Special 12-page issue:

Pavement conference: asphalt, concrete, and more

More than 220 people were on hand for this year’s TERRA (Transportation Engineering and Road Research Alliance) Pavement Conference in St. Paul—more than any other year in the conference’s 16-year history.

TERRA sponsored the conference in cooperation with the Center for Transportation Studies, the U of M Department of Civil Engineering, the Minnesota Local Road Research Board, the City Engineers Association of Minnesota, the Minnesota County Engineers Association, MnDOT, Minnesota LTAP, the Minnesota chapter of the American Public Works Association, and the Minnesota Street Superintendents Association.

Audio recordings and slides of all the presentations, as well as videos for selected presentations, are available at the TERRA website: www.terraroadalliance.org.

Articles summarizing several of the presentations are on pages 4-9.

Living snow fences: win-win-win

A new study predicts that the Minnesota Department of Transportation (MnDOT) could see net economic returns of more than $1.3 million per year by expanding the use of living snow fences to guard roads from drifting or blowing snow.

Living snow fences are plantings of trees, shrubs, grasses, or crops used as windbreaks to manage high winds and drifting snow before it reaches roads. With low maintenance costs and minimal damages, living snow fences protect roads from snowdrifts and blown ice, improving driver visibility and road surface conditions, which saves both time and money.

In a recent webinar, Gary Wyatt, an agroforestry professor with the University of Minnesota Extension in Mankato, described the study and highlighted a benefit-and-cost-analysis tool that enables MnDOT to further its living snow fence program. The tool evaluates the costs of living snow fences to landowners and helps calculate the global and site-specific economic, transportation, and environmental benefits.

“There are about 4,000 problem sites across the state of Minnesota,” Wyatt said.

Online gravel road training open for registration

Minnesota LTAP’s first online distance-learning course—Gravel Road Maintenance and Design—is open for registration. The course, developed in partnership with Minnesota’s Local Road Research Board, will provide a high-quality training option at a low cost to students and employers.

Online training is perfect for students who are unable to travel or prefer a “work at your own pace” environment. It is particularly valuable for older students who may find it challenging to return to a traditional classroom setting.

Students will be able to access the new training anytime, anywhere, within a three-month timeframe. All that’s needed is access to a web-enabled computer and an e-mail address.

The course is made up of 10 lessons. Each lesson contains narrated presentations, video clips, reading assignments, a quiz, time to reflect on what has been learned, and time to develop an action plan. All reading assignments are available online within the course, so no additional books or materials need to be purchased.

The course includes content similar to the in-person LTAP workshop. Students who have already taken the classroom version can test and refresh their knowledge—and earn an additional Roads Scholar credit—by taking the online version. Taking the online course also lets students become familiar and comfortable with computer-based learning.

Please see www.mnltap.umn.edu/gravelroadonline for course details.
AWARDS & HONORS

St. Paul Department of Public Works accredited

The St. Paul Department of Public Works became the first Minnesota city to meet the American Public Works Association’s accreditation standards. Director Rich Lallier announced that his department was certified in the “Best Practices” accreditation by the APWA on January 10 after a three- and a-half year process of rigorous evaluation. The APWA is known as the international professional organization that determines best practices in public works departments across the world. “It’s a way to make sure you are doing what the industry thinks are the best practices,” said former communications staff member Shannon Tyree.

This certification was a voluntary approach to evaluate compliance with recommended management practices, and it was accomplished on top of the department’s daily work. “You’re always looking for ways to improve, and that’s what this process was all about. How can we improve as a public works organization?” said Accreditation Manager Paul Kurtz.

The St. Paul department compared its standards with the APWAs Public Works Management Practices Manual and found that exactly 401 standards were applicable. St. Paul then had to determine whether it was in non-compliance, partial compliance, substantial compliance, or full compliance with each of the APWAs requirements. The department put new policies and practices in place and recorded them in complete documentation to fully meet the correct standard of compliance, and performed internal reviews and made necessary edits.

After all this was completed, the APWA sent a team of professionals from around the nation to determine whether all practices met compliance. The audit finished with the certification of the St. Paul Public Works Department—making it the 75th department in the nation to receive accreditation.

APWA Vice President Elizabeth Treadway attended a city council meeting to bestow the honor to Lallier and Mayor Chris Coleman. “They had to take a good hard look at themselves over 500 standards of performance to achieve acceptable or outstanding ratings against those standards. Four-hundred-one applied to your organization, and I can tell you that they are a superior group of folks,” Treadway said. In addition to an enhanced professional image, other benefits of the self-assessment were clarified budget needs and improved effectiveness throughout the entire department. If these performance standards are maintained, the accreditation will last four years, after which the department would have to defend its practices again to the APWA.

—Nicola Losik, LTAP intern

Association announces annual awards

The City Engineers Association of Minnesota (CEAM) presents the Engineer of the Year Award and the Project of the Year Award during its January conference. For details, please see www.ceam.org.

CEAM 2011 Engineer of the Year

Eagan City Engineer Russ Matthy is the recipient of this award. Matthy has received a variety of other awards and recognitions in recent years, including Eagan’s Spirit Award (employee of the year) just four years after being hired. As stated in the nomination form, Matthy “…helped build a culture of innovation and support” within his city.

2011 Project of the Year Award

The City of Golden Valley, Fridley, and Hutchinson received this honor for their 2011 Trunk Water Rehabilitation Cooperative Agreement Project. The project’s nomination materials described an extraordinary cooperative and coordination effort between public partners while applying a new water main lining technology that addressed deteriorating pipe conditions in an economical and efficient manner.

Turfgrass mixes; online course and resources

Researchers in the U of M’s Department of Horticultural Science are working with the Minnesota Department of Transportation to identify salt-tolerant turfgrass mixes for use on Minnesota roadways. With funding from the Local Road Research Board, the research team has tested hundreds of grass mixes at an indoor facility and on roadside plots. They have already discovered more efficient turf mix than those MnDOT currently uses. The best mixes are those that can survive heavy salt exposure, cold winter conditions, and hot and humid summer weather. Ultimately, the research will help agencies do their work more efficiently and save money by decreasing the number of replanting projects needed.

The U of M’s College of Continuing Education offers an online Turfgrass Pathology course. Read more about the training at www.cce.umn.edu/turfgrass-management.

Another resource is the U of M Extension turfgrass management web page: www.extension.umn.edu/turfgrass. LTAP

Contact us

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Technology Exchange welcomes contributions and suggestions from its readers. Submit articles, news items, technical topics, and other comments to Pamela Smeal, managing editor.

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**Problem:** Increased environmental awareness has led local roadway agencies to consider various means of mitigating the effects of stormwater discharge into lakes and rivers. One technique is to install rain gardens that partially treat the stormwater. Unfortunately, many urban settings do not have enough space to construct a rain garden large enough to fully absorb storm runoff.

**Solution:** The City of Grand Rapids began constructing modified rain gardens as part of a 2008 street reconstruction project on First Avenue Northwest. Since the rain gardens are not large enough to be used solely as infiltration basins, they are connected and allowed to discharge to the city's storm sewer system.

**Procedure:** The gardens were constructed between the curb and the sidewalk on First Avenue Northwest. Each garden is about 15 feet wide and 25 feet long, with a total size of 375 square feet. The rain garden design includes an infiltration pipe and an overflow pipe, allowing the rain gardens to discharge excess water to the storm sewer system.

**Results:** During the summer of 2011, two of the rain gardens were monitored during rainfall events. Samples of stormwater runoff entering the garden were collected, as were samples from the discharge pipe from the rain gardens to the storm sewers. These samples allowed researchers to determine if the rain gardens reduced the amount of total suspended solids, nitrogen, and phosphorus in the runoff.

**OperA spotlight:** Stormwater Pollutant Removal in Rain Gardens

Although no significant conclusions can be drawn about the rain gardens' effect on phosphorus or nitrogen levels, test results indicate that the rain gardens were very effective in removing total suspended solids from the water. Data collected from 10 samples indicated that an average of 69 percent of the total suspended solids was removed as the water passed through the gardens. These results demonstrate that the modified rain gardens have potential as a best management practice for controlling and reducing stormwater pollutant discharges to receiving bodies of water.

**Approximate cost:** $14,000

**OPERA funding:** $58,000

**Implementation:** The city plans to continue implementing this modified rain garden design where feasible. Additional research should also be completed to further quantify the potential benefits of these rain gardens.

**Status:** Complete LTAP

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The Exchange regularly highlights projects completed under the LRRB's Local Operational Research Assistance Program (Local OPERA). A sample from the 2011 OPERA annual report is reprinted above. The report is available at [www.mnltap.umn.edu/opera](http://www.mnltap.umn.edu/opera). Project fact sheets, along with the full project reports, are posted on the OPERA website as they are completed throughout the year. All are available at [www.mnltap.umn.edu/opera](http://www.mnltap.umn.edu/opera).
Low-volume streets and roads make up more than 75 percent of all road miles in the United States, and those low-volume roads are crucial to our nation's economy. They are where all of our farm, forest, and mine products and most of our manufactured goods begin their journeys to market. They are also where most of our nation's workers begin and end their daily commutes.

Nearly all of those low-volume roads were constructed in the 1950s and 60s when America was trying to get out of the mud that had bogged down vehicles for hundreds of years. Now those local roads are near or past the ends of their useful lives. This leaves highway officials in counties, townships, and cities all across the nation wondering how they can keep these millions of miles of roads functioning adequately in a time of reduced budgets and increased demand.

Don't say the "U" word!

One such official is Sue Miller, the county engi- neer in Freeborn County, Minnesota, in the heart of the Corn Belt. At the 2012 TERRA Pavement Conference, Miller said there's a "new normal" for county engineers—and for the most part, it's not a pretty picture: "In our county, we have 224 miles of aggregate-surfaced roads and about 410 miles of asphalt-surfaced roads. Some of them look good, and we're able to maintain them. But a lot more are in bad condition."

Miller described the plight of one of her roads: County State Aid Highway (CSAH) 20: "Last year we had a tougher than normal winter, and County Road 20, which was asphalt-surfaced, had a lot of trouble with frost boils." When Miller used that word—"frost boils"—Miller continued, "my truck drivers were com- ing back into the office saying, 'We're just wasting taxpayers' money on this!' As fast as we can fix one spot, our trucks are breaking up the next spot. We're just making it worse!"

That left Miller in a bind. "We couldn't just leave the road as it was," she said, "but County Road 20 wasn't scheduled for any type of major maintenance until 2015. So after some discussion, we decided we had no alternative. We had to unpave it—claim the asphalt layer had worn out, revert to a gravel-surfaced road until we had time to consider alterna- tives to traditional paving and find the required funding."

When Miller used that word—"unpave"—in a county board meeting, she discovered that it was loaded with negative connotations. "For some of my county commissioners, the word unpave means loss of service. It means we've failed. No one wants to tell constituents that the level of service they expect can't be guaranteed. In fact, I was told not to ever use that word again!"

Frost boils were undoubtedly just the last phase in the deterioration of Freeborn County Road 20. That road, like virtually all of America's rural roads, was built for a type of vehicle and a volume of traf- fic that no longer exists. In days gone by, farmers brought their product to market with single-axle trucks. But to compete in today's economy, farmers need semi-trailers that can hold 800 or more bush- els of grain.

Furthermore, the traffic on America's rural roads is no longer just farm traffic. Ethanol plants, wind farms, soybean processors, and many other enter- prises are placing increasingly heavier vehicles on those rural roads. Those business need to get their products to market year-round; that includes March and April when, in northern climates, load restric- tions are in force because the subgrade and base lay- ers are in their softest, most vulnerable condition. With dwindling budgets, reverting pavements to gravel ("We're not using the 'U' word!") is a hot topic all across the country. At the recent South Dakota Regional Local Roads conference in Rapid City, 220 local road managers from North and South Dakota, Nebraska, Wyoming, Colorado, and Montana attended. Two out of the 15 sessions offered were devoted to the "U" word—but fully half of all comments submitted on evaluation forms were about that topic.

North Dakota's oil boom

Jack Olson, a planner for the North Dakota Department of Transportation, is dealing with a problem similar to Sue Miller's—multiplied by about one million! He has attempted to quantify the amount of damage being done to the roads in northwestern North Dakota's booming oil fields.

The first oil well in North Dakota was drilled in 1951. From that date, for about 30 years, oil pro- duction was fairly steady except for a mini-bloom in the 1980s. But beginning in 2008, the curve of North Dakota oil production started heading almost straight up. In the year 2000, the state produced about 3 million barrels per month. But by 2011, production had reached about 16.5 million barrels per month. Olson projects that, within two years, North Dakota will be producing about 30 million barrels of oil per month. "We'll pass California and Alaska," he said. "North Dakota will be the number two oil producing state after Texas."

What's responsible for the sudden change? In a word, fracking. The geological formation under North Dakota's oil lands, called the Bakken Formation, is composed of low-permeability, low-porosity shale. Geologists have known there was oil in this formation for more than 100 years. But until fracking was developed, there was no economical way to get the oil out. In fracking, Olson explained, "They drill down about 5,000 feet. Then they pump differential pres- sure on the bore so it starts curving. By the time it reaches 10,000 feet, it's on the horizontal. Then they continue for another 10,000 feet. Next, they pump fluid down into that 10,000-foot horizontal run. That fractures the rock, which releases the oil so it can be pumped out. It's transforming the oil industry."

Boom spells doom and gloom for rural roads

But the oil industry's success is having the same effect on the rural roads in North Dakota (and surrounding areas in Montana, Saskatchewnan, and Manitoba) that Sue Miller is experiencing in Minnesota—but to a much greater extent.

"In the early 1990's," Olson said, "the typical oil drilling rig weighed about 90,000 pounds. Now the rigs are about 110,000 pounds. But the legal load limit in North Dakota, with the right number of axles, is 105,500 pounds. Everything's getting bigger all the time."

And the drilling rigs are just the tip of the ice- berg. Drilling one well requires many other heavy vehicles. For example, each well requires two mud pumps that each weigh 164,000 pounds. And three generator houses that each weigh 111,180 pounds. And a hydraulic unit that weighs 127,640 pounds. The list goes on. And that's for just one well. Olson estimates that, eventually, 33,000 to 40,000 wells will have been drilled in North Dakota.

Furthermore, heavy equipment is not the whole story. Olson said, "It takes about 400 truck loads to drill a vertical well, which is still about 10 percent of our wells. But to drill one of the horizontal wells, it takes about 1,150 truckloads. And of course, all of those trucks then need to go back for more, so it's actually 800 trips and 2,300 trips! Those are all legal loads, but they're all going on county roads that were designed for much lower volumes of single- axle farm trucks."

Working with the North Dakota State Patrol, Olson has calculated the number of equivalent single-axle loads (ESALs) being placed on those roads. "The impact on our asphalt-surfaced roads from a single well is 2,017 ESALs. The impact from the same well on our concrete-surfaced roads is 3,175 ESALs." The photo on the next page shows the result of oil-drilling-related traffic on one North Dakota road—four-inch ruts.

"In the last legislative session," Olson said, "state highways in the oil field received $228.6 million. County and township roads received $142 million. Another $60 million was allocated for roads outside that area that are impacted by the oil industry. So
that's a total of about $430.6 million last year—but we're not keeping up with the damage." Currently, there is no North Dakota statute that requires any of the taxes paid by oil companies to be ear-marked for road maintenance. Olson said officials are discussing the situation.

Good information about low-volume roads

With so many miles of low-volume roads in jeopardy—and with miles of previously paved roads reverting to gravel surfaces—it would be good if there were some reliable sources of advice on how to keep those roads in service.

There are.

Ken Skorseth, of the South Dakota Local Technical Assistance Program (LTAP), is an expert on gravel road maintenance. He hosted the South Dakota Region Local Roads conference referenced earlier in this article. Like Sue Miller, Skorseth abhors that "U" word. "I try to put a posi-tive slant on this topic," he said. "I'd rather refer to 'alternatives to paving.' Maybe that softens it a bit. But the fact is— it's a bitter pill to swallow."

Based on a study of 120 low-volume road seg-ments, Skorseth recommends three ways to go with low-volume roads:

- Gravel surface—up to 170 ADT
- Chip seal on an aggregate base—up to 650 ADT
- Hot-mixed asphalt—above 650 ADT

He warned that removing asphalt and reverting to a gravel surface may only lead to different types of problems: "If the truck traffic is 25 to 50 ADT and there is low subgrade support, you will need 14.5 inches of gravel. That's hard to do when trucks are knocking it off constantly and the blade needs to be out the road. Furthermore, the quality and availability of gravel varies greatly from place to place."

The good news, Skorseth said, is that chemically stabilized gravel surfaces can perform very well. "One section that the South Dakota LTAP has been observing has high-quality gravel stabilized with annual chloride treatments. It's used by up to 80 concrete trucks every day and has held up very well since 1998. Between then and 2011, it has required less than 200 visits for repair."

Another section observed by SDLTAP is in an area of Montana where there is heavy traffic from oil and gas development as well as from agribusiness. "Their problem is availability of gravel," Skorseth said. "They're running out. They lose a lot of fines from the surface because the gravel they can get is non-plastic. So they mix Bentonite™, a highly plastic clay, into the top three inches of an eight-inch gravel layer. That becomes their wear-layer. Furthermore, the quality and availability of gravel varies greatly from place to place."

"Good" box and for treating materials halfway into the "Good" box and prevent the too-much-

Figure 1. Plotting plasticity (vertical axis) against gradation (horizontal axis)

Figure 2: Three types of gravel

CAl treated gravel road that gets 400 ADT, 30 to 40 percent of which are heavy trucks

"Good" box and for treating materials halfway into the "Good" box and prevent the too-much-

Figures 1 and 2: Skorseth's gravel chart. These additives can give you better compac-

plasticity, they act as binders, holding the fines together."

As an example, Jones cites the road shown below. "Before we treated it, there was lots of dust and material being displaced, and it required grader maintenance every couple of weeks. But with a CaCl2 treatment, it now gets about 400 vehicles a day—about 30 to 40 per cent heavy vehicles—and it’s performing very well. They go back to it about once a year with 20 to 30 percent of the original application. It hasn’t lost any gravel, and it needs about one blading a year to get it back into shape."

For the Number 3 gravel—with high-plas-ticity—Jones said electrochemical, sulfonated oil, or enzyme-based additives would be most appropriate. "Those additives require some form of clay mineral to react with, which is what you will have in materials at the top of the chart. These additives can give you better compac-

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MINNESOTA TECHNOLOGY EXCHANGE

PAVEMENT CONFERENCE

Low-volume from page 4

100 years of gravel road research

David Jones, of the University of California’s Pavement Research Center, is another source of research-based advice on how to maintain low-volume roads with chemical additives. In harmony with Skorseth and others, Jones said, “The first thing to say about surface treatments for gravel roads is that you can’t make a bad road good. We need to have a good road to start with, and then we can keep that road good with a chemical addi-tive. It makes no sense to chemically treat a gravel road once and then sit back and wait until it fails.”

Instead, Jones said, “We try to introduce some form of maintenance that will prolong the road’s life. If we come back after three months and put down about 10 to 20 percent of the original application, we’ll find that it lasts another three months. And if we come back the next year and top it off with another 10 or 15 percent, we can actually preserve most of the materials and keep the ride quality up to an acceptable standard with [fewer] grader visits than if the road wasn’t treated.”

But Jones said the only way to know how to choose among the more than 100 available additives is to understand the properties of the gravel in a road. He adds that the two essential factors to take into account in assessing the performance of gravel are plasticity and gradation. Using simple formulas on inexpensive standard test results, he plots these factors on a graph (see Figure 1).

He said, “Of course, everyone would want their material to fall in the ‘Good’ box in the middle of the graph. But materials outside that box can still work, provided the road manager understands the implications. For example, anything that falls to the left of center is likely to erode. But you could use it in level areas of North Dakota or parts of Arizona where they don’t have too much rain.”

Next he divides the “Good” box into two sub-categories and plots three examples from different gravel sources numbered 1, 2, and 3 on the graph (see Figure 2). Sample 1 near the bottom will wash-board and ravel—and therefore will require frequent grader maintenance to maintain an acceptable ride—but because it has too little clay to bind the larger aggregate particles. Jones adds that a road manager can use this graph to determine just how much Bentonite™ or other clay to add to bring the material to fall in the “Good” box and prevent the too-much- Bentonite™ problem described by Skorseth.

Jones agreed with Skorseth by pointing out that plasticity and strength are mutually exclusive. Strength on gravel roads is usually measured with the California Bearing Ratio (CBR) test. CBRs need to be above 15 to ensure all-weather passability. Materials falling in the “Good” block on the graph usually meet this criterion. But if the road carries a lot of trucks, the CBR needs to increase. In other words, you need lower plasticity materials closer to the “Good” box. Sample 2 on the graph would prob-ably meet this requirement.

Jones said most chemical treatments are appro-priate for treating materials that fall within the “Good” box and for treating materials halfway into the box below, i.e., down to a shrinkage product of about 50. This group, he said, includes chlorides (MgCl2 and CaCl2), lignosulfonates, synthetic poly-mer emulsions, and mineral oils—but excludes those designed specifically for high-clay content aggregates. “You don’t want to use chlorides with high-clay-content gravel up at the top of the chart because the chlorides retain moisture and will actu-ally aggravate the slippery conditions,” he adds. “But on materials at the bottom of the graph with low
Greg Felt is walking proof that every improvement in paving doesn't require massive amounts of research and/or big piles of dollars. At the 2012 TERRA Pavement Conference on February 9, Felt, who has extensive pavement design experience with MnDOT and Washington and Scott Counties, described two concrete paving projects. Both included inventive solutions that cost little—or actually reduced cost.

**Customized gradation**
The first project was three miles of new road on Scott County CSAH 21. Because of extensive clay in the soils, Felt used a 2-foot-thick granular sub-base with a customized Class 6 gradation: "We required 50 percent crushed material, and we reduced the amount of fines for better drainage." He also specified 4-inch drain tiles under both shoulders.

**Integrant curb-and-gutter**
Perhaps the project's most innovative element is a 1-foot high-integrant curb-and-gutter (top photo) that, in some places, becomes a MnDOT B-448 curb. "The integrant curb-and-gutter made the difference between this being an asphalt project and a concrete project," Felt said. "By making the 12 miles of curb-and-gutter integrant, we got it for $1.86 per concrete project, " Felt said. "By making the 12 miles of curb-and-gutter integrant, we got it for $1.86 per foot in first costs." Since the integrant curb-and-gutter effectively contains water within the roadway, Felt also designed an inward-sloping median with center drop inlets, which functions two ways. First, it helps to keep water off the roadway, which, when Felt pointed out, is especially important on super-elevated sections. Second, by including a grassy median, it provides some degree of filtration. The wearing course is a standard 8-inch-thick jointed, non-reinforced pavement. However, the design includes a 12-foot-wide, full-depth shoulder; this was required on the full length of the project because scheduled transit buses need to travel on the shoulders at times.

**Phased intersection construction**
Another challenge was that the road needed to carry 19,000 ADT every day during construction. In response, Felt specified that the road’s intersection with Scott County Road 18 be built in stages—seven of them as it turned out. Five of these stages required repositioning of temporary signals. "Building concrete in stages is trickier than doing it with asphalt," Felt said, "and we actually considered doing the intersection in asphalt. But the turning volume between the two roads is almost 10,000 vehicles a day, and lot of that is heavy truck traffic because of the businesses that face the road. So we were concerned about the survivability of asphalt with all the rutting and shoving there would be. Ultimately, we decided to go with concrete." A big part of the solution was careful planning by the contractor.

**Unbonded overlay on an 85-year-old concrete pavement**
The other project was 5.2 miles of unbonded concrete overlay on Scott County 66. The existing pavement was composed of an 18-foot-wide concrete slab, built in 1926, with 4 to 6 inches of asphalt overlay. "At the beginning of the design process," Felt said, "we focused on cost. We considered doing it as an asphalt project, but if we had done that we definitely would have had to remove the original slab and regrind. That would have cost about $850,000 per mile. But we thought, if we did a concrete overlay, we could do the project for $500,000 per mile; actually, the bid came in at $576,000 per mile. So we thought it was worth it to try the concrete." Felt said he sought out advice from MnDOT’s Concrete Office and from the Concrete Paving Association of Minnesota before initiating the design. He urged anyone considering concrete pavement at the city or county level to do the same. He said he received important advice from both sources.

Felt said the old concrete slab "was nothing like the original plans; the drawing showed a lip curb, but there was no lip curb." He added that there was tremendous variability in the quality of the old concrete. "There were places where you could break it apart with your hand, and other places where it was as hard as the day they put it in. You have to expect that on an 80-year-old pavement. It shows the importance of a consistent mix design." In addition to all that, Felt said there was no uniformity to the edge; the edge shown in the second photo was one of the best sections.

**Filling an irregular surface with millings**
Because he had heard there might be some rebar sticking up out of the old concrete, he decided the milling machine should leave the last inch of asphalt overlay intact. Nonetheless, he said, "We were working on a highly inconsistent surface, so getting a consistent profile was going to be hard. At first, we tried laying the concrete on that surface, but we were getting terrible yields—sometimes 15 to 20 percent over the projection. Our thickness was sometimes 12 inches, sometimes 10 inches, and sometimes 5½ inches." His creative solution was to fill the surface irregularities with millings. The geotextile used as a bond breaker was then placed, and the overlay was done on top of that. "That layer of millings gave us a more consistent depth for the concrete overlay," Felt said, "and we actually ended up below our projections on the concrete yield."

At first the overlay was attempted in a single pass. But because the right-of-way was very narrow, that did not allow enough room to bypass traffic during construction. So they went to a two-pass overlay. In the third photo, note that the rebar at the edge of the first slab is bent. "They had a special shoe on the paver that placed those bent bars on the first pass," Felt explained. "Then, after the concrete had cured, they came along with pipes and bent the bars out—and then laid the second pass."

"One thing we learned," Felt continued, "is that you can’t have tandem dump trucks backing up on top of the fabric. When the trucks drove forward, there wasn’t a problem. But when you back up, you tend to make small course corrections. When the dump trucks did that, the tandem wheels were pulling the fabric out of shape. That was a problem when we were trying to lay the concrete in a single pass. But when we went to the two-pass approach, it wasn’t a problem because the trucks never got on the fabric."

**Stripping groove made by the paver**
As shown in the fourth photo, the paver was equipped with a simple shoe that created grooves for the edge and center stripping. "They got the right depth on that shoe just by putting weights from the high school weight set on it," Felt said. "Then, depending on how the mix was coming out and how deep they wanted the groove, they could vary the weight on the shoe. It worked great! The stripping company told us we will get 10 to 20 years out of the stripping because of the grooves. The plows can’t hit them. The only problem I’ve noticed is that, with all the salt they’ve put down this year, that groove is now full of salt." Felt concluded by saying there was considerable traffic during construction, but that “the contractor did an excellent job of informing the people along the road, and their signage did the job. We had no problems at all with traffic. So, on narrow roads where you have no ditches to work with, I think this two-pass method should be considered.”

—Richard Kronick, LTAP freelancer
Full-depth reclamation with foamed asphalt

At the TERRA Pavement Conference on February 9, David Jones of the University of California’s Pavement Research Center discussed his extensive experience with project selection for full-depth reclamation with foamed asphalt (FDR-FA). A comprehensive report on the topic co-authored by Jones, containing guidelines for project selection, design, and construction, is available at www.ucprc.ucdavis.edu/pdf/UCPRC-GL-2008-01.pdf.

A principal investigator/research engineer at the center, Jones said his forensic investigations on failed FDR-FA projects have shown that about one-third of failures were due to project selection, another third to improper mix design, and the other third to construction problems. He warned that FDR-FA is not a fix-all: “If rutting is due to poor compaction or the wrong PG grade, that’s not a problem; you can recycle that. But if you have shallow ruts with cracking in the ruts, it’s probably poor subgrade.”

Jones said all available records should be reviewed to determine if FDR-FA is the right choice for a given roadway: “If you see that fairly substantial maintenance is being done on an annual or semi-annual basis, that’s a warning sign that the subgrade might not be strong enough and FDR-FA won’t necessarily solve the problem. Then you need to decide if you want to improve the subgrade before going forward.”

Preliminary site investigation

Jones recommended a preliminary site investigation—a “windshield survey”—and emphasized that the investigation team should include the maintenance supervisor, “the guy who’s out there every day and knows where the problems are.” The team should look for signs of insufficient subgrade strength such as:

- Rutting combined with cracking in the ruts. “If rutting is due to poor compaction or the wrong PG grade, that’s not a problem; you can recycle that. But if you have shallow ruts with cracking in the ruts, it’s probably poor subgrade.”
- Extensive pumping
- Repeated previous maintenance on the same areas

“If you have a major problem related to structure, drainage, subgrade failure, or excessive deep patching that needs repeated fixing,” he added, “it doesn’t necessarily mean you can’t use FDR-FA; it just means you need to fix those problems first. FDR-FA won’t correct an inadequate subgrade.”

“You also need to know how much wearing layer thickness there is so you know how much you need to recycle," he continued. "Do you need to bring in additional material? Or do you need to take some of the material away?"

Field testing

Jones recommended FWD (falling weight deflectometer) testing but said, “If that’s not available, you can get by with DCP (dynamic cone penetrometer):” In any case, he said, the goal of strength testing is to find weak spots that need to be fixed—and decide if it’s worth it to fix them. He noted that testing should be done when pavement is at its weakest—in the spring in Minnesota. He also recommended testing the weakest lane and the area between the wheel paths.

He also recommended a comprehensive visual assessment; following are his comments on each aspect of this:

Cracking. “Cracking tells you a lot. Old, fatigued asphalt is a good candidate for FDR-FA. But if you find big blocks of asphalt, the pulverization process will need to be slowed down to properly grind up the blocks. You don’t want to just pick them up, send them through the machine, and dump them out the back.”

Previous maintenance. “If the superintendent knows that a section was just repaired last year and the damage is reflecting right through, that’s a sign of poor subgrade, and FDR-FA won’t correct the problem.”

Drainage. “Adequate drainage must be provided or the FDR-FA won’t last; you’ll be back next year to fix the road again.”

Thickness. “Ground-penetrating radar is a quick way to determine thickness. If you don’t have that, you should take cores every 500 feet and for all problem areas. If there is rubber in the surface layer or fabric between layers, those are not fatal flaws, but the FDR operator needs to know about them so the machine can be adjusted accordingly.”

Test pits. Test pits, besides giving a cross-section view of the pavement to verify thickness and a chance to assess the subgrade, are also a source of material for your mix design.

DCP in core holes. “Do DCP measurements in the core holes to identify weak areas; it’s a very effective tool for analyzing the subgrade. You can use it alone or in combination with FWD.”

Determine roadside use. “If land ownership adjacent to the road have filled in the ditches so that drainage is diverted onto or through the road, the road may not be a suitable candidate for FDR-FA.”

Preliminary laboratory testing

Jones emphasized that a gradation test must be done on the top 250 to 300 mm of the material to be recycled (asphalt and underlying material together): “After extensive testing, we found that a maximum of between 5 and 12 percent of the aggregate in this milled material needs to pass the 0.75” (20mm) sieve—despite the fact that earlier manuals tell you 20 percent is OK. You can get by with 15 percent if you pass the soaked ITS (indirect tensile strength) test. But if you have 20 percent and higher, you’re going to have moisture problems and you’ll push your binder content up to uneconomic levels. We never see less than 5 percent; but if you do, you won’t have enough for the foam to cling to. If needed, you can drop deeper into the base layer with the pulverizer to boost the fines.”

He added that it’s important to:

- Know the thickness of the material to be pulverized: “If it’s too thick, the recycling machine can’t get through it and you’ll need to pre-mill. But don’t pre-pulverize! If you run through the material two or three times, you tend to destroy the gradation.”
- Determine the strength of the subgrade by testing for Atterberg Limits, CBR, or R Value to determine the subgrade design.

—Richard Kronick, LTAP freelancer

Foamed asphalt resources from the LRRB

The Minnesota Local Road Research Board (LRRB) published two brochures and a report about foamed asphalt in 2009.

The report, Recycled Pavements Using Foamed Asphalt in Minnesota, includes general design guidelines for the use of foamed asphalt in cold-in-place recycling (CIR) and FDR projects. The guidelines offer details about mix design, materials, construction requirements, construction operations, and quality control and quality assurance.

The brochures, for practitioners and policymakers, explain the increasing popularity of CIR and FDR and the benefits of using foamed asphalt in these projects. In Minnesota, Olmsted and Fillmore Counties have successfully used foamed asphalt with CIR.

The report and brochures are online at www.lrrb.org/detail.aspx?productid=2297.
In response to the large, sudden, and constant fluctuation in paving material costs, agencies at all levels—federal, state, county, and city—are taking a look at alternative pavement type selection (APTS). They hope APTS will increase competition and decrease costs by:

- Taking into account the actual material cost at the time of bidding.
- Attracting more bidders.

At the 2012 TERRA Pavement Conference on February 9, Dave Johnson, now a transportation consultant and previously the director of MnROAD research, discussed a three-year evaluation of APTS. In an APTS project, the agency creates equivalent designs for concrete and asphalt construction. Then life-cycle cost analyses (LCCA) are calculated for both material types, and the difference between the LCCAs is computed and shown in the Special Provisions section of the RFP. Bidders may choose to bid either material type. For the purpose of bid selection, the difference between the calculated life-cycle costs is added to bids on the design with the higher life-cycle cost.

Study procedure

Johnson's study was mandated under an experimental Federal Highway Administration program designated SEP 14. Working with an advisory panel composed of representatives from government and industry associations, he evaluated ten APTS projects—five done for MnDOT and five for Minnesota counties. A questionnaire, in part based on the requirements stated in SEP 14, was then developed and sent to MnDOT employees, county engineers, and contractors who had bid on APTS projects within the past three years (including bidders who were not awarded projects). Of those who received questionnaires, 57 percent responded.

Results

The obvious downside of APTS is that it makes more work for both agency personnel and bidders. This was strongly reflected in the responses. At MnDOT, the extra work was done mostly by design and estimating functions. Some bidders’ extra work was increased if subcontractors were involved. No respondents identified time savings. Other key findings:

- Because of market volatility and project variability, it was impossible to determine if APTS had actually reduced the costs of projects.
- Only one of the five MnDOT projects received both concrete and asphalt bids. Johnson surmised that, in some cases, one industry may have been prevented from submitting bids because of current market conditions. He added that, in one instance, while part of the project was open to both material types, an asphalt overlay was specified for another part of the same project. A survey responder stated that this effectively locked out concrete companies from bidding.
- Two of the five MnDOT projects contained lump-sum bid items; that reduced the workload for MnDOT but increased the workload for bidders.
- County responders reported anecdotally that they received more bids on APTS projects than they usually get on conventional bid projects; however, no comparative data were provided.
- Though MnDOT personnel stated that alternate designs were equivalent, industry responders complained that they were not equivalent.
- Only one MnDOT respondent rejected APTS completely and said MnDOT should always select the pavement type.
- Respondents felt that APTS is complicated because specifications and standards for the two materials have been developed independently. It was suggested that future APTS designs and bidding could be simplified if specifications and standards for the two materials were made more similar.
- Similarly, one MnDOT district used an “alternate pavement match line” between AC and PCC designs in an effort to reduce complexity. At each level of the pavement, it tried to make the structures as similar as possible for both designs. This simplified excavation and embankment computations and drawings.
- Bidders felt there was some lack of uniformity on the part of MnDOT in carrying out the APTS process. In response, MnDOT has sent out a memo providing additional APTS guidelines to make projects more uniform.
- Some bidders questioned the fairness of the life-cycle cost analysis method used by MnDOT. Johnson commented that, no matter how bids are handled, this will probably always be an issue.
- The APTS process did not significantly affect construction. However, respondents did complain that the plans were more voluminous and more confusing to construction staff.
- There was no discernable consensus on which type of project (rehabilitation, reconstruction, preservation) might be more appropriate for APTS bidding. 

—Richard Kronick, LTAP freelancer

David Janisch receives 2012 Rohrbach Award

At the 2012 TERRA Pavement Conference on February 9, the Gerald Rohrbach Distinguished Service Award was presented to David Janisch, MnDOT’s pavement management engineer. Janisch has been a leader in pavement management and pavement preservation strategies for more than 25 years.

"While people tend to focus on the data collection aspect," Janisch said, "I'm most proud of how pavement management has become a key factor in shaping decisions and quantifying MnDOT's performance measures and budget. When I worked for the City of Roseville, we used charts and maps to show people the data and why their streets needed to be fixed.

"But at the DOT," Janisch continued, "we've learned how to use the data to make higher-level decisions. We can project our budget and determine which projects each MnDOT district should consider. The data also allows us to look at the impacts of our funding decisions; if a district reduces funding to its nine districts: "And the single biggest component in the formula is how much the districts need in order to reach established targets for pavement ride quality. We look at questions like:

What does it mean for a road to be in good or poor condition? What percent of the system should be in good condition? What percentage can we afford to have in poor condition? How does that compare with other states?"

The most alarming conclusion from MnDOT's pavement management data analysis is that there is a steady downward trend in the ride quality on our roads. "If you plug in the projects we expect to do over the next four years and the amount of money each district plans to spend on pavements," Janisch said, "ten years from now, we'll have two or three times more miles in poor condition than we have today. And today that number is two or three times more than it was ten years ago.

One of the most formidable challenges MnDOT faces is how to coordinate its activity. "If there's a stretch of road that has safety or congestion issues," Janisch said, "we can look at the pavement condition at the same time—so both issues are addressed. That's another way the pavement management software is valuable." Janisch sees greater efficiency in the future: "Data collection is the most time-consuming and expensive component of pavement management. At the state level, our equipment has changed a lot. Back in the 70s, MnDOT experimented with a camera on a tethered balloon; they had people walking it along the road like in the Macy’s Thanksgiving Day Parade. We've come a long way since then! The vans now have all-digital recording and artificial intelligence that looks at the images and classifies cracking into categories. There's also a 3-D system that can assign crack severity. At the state level, that kind of technology saves on the cost of analysis—though on a municipal system it probably works just as well to have someone walk the streets. But someday maybe we'll do it with satellite imagery. Even today, if you zoom way in on Google Earth, you can see the cracks in the roads. If we could get good enough resolution and new images every year, we wouldn't need to drive the roads at all."

—Dave Janisch

“If there’s a stretch of road that has safety or congestion issues, we can look at the pavement condition at the same time…That’s another way the pavement management software is valuable.”

—Dave Janisch
Tire shreds’ lightweight, sheer strength overcome poor soils

Permeable pavement—how is it working?

Permeable pavement is a promising innovation that is just beginning to be used for Minnesota transportation projects. Because they’re permeable, these pavements let stormwater flow through them—instead of to rivers, lakes, and streams, carrying contaminants with them. And in winter, melting snow seeps through the pavement—meaning less ice and slipperiness.

Information is still sparse about short- and long-term performance in cold climates, however, so early adopters can offer valuable insight. Speakers from the Cities of Bloomington and Shoreview shared highlights from their permeable pavements at the City Engineers Association of Minnesota annual meeting in January.

‘Not your typical asphalt pavement’

Steve Segar described one of two porous pavement projects in the City of Bloomington. For the Harrison Park parking lot project, in 2008, the city decided to use porous paving rather than conventional bituminous pavement because the aging, failed pavement had drainage and erosion problems. In addition, the city had to consider its commitment to non-degradation by avoiding direct runoff to Nine Mile Creek and as its pledge to sustainability.

Design challenges included a subgrade that was already compacted, irregular pavement, and a fairly steep 5 percent cross-slope, Segar said. Grading was done with front-end loaders and tracked skid steers to avoid overcompaction of the sandy subgrade. Tracking and rutting of the 3/8-inch choker course was minimized by use of a front-end loader to transfer the mix to the conventional hot-mix asphalt paver. The porous asphalt pavement was allowed to cool enough to attain stability prior to two passes with a steel drum roller to remove tracking marks.

Two rain gardens were planted with both wet- and drought-tolerant plants in the appropriate areas. During plant and turf restoration, Segar said, tarps were used to protect the porous pavement and avoid contamination.

Maintenance has included fall and spring sweeps with regenerative air sweepers and leaf blowers to get corner debris, Segar said. During the winter, alternating sections of the lot were plowed, and only the entrance was salted and sanded. In summer, mowers discharged onto grass to avoid clogging the porous pavement. Training in-house maintenance staff was key to project success, he noted.

Segar shared helpful observations about porous pavement performance:

• In winter, there was some ice and plow damage and aggregate loss in the first season, but it was minimal.
• The high infiltration of the pavement surface has almost eliminated the refreeze from melting snow during late winter/early spring freeze/thaw cycling.
• In summer, during rain events, the porous pavement stayed dry while the regular pavement didn’t, and the rain garden took much of the drainage.
• In fall, weeding and leaf debris cleanup through sweeping was important to minimize clogging.

Scott Anderson, also from Bloomington, described a second parking lot project outside the department’s engineering office. Issues included poor drainage and ice problems due to irregular pavement, and a tight construction area. To learn more about pervious concrete, staff gathered information from the National Ready Mixed Concrete Association (www.nrmca.org).

The existing subgrade was very sandy, Anderson said, so the city used locally sourced limestone for the recharge bed. The choker aggregate course was eliminated based on rutting experience from the Harrison Park project. During construction, test cylinders were cast to estimate in-place mix strength. Construction consisted of four passes on two consecutive days; a skid loader was used to transfer the mix from the truck on the last pass. Initial contraction joints were tooled at 40-foot intervals. A seven-day wet cure was accomplished using plastic and wet curing blankets secured with rebar because of windy conditions. After the initial cure, isolation joint spacing was cut at 10-foot intervals.

Anderson said a rainwater garden, sized to fit the available space, proved to be an important part of the project. The city also preserved shade trees and installed an overflow drain that led to a storm sewer to handle roof runoff drainage.

Maintenance was a little different for pervious pavement, Anderson said. In fall and spring, the pavement was swept with a regenerative air sweeper. In winter, plowing was done with a rotary broom—which proved to be inefficient—so the city switched to using a conventional plow, he said. No sand or granular salt is used; however, a salt brine solution has been used during icy conditions. Recent summer landscaping projects were adjusted to avoid contaminating the pavement voids.

Bloomington educated the public about pervious pavements through interpretive signage and at home improvement fairs, on its website and local television, and in the newspaper. “It’s not your typical asphalt pavement,” Anderson concluded.

Higher cost buys longer durability

Mark Maloney, director of public works for the City of Shoreview, described an example of permeable pavement in the Woodbridge neighborhood. In 2009, a large pervious concrete project was constructed in an area with high-infiltration soils that required no storm sewer or sub-drain installation. So far, he said, there have been no significant clogging or standing water problems.

The cost of pervious concrete for this application was about 8.5 percent higher than a more traditional approach with separate street and stormwater infrastructure. According to Maloney, “Use of pervious concrete makes the most sense when leveraging high-infiltration soils—that’s when using pervious concrete is cost-effective.”

Maloney shared these insights from the project:

• The saw cut joints appear to be more durable.
• Coarse, angular aggregate (not rounded) works best with a 40 percent void space.
• Use of a curing fabric rather than poly sheeting avoids drying out.
• A vacuum or regenerative air sweeper is used to keep the surface clean to avoid clogging in the top 1/4 inch. Some areas may need deeper cleaning, so a cleaning schedule is needed to clear organic material that collects over time.

During winter, the city continues to use a one-ton pickup to plow the streets in the neighborhood, and it does not use road salt or deicing products. Areas affected by the salting of the adjacent arterial highway showed some aggregate loss, Maloney said, so pervious concrete might not have been the optimal choice for road sections just off highly salted roads. Maloney also stressed the need to educate residents so they understand the unique features of pervious concrete pavement. He anticipates long durability for pervious concrete surfaces: a 30-year life cycle “may be conservative,” he said, though no long-term research yet exists for pervious concrete.

LTAP

—Jeanne Engelmann, LTAP freelancer

Tire shreds’ lightweight, sheer strength overcome poor soils

Construction on a multi-year, $25 million road project outside of Mankato on CSAH 12 was delayed when an embankment leading to a bridge failed, temporarily affecting service on the DMR&E Railroad’s mainline running along the base of the embankment. Blue Earth County sought the advice of geotechnical engineers to determine the cause of the failure and figure out the most effective and cost-efficient remedy. In this case the solution turned out to be recycled-tire engineered aggregate (R.T.E.A.).

Determining the cause required reviewing the site, which had about a 30-foot-high embankment with double train tracks at the bottom. Soil borings were drilled and tests were run on samples from the road section. The determination was that heavy fill on top of soft soils caused the failure and continued movement.

Four different materials were evaluated for their engineering properties and cost-effectiveness: foam, lightweight aggregate, wood chips, and tire shreds. “Shredded tires have certain properties that were advantageous in this case,” said Bob Gale of Gale Tec Engineering Inc. “They have a high interface friction angle and low weight, about one-third of the weight of regular soil.”

The county engineer, Al Forsberg, was very satisfied with the diagnosis and the remedy. “Tires were the most economical solution and they solved the slope stability problem,” Forsberg said.

(Condensed from a press release)
Mill-and-overlays—strategies and solutions for cities

When it comes to mill-and-overlay projects, how can we choose the right solution for the right condition? Speakers at the City Engineers Association of Minnesota annual meeting in January said the steps to success lie in knowing the existing pavement conditions and understanding what methods to use for those conditions.

Overlay, reclaim, or recycle? David Rettner from American Engineering Testing, Inc. discussed how to choose rehabilitation solutions including overlay/mill-and-overlay, reclaimation, recycling, cold-in-place recycling (CIR), and full-depth reclaimation (FDR).

Direct placement is called for when all the following are true: additional structure is needed, there are no issues with existing pavement materials, and no vertical limitations exist. Choose milling when one or more of the following is true: the existing pavement has adequate structure, there are problems with existing pavement materials, or vertical limitations exist. Poor candidates for overlay or mill-and-overlay, Rettner said, are pavements with poor subgrade and/or base support and significant surface distresses.

Reclamation involves milling, haul away, and resurfacing, Rettner said, and can be done with the CIR approach or FDR. CIR involves on-site rehabilitation of asphalt pavements without the application of heat during recycling. CIR interrupts the existing crack pattern and produces a crack-free layer. “The beauty is that it’s a self-contained application and it’s fast, but it’s best done on long lengths,” he said. Good candidates for CIR are pavements with at least 4 inches of hot mix, adequate base and subgrade supports, and severe pavement distresses. Poor candidates for CIR are pavements with inadequate base or subgrade support, inadequate drainage, and pavements that contain fabrics or interlayers.

Full-depth reclaimation reclaims the asphalt and base, which is pulverized and blended. FDR typically consists of a combination of asphalt and aggregate base, which can be left unbound or a binder can be added. FDR has lower stiffness but higher flexibility; if a pavement requires higher stiffness and lower flexibility, Rettner said, then it’s better to use cement and stabilization. Good candidates for FDR are pavements that need upgrading, widening, or rehabilitation, and bituminous surfaces that have sufficient depth to reclaim. Poor candidates are pavements with clay-like soil and drainage problems.

Recycling is a good approach for a number of reasons, according to Rettner. Recycling makes servicing deteriorated pavements easier, reduces the cost of raw materials, and allows you to level deformations and reset crowns. Recycling also helps retain overall closures and minimizes lane closure time and delays. There is also a great degree of public acceptance for recycling.

Before starting a paving project and prior to determining what approach to use, Rettner recommends testing to determine the strength of the pavement structure by using coring data and soil borings for moisture content.

‘Don’t be afraid to try things’

“ ’We’ve seen a pattern of getting away from traditional, high-assessment paving methods,’ said Steve Bot from the City of St. Michael. The city does proactive pavement management evaluations to get to problems before pavement fails. It uses crack sealing to keep water off pavements and often does seal coats and overlays rather than typical reconstruction.

The keys to success in St. Michael were the use of heavy-duty fabric and edge milling to increase the crown and maximize strength. Bot said fabric and overlay added approximately $1.50/square yard in cost over traditional methods.

Another example in St. Michael was a rural road with low-volume traffic where a fabric and seal coat were used. The pavement was old and had already been crack sealed, and there was a minimum budget for the project. Because the road had a good base, fabric and a chip seal coat were chosen. The pavement sheds water so the pavement is protected, and the fabric expands and contracts during summer and winter. Three years later, the

ADA transition plan: What you need to know now

Every agency must document its intent to meet the Americans with Disabilities Act (ADA) requirements—and developing a transition plan based on self-evaluation is the way to do it. Workshop presenters at the City Engineers Association of Minnesota annual meeting in January offered perspectives from three levels of government—state, county, and city—to help all agencies meet both the requirements and spirit of the law.

Why create a transition plan?

Lynnette Geschwind, ADA Title II coordinator for the Minnesota Department of Transportation (MnDOT), provided the state perspective. MnDOT’s self-evaluation and transition planning process is based on the idea that “any public entity must make all of its facilities accessible,” she said. She defined the two parts of an evaluation and transition plan: The self-evaluation portion consists of an inventory of programs, services, and activities to determine which ones are accessible. The transition plan identifies corrections that need to be made. “In Minnesota, we’re all behind on transition plan requirements—but we are under way,” she said.

Why do the plan? Beyond being an ADA requirement, Geschwind said the transition plan provides a better understanding of your system. It creates the opportunity to get input from the disabled community at the program level. And, it helps agencies develop investment priorities. Having early input about where improvements are needed is very useful information to have before projects are budgeted and implementation begins, she said.

What steps should be taken to create a transition plan? After identifying the existing facilities, programs, and services that limit access, Geschwind advised these steps:

• Describe the methods to be used to make them accessible.
• Specify a schedule by prioritizing the needs of persons with disabilities—which also means being willing to interrupt the schedule when an issue or complaint is raised by an individual with a disability.
• Identify the official response for seeing that the plan is implemented. “The ADA coordinator has oversight for general compliance in your jurisdiction,” she said.

MnDOT’s transition plan timeline began in July and August of 2009 when the plan was written and put out for public comment. The written transition plan was then revised in April 2010. Curb ramp and pedestrian bridge inventories were done in the summer of 2011; the sidewalk inventory is not yet finished but is expected to be complete in summer of 2012.

The transition plan has led to a number of positive outcomes within MnDOT, Geschwind said. For example, major revisions to the accessibility design have occurred; an investment program was developed; the internal advisory structure was revamped to organize staff around the initiative; the transition plan was published; and a training plan has been developed.

There are some ongoing challenges, according to Geschwind. “This isn’t a plan you write once and then it’s done,” she said.

The current version of MnDOT’s ADA transition plan, an outline of how it’s been revised to comply with this important statute, and other ADA resources are available at www.dot.state.mn.us/ada/index.html.

‘The right thing to do’: a county perspective

Pete Lemke provided a county perspective on ADA transition planning by sharing how Hennepin County ensures that its transportation system is accessible to all.

In 2010, in response to a complaint that Hennepin County didn’t have a transition plan for public right-of-way, the county took steps toward compliance. First, it did a self-evaluation in conjunction with a Complete Streets Inventory. This provided a summary of sidewalks, ramps, and truncated domes, along with other elements such as travel lanes, trails, crosswalks, and sidewalks. In addition, the transportation department evaluates portions of its pedestrian infrastructure each year.
ADA from page 10

as part of its annual pedestrian curb ramp projects, and it has developed a working plan for the instal-
lation and management of accessible pedestrian sig-
nals. Based on this information, a transition plan is being developed, with approval expected in 2012. Hennepin County also worked on communication issues to ensure open exchange of information and ideas surrounding its transition plan. In 2011, four open houses were held to engage the public on ADA issues. "These were very successful," Lemke said. The county also has a formal grievance procedure, which means lower assessments for property owners. And, alternate methods use 100 percent of the in-place materials and produce less greenhouse gas. More information is available at www.dot.state.mn.us /materials. LTAP —Jeanne Engelmann, LTAP freelancer

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Practical Approaches for Involving Traditionally Underserved Populations in Transportation Decisionmaking (Transportation Research Board, 2012)

This report describes tools, techniques, and approaches for identifying and connecting with populations that have traditionally been under-
erved and underrepresented in transportation decisionmaking.

Promoting Bicycle Commuter Safety (San Jose State University, Mineta Transportation Institute, 2012)

This report focuses on an overview of the risks associated with cycling to emphasize the need for safety. The structure of the Five Es—education, engineering, enforcement, encouragement, and evaluation—is used to organize information.

Preserving and Protecting Freight Infrastructure and Routes (Transportation Research Board, 2012)

This report provides information about freight transportation and its importance to people's everyday lives; illustrates the types of conflicts between freight and other land uses and their consequences; and provides tools and resources designed to help preserve facilities and corridors, including prevention or resolution of conflicts.

Attracting, Recruiting, and Retaining Skilled Staff for Transportation System Operations and Management (Transportation Research Board, 2012)

This report offers guidance to help trans-
portation agencies recruit and retain qualified professional staff in the systems operation and management area. The report covers career
paths, skill requirements, and training needs, and identifies successful programs, state-of-
the-art initiatives, and best industry practices.


This report describes a new method of achieving and documenting compaction requirements.

A Primer on Work Zone Safety and Mobility Performance Measurement (Federal Highway Administration, FHWA-HOP-11-033)

Find out how to better quantify the effects of work zones.

Teen Driver Cell Phone Blocker (Texas Transportation Institute at Texas A&M University, 2012)

This report describes the effectiveness of a cellular phone control device that communi-
cates with the vehicles of teen drivers to deny them access to their phone while driving for the purpose of reducing distraction-related negative driving events.


Explores highway microsurfacing project selection, design, contracting, equipment, construction, and performance measurement processes used by transportation agencies in the United States and Canada. LTAP

Mill from page 10

pavement is holding up well, according to Bot, who said the chip seal provided a good moisture barrier and was cost-effective. "Do what's right for your city and don't be afraid to try things," Bot concluded. More information about fabrics is available at www.roadfabrics.com.

What's new for streets

Thomas Wood from MnDOT's Office of Materials and Road Research offered an overview of what's new for streets. The hottest issues at the moment are overlaying streets, stripping under chip seal, and using new methods to renew streets.

Wood described key steps for overlaying streets:

• Properly apply tack to increase the life of the overlay (by 40 percent).
• Use the proper size nozzles.
• Work quickly.
• Clean the surface.
• Use proper binders.
• Saw and seal intersections and manholes. "The one joint you need to seal is between the street and curb," he said. MnROAD research shows an 85 percent reduction in water infiltration when that joint is sealed.

Regarding chip seals, Wood said some streets develop potholes two to five years after one is placed. Potholes appear mainly in the wear course and almost always in the curb and gutter section. Tests of core samples in research last year found low density and high permeability in cores where stripping issues were a problem. Early research recom-
mandations include using a specified density for all hot-mix asphalt paving and eliminating ordinary compaction. In addition, he recommends chip seal-
ing early in the life of the street and doing a field evaluation of street condition before planning chip seal projects. A report should be out this summer with more information.

New methods for street reconstruction include emulsion-stabilized FDR and a modified double chip surface, Wood said. Such methods are less expensive than milling and replacing, which means lower assessments for property owners. And, alternate methods use 100 percent of the in-place materials and produce less greenhouse gas. More information is available at www.dot.state.mn.us /materials. LTAP —Jeanne Engelmann, LTAP freelancer

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The Minnesota TECHNOLOGY EXCHANGE

INFORMATION SERVICES
News from our coordinator

Hello and happy spring! Every year about this time, the staff and advisory group for Minnesota LTAP reflect on the previous year’s accomplishments and challenges and begin assessing the training needs of local agency staff—in other words, you and your coworkers and colleagues.

Last year we offered approximately 155 training sessions, including LTAP and CTAP workshops, event sessions, and seminars. We reached more than 7,842 participants, and the Roads Scholar program has over 1,500 students enrolled in it! Four of the workshops we offered were new: snowplow, pavement rehabilitation for trails, micro/slurry application, and work zone traffic control and safety. If you have suggestions for topics you would like to see covered, please send me an e-mail and we will take it into consideration.

Many of you have attended our motor grader operator hands-on training in the past and most likely were trained by our instructor, Bruce Higgins. Sadly for us, but lucky for him, he has decided to retire! We say goodbye to him and wish him all the best. Meanwhile, we are interviewing a new instructor and we hope to begin summer scheduling in May.

Many people at the Center for Transportation Studies support Minnesota LTAP in one way or another but don’t often get out of the office to our events and workshops. I would like to introduce you to a relatively new CTS staff member and a major asset to LTAP: Christine Anderson. Christine is responsible for creating and editing our LTAP electronic announcements and web pages. She does a fantastic job, is a pleasure to work with, and always has a smile on her face.

Michael McCarthy, who was our editor in the past, has moved on to multimedia ventures within our center. You may have seen Mike at many of our events taking photos and shooting videos. Check out the snowplow simulator video he shot and edited at www.mnltap.umn.edu/publications/videos. Mike and Christine are both great assets to our program and deserve to be recognized for their hard work and dedication.

Don’t forget, if you have any questions about the Roads Scholar program or want a copy of your transcript, please feel free to contact me any time.

Anyone who graduates in 2012 will be invited to attend the Minnesota Roadway Maintenance Training and Demo Day in spring of 2013, where we will hold the graduation ceremony. LTAP

—Mindy Carlson, LTAP coordinator