Experiences with Roller Compacted Concrete in Kansas

When paving a road or street, two common choices for the material are asphalt and poured concrete. Each material has its pros and cons in terms of cost, maintenance, and longevity. Now, in some parts of Kansas, there is a third option: roller compacted concrete (RCC). This article will describe a few roller compacted concrete projects in Kansas, and introduce you to a few resources for further information.

The roller compacted concrete process

The name of the product provides a good description of its characteristics. It starts with a very stiff concrete mix. The mix is trucked to the job site in dump trucks rather than drum mixers. The mix is then loaded into a paving machine, laid like asphalt, and then is compacted with vibratory rollers immediately after it is laid.

A typical asphalt paving machine can lay RCC at 85 percent density, but a high-density paver produces a better result at 95–98 percent density. The machine’s rollers further compact the pavement to about 98 percent. Water content in the mix is a key to successful placement and rolling. It has to be right for the conditions. (See sidebar on Keys to a Successful RCC)

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Pavement Treatments Tried in Sedgwick County

Sedgwick County’s proactive approach is saving them money.

By Lynn Packer, P.E., Transportation Engineer, Sedgwick County, KS

Sedgwick County currently maintains over 1,200 lane miles of asphalt roads—and these are costly to maintain. This necessitates that we employ a pavement preservation program as the driving force behind our road maintenance to help extend the service life of our asphalt roads. The program consists of a series of preventive maintenance treatments and minor rehabilitations. Various treatments are applied over time because we have learned that the true benefits of pavement maintenance are realized when there is a consistent schedule.

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Project.) After rolling, the pavement needs to be sealed for proper curing, and scored to prevent cracking.
Concrete forms are not necessary because the material does not slump. Edges can be angled or straight. The material does not contain reinforced steel, except at cold joints. It can be placed on streets with curbs and gutters, or without.

The end-result is a durable pavement with a rougher texture than poured concrete. It looks more like asphalt (see photo on next page).

RCC in the Wichita area

Andale Paving, Inc., purchased a high-density paver a few years ago, and they have been marketing the technology to communities in their area for use on roads and streets. A few cities have jumped on board, with excellent results:

City of Maize. Maize has contracted with Andale to place RCC at three locations over the past few years:
1) A project at an intersection where heavy trucks were shoving the asphalt. Bill McKinley, city engineer, said they replaced an 80 ft section of asphalt with RCC and they have not had any problems since.
2) A one-mile stretch of road at the Mystic Lakes subdivision in October 2011. The road has 20 houses on it, built around a lake. The surface was compacted sand/gravel.
3) A one-mile sand residential street in Belle Park.
Maize uses 5 inches of RCC for residential streets over a base compacted to 95 percent. The base has several inches of AB3 rock/gravel and/or crushed concrete. The concrete pavement was sawn. McKinley recommends sawing at 20 to 30 ft spacing across the pavement and at the center-line if there is a crown.

McKinley is very pleased with the performance of their RCC roads. Advantages of RCC, per McKinley, are:
• Relatively little down time for residents. “It lays down fast, and you can get traffic on it pretty quick. We did one mile in three days,” he said. The city keeps traffic off the RCC roads 1-3 days, just to be on the safe side, especially at the ends of the project where the pavement can be more fragile. “However,” McKinley said, “one time a project just had a few hours of drying time before a vehicle was on it—by mistake. The driver did not know the barricade was for him. The pavement was fine.”
• Priced about the same as asphalt.
• Durability.
• Very little steel is needed; only at cold joints.
• The pavement is relatively cool and generates less heat and fumes than hot mix.

McKinley said RCC is impressive to see while it is being laid down. “It’s the most amazing thing I’ve seen with concrete,” he said. “Right after you lay it down, you can walk on it.”

Maize has added RCC as an option to its paving bids and will be bidding a pavement project on an arterial street this year. If RCC wins that bid, the city will have the pavement depth at six inches instead of five.

McKinley said he did his homework before trying RCC. He said the product has been used for 40-50 years in Canada on logging roads. Alliance, Nebraska did an RCC project 20 years ago on a collector street and it has not needed any maintenance in those 20 years. He talked with the public works director in Alliance for advice. Other road departments have used RCC for shoulders (see the KDOT project later in this article) or as a base with asphalt over the top (e.g., Columbus, Ohio) and for runways and parking lots.

Bill McKinley can be reached at bmckinley@cityofmaize.org and at (316) 722-7561.

The City of Haysville with about 10,000 residents near Wichita, contracted with Andale Paving for an RCC project on a curb-and-gutter residential street that carries a couple of hundred vehicles per day. They placed a 700 ft section of RCC. The project has been in place for about eight months,
without cracking or settling.

Randy Dorner, public works director, said there is a slight curve in the road, and you can see faint roller marks in the curve, but nowhere else. The road was laid last summer, at night, to avoid the daytime heat. Temperatures in Haysville have ranged from 10 degrees to 110 degrees since the pavement was laid. “No spalling, no nothing,” said Dorner. “It’s excellent.”

Dorner said their decision to try RCC fit with his department’s overall approach for trying new things to improve their operations. “But before we [tried RCC] we did lot of research,” he said. Dorner visited one of the Maize projects as part of his research, and he took with him his mayor, engineering firm representatives and the director of governmental services (city manager). That made a difference in convincing them to try the technology.

Like Maize, Haysville now has RCC as a bid option. Dorner prefers using a concrete product when he can; he thinks concrete is a better investment for the community. “We see [RCC] as a cost effective alternative to asphalt, and a more durable product,” he said.

Dorner noted that its important to saw joints in RCC every 20 ft, which is closer than what is recommended by the national standards book (40-50 ft). He also said using a high density paver is the key to a good result when using RCC.

To sum up his thoughts about using RCC on the above project, he said “I’m proud of this street.”

Randy Dorner can be reached at r dorner@haysville-ks.com and at (316) 529-5940.

KDOT’s experience with RCC

KDOT has used RCC on one project to date—as a base for an asphalt shoulder on a highway between Dodge City and Garden City. Thirty miles of RCC were laid in Summer 2011, 12 feet wide, topped with a 2 inch asphalt overlay, 10 ft wide. Koss Construction was the contractor.

The project manager was Ted Orrison, engineering technician senior, at KDOT’s Dodge City construction office. He said the idea for using RCC came from KDOT’s Bureau of Design. “They heard about it and wanted to try it,” he said.

Orrison had no prior experience with RCC, but did attend a tutorial to become more familiar with the technology. The contractor, Koss Construction, also did not have experience with the product, but laid a nearby temporary detour on/off ramp with RCC to try the product before the KDOT project. In both projects, Koss used a typical asphalt paving machine to lay 7 inches of RCC over 6 inches of fly ash treated base, topped with 2 inches of asphalt.

Orrison said KDOT’s experience with using RCC was mostly good, but they did have a few problems. “It’s pretty easy to work with,” he said. However, the pavement was not scored after being laid and it ended up cracking on its own every 15-20 ft or so. This caused reflective cracking in the asphalt overlay.

Another problem they encountered was having the steel rollers stick to the pavement after the contractor sprayed water on the pavement after it was laid. Water was added to keep the pavement from drying out before it was sufficiently rolled. (They did three passes.) Orrison said this was a “lesson learned”—and they do not recommend spraying the pavement when the rolling is in process.

You can reach Ted Orrison at TOrrison@ksdot.org or (620) 227-6122.

Getting it right

Andale’s Paving’s quality assurance manager, Richard Mfuko, stresses the importance of carefully controlling the mix for moisture content given the conditions of the particular job. The contractor needs to consider environmental conditions such as heat and wind and transportation distance in determining the percentage of water in the mix.

Mfuko also said that proper mixing equipment and transporting equipment are important to a good quality result. He recommends a twin shaft mixer (with paddles) or pug mill for mixing. Mixer trucks are a last resort, he said, because the mix can stick to the sides of the drum.

It’s important to have enough dump trucks to keep a steady supply of mix going into the paver, Mfuko said. And dump truck beds used to carry the mix need to be clean. Truck bed covers are very important. Mfuko related one instance where a driver forgot to cover his load. When the driver arrived at the project site, the mix had two inches of white concrete on top, and the load had to be scrapped.

Rolling can be done with steel or rubber rollers, but Mfuko prefers steel because they leave fewer roller marks.

Because water content needs to be carefully controlled, Mfuko said the mix should not be transported more than

Continued on next page

Sources:
• Interviews with Bill McKinley 2-12-12, Pete Molitor 3-15-12, Richard Mfuko, 3-15-12, Randy Dorner, 3-19-12, Ted Orrison, 3-20-12.
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30 minutes to an hour from the plant. He said for distances longer than that, it could be feasible to bring in a high-density paver and have the local concrete plant prepare the mix.

You can reach Richard Mfuko or general manager Peter Molitor at Andale Paving at (316) 303-2624.

Conclusion

Experience in Kansas is showing that roller compacted concrete can be a cost effective and durable option for pavement projects—if the mix design and placement is carefully controlled by the contractor, if the concrete is sown, and if the equipment used is appropriate for the desired pavement density and smoothness.

For more information, consult the Guide for Roller Compacted Concrete, August 2010, $12, by the Concrete Pavement Technology Center at Iowa State University (http://www.cptechcenter.org). McKinley said it’s the best comprehensive guide he’s seen on RCC.

For a quick read, the Portland cement Association has a 4-page publication called Roller Compacted Concrete Pavements for Highways and Streets. See page 14 for more information.


Cemex has a good five-minute video on RCC at http://www.youtube.com/watch?v=CP8zaT35X8. It includes footage and testimonials from projects in South Carolina.

When to use which pavement?

There are no clear-cut guidelines for when to use asphalt, RCC or poured concrete for a pavement. It often comes down to the price of materials in your area, or a judgement call. But, in general:

- **Poured concrete** is the most expensive option and is usually used in Kansas on higher-volume roads or those routinely carrying heavy loads. It provides high durability and smoothness.

- **Roller-compacted concrete** is considerably less expensive than poured concrete. It is more commonly used on lower-volume roads and streets, or on shoulders, because of its rougher surface texture. But using a high density paver and/or diamond-grinding the surface can improve the smoothness to rival poured concrete. Its durability can match or even exceed poured concrete. A successful project requires tight quality control.

- **Asphalt** is generally a little less expensive than RCC, but the price tends to fluctuate with the price of the petroleum products used in the mixes. Asphalt pavement is not designed to last as long as poured concrete or RCC, and it needs regular maintenance to maintain longevity.

Sedgwick County asphalt pavement treatments  Continued from page 1

Our goal is to be proactive in maintaining our existing roads so that, besides extending pavement life, we can reduce delays for the traveling public and provide improved safety and mobility.

Benefits of preservation

- **Cost savings.** The cumulative effect of our systematic, successive preservation treatments is to postpone costly rehabilitation and reconstruction, which can cost between $375,000-$500,000 per lane mile.

- **Predictability.** By extending the life of a road until it can be rehabilitated, the maintenance needed for that road becomes more predictable. Preventive maintenance allows us to even-out our maintenance budget from year to year, which otherwise can vary greatly.

Pavement preservation techniques used in Sedgwick County

We use conventional treatments such as crack sealing and chip sealing, and others such as:

- ultrathin bonded asphalt surfacing,
- thin overlays,
- latex-modified slurry seals, and
- hot in-place asphalt recycling.

Aside from crack treatments, all of these treatments leave the pavement with a new wearing surface with a minimum effective life of at least five years, and sometimes up to 10 years.

To help determine which treatment is needed, we use a 5-year cyclical approach combined with a 5-point road grading system (5 is good condition and 1 is poor condition). This approach helps ensure we evaluate a specific mile of road at least every five years, allowing us to address pavements while they are still in good condition and before the onset of serious damage. The type of treatment we use depends on the condition rating of the road and whether it is hot mix or cold mix.

**Hot mix maintenance strategy.**

Our hot mix asphalt roads are maintained through contract work. Although we continually experiment with new processes and surface treatments, such as rubberized seals and cold mix recycling, the heart of the pavement preservation program is a combination of latex modified slurry seals, ultrathin bonded asphalt surfaces, and hot in-place asphalt recycling.

Slurry seals are applied to roads rating 4 or 5 on our grading system; they are in very good to good shape with some small thermal cracking. This is often the first maintenance treatment after construction or reconstruction, and is
Photos from Sedgwick County, KS.

an effective, low-cost treatment at about $16,000 per lane mile. We typically experience about a 5-year service life from our latex-modified slurry seals.

_Ultrathin bonded asphalt surfacing_ is used on roads that typically rank a 3 or 4. The pavement may have somewhat larger cracks, but it is still in good condition and is structurally sound. The emulsion membrane seals the existing surface and produces high binder content between the existing roadway surface and the gap-graded ultrathin hot mix all in one pass. This treatment works well for us on higher-traffic areas because of the single-pass process and the ability to reopen the road quickly after application. Ultrathin bonded asphalt surfacing costs about $28,000 per lane mile in Sedgwick County and has a service life of between 5-10 years.

Rounding out our preventive maintenance treatments is _hot in-place asphalt recycling_. The process recycles in-place asphalt with a single machine by performing a multi-step process of heating, scarifying, applying an asphalt recycling agent and thoroughly remixing and reshaping the old asphalt surface as a leveling course. This is immediately followed by a minimum one-inch virgin hot mix asphalt overlay placed over the recycled leveling course. This type of treatment corrects many types of surface distresses, and the additional aggregate provides increased strength. This process is typically reserved for roads with a grade of 1 or 2, and is our most expensive preservation treatment at a cost of about $50,000-$56,000 per lane mile. Depending on traffic loads, this treatment has a service life of anywhere from 5-10 years in Sedgwick County.

**Cold mix maintenance strategy.**

Sedgwick County has a long history of using cold mix asphalt. It has traditionally been used as the first step when upgrading a gravel road to a paved road. The strength added by the cold mix asphalt allows time to incorporate a road reconstruction project into the Capital Improvements Program (CIP). We recently discontinued the cold mix asphalt program, however, because of budget cuts.

Maintenance can be burdensome with our cold mix asphalt roads. We have learned that the adage “build it and they will come” is true of any paved road. Paved roads are the preferred route for local residents and all manner of trucks, including grain trucks. Additional traffic loading causes deficiencies in the pavement structure much faster on cold mix roads. Therefore, maintenance is needed despite the intention of constructing further improvements with a CIP project.

The County still maintains over 290 lane miles of cold mix asphalt roads, with county forces. We don’t rate these roads, but when needed, we patch them and apply skim coats to reduce aging, restore serviceability, and add strength. Typically, a _chip seal_ is applied later in the same year for additional protection. The skim coat treatment costs about $38,000 per lane mile when county labor and equipment are added. The chip seal runs about $8,000 per lane mile and will last anywhere between 3-6 years depending on traffic loads.

**Conclusion**

Regardless of the type of treatment used, timely maintenance is the critical element in extending the service life of a road. Having a pavement preservation program in place has helped Sedgwick County bear the burden of severe funding cuts without dramatically reducing the quality of our road network.

For more information on Sedgwick County’s pavement preservation program and strategies, contact Joe Brand, P.E., supervisor, Inspection and Survey, (316) 660-1754, jbrand@sedgwick.gov.
ROW Acquisition Using Local Only Funds

A tutorial from the Kansas Association of Counties.

As reported previously in this newsletter, projects using federal funds and those under KDOT’s Federal Funds Exchange Program require that the local agency follow federal regulations referred to as the Uniform Act. (See sidebar below).

For projects that are funded solely with local funds there are fewer rules about how the right-of-way (ROW) is acquired. State laws and regulations may apply, but not federal. However, it can be a complicated process if you are not familiar with land transactions.

When a local agency is acquiring an interest in land for use as right-of-way, that interest has to be acquired in writing to have legal effect. Generally a notarized document signed by the owners of the land has to be recorded at the Register of Deeds Office. But the recording is the easy part; the hard part is the process. For agencies not familiar with acquiring right-of-way, the assistance of a local attorney or title company will be essential to get the process developed.

Contact the landowner early-on.
The right-of-way acquisition process really starts at the beginning of a project. Land owner participation in development of the project builds goodwill with the landowner and avoids surprises and changes after plans are developed.

It is usually not a good situation when a landowner discovers that a project is being planned when the surveying is underway. Prior to that time the local agency has selected a consulting engineer and decided on the basic scope of the project, and the landowner may feel he or she does not have a voice in the project.

Research ownership.
There are a number of ways to determine ownership of land adjacent to a project. The scope of services with the consultant may provide for the engineer to research the ownership and pull deeds for adjacent landowners— and perhaps pull addresses from the tax records. Some agencies have people on staff who will research the ownership.

No matter who searches the records, they should know that not all land records are easily accessible. For instance, court orders such as divorce settlements and estates are located in the district court, and these records are not indexed to the land. It is always safer to have a title company determine the ownership. If the engineer or local agency researches the ownership, a title company should be contacted at any hint of a problem.

After the ownership is determined, the adjacent landowners should be informed of the project and that a survey crew will need access to their property.

Input during the design process.
Many agencies meet with adjacent landowners during the design process. This gives the landowners some input on the final design, and affords the opportunity to discuss issues important to the landowners. This meeting is also a good time to discuss right-of-way issues such as fence replacement, driveways, slopes and landscaping that might be affected.

Near the end of the design of the process, the exact amount of additional right-of-way is determined. Most engineering agreements state that the consultant will provide legal descriptions to the local agency and stake the new

If Using State or Federal Funds...

The federal Uniform Act (49 CFR Part 24) has many requirements including the following:

- Appraisal by a certified appraiser if the value of the taking exceeds a certain amount,
- An offer to the landowner of “just compensation,”
- Documentation of good faith effort at negotiation,
- Recording of the easements on the public record.

Failure to follow federal regulations can lead to the local community having to refund federal or state funds. For those agencies without experience or expertise to follow federal regulations there are consulting firms that specialize in right-of-way acquisition. There are also classes available each year through Kansas LTAP. Advice is also available from KDOT’s Bureau of Local Projects at (785) 296-0413.
right-of-way lines. State regulations require that these legal descriptions are to be stamped by the land surveyor who prepared the descriptions.

**Determine the cost of the land.**
So far you have determined ownership, developed legal descriptions, and have had the right-of-way staked. The next step is to determine the value of the land to be acquired, sometimes referred to as the “taking.” There is no law in Kansas that specifies how the value of the taking is determined, but the landowner will want assurances that the process is fair. You also don’t want your local government paying more for the land than it is worth.

Some agencies have their employees research comparable sales. In rural areas where the acquisition is simple, the county commission may set standard purchase rates for cultivated land and pasture. Certainly, for more complicated takings, a formal appraisal is necessary. A licensed appraiser can provide a formal appraisal or perhaps an estimate of value.

**The offer.** Once the value of the taking has been determined, normal practice is to meet with each landowner individually and make an offer based on the value. Often a landowner is not satisfied with the offer and will want to negotiate a higher amount. If you can’t reach an agreement with the landowner, eminent domain legal proceedings (condemnation) will be necessary, so to avoid that cost, most agencies try to negotiate a reasonable settlement with the landowner.

**The written agreement.** When a price is negotiated, it will be necessary to develop a written agreement detailing the terms of the settlement. The agreement will usually state the amount of the taking, the agreed price, and any other considerations that might be part of the settlement, such as fence replacement, retaining wall, driveway paving, etc. The agreement is the basis for getting a check cut to the landowner. Many agencies have a standard agreement form that is modified to fit the situation.

**The easement form.** The endgame is getting the easement form signed by the landowner. The easement form will have to be notarized so that it can be recorded at the Register of Deeds. Many agencies have standard easement forms that record details such as landowner names and the legal description. There are different forms of ownership and the easement form has to reflect the particular type of ownership. The most common types of ownership are by a single person, a husband and wife, a type of corporation, a trust, or a partnership. If in doubt on how to prepare the easement form, it is always a good idea to contact an attorney or title person.

**Close the transaction.** Most of us have purchased a home and have gone through the closing procedure. The closing procedure for a taking is simpler, as there are no loan papers or other forms required. You basically need to exchange the signed and notarized easement document for a check in the agreed amount. A W-9 form will need to be processed, as the payment to the landowner could be taxable income. Normally the finance department of the local agency will send the landowner a 1099 Form at the end of the year and report the payment to the IRS.

Once you have the signed and notarized easement document, it should be recorded at the Register of Deeds.

**Seek help when you need it.** While the acquisition process may not seem complicated, a small error can have significant consequences. For instance, if all the individuals with an interest in the land do not sign the easement form, you will not have a clear title. If you are not sure of what you are doing, always contact a professional for advice. If your department does not have the staff or expertise to acquire right-of-way, there are firms that specialize in acquisition for public projects.

**Sample forms.** The Kansas County Highway Association has helpful sample forms for acquiring right-of-way. Go to the Right-of-Way folder in the

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**Permit of Entry:** Sometimes a formal easement is not necessary for minor work off the right-of-way, such as channel cleaning. In this case a simple form that gives permission to do certain work with a set termination date may be adequate. This is a less formal method than a temporary easement and is kept on file but not recorded at the Register of Deeds.

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**Save these dates**

**Do you need an engineering license to do this?**

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A Leg Up

Guides for Providing Accessibility: MUTCD and ADAAG

By Nate Vander Broek

Now that the 2009 version of the Manual on Uniform Traffic Control Devices (MUTCD) has been adopted by the State of Kansas (as of December 2011), any local government in Kansas that does not comply with its revised requirements runs the risk of a lawsuit if there is a crash and it is found that the MUTCD was not followed. The 2009 version has several revisions from the older 2003 version related to ADA (Americans with Disabilities Act) requirements. This article will highlight these changes and provide some examples of municipalities in Kansas working through these new requirements—and others of the ADA.¹

MUTCD and accessibility

Bruce Friedman, the MUTCD’s national ADA expert, said the parts of the 2009 MUTCD most directly related to accessibility provisions are Chapter 4 and Chapter 6.

Chapter 4E (especially Sections 4E.09 through 4E.13) deals primarily with pedestrian signals and detectors, such as audible tones, speech messages, and/or vibrating surfaces. Major revisions to this section include the following:

• Requiring both audible and vibrotactile walk indications;
• Providing for additional features through an extended push-button press;
• New provisions for the use of audible beaconing;
• A new requirement that accessible walk signals shall have the same duration as the pedestrian walk signal unless the pedestrian signal rests in the walk phase;
• Limiting the use of speech messages only to locations where it is infeasible to install two accessible pedestrian signals (APS) separated by at least 10 feet on a given corner;
• A new standard that requires the use of locator tones, tactile arrows, speech walk messages, and a speech push-button informational message when two accessible pedestrian push-buttons are placed less than 10 feet apart or on the same pole;
• If the clearance time is sufficient to only cross to the median of a divided highway, pedestrian signals (with pedestrian detectors if actuated operation is used) shall be provided on the median.

Chapter 6D (especially Section 6D.02) of the MUTCD covers accessibility considerations for temporary traffic control (TTC) zones. Changes to this section are minor, and they mainly include instructions moved from one section to another. Accessibility considerations found in Chapter 6D.02 include:

• When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
• Where pedestrians with visual disabilities normally use the closed sidewalk, a barrier that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.

We spoke with Mike McGee, director of building and general services for the City of Topeka public works department, about meeting MUTCD regulations for accessibility. He said it hasn't always been easy to get contractors to accommodate pedestrians and persons with disabilities—especially in work zones that require a detour. To help with this problem, all bid documents for Topeka now include the necessary accessibility requirements as stated in the MUTCD. McGee's advice for cities is to be proactive. “Topeka has stayed out of trouble because the City set aside money in its budget to make accessibility improvements, such as new traffic signals, when necessary,” he said.

ADAAG compliance

Even if your city is following all of the MUTCD regulations for accommodating people with disabilities, that’s just one aspect of federal requirements for providing accessibility. You must also be up-to-date with all of the requirements in the Accessibility Guidelines for Buildings and Facilities (ADAAG), or run the risk of being sued. That is exactly what happened to the City of Winfield, KS.

In 2006, the Kansas Disability Coalition sued the City over compliance with Title II of the ADA. At the time, the City was actually installing new ramps with construction projects at a faster rate than most other cities of comparable size, and ADA items accounted for 25-35 percent of overlay project budgets, but a suit was still filed at the request of a resident who believed his accessibility needs were not being met. The

¹Note that the ADA does not require immediate system-wide retrofits; most changes are required to be done at the time of construction or major repair.
Coalition and the City reached a settlement that required the City to create an ADA Transition Plan (see link below in the Sources). Completion of the plan is estimated to cost the city $288,000 over a 10-year period.

Russ Tomevi, director of public works and engineering for the City of Winfield, said the City created an advisory committee to help keep track of the plan and be proactive with ADA compliance. He said the transition plan allowed the City to restructure and do a better job at prioritizing the City's continued efforts to comply with the law.

The City is constructing sidewalks and ramps to make the city more accessible and to fully comply with ADA regulations. Tomevi estimated improvement costs to be $8,000 to $10,000 per intersection. In the distant future, Tomevi intends to update the City's traffic signals to make them more accessible, such as by adding sound actuators. Tomevi is concerned, though, that the noise of the actuator may be a nuisance to some people living or working near the traffic signal.

We spoke with another city’s public works director, Suzanne Loomis of the City of Newton, about her city's experience complying with the ADA. She said ADA related pavement marking and signage has not been a significant hardship: “We just go about the required installations.” However, she said providing accommodations for persons with disabilities is not always easy. She said their biggest challenge is providing ramps with truncated domes because they are complete retrofits and are very expensive.

Detectable warnings like domes are not included in the MUTCD, but they are required under the ADAAG. The City of Newton installs truncated domes on new ramps that are a part of a new construction project and on existing ramps as repairs are necessary, said Loomis. “We have even done a few pilots using multiple installation types to determine our method of choice,” she said.

**In sum**

McGee’s advice for cities is to try to stay ahead of the game and make sure all facilities are accessible, including streets, sidewalks and buildings. “Follow the MUTCD for traffic control devices and the ADAAG for other transportation-related accessibility requirements,” he said. McGee also mentioned the importance of working with the public. “Topeka has done a good job of advertising to the community that we’re trying our best to make streets and facilities accessible, and that if anyone has accessibility issues, to let us know.” McGee concluded with some practical advice: “Be creative. There are many things you can do to make things accessible.”

Loomis says “changing regulations almost always means more budget dollars are needed for us to comply. However, if you spend the day with someone in a wheelchair, you begin to understand the drive behind the changes. My friend, the City police chief, has to use a wheelchair to get around and I have seen his challenges. It is a different world for those with disabilities and we want our city to be compassionate to those issues. We just hope future updates of the regulations are sensible so we have the dollars available to serve the critical needs of those requiring assistance.”

The continual change in regulations is very challenging, said Tomevi. Improvements that were fully compliant when they were constructed 10-15 years ago now must be modified to meet newer regulations.

“People tend to think that ADA is only about individuals confined to wheelchairs, when it is not,” said Tomevi. “There are many other types of disabilities, and with an aging population, most of us will be challenged with some of these issues. You only need to spend a few hours using crutches to learn how sidewalk cross slopes and other barriers affect your mobility and quality of life. We want our citizens to know that we make a variety of accessible improvements because it is the right thing to do for everyone.

To read more about the MUTCD’s latest changes, see the first two sources below. For questions about accessible non-traffic control devices, such as curb ramps and detectable edging, Friedman suggests contacting the U.S. Architectural and Transportation Barriers Compliance Board (US Access Board) at http://www.access-board.gov or at (202) 272-0080.

**Sources:**

Traffic control and accessibility:
- Pedestrian Safety and Accessibility in Work Zones.
  http://www.workzonesafety.org/fhwa_wz_grant/atssa/atssa_pedestrian_work_zones

Accessible public facilities:
- U.S. Legislation, Standards, and Guidance Applicable to APS. http://www.apsguide.org/chapter1_guidance.cfm
  http://www.access-board.gov/prowac/alterations/design.comp
- City of Winfield ADA Transition Plan.
Field Report: Use of Permazyme on a County Road

By Ken Skorseth

Have I heard of Permazyme? Yes — several times over the years. I have gotten a lot of inquiries recently, including from Marshall County, SD, the SD School of Mines, my own staff, and even Secretary Bergquist from SDDOT.

Here’s where all the recent interest originated: http://www.agweek.com/event/article/id/18742/ — an article published last July in AgWeek. The title alone scares me: “Hard Roads, Easy Fix.” My first thought: I doubt it! A marketing pitch like that always worries me. If indeed there is a truly cheap, easy solution to strengthen weak subgrade and base, I would think the product and/or process would be used everywhere.

I did some research on this topic last summer to help several folks who were pounding on my door. I contacted one source in Utah for information on a test of Permazyme™, but found the manager who originally coordinated the test section construction is gone. The current manager has no knowledge of it.

I had better luck in Montana. I talked with Shawn Norick, road superintendent in Liberty County. His county first used the product Permazyme 11x™ over a decade ago, and they are still using it. Here are my notes from our phone conversation:

Liberty County’s first use of the product was on a section of road with a steep grade that was a constant source of complaints — a lot of corrugation (washboarding) and loose material on the surface. The road had approximately 175 vehicles per day. Frequent blade maintenance was needed and the road still performed poorly. The Bureau of Reclamation had some experience with Permazyme™ and recommended the product for use as a test on this road.

The existing material on the road was sandy, with little or no binding material. The County hauled in natural clay and mixed it with the existing material. (No specific proportioning was recorded, just field judgment used to determine the ratio.) Norick indicated no testing was done on the existing material or the clay-type material hauled in. From his description, I concluded it was highly plastic. The material was mixed, treated, and compacted with pneumatic rollers.

It rained immediately afterward, causing serious problems with rutting and instability. After reshaping the road in dry conditions, it performed satisfactorily. Another rain a short time afterward brought problems as well, but not as serious as with the first rain after construction.

Thereafter the road became very stable and performed very well for five years. In some seasons, blade maintenance was done only once. This gave the County confidence to use the product again and it has been applied to many other road sections in the past several years.

Liberty County has not used the product on long sections; generally only on trouble-spots in locations with steep vertical alignment (hilly terrain) up to a half mile in length. However, there is no indication the product would not work on an entire road section.

Overall, Liberty County’s experience using Permazyme™ has been good. One recurring problem is instability after the first rainfall following construction. Thereafter the roads gain stability and the maintenance needed is greatly reduced. Norick said the stabilized sections always seem to perform better after the first year, and performance remains good up through the fifth year. After that, the product retains some stabilizing value, but more maintenance is required. The County’s current experience indicates reconstruction is needed after 10 years.

Norick said the right mix is the key to good performance of Permazyme™. “It works,” he said, “but only if you get the right blend of clay with the gravel already in place.” Norick didn’t give me current cost data, but indicated he is willing to talk to anyone who is serious about trying the product. He was quick to point out he’s not a salesman for the product. (That’s good to know.) His phone number is (406) 759-5623.

Norick’s input gives me some confidence the product has some merit. However, you need to know that Liberty County is located in far north central Montana on the Canadian border. Precipitation there is only about 14 inches annually. I am not sure what the subgrade soil type was in the area where the initial road test was done. The climate and soil conditions are not the same as much of South Dakota, especially the eastern part, and that’s true for Kansas as well.

Having said that, I’m not discouraging a test of the product. My advice would be to build a test section if you decide to try it, and follow the manufacturer’s...
recommendations on product application and construction procedure. Don’t build a long section; a half-mile is more than enough to get a good test. Continue the section with the same modification of gravel and material at the same volumes and construction procedures, but leave it untreated. That will give a comparison with and without the product added. Then observe the sections for at least a year or more to see what the benefit of the product will be.

For more information about Permazyme™, read the Agweek article referenced above. It contains information on a few other local agencies that have tried the product. Also visit the manufacturer’s website at http://www.pacificenzymes.com/PacificEnzymes/Default.aspx.

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Cracking Down on Crumbling Concrete

By Lisa Harris

Some cities, especially in Northeast Kansas, have found their concrete pavements and curbs are not all they are cracked up to be. They are not lasting as long as they should. The culprit is D-cracking, caused when the aggregate breaks down under repeated freeze-thaw cycles. Many of the limestone aggregates available in the Kansas City metropolitan region are susceptible to this distress.

Another cause of deterioration in concrete is alkali silica reactivity (ASR) that causes the aggregate (limestone or not) to react with the cement paste, creating a gel-like substance. This substance causes weakness in the concrete and the concrete deteriorates faster than expected. A concrete road designed to last 50 years may only last 20.

This article will describe how some communities are spec’ing their concrete to head off these problems.

Lawrence. The City of Lawrence has recently joined a group of communities in the Kansas City area that together form the Kansas City Metro Materials Board (KCMMB). The Board helps communities spec and obtain durable aggregates. Member-communities write into their concrete specs that their mixes must be approved by the KCMMB. These specs do not allow the use of limestone and instead specify more durable options such as quartzite, granite and trap rock. KCMMB mixtures also include either slag cement or type F fly ash to prevent ASR.

Currently, there are 19 members of the KCMMB: 16 cities in the Kansas City Metro area, plus Lawrence, St. Joseph, MO, and the Unified Government of Kansas City, Kansas/Wyandotte County.

Assistant public works director Mark Thiel said Lawrence has been using KCMMB specs since 2004, but recently joined the Board for an extra measure of assurance that the aggregate actually meets their specs. Every mix for a KCMMB member is tested by an engineering firm retained by the Board.

Overland Park. Overland Park initiated the research that led to formation of the City/Concrete Industry Work Group of Johnson County—later called the Johnson County Concrete Board—an informal organization that brought together public works professionals, concrete suppliers, and representatives of related associations to share information and develop solutions to premature deterioration of curb and gutter applications and pavement, bridges, sidewalks, and storm drainage inlets. After studying various concrete mixes over three years, members of the Work Group agreed to develop a standard concrete specification. The new specification became effective for municipal and county projects constructed after April 1, 2001. The Group later expanded to add cities from Missouri and changed its name to the Kansas City Metro Materials Board.

Mike Ross, manager of technical and administrative support for Overland Park, said having a spec is just the first step in obtaining more durable concrete. “You also have to test the mix and pay attention to the process,” he said.

Topeka. Shawn Bruns, city engineer, said that Topeka changed its own concrete specs in 2010 and now specifies durable aggregates such as granite, quartzite or trap rock in pavement-class concrete except that concrete in sidewalks, trails and

Sources:
• Interviews with Mark Thiel, 3-26-12, Shawn Brunz, 3-27-12, Mike Ross, 3-30-12, Rick Kreider, 4-5-12.
New Guide on Sustainable Concrete

Sustainable concrete pavement is a complicated technical topic—starting with establishing a definition of pavement sustainability to covering the many different sustainable technologies developed for the many different stages in the production of concrete pavement. We can’t do justice to this topic in one newsletter article.

Luckily, there is an excellent new resource that covers this topic in depth. Sustainable Concrete Pavements: A Manual of Practice is a 114-page resource available to download for free. Developed by the National Concrete Pavement Technology Center at Iowa State University, it covers the topic of sustainable concrete in a well-organized and easy-to-read manner.

The manual provides practical guidance for adopting sustainable technologies for new concrete pavements. It also covers sustainable solutions for rehabilitating existing pavements. Costs and benefits of sustainable technologies and materials are also discussed.

The manual is aimed at the different individuals and agencies that contribute to decisions and practices related to constructing sustainable pavement in a community, such as elected officials, engineers, material suppliers, and contractors.

The manual covers:

- Definition / concepts of pavement sustainability;
- Concrete design attributes that contribute to sustainability, including extended service designs and two-lift construction (with an example from KDOT);
- Materials design, including use of geopolymers and recycled materials in the mix, the use of precast concrete pavements and thin pavements, and longevity as a component of sustainability;
- Sustainable aspects of the construction process, including energy consumption, water use, and generation of noise and particulate matter;
- The impact of roughness/smoothness on fuel consumption;
- Surface reflection and heat generation;
- Sustainable preservation and rehabilitation strategies, focusing on diamond grinding and concrete overlays;
- Pavement recycling strategies;
- Assessment methods for pavement sustainability, including the Greenroads™ rating system.

If your community would like to investigate options in sustainable concrete pavement, this publication is for you. It will be updated regularly to reflect evolving understandings of issues related to enhancing concrete pavement sustainability. Download it for free at the link below.

Sources:

Testing deicing chemicals provides information that can save agencies money, improve roadway safety, and increase efficiency of winter operations. A new guidebook and online video, Field Guide to Testing Deicing Chemicals, are now available to agencies interested in learning more about effective testing procedures. These resources were produced by the “Clear Roads” pooled fund project for winter highway maintenance research. This ongoing research project is funded by 23 state DOTs, including KDOT.

This article will provide a brief summary of the training video and guidebook, with comments about how these resources can help winter operations managers.

The 24-minute instructional video gives step-by-step instructions for performing three levels of field testing that can be used to determine the effectiveness of a deicing chemical. The video outlines the following tests:

1) Simple garage test; a basic test done near the maintenance garage on a parking lot or sidewalk (see photos on this page).

2) Single roadway test; a test with a single deicing chemical applied under normal traffic conditions during a winter storm.

3) Side-by-side test; a test with a control deicer compared alongside a test deicer under the same roadway conditions.

The video also describes a set of considerations that influence the accuracy of test results and control procedures to address them. These include:

- Roadway environments: how differences in traffic intensity and roadway material can affect test results.
- Weather: the influence of weather and what weather information should be collected.
- Spreading equipment requirements: how to use equipment during tests and standardization to avoid testing bias.
- Testing material considerations: how to stockpile and use deicing chemicals involved in the tests.
- Data collection tools: what information should be collected during the testing period, how often tests need to be done and what tools are needed to get quality results.

The guidebook, a 30-page document, elaborates on the three test types and control procedures for roadway deicing tests. It also includes a sample data collection log book. This is especially useful for winter operations managers and staff to use for testing, because it contains the steps to follow and data to collect in the testing process.

The instructional video and guidebook complement one another. The video provides a visual demonstration of the methodologies presented in the manual. The video is very straightforward and is a good instructional tool, with the narrator leading the audience between topics, telling what is upcoming and focusing on key takeaway points. It includes interviews with operations managers that serve as good case studies from the real world.

The guidebook is designed to be used as a reference, with the information organized in a way to make it easily accessible.

The information provided by these two resources is presented differently but the content is the same. The overall purpose of the Field Guide to Testing Deicing Chemicals is to enhance the validity of field testing procedures and ultimately save agencies money, improve safety and increase efficiency.

See below for links to the manual and video.

Sources:
Green Values® National Stormwater Management Calculator

This free online tool is designed to take you step-by-step through a process of determining the average precipitation at your site, choosing a stormwater runoff volume reduction goal, defining the impervious area of your site under a conventional development scheme, and then choosing from a range of best management practices to find the combination of green technologies that meet runoff reduction goals in a cost-effective manner. Center for Neighborhood Technology.

Roller Compacted Concrete Pavements for Highways and Streets


ADA Best Practices Tool Kit for State and Local Governments

This resource is designed to teach government officials how to identify and fix problems that prevent people with disabilities from gaining equal access to state and local government programs, services, and activities. U.S. Department of Justice Civil Rights Division, updated 2007.

SPECIAL WORKSHOP:

GEO-SYNTHETICS for STREAM CHANNELS and CHANNEL STABILIZATION

This four-hour workshop on May 9 will include an introduction to geo-synthetic applications in public works, including an overview of products available, typical applications, and the rationale for use of geo-synthetics in stream channels. The workshop will include criteria in selecting the appropriate material and guidance on writing specs for use of geo-synthetic materials. Contact Kristin Kelly at kbkelly@ku.edu for more information or visit http://www.ksltap.org and click on “Register to Attend.”

By Lisa Harris

See download / ordering information on next page.
FREE ROAD & BRIDGE RESOURCES

Check off your selections, fill in the bottom portion, and return this form to:
Kansas LTAP Materials Request, 1530 W. 15th St., Room 2160, Lawrence, Kansas 66045 or fax to 785/864-3199

TRAINING GUIDES & REPORTS
You are free to keep these unless otherwise noted. Or you can download at the links provided.

Green Values® National Stormwater Management Calculator
See description on page 14. Center for Neighborhood Technology. Access this tool at:
http://greenvalues.cnt.org/national/calculator.php

Roller Compacted Concrete Pavements for Highways and Streets

ADA Best Practices Tool Kit for State and Local Governments
Online resource. See description on page 14. Download section by section at:
http://www.ada.gov/pcatoolkit/toolkitmain.htm

EQUIPMENT LOANS
We offer the following items for loan to local highway agencies.
Contact mgivechi@ku.edu for counter boards and weaver@ku.edu for the Safety Edge shoe. There could be a waiting list for these items.

Safety Edge Paving Shoe. This Advant-Edge shoe attaches to a paver with a universal bracket, provided with the shoe.

Turning Movement Counter Board DB-400, Jamar Technologies, Inc. A basic model for recording turning movements at intersections. The board is lightweight and comes with its own case.

Turning Movement Counter Board TDC-8, Jamar Technologies, Inc. Can be used to do turning movement counts, classification counts, gap studies, stop-delay studies, speed studies, and travel time studies. The board is lightweight and comes with its own case.

Request Form
❑ send materials indicated ❑ address correction ❑ add to LTAP Newsletter mail list ❑ send Road Scholar Program brochure
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http://www.ksltap.org

The Kansas Local Technical Assistance Program (LTAP) is an educational, technology transfer and service program of the Kansas University Transportation Center (KUTC), under the umbrella of the KU Transportation Research Institute. Its purpose is to provide information to local government highway departments and their personnel and contractors by translating into understandable terms the latest technologies in the areas of roads, highways and bridges.

The Kansas LTAP Newsletter is published quarterly and is free to counties, cities, townships, tribal governments, road districts and others with transportation responsibilities. Editorial decisions are made by Kansas LTAP. Engineering practices and procedures set forth in this newsletter shall be implemented by or under the supervision of a licensed professional engineer in accordance with Kansas state statutes dealing with the technical professions.

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