



TECHNOLOGY EXCHANGE

A Newsletter of the Minnesota Local Technical Assistance Program (LTAP)

UNIVERSITY OF MINNESOTA
CENTER FOR TRANSPORTATION STUDIES

www.mnltap.umn.edu

The trusted resource for Minnesota's local transportation agencies

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FHWA initiative helps bring drivers back from the edge

In October, the Federal Highway Administration (FHWA) partnered with Dodge County, Minnesota, the Minnesota Department of Transportation, and Minnesota LTAP to discuss and demonstrate the Safety Edge during a county road paving project. The event was one example of a growing number of similar events involving a mix of partners—including federal, state, and local agencies as well as industry—to share the safety solution.

The Safety Edge replaces vertical drop-offs during the paving process with a 30-degree slope at the edge of the pavement, allowing drivers to recover safely if they drift off the road.

Vertical pavement-edge drop-offs, particularly on rural two-lane highways, are one cause of roadway departure crashes. Such crashes are frequently severe and account for more than 50 percent of U.S. traffic fatalities. Pavement drop-offs develop during paving or over the life of the pavement as aggregate and other material adjacent to the pavement settles or is worn away.

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The Safety Edge under construction in Dodge County, Minnesota

The Safety Edge will be featured at the Minnesota Spring Maintenance Training Expo (see article below).

Spring Expo to feature Safety Edge

The Safety Edge will be one of the featured topics at the 2011 Spring Maintenance Training Expo. The event takes place April 12 and 13 at the St. Cloud Civic Center.

William Stein of the FHWA will share information about the Safety Edge, a promising paving technology (see article above). Other general sessions will cover stormwater maintenance and inspection, commercial driver's license requirements, and communicating with the public.

Concurrent sessions will touch on topics such as cable barriers, pavement markings, sweeping/removal, roadside vegetation, sign management, safety research innovations, and safe rigging practices.

The expo will begin with a ceremony honoring Minnesota LTAP's Roads Scholar graduates. Also, vendors from a variety of companies will display and demonstrate equipment during the expo.

Sponsors are Minnesota LTAP, the Minnesota Local Road Research Board, Mn/DOT, the Minnesota Street Superintendents Association, and the Minnesota Chapter of the American Public Works Association. The event is facilitated by the College of Continuing Education at the University of Minnesota.

Look for the expo brochure in the mail shortly or visit www.mnltap.umn.edu/expo. **LTAP**

APWA-MINNESOTA CONFERENCE

Pipes and ponds

Protecting our waters and environment was the focus of the American Public Works Association-Minnesota Chapter 2010 Fall Workshop and Conference on November 17-19. Summaries of several presentations start below and continue on pages 4 and 5.

Maintaining pipes and ponds: 'How did it get so complicated?'

Public works departments must navigate a host of new and changing federal, state, and city regulations aimed at keeping our waters clean today and for future generations of Minnesotans. "Stormwater management rules are changing, and that has an impact on the way you do business," Todd Hubmer, of WSB and Associates, Inc., told the audience in the opening conference session.

Water quality in Minnesota has steadily improved over time, and water is far cleaner today than it was a few decades ago. In the 1940s and 1950s, the goal was just to get water away from the streets, so all water—both rain and sewage—was combined in the same pipes. In 1970, reducing water pollution from direct discharges became the new focus with the formation of the federal Environmental Protection Agency and passage of the 1972 Water Pollution Control Act or "Clean Water Act." In 1991, the Wetland Conservation Act (WCA) was passed, which put local areas in charge of stormwater management. In 1999, stormwater pollution prevention plans were required. Today, pollutants from discharges are reduced through implementation of the Stormwater Pollution Prevention Program (SWPPP).

Six ways to reduce pollutants

The goal of SWPPP is to reduce the discharge of pollutants from storm sewer systems to the maximum extent practicable. Hubmer outlined SWPPP's six minimum control measures (MCMs) and gave some examples of

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SAFETY

The Traffic Corner: Neighborhood Street Design Guidelines

The Institute of Transportation Engineers just published a recommended practice titled *Neighborhood Street Design Guidelines*. It's a very good reference for anyone involved with the design of new neighborhoods. Table 1 shows recommended design elements derived from the report based on the density of the neighborhood.

In Minnesota, the statutory speed limit on local streets is 30 mph. Following are other design guidelines based on this speed (note the recommended practice also provides guidelines for other speed limits):

- Minimum stopping sight distance = 200 feet
- Minimum centerline horizontal curve radius = 300 feet
- Maximum grade in rolling terrain = 8 percent (2 percent at intersections)
- Clear sight distance provided at intersections without traffic control = 140 feet

- Corner radius at intersecting streets at 90 degree angle = 15 feet
- Minimum distance between tee intersections = 125 feet

The recommended practice provides discussion related to each of these design elements as well as other topics such as planning connectivity, utilities, street lights, parking, etc. The 64-page document is a handy reference for those working on neighborhood design, and I highly recommend it.

One topic not covered in detail is where to put

signs within neighborhoods. Given the budget pressures faced by agencies and research about the effectiveness of signs, I encourage you to minimize the use of all signs in new neighborhoods other than street name signs.

LTAP

—Mike Spack, LTAP contributor (Mike Spack, P.E., is an adjunct professor in the University of Minnesota Department of Civil Engineering. He is a regular contributor to the newsletter, writing brief articles on traffic engineering topics.)



Mike Spack

Table 1. Recommended Transportation Design Elements for Neighborhoods

	Density of Dwelling Units per Acre			
	2.0 or fewer	2.1 to 6.0	6.1 to 10.0	10.1 or more
Right-of-way width	46 ft.	52 ft.	58 ft.	64 ft.
Pavement width	22 ft.	28 ft.	32 ft.	38 ft.
Number of channels for parking and traffic lanes	2	3	4	4
Boulevard width	7 ft.	7 ft.	7 ft.	7 ft.
Sidewalks	5 ft. on at least one side (optional if density less than 0.5)	5 ft. on both sides	5 ft. on both sides	6 ft. on both sides
Alley width (when used)	n-a	15 ft. of pavement, 16 ft. of right-of-way	15 ft. of pavement, 20 ft. of right-of-way	15 ft. of pavement, 20 ft. of right-of-way



TZD conference features Swedish safety innovations

Presentations and handouts from the annual Toward Zero Deaths (TZD) Conference held in October are online at www.minnesotatzd.org.

Following the TZD conference, more than 100 people attended a seminar about Sweden's Vision Zero Initiative. A world leader in traffic safety, Sweden sends experts around the world to talk about its vision of a safer road system and help other governments adopt their own "vision zero."

At the seminar, high-level safety advocates and transportation officials discussed how Sweden has changed the culture of traffic safety, how roads

can be built cost-effectively and still minimize the fallout from driver error, and how Sweden's approach to impaired driving differs from that of Minnesota.

One of the tools that have helped the country make large strides toward its goal of zero fatalities is a tactic known as the 2+1 road. In the 1990s, hundreds of Swedes were killed and injured on the nation's 2,200 miles of 13-meter-wide, two-lane roadways. These rural roads were some of Sweden's most dangerous, accounting for 25 percent of severe-injury crashes even though they made up less than 4 percent of the total road system.

After searching for a low-cost way to improve the safety of 13-meter roads within the existing right-of-way, they settled on an innovative approach: the 2+1 road. In this design, the existing two wide lanes and shoulders are converted to three narrow lanes with a cable barrier down the centerline. The central lane alternates between traffic directions at regular intervals to provide ample passing opportunities. After years of discussion and debate, the first 2+1 road was built.

Today, Sweden has more than 1,200 miles of these roads. Fatalities have dropped 90 percent, saving more than 50 lives a year. The level of service has

also increased, with drivers traveling at higher average speeds.

Other innovations the Swedish presenters discussed included automated speed enforcement and rear-facing child safety seats.

To read more about Sweden's efforts, please see the article in the December 2010 e-news of the Center for Excellence in Rural Safety at www.ruralsafety.umn.edu. **LTAP**

Technology Exchange

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OPERA spotlight: Cushion-release technology takes the jolt out of plowing

Hitting an uneven pavement edge or an obstacle like a manhole cover gives a jolt to tractor-mounted snow blowers. This jolt usually means the snow blower has come to an instant dead stop—a real safety hazard for the operator. The machinery may also be damaged, and snow is not completely cleared away.

A new mechanical linkage technology developed in part with Local OPERA funding—the Cushion-Release Push Frame—helps a blower “walk” over obstacles by absorbing the impact. On a plow equipped with the push frame or the skidsteer attachment, the cutting edge will raise to different heights, depending on construction specifications. The snow blower lifts to approximately 1.5 inches, says inventor Grant Hanson of the City of Glenwood. The push frame can be installed on snow blowers, front-end loaders, and other equipment.

The technology offers several benefits, Hanson says. It allows operators to scrape rugged surfaces continuously so a second pass isn’t needed for



residual snow, and it can reduce downtime from mechanical breakdowns. But “the biggest advantage,” he says, “is the safety aspect.”

The Glenwood public works department received OPERA funding to develop the technology, and a Glenwood manufacturer has begun building them.

A short video clip of the push frame is on the Minnesota LTAP website at www.mnltap.umn.edu. More information about the push frame is at www.safeloader.com. **LTAP**

OPERA annual report and fact sheets online

The Exchange regularly highlights projects completed under the LRRB’s Local Operational Research Assistance Program (Local OPERA). A project from the 2010 OPERA annual report is described above. The annual report, as well as individual, downloadable fact sheets of the 2010 projects, is available at www.mnltap.umn.edu/opera.

Edge from page 1

A typical pavement-edge drop-off-related crash occurs when the driver attempts an immediate return to the roadway but loses control of the vehicle as a tire catches on the edge of the pavement. Drop-off crashes usually involve a collision with a roadside object, a head-on collision, a rollover, or an opposing sideswipe.

“We do have a serious safety problem,” said Cathy Satterfield with the FHWA Office of Safety. “We’ve selected a few technologies that we think are out there ready to be installed and we’re going to push a little harder to try and move forward faster so we can get the benefits much sooner.”

The Safety Edge has been in development for almost a decade and is now part of the FHWA Every Day Counts (EDC) innovation initiative. EDC is aimed at “taking effective, proven, and market-ready technologies and getting them into widespread use” to help “improve safety, reduce congestion, and keep America moving and competitive.”

The FHWA is working with states to develop specifications and adopt this pavement edge treatment as a standard practice on all new and resurfacing pavement projects. The preventive technology has been used on a limited or test basis in several states.

A major challenge to widespread implementation of the Safety Edge, however, has been a lack of data

about the role of edge drop-offs in roadway departure crashes. Available crash data often contain no clear, easily quantifiable indication of whether an edge drop-off was a factor in a crash. But a 2006 AAA Foundation for Traffic Safety study of rural paved roads with unpaved shoulders in Missouri and Iowa found that drop-off crashes were two to four times as likely to be fatal as all rural crashes. The same study found nearly a quarter of all roadway departure crashes in Missouri involved edge drop-offs.

Despite the limited data supporting the need for the Safety Edge, a small-but-growing body of experience with the technology has yielded positive results. “Because we have so few sections, and they tend to be on lower-volume roads, we don’t have a significant number. But everything seems to be better, and our best estimate right now is a 5.7 percent reduction in all crashes,” Satterfield said at the Dodge County demonstration.

As a further benefit, the Safety Edge involves minimal time and cost to implement. It is installed during paving, using a special commercially available shoe that attaches to existing equipment in just a few minutes. The special paving shoe costs about \$3,000. Typically, little or no additional asphalt is needed (less than 1 percent of the total project). The Safety Edge also has been used for concrete pavement edges.

Because the Safety Edge provides an

Locations at high-risk for drop-offs

- horizontal curves
- near roadside mailboxes
- turnarounds/unpaved pull-outs
- shaded areas
- eroded areas
- asphalt pavement overlays

additional compaction along the edge, it also improves pavement durability and contributes to longer pavement life. It can also help save contractors money during the paving process of some projects by reducing the need for traffic control and improving temporary access to detour lanes without extra paving.

Sue Miller, county engineer in Freeborn County, Minnesota, and past president of the National Association of County Engineers, has been an advocate of the Safety Edge since implementing the technology in response to a fatal crash in 2004 involving teens and a 2-inch edge drop-off. She characterized the Safety Edge as low-cost insurance against tort liability, especially for roads with hard-to-maintain shoulders and for roads with no shoulders.

To date, Freeborn County has paved

about 65 miles of road with the Safety Edge. “There’s so much stuff going on in our cars today,” Miller said at the Dodge County demo. “We have to provide more of a safety net for drivers and safety-proof our roads.” **LTAP**

—Michael McCarthy, LTAP editor

Related resources:

Safety Edge web page (FHWA Office of Safety): http://safety.fhwa.dot.gov/roadway_dept/pavement/safedge

Safety Impacts of Pavement Edge Drop-offs (AAA Foundation for Traffic Safety, 2006): www.aaafoundation.org

LRRB UPDATE

New at LRRB.org

Mn/DOT has published new guidelines for the design of turn lanes. The guide provides design engineers with step-by-step worksheets for determining safe and functional turn-lane lengths.

Design of Turn Lane Guidelines (October 2010, 2010-25) and a corresponding technical brief, *Putting Research into Practice: Guidelines for Designing Turn Lanes* (October 2010, 2010-25TS), are available on the Minnesota LRRB website—www.lrrb.org—along with other reports on topics such as bumps in overlays, ground penetrating radar, and bridge monitoring technology. **LTAP**

Every Day Counts

In October the FHWA held a summit in Minneapolis for its “Every Day Counts” (EDC) innovation initiative. EDC is designed to identify and deploy innovation to shorten project delivery, enhance roadway safety, and protect the environment.

FHWA teams will work with state, local, and industry partners to deploy innovations and develop performance measures to gauge their success. Minnesota LTAP will take part in these efforts, says director Jim Grothaus, who attended the summit.

More information about Every Day Counts is at www.fhwa.dot.gov/everydaycounts. **LTAP**



The Dodge County demo attracted a diverse audience.

ENVIRONMENT

APWA-MINNESOTA CONFERENCE

Pipes from page 1

how each might be implemented:

- MCM 1 involves public education and outreach through events and activities that teach the public about both the problem of water pollution and solutions the city intends to implement.
- MCM 2 encourages public participation and involvement, which can mean activities like involving the community in trash pickup or a storm sewer-stenciling program to get youth involved and into the outdoors.
- MCM 3 covers detecting and eliminating illicit discharge, which is accomplished by observing what is coming out of the city's pipes, investigating the source of the problem (construction sites, car washing facilities, industrial waste dumping), acting to fix those problems, and then documenting the observations.
- MCM 4 guides stormwater runoff control from construction sites, a problem that can be tackled by inspecting such sites for things like properly installed silt fences, removal of silt fences upon project completion, and timely vegetation restoration.
- MCM 5 directs attention to post-construction stormwater maintenance that becomes the responsibility of the city once construction is completed.
- MCM 6 suggests that pollution prevention and good housekeeping begins with how municipal operations maintain their own facilities. Doing things like keeping road salt and sand piles contained, using proper storage and handling techniques for other chemicals onsite, and generally running an organized, clean facility, is key.

Auditors love checklists

Hubmer offered a helpful checklist of ways public works facilities can document specific activities undertaken annually to enforce city stormwater requirements, helpful for audits as well as for

regularizing inspection and maintenance. His suggestions included:

- Keep an organization chart that tracks "who's doing what" (including public outreach) and incorporate those responsibilities into job descriptions.
- Educate staff on their responsibilities and explain the importance of their jobs.
- Use checklists to ensure consistency in reviewing plans and responding to permit rules. In Hubmer's words, "Auditors love checklists."
- Document inspections, actions taken, and other activities throughout the year and keep orderly records.

Because so many agencies have varying environmental responsibilities, many permitting bodies may need to be consulted before starting maintenance projects. Keeping good documentation is also vital in working with agencies such as the Soil and Water Conservation District, Board of Water and Soil Resources, U.S. Army Corps of Engineers, Minnesota Pollution Control Agency, and watershed districts.

A few questions to ask before starting a maintenance project include:

- What is the scope or limit of the project?
- Will permits be required? From what agencies?
- Will dredging be involved?
- Is the project in a wetland?
- Is the project in a body of water governed by the Department of Natural Resources (DNR)?

To avoid receiving notices about not being in compliance, Hubmer recommended sending letters to all potential permitting agencies to inform them about the project and ask if a permit is needed.

Where should we be today?

Hubmer drew a clear picture of where public works departments should be today regarding stormwater issues. All pollution control devices



Stormwater control measures encourage public participation. (photo courtesy Todd Hubmer)

should be inspected annually with a plan in place and a system for documentation. Twenty percent of outfalls, sediment basins, and ditches should be inspected annually or all inspected every five years. Best management practices require cleaning sumps and adjusting the frequency of cleaning based on inspections. Inspection and maintenance activities should be documented and the records retained.

"Public works employees are on the ground and have a big impact on educating the public—you're on the front line of outreach for water quality issues in Minnesota," Hubmer concluded. **LTAP**

—Jeanne Engelmann, LTAP freelancer

Additional information on MCMs, regulations, and permits is available at:

Minnesota Pollution Control Agency (MPCA) Program MS4 page: www.pca.state.mn.us/index.php/water
Environmental Protection Agency (EPA) page: http://cfpub1.epa.gov/npdes/home.cfm?program_id=6

APWA-MINNESOTA CONFERENCE

Pond maintenance: dos and don'ts

To provide a better understanding of ways to perform pond maintenance under new federal and state rules, presenters at the APWA-Minnesota conference outlined case studies of various pond maintenance activities. Beyond performing the actual repair work, best management practices that help public works departments comply with regulations include pond inventory and rehabilitation programs. These programs help by prioritizing ponds for inspection and cleanout. In addition, pre-planning aids in dealing with pond sediment contamination when it is discovered through sampling.

To determine the most cost-effective way to handle pond maintenance, Liz Stout with the City of Minnetonka described a study done to inventory ponds, identify ponds needing maintenance for sedimentation issues, and prioritize citywide pond maintenance. The survey indicated the large scope of Minnetonka's pond maintenance chore: 1,200 ponds and wetlands. To narrow the scope, DNR wetlands and waters were excluded and the focus was narrowed to constructed ponds maintained by the city. After a

sedimentation survey of the remaining ponds, the number was furthered narrowed by size, land use, and proximity to sensitive downstream water bodies. These parameters led to identification of 54 ponds that were ranked by degree of sedimentation: those 50 percent full or more needed cleaning. The 54 ponds were further ranked based on proximity to high-quality water bodies and potential for water quality benefits. The final tally indicated 11 ponds with a moderate to high priority.

Stout said a key benefit of the process was that inventory data were entered into a tracking software program, providing benchmarks that can be used for future surveys. Challenges included lack of original pond data such as water volume and sedimentation. Also, ponds in developments often do not have easements for city access, and homeowner associations often do not maintain the ponds.

A lot of cooks in the kitchen

The City of Plymouth approved a pond maintenance policy in 2005, and in 2006 it inventoried 1,100 drainage basins that included 15,000

outfalls. According to Derek Asche, water resources manager for the city, the inventory identified a number of common maintenance needs such as pipe separation, erosion around pipes, sand deltas, and vegetation obstructing flow. Because of flood damage in 2003, top priority was given to flood protections and water flow. The inventory process resulted in prioritizing the type of problems to address, which in turn determined staffing and budget needs.

Asche said that small maintenance projects often grew into bigger ones that required more permits from a variety of regulatory bodies. Each project had to be vetted to determine what agencies had permitting jurisdiction. Every project is unique, so it's wise to ask, even if general permits exist. "There are a lot of cooks in the kitchen, a lot of agencies involved in water quality issues, and we want to protect water quality, so it's important to know who the players are," Asche said.

He concluded with one rule to remember: understand the scope of the project—small projects can

Stormwater U offers tailored workshops

The University of Minnesota Stormwater Education Program works with many organizations to help protect water quality. The program promotes innovative stormwater best management practices among stormwater practitioners through locally tailored workshops known as Stormwater U.

The program's website includes workshop information; links to programs, manuals, and other references for stormwater professionals; and pond sediment excavation best practices.

Check it out at www.extension.umn.edu/stormwater. **LTAP**



photo courtesy Todd Hubmer

Ponds continued on page 7

APWA-MINNESOTA CONFERENCE

Do it right the first time: repairing erosion and pipe outlets

Public works crews see it every day—outlet pipes surrounded by eroding banks or deeply eroded channels leading away from the pipe. Or maybe the pipe is broken altogether and lying in pieces at the bottom of a ravine after a storm. At the APWA-Minnesota conference, Steve Klein of Barr Engineering Company showed image after image of improperly installed outlet pipes and the scoured earth surrounding them. Based on his years of experience designing outlet pipe, Klein outlined the elements he thinks about when approaching each project: how to prevent scour around the pipe, ways to prevent downstream erosion, implications of discharge velocity, public safety, and type and placement of trash racks.

Do it right the first time

“In order to do it right the first time, you need to understand what went wrong in other situations where the pipe failed,” Klein said.

To prevent scour around the pipe, filter material and riprap must be placed all around the pipe and to a point downstream where flow velocities will be less than 4 feet per second (fps). In most cases the riprap and filter must be placed from the end of the pipe to at least the bottom of the hill, ditch, or pond the pipe discharges onto. But, if possible, the pipe should not outlet on a slope at all. Rather, he said, it should extend all the way to the bottom of the slope. And the most important element is the discharge velocity, which must be less than 4 fps onto unprotected ground. That may require placing the pipe at a grade no steeper than 2 percent, turning the pipe into the downstream flow, or



Concrete gabions are used for water overflow or to line steep channels. (photos courtesy Steve Klein)

using a variety of energy dissipaters.

Typical reasons for outlet and overflow failure are using the wrong size pipe, not placing enough riprap around the pipe, and not placing riprap far enough downstream until a flow velocity of less than 4 fps is achieved. In addition, Klein emphasized the need to use a filter material below the riprap in all circumstances. “Riprap without filter material is not riprap,” he said.

There are many alternative materials to riprap for armoring flow paths with velocities in excess of 4 feet per second, Klein said, so understanding those materials and where and how to install them is the best way to use limited public works dollars wisely. Some of these materials and best uses include:

- Gabion baskets prevent seepage through rock that can cause failure.
- Cable concrete (concrete blocks woven together with steel belting) or Armour Flex (concrete blocks woven together with

geogrid) work well on shore areas, overflows below ponds or dams, pipe outlets, channel banks, boat ramps, wave breaks, and bridge abutments. Topsoil and seed can be planted over it to conceal the material.

- Articulated block (concrete blocks that interlock) can be placed in areas with difficult access, on shorelines, pipe outlets, and boat ramps. Vegetation can also be grown over it.
- Concrete gabions stand upright and are used for waterfall check dams or to line steep channels.
- Turf-reinforcing material is a non-photo degradable turf material that is permanent and long-lasting and allows water to flow over it while protecting the vegetation that grows through it. It can also be used in areas where native prairie plantings are desired and that periodically need to be burned to be managed.

Energy dissipaters should be used when outlet velocities exceed 10 fps

or where it's not possible to slow the water velocity to less than 4 fps in an acceptable length of channel. Various types of dissipaters are available, he said, and all are designed so that water hits a wall and then flows over, under, or around it to dissipate energy.

Examples of these dissipaters include stilling basins, precast energy dissipaters made at concrete pipe plants, or cast-in-place structures and protected waterfalls.

Klein is also very careful to design trash racks that do not impede water flow. To ensure self-cleaning, the vertical bars should be replaced with sloping bars that are no more than 5.5 inches apart. He emphasized that if a trash rack is placed on the downstream side, one must always be placed on the upstream side as well. This eliminates the danger of a child or animal being sucked in one side and caught in the trash rack on the downstream side. **LTAP**

—Jeanne Engelmann, LTAP freelancer

Greenroads rating system to certify sustainable roads

Road construction is an \$85 billion a year industry in the United States. While the building industry has had Leadership in Energy and Environmental Design (LEED) certification available since 1998, no generally accepted system is in place to certify sustainably built roads. The Greenroads system, developed by the University of Washington and CH2M Hill, is an attempt to provide that metric.

Greenroads is the first rating system for sustainable road design and construction. It awards points for a list of sustainable choices and practices and can be applied to new, reconstructed, and rehabilitated roads. The rating system evaluates sustainability tradeoffs and decisions, encourages greener practices and innovation, and confers marketable recognition on projects.

The goals of Greenroads are threefold: to recognize companies already

using sustainable methods; to provide a catalog of ideas for greener practices; and to offer an incentive for agencies and companies to build more environmentally friendly roads.

Projects have to fulfill basic building, waste, pollution, lifecycle and outreach plans, and can then earn extra points for using recycled or local resources, reducing their reliance on fossil fuels, minimizing water use, and implementing smart traffic management systems.

According to its developers, the Greenroads standard helps show the public that the road construction industry can become more sustainable.

To learn more about Greenroads, please see the fact sheet on the website of the Transportation Engineering and Road Research Alliance (TERRA) at www.terraroadalliance.org. **LTAP**

APWA-MINNESOTA CONFERENCE

Recreational trail assessment and management: gauging the bumps

The Three Rivers Park District includes 27,000 acres of parkland crisscrossed by 150 miles of recreational trail corridors. Each year, nearly eight million people visit the parks and use the trails. Trail users include big wheel and small wheel users—bicyclists, skateboarders, rollerbladers, and rollerskiers.

Because of the sheer number of trail miles that require maintenance, some district staff, headed up by Brent Christensen, designed a survey and rating system that would help them develop a trail management plan.

“When engineers look at a trail and see some bumps and cracks but overall no major problems, they would rate it in fair condition,” Christensen said at the APWA-Minnesota conference. “But would a trail user agree with that condition assessment? If their ride is bumpy, maybe not.” The district wanted to learn how to manage trails to better meet visitor

expectations and, at the same time, create criteria for when to perform trail maintenance. The study sought to answer two questions:

- How well does the engineer rating of trails correlate to user satisfaction?
- How well does the PASER asphalt rating scale predict user satisfaction?

Keeping good trails good

An asphalt road rating system was used to assess the condition of trails and assign a value on a scale. Three types of rating systems were tested, and a system was developed to sample trail users' satisfaction. The results of these preliminary tests showed that one rating system, PASER, worked well, and the best user group to survey were bicyclists. The district collected 480 surveys from bicyclists. After some number crunching, some

Trails continued on page 7

FALL MAINTENANCE EXPO

Following are some highlights from the expo, held October 6–7 in St. Cloud. Sponsors were Mn/DOT, Minnesota LTAP, the Minnesota Street Superintendents Association, and APWA–Minnesota.

The new normal for transportation

Who knows what the future of transportation will be? Tom Sorel, Mn/DOT commissioner, outlined some broad concepts percolating within state government and across the country.

The current recession has been more severe than those in 1990–91 and 2001, he said at the expo, and the recovery has been slower. The nation's household net worth fell more than \$17 trillion.

Demographics are also changing:

- More people will be over age 65 than school-age by 2020.
- National mobility has fallen to the lowest point ever recorded.
- The size of the labor force is about to contract sharply as baby boomers retire.
- Minnesota diversity will grow but at a slower pace than the national rate.

“Think about what these things mean to the economy and our future transportation needs,” Sorel said. “Put this all together and this is the new normal—things won't return to the way they were before.”

Minnesota and the new normal

Some fear this new normal. Sorel, however, suggested playing to our strengths by supporting education as a key response and understanding that future productivity depends on decisions made now. The public sector is essential in the response to the new normal. For example, continuing to use the skills and experience of the retiree population will help the state's effort to remain on the leading edge in innovation, particularly in sustainable transportation practices, he said.

Sustainability is a guiding principle for Mn/DOT, Sorel continued. Sustainability includes economic, social, and environmental components, he explained, and “transportation needs to play a key role in all three.”

To build sustainability as a standard across the agency, performance measures have been put in place and decisions will be weighed against their effect on the quality of life of Minnesotans, he said.

Mn/DOT conducted a pilot study to define what quality of life means, how it affects the lives of citizens, and how transportation decisions intersect with quality of life concerns. The study found that citizens value good quality, safe roads, and snow removal, and that potholes, traffic congestion, and rush-hour stress are transportation detractors. Citizens want more project-related communication and system connectivity, he said.

Ambassadors of transportation

In addition to the pilot study, Mn/DOT is gathering information through an ongoing online survey of 600 Minnesotans who are asked periodically to weigh in on transportation issues. So far, the agency has been rated well in many aspects of operation; however, Mn/DOT was rated lower on transparency. Sorel sees this as an opportunity for focus and change. “We need to do more work on transparency, especially since the (I-35W) bridge collapse,” he said. “But clearly Mn/DOT employees should be proud of their work because the public thinks highly of what we do.”

Sorel summed up by saying, “We're on a journey as we consider the new normal. We need to

transform our thinking to sustainability and quality of life. We're not just thinking of the immediacy of our actions but also impacts for the future.

The true ambassadors of transportation are those doing the day-to-day maintenance. You're out there working, and that's what people see.” **LTAP**

—Jeanne Engelmann, LTAP freelancer

Congratulations, roadeo winners!

One of the highlights of the annual Minnesota Fall Maintenance Expo is the snowplow “roadeo,” which allows drivers to compete on a closed course. The course challenges drivers' abilities to perform maneuvers such as backing and making tight turns while avoiding obstacles. More than 100 talented operators competed in the 2010 roadeo; the top four drivers are shown below. **LTAP**



Left to right: Gary Kertscher (Becker County), Doug Kolles (City of St. Michael), Mike Schmidt (City of Eden Prairie), Tim Daluge (City of St. Michael)

Hunting and fishing in Minnesota: Here today, gone tomorrow? Or here to stay?

What is the status of the natural resources that are crucial to hunting and fishing in Minnesota? Will generations-old outdoor sporting traditions give way to continual pressure on the state's natural resources?

Dennis Anderson, outdoors columnist and editor at the Minneapolis *StarTribune*, offered an overview at the fall expo of upland habitat that is disappearing and wetlands that are being drained. He also painted a picture of reduced advocacy as the numbers of baby-boom hunters and anglers wane and fewer young hunters and anglers follow behind in such outdoor activity.

Other issues also indicate trouble ahead. Water volume is becoming concentrated in fewer areas. Large fluctuations in river water levels destroy backwater vegetation, which affects waterfowl. The number of hunters seeking big game and waterfowl is down everywhere, even where game is abundant. And one way people have adjusted to the various economic recessions is by working more, so people are busier and have less time for hunting and fishing.

These factors point to a continuing loss of political power among hunters and anglers in the legislature, Anderson said. Will fish, wildlife, and other natural resources remain important to Minnesotans in the future?



While Minnesota sleeps: draining the wetlands

Anderson started with an overview of wetlands. Minnesota doesn't have the wetlands it once had, and those that do exist are degraded. “If you head out west of the Twin Cities you might see a cattail slough and think it looks healthy, but it's not.” As a result, he said, “The duck situation in Minnesota is not good.”

As more wetlands are drained and farm fields tilled, the same amount of rainfall is squeezed into fewer drainage areas. The remaining wetlands are deeper, so rain and snowmelt drain much faster. Minnesota rivers, like the St. Croix, Minnesota, and Crow, have never been as high in the fall as they were in 2010. “Over the last 30 years, we've drained the wetlands as Minnesota sleeps,” Anderson said, which affects both hunting and fishing.

The Minnesota Water, Land, and Legacy Amendment, passed by Minnesota voters in 2008 to help clean water, was a gamble. “Experts said we'd shoot ourselves in the foot because people won't vote for it, especially in recess,” Anderson said. “We took a big chance but about 60 percent of voters approved the amendment.”

Anderson believes that people love Minnesota for what it has been and want to see their children have recreational opportunities. Many Minnesotans live here for and enjoy the outdoors. In Minnesota, the quality of outdoor life is important—90 percent of people responding to a *StarTribune* survey said they love it here for the outdoors quality of life.

Fewer young people enjoying the outdoors

Young people aren't enjoying the outdoors as much now for a number of reasons, but urbanization is the big one. Access to outdoors is key;

Anderson said that many parents default to team sports. It's easier to drop kids off at soccer practice than take them to hunt and fish.

With fewer young people who hunt and fish and other Minnesotans who don't care or are too busy, and yet others who do care but are not politically or socially motivated, the collective political will to protect our land and water is waning, Anderson said. At peak, Minnesota had 150,000 duck hunters, but today only 80,000 licenses are typically sold. In addition, membership in organizations like Ducks Unlimited and Pheasants Forever is a very small percentage of the hunting population; very few hunters are actively involved.

Time to take a stand to protect our land and water

So what is the solution? Do we continue to adjust and accept declines, or do we take a stand? One of the good things about the Water, Land, and Legacy Amendment is that it secured many acres of land for recreational and hunting use, Anderson said.

In addition, adults must start taking an active role in introducing young people to the outdoors. “If you want to influence a child, you need to take them out there and help them enjoy it whether or not they catch a fish or shoot a duck,” Anderson said.

The best response is to fight for efficient use of Water, Land, and Legacy Amendment funds and introduce young people to hunting and fishing, according to Anderson. “You have to take kids outdoors if you want them to do it in the future.” **LTAP**

—Jeanne Engelmann, LTAP freelancer

INFORMATION SERVICES

The Shelf

Links to these publications and many more are on the LTAP website. Questions? Contact Anne Shelley, Minnesota LTAP librarian, 612-626-8753, ctslib@umn.edu.

Reports

Barriers to Implementing Low-Impact Development Approaches in Washington State Roadways and Highways

(Washington State Department of Transportation, 2010)
This report explores barriers to implementing low-impact development (LID) stormwater management approaches in a state roadway setting and provides recommendations on how WSDOT can overcome those barriers.

Guidance for Construction of Curved I-Girder Bridges

(Center for Transportation Research at the University of Texas at Austin, 2010)
This report explores the behavior of horizontally curved girders during construction, primarily during early stages of construction when little or no bracing is provided.

Evaluation of Environmental Impacts of Two Common Restoration Methodologies for Pipes that Convey Stormwater Runoff

(Virginia Transportation Research Council, 2010)
This report examines the environmental impact of chemicals that leach from synthetic pipe liner material into water flowing through the repaired pipe.

Stormwater Treatment: Assessment and Maintenance

(University of Minnesota, 2010)
This manual has been developed to help users assess the performance of, and schedule maintenance for, stormwater treatment practices.

The New National Standard for Maintaining Minimum Sign Retroreflectivity

(Michigan Tech Transportation Institute, 2010)
This web-based informational presentation is designed to help local agencies begin the discussion of sign retroreflectivity with decision-makers.

Catalog

Winter Chemical Catalog

(Mn/DOT, 2010)
Mn/DOT's Office of Maintenance has published a *Winter Chemical Catalog*. The document provides contact information for an array of deicer vendors as well as background information about deicing chemicals and their impact on infrastructure and the environment.

LTAP

Search me

The Minnesota LTAP website features custom search engines to help you find information. You can search:

- LTAP & TTAP Centers
- State DOTs
- Transit agencies
- University transportation centers

Bookmark www.mnltap.umn.edu/SearchOptions.html.

Another great resource is TLCat, the Transportation Libraries Catalog. It is an online database of the leading transportation libraries with extensive transportation-related research and publications. Along with links to many other organizations, TLCat is accessible at www.mnltap.umn.edu/Topics/TransportationOrganizations.html.

LTAP

Flooding resources coming to LTAP website

This winter is already one for the record books, and many officials are concerned about spring snow melt and flooding. To help you prepare

for floods and other emergencies, Minnesota LTAP is creating a new Technical Topics page on our website. The page, which will have links

to many helpful resources, will go live in February. Please check it out and keep your fingers crossed for a gradual spring thaw! **LTAP**

Ponds from page 4

explode into much larger ones and every portion of a project may involve another regulatory agency.

Sharon Doucette, environmental resources coordinator for the City of Woodbury, said the city developed a work plan to deal with constructed stormwater ponds first, and wetlands later. After visual inspections of ponds was completed, three ponds were identified as needing sediment maintenance. Sediment sampling resulted in dredging a level I, II, and III pond in the same year. Each pond sample cost the city \$500, and several samples were needed from each because samples within the same pond but taken at different locations and depths within the pond yielded varying results. Costs rose further when the city looked for a disposal site for the level III material. They found that only a few sites will take the material, and it has to be tested again by the disposal site for metals, volatile organic compounds (VOCs), and herbicides and pesticides. Biggest lesson learned: don't proceed with removal of level III contaminated sediment until more and better disposal options are available. "There are a lot of other ponds that need maintenance—do those first," Doucette concluded.

Pete Willenbring, WSB and Associates, Inc., consulted with the City of Circle Pines to complete a pond inventory and evaluation and develop a management plan for 10 ponds. The city experienced a lot of development in the 1950s–1970s, and Willenbring found that developers often built trails to contain ponds, which presented special maintenance issues. After identifying the ponds requiring maintenance, a funding plan was developed along with a complete pond management plan with a prioritized project list and schedule. The plan also included the scope of the project, disposal site, access, and whether dewatering or winter work was required. The city now has a priority list of projects through 2011. **LTAP**

—Jeanne Engelmann, LTAP freelancer

Trails from page 5

surprising conclusions surfaced:

- Trail surroundings matter; this includes things like availability of water and cleanliness of trails.
- Trails had to be "pretty bad" before users registered dissatisfaction. Users were satisfied until trail conditions deteriorated almost to the "poor" category.
- Preventive maintenance is most cost-effective when trails are in the "good" category rather than waiting until conditions reached the "poor" level. In other words, to keep users in the "highly satisfied" range, the trails need to be maintained at the "good" rating level.

After deciding to continue using the PASER scales, engineers were sent out to assess the condition of each segment of trail and transfer that information into the Geographic Information System

(GIS). New management practices evolved from breaking the PASER ratings into four tiers. Then, using the GIS information, trail graphs were color-coded to show the breaking point at which user satisfaction started to fall off. "We learned that 98 percent of users were satisfied with the trails but 28 percent could fall off into dissatisfaction when trail conditions dropped into the good or fair tier," Christensen said.

The answers to the two study questions indicated that engineers' ratings of trail quality correlated well to that of users, and user satisfaction correlated well to the technical trail ratings. The study results were used to prioritize budget and schedule maintenance based on criteria mutually agreed on by both engineers and trail users. **LTAP**

—Jeanne Engelmann, LTAP freelancer

Maintenance Research Corner

Staff of Mn/DOT's Maintenance Operations Research (MOR), along with the members of the Mn/DOT New Technology, Research, and Equipment Committee (NTREC), publish a monthly one-page bulletin of their latest news and findings. Below is a product from a recent bulletin. If you would like to be added to the bulletin mailing list, please e-mail Farideh Amiri of Mn/DOT Maintenance Research at farideh.amiri@dot.state.mn.us.

NEUTRO-WASH

Stopping rust before it starts is the most cost-effective method of extending the operational life of expensive winter maintenance equipment. Today, most maintenance employees regularly wash their equipment in an attempt to remove the salt, but a corrosive "white salt film" reappears after the equipment has dried. This "white salt film" is what

fuels the rusting process. NEUTRO-WASH neutralizes the corrosive effects of sodium chloride, allowing the salt residue to be washed away. District 2 is currently evaluating whether NEUTRO-WASH is effective and if it prolongs the life of their snow and ice equipment.

For more information, contact Steve Scholand, transportation operations supervisor 3 with District 2, at 218-277-7966. **LTAP**



TRAINING AND EDUCATION

Calendar

If your professional organization meets on a regular basis, let us include the information here. Contact us at mnltap@umn.edu. For an up-to-date list of events in Minnesota, please see the LTAP workshops and events calendar: www.mnltap.umn.edu/events.

Date	Event	Location	Contact
February			
LTAP Feb.	Work-Zone Traffic Control Seminar (0.5 cr)	Statewide	Highway Technologies, 800-766-5483, Mike.Leaf@hwy-tech.com
LTAP Feb. 9	Traffic and Transportation Engineering Symposium (1 cr)	St. Paul	www.mnltap.umn.edu/Events
LTAP Feb. 10	TERRA Pavement Conference (1 cr)	St. Paul	www.cts.umn.edu/Events/PavementConf
LTAP Feb. 22	Pavement Rehabilitation: Products, Processes, and Strategies (1 cr)	Duluth	612-625-2900, cceconf2@umn.edu
LTAP Feb. 24	Pavement Rehabilitation: Products, Processes, and Strategies (1 cr)	Rochester	612-625-2900, cceconf2@umn.edu
LTAP Feb. 25	Pavement Rehabilitation: Products, Processes, and Strategies (1 cr)	Twin Cities Metro	612-625-2900, cceconf2@umn.edu
March–May			
LTAP March 1	Transportation Career Expo	Minneapolis	612-625-5608, haag0025@umn.edu
March 2	55th Annual Asphalt Contractors' Workshop / Quality Initiative Workshop	Brooklyn Center	651-631-0156, info@mn-aapt.org
LTAP March 8	Seal Coat Operations: A Workshop for Practitioners (1 cr)	Twin Cities Metro	612-625-2900, cceconf2@umn.edu
LTAP March 15	Seal Coat Operations: A Workshop for Practitioners (1 cr)	Brainerd	612-625-2900, cceconf2@umn.edu
March 15–16	Northland Chapter of ATSSA "How To" Training & Education Workshop (0.5 cr)	Fargo, N. Dak.	www.northlandatssa.com
LTAP March 22	Seal Coat Operations: A Workshop for Practitioners (1 cr)	Mankato	612-625-2900, cceconf2@umn.edu
March 10–11	Concrete Paving Association of Minnesota 50th Annual Concrete Paving Workshop	Duluth	www.concreteisbetter.com
LTAP Apr. 12–13	Spring Maintenance Training Expo (1 cr)	St. Cloud	www.mnltap.umn.edu/Events/SpringMaintenanceExpo
May 24–25	CTS Transportation Research Conference	St. Paul	www.cts.umn.edu/Events/ResearchConf

<p>LTAP workshops LTAP workshops, along with events cosponsored by Minnesota LTAP, are marked with an LTAP above. Check the Web for details: www.mnltap.umn.edu/Events. You may also register online.</p> <p>Brochures advertising upcoming LTAP workshops are mailed six weeks prior to the first scheduled workshop. Electronic notices are sent as a reminder approximately three weeks later. To be included on our electronic mailing list, contact Minnesota LTAP at mnltap@umn.edu or call 612-625-1813.</p> <p>Disability accommodations are provided upon request.</p>	<p>CTAP workshops If the events above aren't convenient for you, consider scheduling a Circuit Training and Assistance Program (CTAP) workshop in your neck of the woods. CTAP uses a fully equipped van to provide on-site technical assistance and training. Current CTAP training courses and special presentations are:</p> <ul style="list-style-type: none"> • Asphalt Pavement Maintenance and Preservation (0.5 cr) • Culvert Installation and Maintenance (0.5 cr) • Gravel Road Maintenance / Dust Control (0.5 cr) • Roadside Vegetation Management and Erosion Control (0.5 cr) • Snow and Ice Control Material Application (0.5 cr) • Truck and Equipment Washing Best Practices (0.5 cr) • Work-Zone Traffic Control and Flagger Training (0.5 cr) 	<p>CTAP workshops are informal and usually hands-on—in fact, many are held in or adjacent to maintenance facilities. Sites with easy access for the van are preferred. CTAP fees are \$250.00 for 8 to 10 participants and \$350.00 for 11 to 40 participants. The fees are for a two- to four-hour CTAP workshop. To schedule classes, call the CTAP instructor, Kathy Schaefer, at 651-366-3575, or e-mail Kathleen.Schaefer@dot.state.mn.us.</p> <p>Roads Scholar credit You can earn credits in Minnesota LTAP's Roads Scholar program by attending LTAP and CTAP workshops and other cosponsored events (credits are indicated above). Required workshops and electives are subject to change. To learn more or enroll in the program, visit www.mnltap.umn.edu/roadsscholar. LTAP</p>
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Workshop poster enclosed

We're pleased to include the 2011 LTAP workshop poster with this newsletter. Please take a moment to see what's on tap and plan your training and professional development. And we hope you post it in your building or shop too!

Training news: AirTAP, township tour, spring expo

Along with Minnesota LTAP, did you know that the Center for Transportation Studies also administers a similar program for airport personnel? It's true, and this year we held our 7th Annual AirTAP Fall Forum. This two-day event included many educational sessions about airport operations as well as technical tours at the Alexandria Airport on topics such as pavement rehabilitation, lighting, equipment, and fueling.



Teresa Washington, our LTAP workshop facilitator, joined the AirTAP staff last year to help manage the 7th Annual AirTAP Fall Forum.

AirTAP, the Airport Technical Assistance Program, is similar to LTAP in that we provide training, technical assistance, and resources to help airport managers and maintenance personnel improve the quality, safety, and efficiency of airport operations.

One of those operations is snow and ice control. At many airports the same person who plows our county roads and city streets also plows the city's airport runways. Plow operators face different challenges when maintaining runways. Slippery surfaces are more dangerous for a plane than for a car, as planes are not able to brake in the same way a car can. Maneuvering a plow on the runway also requires a special technique to keep lighting, signs, and markings clear of snow, which is critical to a safe takeoff or landing.

If you are interested in learning more about snow and ice control at your local airport, check out the

AirTAP fact sheet on airport snow and ice operations at www.mnairtap.umn.edu. The AirTAP site also has resources on topics such as wildlife control and equipment sharing.

In other news, the annual Minnesota Township Tour is coming up March 16 through April 1. Ken Schroepfer will present information on sign retroreflectivity requirements. Ken wants to make sure you have a sign management plan in place by 2012 and will also talk about non-critical signs that may be removed instead of being replaced.

I look forward to seeing many of you at the 2011 Spring Maintenance Training Expo in April. We have several new graduates to honor at the Roads Scholar Ceremony. We are also planning many important educational sessions such as a Toward Zero Deaths session with cable barrier median and Safety Edge installation and maintenance topics. **LTAP**

—Mindy Carlson, LTAP coordinator

Fact sheet offers tips for airport snow and ice control

July is a good time to start planning winter operations at airports, according to a new fact sheet from the Airport Technical Assistance Program (AirTAP).

To be prepared before the first snow flies, the fact sheet advises creating a "snow plan" for winter operations. Other sections discuss communication with pilots and other key airport players, plowing procedures, and appropriate use of sand and chemicals.

The fact sheet is available for download at www.mnairtap.umn.edu. **LTAP**

