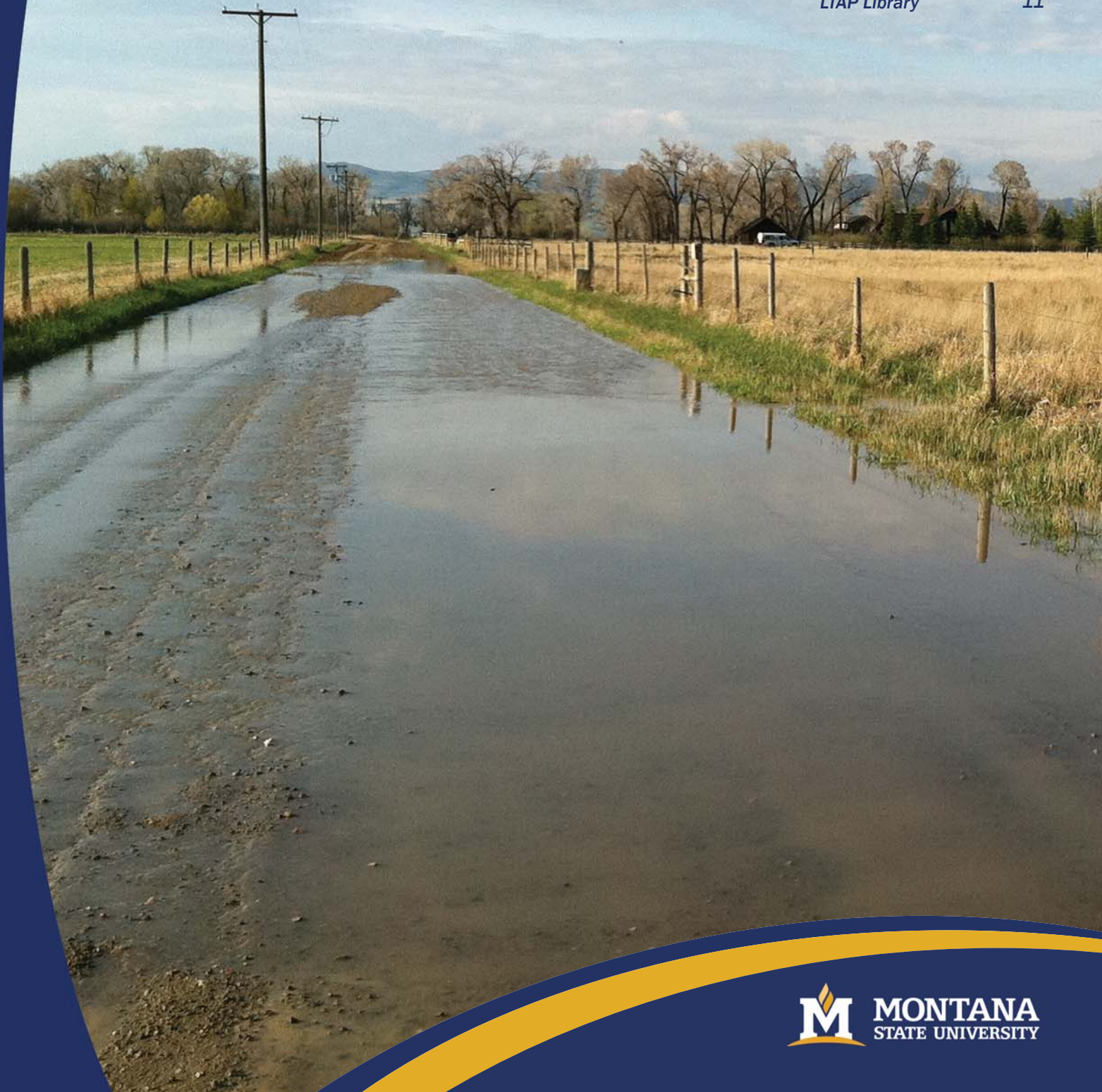


LTAP MATTERS

Montana's Answers To Technical Education of Roads & Streets
Vol. 28, No. 3

Summer 2011

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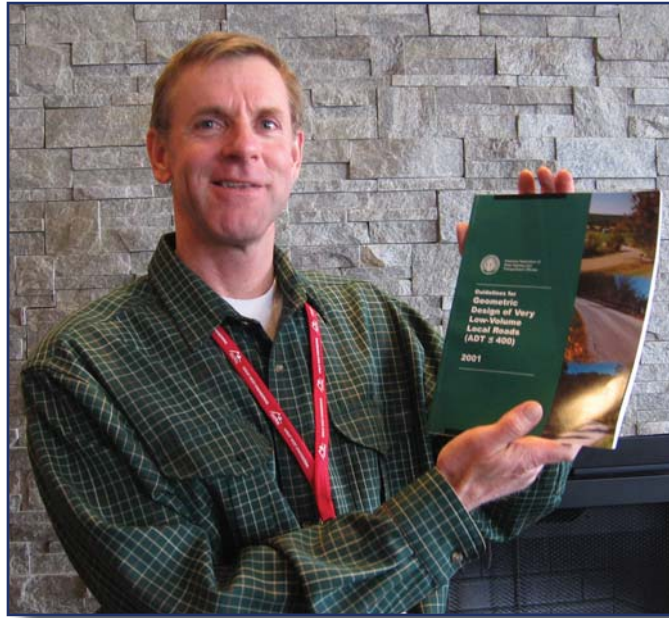
From the Director

With the heavy winter snows, everyone is now dealing with flooding. While at MACRS 31st Conference, county road supervisors on Montana's Highline said this was one of the toughest winters they ever had with snow accumulations and drifting. Several mentioned LTAP's winter maintenance training and winter survival courses were extremely helpful.

While presenting at the MACRS conference on design of low volume roads, I referenced the smaller "Green Book," *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)*. It is a valuable tool for those constructing and redesigning low volume roads.

In early April, I also spoke on Winter Maintenance issues at the Rocky Mountain Region 2011 Tribal/BIA Transportation Symposium in Bozeman, Montana.

The April Gravel Roads day-and-a-half courses I taught in Butte, Lewistown, and Miles City were well attended this spring. With more clients attaining their Roads Scholar Level 1 status, I was grateful to those scholars who assisted in these informative classes. Topics covered were gravel road design, drainage issues, materials, dust control, cattleguards, environmental concerns near wetlands, Dynamic Cone Penetrometer, and motor grader operation.



Montana LTAP Director Steve Jenkins with his teaching reference, *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)*, for his AASHTO Low Volume Roads Presentation.

Our thanks to ARTBA trainer, Jerry Teeler, who provided a free OSHA Ten-Hour course in Billings with Montana LTAP as host. The twenty-five attendees received training on OSHA, work zones, PPE, collisions, night work, equipment and electrical safety. We are looking forward to hosting a similar safety session next year in Great Falls. It is partnerships like these that further our main focus on safety for all.

We provided flagging certification courses again in May with over 250 students being trained with

new MUTCD work zone flagging requirements. Training was held at Havre, Great Falls, Lewistown, Billings, Lame Deer, and Bozeman. Due to the volume of calls requesting certification, these job opportunities to become a certified flagger are one way Montana LTAP adds to the workforce training and highway safety.

Please check out our calendar for classes and upcoming events in this newsletter and at our website: <http://www.westerntransportationinstitute.org/centers/ltap/Training>.

*Travel safe this summer,
Steve Jenkins, Director*

LTAP Matters is published by the Local Technical Assistance Program. LTAP is located at Western Transportation Institute College of Engineering Montana State University Bozeman, Montana.

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Our website lists upcoming training courses, registration forms, library information, our contact information, newsletters, various links, and MACRS information. Please go to: <http://www.westerntransportationinstitute.org/centers/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.



MACRS 31st Annual Conference

By Michele Beck, Montana LTAP

In March nearly 300 participants and vendors attended the MACRS 31st Annual Conference held in Great Falls, Montana.

“The support and turnout from our vendors was outstanding,” said MACRS President Wayne Buck, Rosebud County. “This conference offers vendors an opportunity to talk with participants from each of the 56 counties without traveling the entire state. It’s a definite win-win situation for everyone.”

The conference’s theme, “Stimulating Growth and Development of County Roads Through Positive Attitudes,” was indicative of the wide variety of presentations available for attendees.



Terry Fleck, The Attitude Doctor, answering participant question

The pre-conference speaker, Terry Fleck, The Attitude Doctor, reviewed the importance of having a positive attitude on the job, how to deal with employees with bad attitudes, and focusing on the values of attitudes.

As one of the keynote speakers also during general session, Fleck entertained the audience with his high-energy personality while outlining key aspects of maintaining a positive attitude.

USAF Brig Gen (SEL) Anthony Cotton, Commander of 341st Missile Wing, provided an enlightening presentation on missiles and missile roads to start out the first day of presentations.



USAF Brig Gen (SEL) Anthony Cotton, Commander of 341st Missile Wing

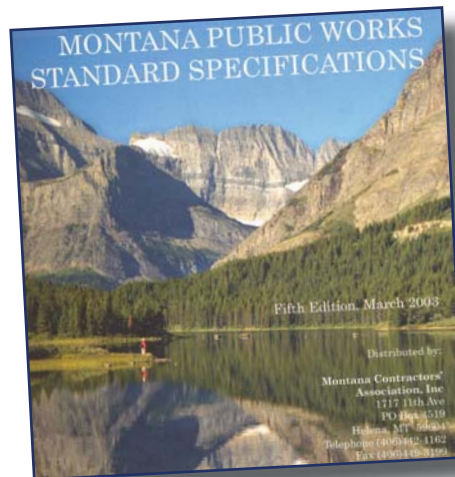
Dr. Jill Hough, North Dakota State University, dealt with Ethics: what they are, what they look like, and how they are important in transportation. She noted that at the end of any given day to ask these questions:

- Did I do more good than harm today?
- Did I treat people with dignity and respect today?
- Was I fair and just today?
- Was my community better because I was in it?
- Was I better because I was in my community?



Dr. Jill Hough

The afternoon sessions covered large truck engines and hybrid equipment. During the split session, participants had the choice of attending asphalt topics on crack sealing, patching, and chip seals; or finishing out their afternoon learning about the Montana Public Works Standard Specifications manual, low volume road design, and average daily traffic counts.



One Montana Public Works Standard Specifications manual (valued at \$65) was given to each Montana county thanks to efforts by Eric Griffin, Lewis and Clark County, MACRS Executive Board, and Montana Contractors Association.

“It’s important that county road departments have the latest reference manuals to assist them in decision making,” noted Griffin. “This is a valuable tool they and their county commissioners will be able to use within the scope of construction.”

The second day started with Steve Monlux, Gravel Roads Consultant, and Russ Huotari, Richland County Public Works Director, reviewing alternate surfaces for gravel roads carrying heavy loads.

Continued on Page 4 . . .

ADVISORY COMMITTEE MEMBERS

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

Russ Albers
Chouteau County

Kris Christensen
Montana Dept of
Transportation

Kelly Elser
Town of Ennis

Alec Hansen
Montana League of
Cities & Towns

Jim Rearden
City of Great Falls

Debbie Arkell
City of Bozeman

Thomas Danenhower
MMIA

Eric Griffin
Lewis and Clark County

Fred Hansen
MACo

Bob Seliskar
Federal Highway
Administration

Dave Hand
Montana Dept of
Transportation

Russ Huotari
Richland County

MACRS 31st Annual Conference (cont'd from Page 3)

With the oil boom back in full swing in eastern Montana, Huotari tried various surfacing methods on county roads to determine the most effective combination. These roads were not originally designed for extreme weight loads. Dust issues were another major concern. The next presentation covered Geo-Tech options for gravel roads.



Clay & Chloride Additives to Improve Surfacing Performance

The afternoon presentations included driver behavior and safety issues such as steps to reduce crashes:

1. Site Identification
2. Determine Crash Experience
3. Conduct a Field Visit
4. Identify Contributing Factors
5. Identify Appropriate Countermeasures
6. Assess and Select Countermeasures

The last session of the day focused on avoiding supervisor liability with Michele Puiggari, an attorney who works with MACo on various training issues. Puiggari outlined how to set goals in learning to identify personnel issues, how to apply that knowledge, and understand and act on supervisor responsibilities. In closing, she emphasized it is the supervisor's responsibility when retaliation is suspected:

- Report to Human Resources
- Intervene to prevent others from retaliating
- Document file carefully with the business-related reasons as to why you requested employee to do something or you denied employee something
- Supervise the actions of coworkers

At the evening banquet, President Buck was assisted by his fellow officers and district representatives in distributing gifts from various counties to lucky patrons who had their names drawn from a basket. Roads Scholar Awards were presented by Montana LTAP Director Steve Jenkins. Ringling 5, musical entertainment, closed the evening activities.



Ovila Byrd, Flathead County, and Jerry Backlund, Custer County

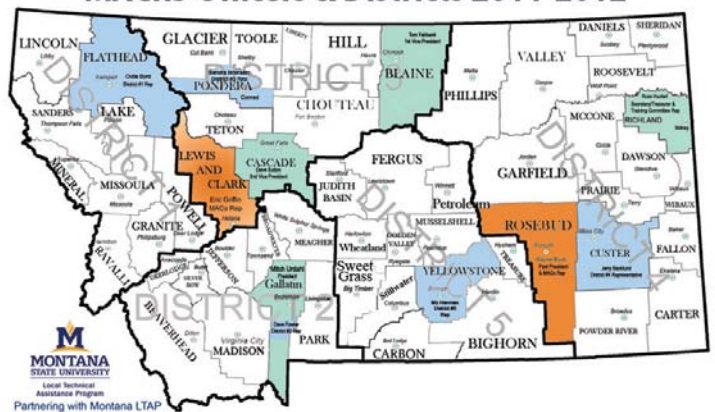
President-Elect Mitch Urdahl urged all officers and district representatives at the Thursday morning business meeting to keep in contact with county supervisors and employees within their districts. Urdahl said it is important informing everyone with upcoming issues and training. He noted that next year's conference will be at the Heritage Inn again in Great Falls, March 26 - 29, 2012. Urdahl looks forward to another great year for MACRS. ❖

MACRS Officers & District Representatives 2011-2012

President: Mitch Urdahl, Gallatin County: 582-3250
 1st Vice President: Tom Fairbank, Blaine County: 433-2407
 2nd Vice President: Dave Sutton, Cascade County: 454-6912
 Sec/Treasurer: Russ Huotari, Richland County: 433-2407
 District #1: Ovila Byrd, Flathead County: 253-8688
 District #2: Dave Fowler, Gallatin County: 582-3250
 District #3: Sandra Broesder, Pondera County: 275-3156
 District #4: Jerry Backlund, Custer County: 232-1970
 District #5: Mo Henman, Yellowstone County: 256-6812
 MACo Reps: Eric Griffin, Lewis & Clark County: 447-1636
 Wayne Buck, Rosebud County: 346-2261



MACRS Officers & Districts 2011-2012



Carol T. Place, "The Trolley Lady," took the MACRS Guests on a delightful tour to the Hutterite Colony and First Peoples Buffalo Jump. The second day the gals enjoyed making candy and tempering chocolate and tasting tea, topped off with antiquing in downtown Great Falls. Thanks to Great West Engineering for sponsoring this event!

Carol T. Place, The Trolley Lady



2011 Montana Roads Scholars



(22 of the 29 Roads Scholars who attended Spring MACRS 2011)

- | | | |
|------------------------------------------------|---------------------------------------------------|----------------------------------------------------|
| 1. Dave Amunrud, <i>Park County</i> | 11. Dustin Hirschy, <i>Beaverhead County</i> | 21. Tim Paulson, <i>Yellowstone County</i> |
| 2. Sandra Broesder, <i>Pondera County</i> | 12. Cynthia Johnson, <i>Pondera County</i> | 22. Rick Reed, <i>Sweet Grass County</i> |
| 3. Ovila Byrd, <i>Flathead Lake County</i> | 13. Johnny Kinkelaar, <i>Fergus County</i> | 23. Russ Sigman, <i>Beaverhead County</i> |
| 4. Joe Christiaens, <i>Pondera County</i> | 14. Shawn LaDue, <i>Missoula County</i> | 24. Gary Stewart, <i>Madison County</i> |
| 5. Hue Croy, <i>Madison County</i> | 15. Dave Lassle, <i>Prairie County</i> | 25. Edward Tinker, <i>Lewis & Clark County</i> |
| 6. Jay Dixon, <i>Park County</i> | 16. R.J. Lowder, <i>Madison County</i> | 26. Greg Turley, <i>Musselshell County</i> |
| 7. Mark Ebert, <i>Lewis & Clark County</i> | 17. Roger Mallery, <i>Sanders County</i> | 27. Jody Woods, <i>Fergus County</i> |
| 8. Skip Ehret, <i>Park County</i> | 18. Jason Mann, <i>Madison County</i> | 28. John Young, <i>Park County</i> |
| 9. Curtis Gehrke, <i>Missoula County</i> | 19. Lonnie Moyer, <i>Lewis & Clark County</i> | 29. Tod Zellmer, <i>Lewis & Clark County</i> |
| 10. Dan Hackman, <i>Park County</i> | 20. Keith Osborne, <i>Richland County</i> | |

"The Roads Scholar Program, started back in 2001, has continued to gain recognition as a viable method of honoring those employees attending safety training and advancing themselves in their careers," said Steve Jenkins, Montana LTAP Director. "They are the counties' most valuable asset and this training provides the largest payback of money invested." Twenty-nine were honored at the MACRS banquet with certificates and Roads Scholar jackets.

Pondera County highlighted the awards with all three county commissioners receiving Roads Scholar Level I. To further the program's initial goal, many of those attaining a Roads Scholar status assist Jenkins at workshops sharing their knowledge with others. To learn more about Montana LTAP's Roads Scholar Program, go to: <http://www.westerntransportationinstitute.org/centers/ltap/Resources/RoadsScholar>. ❖

Montana Bicycle/Pedestrian Safety

"Be smart, be visible, and watch for road hazards" emphasizes MDT's bicycle/ped safety website. <http://www.mdt.mt.gov/travinfo/bikeped/bikesafety.shtml>. MDT has "Bikes on Roadway" signs available for any individual or group organizing an event to reserve and check out from the following MDT employees:

- John Maricelli, Missoula - 523.5836
- Elizabeth Hedstrom, Kalispell - 751.2015

- Randy Roth, Billings - 657.0217
- Kam Wrigg or Pat Kenney, Butte - 494.9600 or 494.9603
- Dave Hand, Great Falls - 454.5889
- Ray Stocks, Bozeman - 556.4704
- Mike Patch, Miles City - 233.3623
- Randy Boysun, Wolf Point - 653.6704
- Mike MacDonald, Havre - 262.5504
- Doug Lutke, Lewistown - 538.1301
- Helen Osterman, Glendive - 345.8225
- Mark Keeffe, Helena - 444.9273 ❖

Calendar of Events • January 2011 - June 2011

January 2011

S	M	T	W	Th	F	S
						1
2	3	4	5	6	7	8
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23	24	25	26	27	28	29
30	31					

4, 5, 6: **Signing Basics & 2009 MUTCD (MT LTAP):**

4: Bozeman 5: Lewistown 6: Billings

9-13: Transportation Research Board, Washington, DC

11-13: **Loss Control Conference (LTAP Safety Congress) MACo;**

12: **MT LTAP Steve Jenkins**

17: Martin Luther King Day - Offices Closed

25: MT LTAP Safety Webinar - Every Day Counts: 7:30am-8:00am

MACo Loss Control Conference:

January 11-13 - Red Lion Colonel Inn, Helena, MT

January 12, Wednesday - Steve Jenkins Presents

Preregistration Required - www.maco.cog.mt.us

February 2011

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1: **Asphalt Institute, Colonial Inn, Helena (MT LTAP)**

7: **Work Zone Tech, Wingate, Helena, MT (MT LTAP)**

8&9: **Traffic Control Supervisor Two-Day Course, Helena (MT LTAP)**

21: President's Day - Offices Closed

22: **Flagging Certification Course - Bozeman (MT LTAP)**

23: **Flagging Certification Course - Lewistown (MT LTAP)**

24: **Flagging Certification Course - Billings (MT LTAP)**

Traffic Control Supervisor Two-Day Course

February 8 & 9 - Tuesday & Wednesday - Helena - Wingate

Pre-registration Required - Montana LTAP - 1-800-541-6671

www.westerntransportationinstitute.org/centers/ltap/

March 2011

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8: **Flagging Certification Course - Helena (MT LTAP)**

9: **Flagging Certification Course - Missoula (MT LTAP)**

10: **Flagging Certification Course - Kalispell (MT LTAP)**

14: **Flagging Certification Course - Miles City (MT LTAP)**

15: **Flagging Certification Course - Glendive (MT LTAP)**

16: **Flagging Certification Course - Wolf Point (MT LTAP)**

17: **Flagging Certification Course - Plentywood (MT LTAP)**

14-18: MSU Spring Break

28-31: **MACRS 31st Annual Conference**

Heritage Inn, Great Falls, MT (MT LTAP)

April 2011

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4-8: **National Work Zone Awareness Week (FHWA)**

11&12: **Gravel Roads - Helena (MT LTAP)**

10 - 13: **APWA North America Snow Conference, Spokane, WA**

Go to www.apwa.net/snow

13 & 14: **Gravel Roads - Lewistown (MT LTAP)**

17-21: NACE 2011, Hilton Minneapolis, MN, www.naco.org

20 & 21: **OSHA-Ten Hour Safety Training (MT LTAP) Billings, MT**

27 & 28: **Gravel Roads - Miles City (MT LTAP)**

Training Opportunities at NEW Montana LTAP Website:

www.westerntransportationinstitute.org/centers/ltap/

May 2011

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17: **Flagging Certification Course - Great Falls (MT LTAP)**

18: **Flagging Certification Course - Lewistown (MT LTAP)**

19: **Flagging Certification Course - Billings (MT LTAP)**

24: **Flagging Certification Course - Bozeman (MT LTAP)**

26: **Montana LTAP Annual Advisory Board Meeting - Bozeman**

30: Memorial Day - Offices Closed

June 2011

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1&2: LTAP Region 7 Meeting - Nebraska

28: **MACRS Executive Meeting - Bozeman (Rescheduled from May 25 due to flooding in May and early June)**

We Need Your Help!

This newsletter costs \$2.06 each to print and mail. If you prefer to receive this newsletter electronically, please call Montana LTAP at 1-800-541-6674 or e-mail Michele Beck: mbeck@coe.montana.edu with your e-mail address. OR if this newsletter is going to an incorrect address, please let us know so we can correct our mailing addresses. Thanks for your help.

Some dates and locations are subject to change.

Call Genevieve Albert, LTAP, 1-800-541-6671 to confirm.

Calendar of Events • July 2011 - December 2011

July 2011

S	M	T	W	Th	F	S
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31						

4: Offices Closed

Training on Request:

*Summer Survival
Hand Safety
Slips, Trips, & Falls*

August 2011

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21	22	23	24	25	26	27
28	29	30	31			

1-4: National LTAP Conference - Boston, MA

Aug. 31 - Sept. 1: 22nd Annual Equipment Safety Training and Snow Rodeo - Helena, MT (MT LTAP) Brochure available in July

Training on Request:

*Forklift
Sign Safety
Road Audits*

September 2011

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11	12	13	14	15	16	17
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25	26	27	28	29	30	

Aug 31 - Sept. 1: 22nd Annual Equipment Safety Training and Snow Rodeo - Helena, MT (MT LTAP)

5: Labor Day Holiday - Offices Closed

18-21: APWA International Public Works Congress & Exposition, Denver, Colorado. Go to this link: <http://sites.apwa.net/congress/2011/home.aspx>

25-29: MACo Annual Conference, Gallatin County location

October 2011

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30	31					

MACRS Fall District Meetings: Gravel Pits/Materials, Winter Survival

4: Miles City 6: Billings

11: Bozeman 12: Conrad 13: Kalispell

4-6: Rocky Mountain West Pavement Preservation Partnership Annual Meeting
Reno, NV (www.tsp2.org/rmwppp)

5 - 7: 80th League of Cities & Towns - Crowne Plaza, Billings, MT

5: Public Works Directors - MT LTAP

9: Put On The Brakes Day - 11th Anniversary (go to: www.brakesonfatalities.org)

10: Columbus Day - Observed

26 & 27: 26th Regional Local Road Coordinators Conference,
Rapid City, SD

November 2011

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20	21	22	23	24	25	26
27	28	29	30			

8: Election Day

8 & 9: MACRS Planning Meeting, Heritage Inn, Great Falls, MT

11: Veterans' Day - Offices Closed

24-25: Thanksgiving Holiday - Offices Closed

29: Winter Maintenance/Winter Survival: Missoula

30: Winter Maintenance/Winter Survival: Billings

December 2011

S	M	T	W	Th	F	S
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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

26: Christmas Holiday - Offices Closed

Training on Request:

*Winter Survival
Winter Maintenance*

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

Ideas that Bridge Safety and Mobility for People and Wildlife

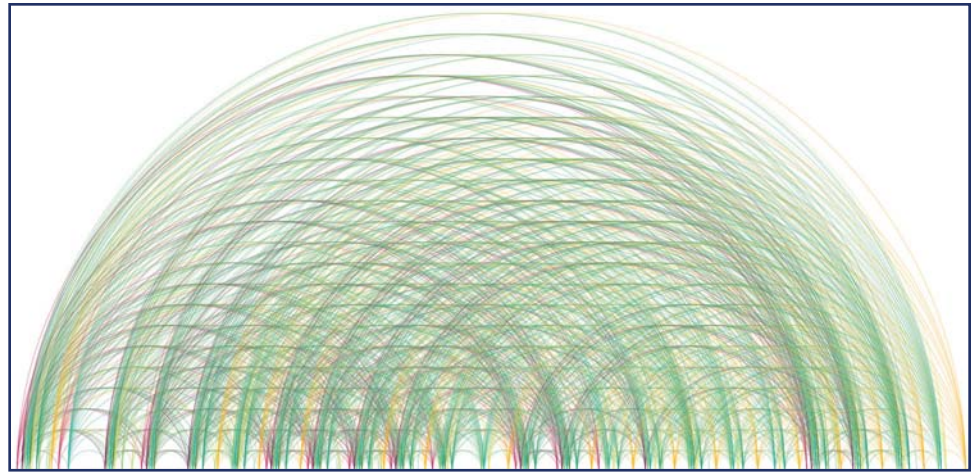
By Angela Kociolek, ARC Technology Transfer Leader, Western Transportation Institute

Sometimes a single person's idea can turn into something big. At the Western Transportation Institute (WTI), engineers, ecologists, and planners tackle rural transportation issues and share ideas with agencies and practitioners in the field.

One such idea by Senior Road Ecology Researcher Dr. Tony Clevenger sparked the first ever competition of its kind—the ARC International Wildlife Crossing Infrastructure Design Competition (ARC).



WTI's Tony Clevenger, the initiator of ARC, at work in Canada.



The ARC logo is based on data collected over one year at 24 wildlife crossing structures in Banff National Park in Alberta, Canada. Each colored arc represents a successful crossing of the TransCanada Highway via a crossing structure by elk, bear, cougar and other wildlife species.

Because people rely on highways and expect them to be safe, a huge challenge affecting roadway managers is the increase in wildlife-vehicle collisions that threaten human safety. Collisions with wildlife have increased by 50 percent in the last 15 years and cost our country \$8 billion annually in damages and lost wildlife resources.¹

Fortunately, effective mitigations exist such as wildlife crossing structures that span under or over the roadway so animals have no need to cross at-grade. Animals find these crossing opportunities over time because 8-ft-high fencing keeps them from entering the road elsewhere.

The fact that wildlife adapts to this type of infrastructure means that animals have continued access to the habitats they need for survival and genetic exchange between populations is possible. The measures also make highways safer for drivers.



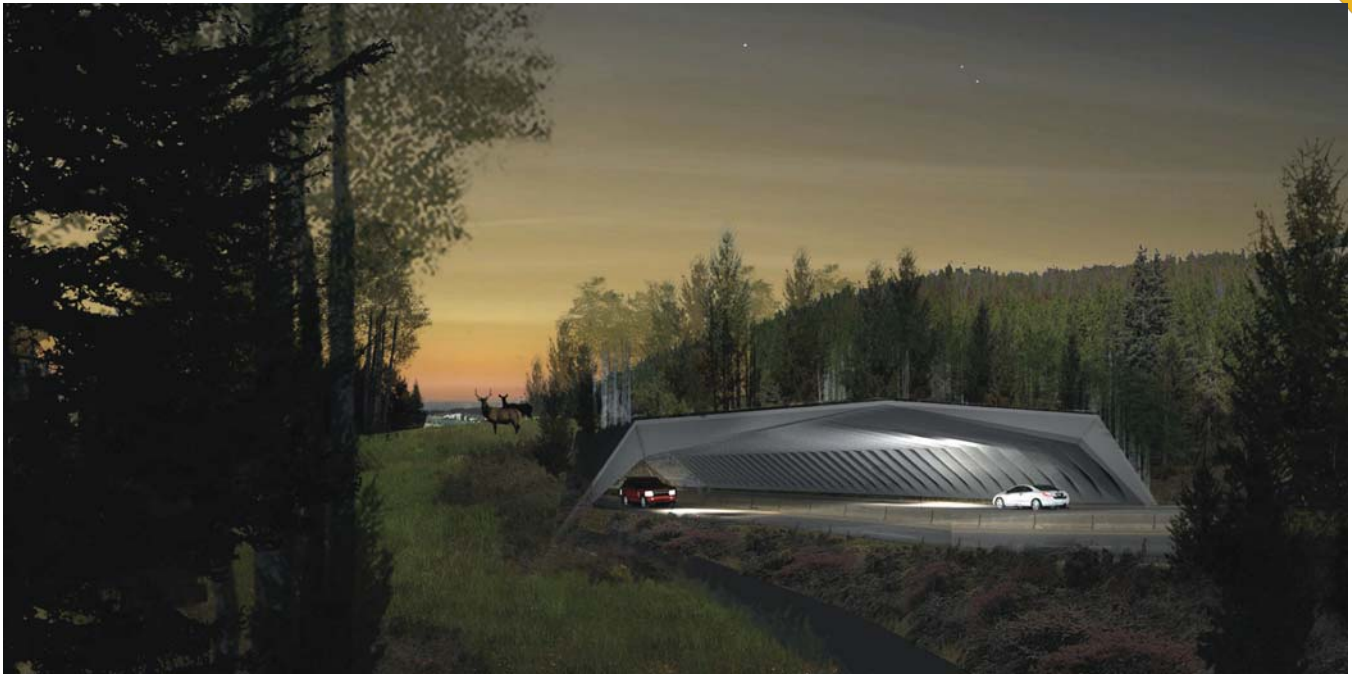
The Balmori Associates team (New York) proposed a modular system made from "standing dead timber left in the aftermath of beetle attacks which provides the opportunity to reclaim a resource in the face of an ecological tragedy."

But the price tags for these structures are in the millions, limiting the number that can be built. That's what inspired Tony to challenge the world's engineers, landscape architects, ecologists and designers to create the next generation of wildlife crossing structure that is both workable and cost effective. But the challenge didn't end there. Wildlife-transportation conflicts are also exacerbated by a changing climate, which can alter vegetation patterns and species distributions as we know them.

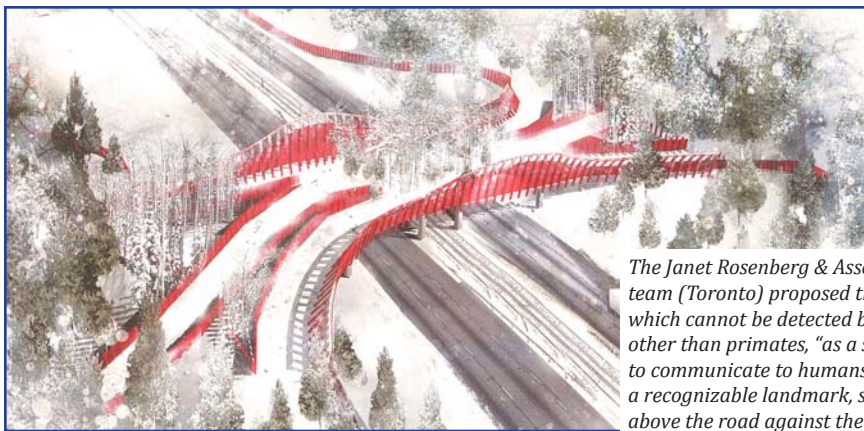
Continued on Page 9...



The OLIN Studio team (Philadelphia) proposed as its framework, the rhomboid, "one of the most efficient structures in nature. It offers structural strength, dynamic flexibility and efficient modular patterning. It is the inspiration for (a) wildlife crossing—the union of living and static systems."



The winning design of HNTB with Michael Van Valkenburgh & Associates (New York) employed “hypar modules that are optimized for being efficient to transport, erect, combine and recombine. No on-site concrete work is required, and bridges can be added to or removed as animal migration pressures shift over time.” Each rib-like unit is a hypar module that, when paired, forms the arch for vehicles to travel under.



The Janet Rosenberg & Associates team (Toronto) proposed the color red, which cannot be detected by mammals other than primates, “as a secret code to communicate to humans.” “It will be a recognizable landmark, set hovering above the road against the layered folds of the landscape, reminding us that we do not walk alone.”

“The crossing structures of today are built of concrete and steel,” said Tony “The possibilities for lighter, more durable, mobile and less expensive structures exist; the ARC competition encourages innovative thinking out of the box.”

WTI coordinated the competition in 2010 with financial support from, and collaboration with, a strong and diverse partnership (<http://www.arc-competition.com/partners.php>).

Thirty-six design teams representing 100 firms and nine countries responded to the challenge. Designs by the five finalists are pictured here. You can learn more about them and their creators at: <http://www.arc-competition.com/finalists.php>.



The Zwarts & Jansma Architects (Amsterdam) proposed “‘curves’ as the main organizing elements for the architecture of the load-bearing structure itself. In cross section the curve ‘contains’ the landscape and the wildlife that overpasses. At the same time it is an ‘inviting’ shape in the perpendicular direction for the traffic that underpasses.”

The jury succinctly encapsulated the excitement of the competition by declaring, “The winning proposal by HNTB Engineering with Michael Van Valkenburgh & Associates was not only eminently possible; it has the capacity to transform what we think of as possible.” That’s the challenge to every one of us no matter our role—to question what is possible.

The ARC competition is now over but the ARC Partnership continues to strive for the implementation of wildlife crossing infrastructure wherever it is needed to ensure the safety and mobility of humans and wildlife. ❖

Don't Run Short on Concrete: Estimating Project Quantities

Article adapted from an original article authored by John Hopkins, Municipal Transportation Specialist, PSATS
Reprinted with permission from the Pennsylvania LTAP

Have you ever seen a work crew pouring concrete and heard someone yell, "Oh no! We're going to need more concrete!" Or, have you ever watched as concrete is poured level with the top of the forms and then the concrete truck driver says, "Well, that is the last of them. What do you want me to do with the three yards of concrete left in my truck?"

Using concrete doesn't have to be that way. Roadway agency employees can determine the appropriate amount of concrete needed for any type of project once they learn how to calculate amounts using some simple math formulas.

UNDERSTANDING THE MATH

To start, let's review some basic math.

Convert to common units — To begin, you must convert all measurements into common units (such as inches, feet, yards, etc). How would you multiply 11 feet times 6 inches, for example? You would convert either the 11 feet into inches or the 6 inches into a decimal part of a foot.

Inches into feet — Converting the 6 inches into a decimal part of a foot is the preferred choice since in our English system of measurement, the "foot" is the base unit. This system then divides feet into smaller units (inches, fractions) or multiple units of a foot (yards, miles).

How do you convert 6 inches into feet? There are 12 inches in 1 foot. If you take the number of measured inches (6) and divide it by the number of inches in a foot (12), you will have the measurement expressed in feet (in decimal form). In our example: $6 \div 12 = 0.50$ feet.

Using this conversion formula in another example, you would change 7 inches into feet by taking the number of inches (7) and dividing it by 12 to get 0.583333 feet, which you can round to 0.58 feet.

Fractions into decimals — But, what do you do if your measurement is in fractions of an inch? Since you are changing the inches into decimal numbers, you will need to change the fractions into decimals. To do this, simply take the top number in the fraction and divide it by the bottom number. For the fraction $\frac{1}{2}$, for example, you would divide the top number (1) by the bottom number (2) to get 0.5. For the fraction $\frac{3}{8}$, divide 3 by 8 to get 0.375, which you can round to 0.38. For $5\frac{1}{4}$, you would divide 1 by 4 to get 0.25. Then you would add it to 5; therefore it would be 5.25. With all the numbers now in decimal form, you can proceed with converting inches into feet.

APPLYING THE CALCULATIONS

Use the formula — Once you have all the measurements converted into like units (feet) in decimal form, you are ready to apply some calculations to your measurements. Calculating quantities for concrete can be obtained by using three dimensions:

Length (L) times Width (W) times Height (H) or $L \times W \times H$. If you are using feet as your standard unit of measurement, this formula will give you the volume of concrete in cubic feet. Most projects use standard-dimension lumber for forms:

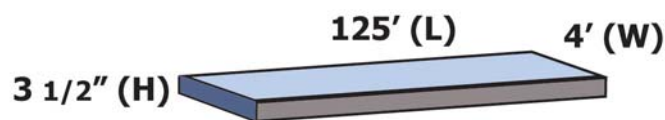
2-by-4s or 2-by-6s. A 2-by-4 is actually $3\frac{1}{2}$ inches wide and a 2-by-6 is $5\frac{1}{2}$ inches wide. That's important to know when you begin your calculations.

Sidewalk Project Example

You are pouring a sidewalk 4 feet wide by 125 feet long and using 2-by-4s for forms. To calculate the quantity of concrete needed for this project, you will use the formula $L \times W \times H$ to get cubic feet.

Convert to common units.

Before you can calculate this quantity, you have to convert the $3\frac{1}{2}$ inches into feet. To do that, first change the fraction $\frac{1}{2}$ into a decimal ($1 \div 2 = 0.5$) and add this to the 3 inches to get 3.5. Next, divide the 3.5 inches by 12 to change it into feet: $3.5 \div 12 = 0.291666$ feet, which you can round to 0.29 feet.



You are now ready to plug your measurements (all expressed in feet) into the $L \times W \times H$ formula to get the necessary quantity of concrete expressed in cubic feet. Keep in mind the height of the form is really $3\frac{1}{2}$ inches (0.29 feet), not 4. So your calculation will be:

$125 \text{ feet (L)} \times 4 \text{ feet (W)} \times 0.29 \text{ feet (H)} = 145 \text{ cubic feet.}$

CONVERT CUBIC FEET INTO CUBIC YARDS

Ready-mix concrete is measured in cubic yards. You will need to convert your cubic-foot measurement to cubic yards. (Remember 3 feet = 1 yard.)

Using the formula $L \times W \times H$, we know that there are 27 cubic feet in a cubic yard ($3 \text{ feet} \times 3 \text{ feet} \times 3 \text{ feet} = 27 \text{ cubic feet}$). Our sidewalk project example requires 145 cubic feet of concrete. To convert to cubic yards, divide 145 by 27, which equals 5.37 cubic yards ($145 \div 27 = 5.37$).

Since concrete is usually ordered to the nearest $\frac{1}{4}$ to $\frac{1}{2}$ cubic yard (0.25 to 0.50 cubic yard), you would round the 5.37 to 5.50 cubic yards. By ordering this amount of concrete for your sidewalk project, you are guaranteeing that you will neither run short nor have too much excess concrete. Learning how to calculate the quantity of concrete needed for a project will help save you time, money, materials, and aggravation. ❖

Roadside Revegetation Website

A recently launched website: www.nativerrevegetation.org is available with information about using native plants to revegetate roadsides after construction. The website is divided into three main sections: Learn, Train, and Visualize. Modules within these sections include relevant links to other websites for additional information. The Visualize section uses interactive features to show how different variables can influence the effectiveness of site revegetation. ❖

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Welcome to the LTAP Lending Library where publications, videos, DVD's, and software may be borrowed for a two-week period. We have a limit of three videotapes or DVD's for a rent-free two-week period. Some publications are free or for a nominal charge upon request.

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We have new lists for the library publications, software, DVD's, and videos at our new web site:

<http://www.westerntransportationinstitute.org/centers/ltap/Resources>

At this web site, you can also keep track of upcoming workshops, past and present newsletters, and workshop announcements. Our 2011 Needs Assessment Survey is available at this web site. Thank you in advance for taking time to complete it.

New Publications

p-7 Geosynthetic Reinforced Soil Integrated Bridge System Interim Implementation Guide (FHWA 2011) This manual outlines the state-of-the-art and recommended practice for designing and constructing Geosynthetic Reinforced Soil (GRS) technology for the application of the Integrated Bridge System (IBS). The procedures presented in this manual are based on 40 years of State and Federal research focused on GRS technology as applied to abutments and walls. (169 pages) The second part of this series (p-8) is a synthesis report that covers the background of GRS-IBS and provides other supporting information to substantiate the design method. (169 pages)

p-8 Geosynthetic Reinforced Soil Integrated Bridge System Synthesis Report (FHWA 2011) This report is the second in a two-part series to provide engineers with the necessary background knowledge of Geosynthetic Reinforced Soil (GRS) technology and its fundamental characteristics as an alternative to other construction methods. (64 pages)

p-294 Road Safety Assessment: Amsterdam Road/I-90 EB On-ramp (MDT October 2010) The overall purpose of this RSA was to determine if an additional on-ramp to the Interstate would potentially degrade safety with the two existing on-ramps. Additionally, the RSA explored several potential design options and their respective safety and operational impacts. (48 pages)

p-379 Modeling of Hot-Mix Asphalt Compaction: A Thermodynamics-Based Compressible Viscoelastic Model (FHWA 2010) This study was conducted to develop a model within the context of a thermomechanical framework for the compaction of asphalt mixtures. The developed model is a useful tool for simulating the compaction of asphalt mixtures under laboratory and field conditions. (110 pages)

p-523 Current and Innovative Solutions to Roadside Revegetation Using Native Plants – A Domestic Scan Report (FHWA January 2011) The use of native plants in roadside revegetation has evolved as more and more resource management agencies prescribe the practice as a much better approach for ecosystem. A domestic scan was initiated by the Federal Highway Administration to facilitate understanding about the processes and techniques used in successful and innovative projects that used native plants for roadside revegetation. (72 pages)

p-882 Intersection Safety: A Manual for Local Road Owners (FHWA 2011) This document provides information on

New Publications (Cont'd)

effectively identifying intersection safety issues in local areas, choosing the countermeasures that address them, and evaluating the benefits of those treatments. (60 pages)

p-883 Roadway Departure Safety: A Manual for Local Road Owners (FHWA 2011) This document provides information on effectively identifying roadway departure safety issues in local areas, choosing the countermeasures that address them, and evaluating the benefits of those treatments. (68 pages)

p-884 Road Safety Information Analysis: A Manual for Local Road Owners (FHWA 2011) This document was developed to provide data collection and analysis techniques as well as other processes applicable to the local practitioner to help improve the safety of local rural roads. (46 pages)

New DVD's

DVD 530 Successful Roadside Revegetation Using Native Plants (FHWA 2011) The use of native plants in roadside revegetation has evolved as a much better approach for the ecosystem. This DVD documents the processes and techniques used in successful and innovative projects that used native plants for roadside revegetation. Host project sites included Arizona, New York, Oregon, and Montana. (24 min)

DVD 2530 International Wildlife Crossing Infrastructure Design Competition (WTI November 2010) ARC engaged the best and most innovative international, interdisciplinary design teams—comprised of landscape architects, architects, engineers, ecologists, and other experts—to create the next generation of wildlife crossing structures for North America's roadways. The ARC competition short-listed five, world-class, interdisciplinary teams to develop concept designs for a wildlife crossing structure at Colorado's West Vail Pass along I-70. The finalists' designs can be seen on this video. (12 min)

New CD's

SW857 Road Safety 365: a Safety Workshop for Local Governments (FHWA October 2010) This Workshop contains 9 powerpoint modules, pdf Participant Workbook and two video clips illustrating how we can all be part of the safety solution.

SW882 (1) Intersection Safety: A Manual for Local Road Owners (FHWA 2011)60 pages; (2) Roadway Departure Safety: A Manual for Local Road Owners (FHWA 2011)68 pages; (3) Road Safety Information Analysis: A Manual for Local Road Owners (FHWA 2011)46 pages This CD contains three manuals. (See above publications p-882, p-883, p-884 for descriptions.) ❖



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