructions



Wash warm - max 25 x  
Do not bleach  
Tumble dry low  
Do not iron  
Do not dry-clean

To read the entire Federal Register rule, go to: [http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2006\\_register&docid=E6-19910.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2006_register&docid=E6-19910.pdf)



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## Editorial Contributions Welcome

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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The Local Technical Assistance Program Newsletter, *LTAP MATTERS*, is published quarterly. Funding for this program is provided by the Federal Highway Administration through the Montana Department of Transportation, Montana State University and a portion of Montana's gas tax revenues.

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.

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Approximately 1200 copies of this public document were published at an estimated cost of \$1.37 per copy for a total cost of \$2,100 which includes \$1,700 for printing and \$400 for distribution.

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