Maintaining township roads in Kansas—Which system is best?

by Lisa Harris and Norm Bowers

Responsibility for maintaining township roads in Kansas can be handled in a few different ways, each bringing plusses and minuses to counties. This article will describe the three road systems enabled by statute, and some thoughts about those systems by county road officials that have worked under them.

In Kansas there are three types of road systems for roads outside cities.

**NonCounty Unit Road System.** The NonCounty Unit Road System is also called the County-Township System. In this system the county maintains main traveled roads, which includes the county federal aid routes and those roads designated by the county commission as routes designed primarily for the movement of traffic between different areas of the county. The townships maintain the local roads that are not within a city. The county maintains all the bridges as well as those culverts with a waterway opening of 25 square feet or larger. Prior to 1917 the townships maintained all the roads, but since 1917 the County-Township System is the road system unless the county has elected to use one of the other road systems.

There are 35 counties in Kansas with this road system. Funding for the county roads is on a countywide tax basis with all property in the county having the same mill levy for county roads and bridges. Township road maintenance is provided by the townships and is funded from a mill levy on property within the township. Townships do not collect property tax for property within a city.

**County Unit Road System.** In the County Unit Road System the county is responsible for maintaining all the public roads outside the cities. The townships have no road maintenance responsibilities. The County Unit System was authorized by state law in 1917, but it takes action by the county to take over the township roads.

There are 65 counties in Kansas that... continued on page 2
Township road maintenance, continued from page 1

have this road system. Funding for all the county roads is on a countywide tax basis with all property in the county having the same mill levy for county roads and bridges. This results in a somewhat higher mill levy for city residents than with the County-Township System, as the city residents have to pay taxes for maintaining all the roads in the county, including the old township roads. This road system is authorized by KSA 68-515b.

The last county that converted to a County Unit System was Coffey County in 1979. It appears that there is currently a reluctance to convert to a County Unit System as this will increase the taxes for residents inside of cities.

General County Rural Highway System. The General County Rural Highway System, or County-Rural System is similar to the County Unit System in that the county maintains all the public roads outside the cities, and the townships have no road maintenance responsibilities. In this system, however, the county has to have two separate funds, one for the main traveled county roads, and one fund for what were previously township roads. The County-Rural System was authorized by state law in 1970.

There are just three counties in Kansas with this road system. Funding for the county roads is on a countywide tax basis with all property in the county having the same mill levy for county roads and bridges. Funding for former township roads comes from a mill levy on property within the townships. In this system city residents do not pay taxes for maintenance of the former township roads. The county has to keep track of expenses on their two road systems, and must ensure that the correct amount is spent on county roads and township roads. This road system is authorized by KSA 68-591.

Trends in road system conversion
This table illustrates the trend in conversion from the County-Township System to another road system in Kansas.

<table>
<thead>
<tr>
<th>Year</th>
<th>County Unit</th>
<th>County Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910s</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1920s</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>1930s</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>1940s</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>1950s</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1960s</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1970s</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>1980s</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1990s</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2000-2008</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Here are some comments about these systems from three county road and bridge professionals who have had experience maintaining both county and township roads.

Steve Liby. Steve is road and bridge administrator for Clay County, a rural county with a few small cities. In 2001, Clay County changed from a County-Township System to a County-Rural System. One of the factors contributing to the decision was that eight of their 18 townships had already contracted their road-work to the county (with county approval). As a result, county road operators were dead-heading as they went from one area to another, which was inefficient and costly.

“The County-Rural System is a bookkeeping nightmare.”

Liby favored the change to take over maintenance of the township roads, to provide better service to citizens in very rural areas and to make more efficient use of the county’s vehicles and resources. These objectives are being realized. Another thing that has been realized, however, is a big headache for the county.

“The County-Rural System is a bookkeeping nightmare,” said Liby. “Our employees need to keep track of the time they spend on township roads, and we bill that and all other equipment and material expenses for roadwork done in the townships to our township fund. We bill the fund monthly, to stay on top things,” he said. “I don’t like it.”

There are advantages to the new system, though, said Liby. Some townships, especially those with the fewest residents, are getting much better services. The county is also getting more utility out of its investments. “We used to have 25 motorgraders between the county and the townships combined; now we get by with 12,” said Liby.

Township roads also benefit from having access to more and better equipment to work on them. “Most townships had just a motorgrader, and maybe a rubber tire loader. Townships were using contractors to haul rock and road materials. Now we do all that,” said Liby.

Which system would Liby prefer if he had a choice? County Unit. It provides the same benefits to the community with much less hassle. Plus, cities would help support the roads out in the county, which Liby thinks is fair. “Rural residents travel on those roads to get to businesses in the cities,” he said.

Liby’s advice for communities considering switching from a County-Township System: “Go for County
Liby’s selling point to the township voters for changing to the County-Rural System was that citizens would notice a difference in the quality of the roads in the townships within five years. That goal was met. However, “there was a lot more work out there than I detailed,” Liby said.

Snow removal has been a big challenge. The county aims to plow the entire system in 8-10 hours in normal conditions. Public comment has varied. Some appreciate the new service, grateful that they can drive on plowed roads on the way to work. Others complain that they are being woken up by plows in the middle of the night.

Another big push in the new system has been tree trimming and vegetation removal. This was not welcomed by everyone. Some farmers with large equipment were delighted; before, they were having to go 4-5 miles out of their way to avoid trees overhanging the roads. Others did not want the trees and vegetation removed or trimmed for historical or habitat reasons. The latter group, about a dozen individuals, attended county commission meetings regularly to discuss their concerns. Farmers got wind of that, and at one meeting, 80 farmers showed up to share their perspectives. “That was great,” said Liby. “It was the one time I did not have to stand up and defend myself.”

The county uses a BuzzBar trimmer to trim trees and vegetation. “It makes a nice clean cut,” said Liby. “Once we were able to prove ourselves, the trimming was appreciated. Some residents even allow the county to cut their fence to push brush into their fields.”

Tree trimming has an added benefit for unpaved road maintenance—with more sun and wind reaching the roads, it helps them dry up faster.

When switching to the new system “In the end, it all boils down to cost,” said Liby. “Once we were able to prove ourselves, the trimming was appreciated. Some residents even allow the county to cut their fence to push brush into their fields.”

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“Cities are just not going to vote to make that happen, he said. “People are better informed these days, and they will not want to see their taxes increase to pay for maintenance in the rural areas.”

Leon Hobson, director of public works for Riley County, has had experience under two systems—the County-Rural System in Pottawatomie County (before Lowrey) and the County-Township System in McPherson and Riley Counties. Like Lowrey, he prefers the County-Township System.

“With the township system, the rural residents have a closer relationship with the decision makers for their roads. If there are complaints, the complaints go to the township officials. We would get inundated with complaints about township roads in Pottawatomie County,” said Hobson.

Hobson pointed out that when rural township roads are maintained by the county, residents who live on those roads expect a much higher level of service—oftentimes not justified due to low traffic volumes. He thinks it makes more sense to keep the township road responsibilities with the townships.
They’re tearing up our roads! — and what to do about it

The freight industry has a significant impact on the condition of the infrastructure in Kansas. Any road and bridge manager knows that trucks travel on local roads as well as interstates. However, local roads are not built to the same standards for handling heavy loads. County, city and township roads can see severe damage from semis and large agricultural equipment. With an increase in the average size of farms in the state, growth in large-scale agriculture-related industries such as feed lots and ethanol plants, and development of multimodal freight-transfer centers (such as one in the works for Gardner, KS), it is important to look at the impact trucks have on the local roads that cover much of the state, including unpaved roads.

What causes the damage?
The Minnesota Department of Transportation performed a study in which they found three common attributes associated with the degradation of pavement from trucking. These are:

1) exceeding the 20,000 lb single-axle weight limit;
2) having wide transverse tire spacing that distributes heavy loads to pavement edges which can cause critical stress. This phenomenon can decrease the design life of rigid pavements by up to 20 times. (In other words, a 20 year pavement would fail in one year); and
3) moving slowly, which increases the load duration—and rutting—

Conclusion
Kansas statutes provide different options for maintaining township roads. The County-Rural System, while a good idea on paper, comes with paperwork and complaint headaches for counties that give pause.

Liby, Lowrey and Hobson each shared their own views on maintaining township roads. Their perspectives are shaped by their experiences and by the characteristics of the counties and townships they have served. Which system is best? There’s no clear-cut answer, but, if you are considering switching from a township system to another system, we hope this article will give you some good food for thought.

Table 2. Lane miles by surface type for local Kansas roads

<table>
<thead>
<tr>
<th>General Information</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total County Reports Received</td>
<td>69</td>
</tr>
<tr>
<td>Total Miles of County Roads Reported</td>
<td>52051.60</td>
</tr>
<tr>
<td>Miles of Asphalt Roads</td>
<td>7692.39</td>
</tr>
<tr>
<td>Miles of Concrete Roads</td>
<td>127.22</td>
</tr>
<tr>
<td>Miles of Gravel Roads</td>
<td>34943.95</td>
</tr>
<tr>
<td>Miles of Earth Roads</td>
<td>9288.04</td>
</tr>
<tr>
<td>Total Number of Bridges Reported</td>
<td>11926</td>
</tr>
<tr>
<td>Total Miles of Township Roads Reported</td>
<td>14412.55</td>
</tr>
<tr>
<td>Miles of Asphalt Roads</td>
<td>396.49</td>
</tr>
<tr>
<td>Miles of Concrete Roads</td>
<td>3.50</td>
</tr>
<tr>
<td>Miles of Gravel Roads</td>
<td>9374.36</td>
</tr>
<tr>
<td>Miles of Earth Roads</td>
<td>3619.20</td>
</tr>
</tbody>
</table>

Source: Kansas DOT Bureau of Local Projects
Table 1.
Legal maximum dimension and load limits in Kansas

<table>
<thead>
<tr>
<th>LEGAL MAXIMUM DIMENSIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>8 1/2 ft.</td>
</tr>
<tr>
<td>Height</td>
<td>14 ft.</td>
</tr>
<tr>
<td>Length (Single Motor Vehicle)</td>
<td>45 ft.</td>
</tr>
<tr>
<td>Length (Truck-Trailer Combinations)</td>
<td>65 ft.</td>
</tr>
<tr>
<td>Length (Tractor-Trailer Combinations)</td>
<td>No Limit</td>
</tr>
<tr>
<td>Length (Single Semi Trailer)</td>
<td>59 1/2 ft.</td>
</tr>
<tr>
<td>Length of each Trailer when pulled in Tandem*</td>
<td>28 1/2 ft.</td>
</tr>
</tbody>
</table>

* A truck-tractor semi-trailer-trailer combination shall be used when pulling trailers in tandem.

<table>
<thead>
<tr>
<th>LEGAL WEIGHTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Axle</td>
<td>20,000 pounds</td>
</tr>
<tr>
<td>Tandem Axle</td>
<td>34,000 pounds</td>
</tr>
</tbody>
</table>

(Tandem axles with centers less than 40 inches apart are counted as one axle)

| Maximum Gross Weight Limit – Internates | 80,000 pounds |
| Maximum Gross Weight Limit – Other highways | 85,500 pounds |

The weight on any group of axles is limited by the Federal Bridge table


flexible pavements. Table 1 identifies the legal maximum dimensions and legal weights for trucks in Kansas.

The Kansas Department of Transportation (KDOT) Bureau of Local Projects has information on total miles of county and township roads from 69 out of the 105 counties in the state. Table 2 separates the miles of roads reported for these roads into type of surface—asphalt, concrete, gravel, or earth. Many of these roads are subject to large farm equipment that may exceed regulated truck dimensions. Of the total amount of lane miles reported for these 69 counties and townships, earth and gravel road accounts for over 86 percent.

To not create a burden for farmers, oversize permits are not required for farm implements transported during daylight hours on KS & US highways, per K.S.A. 8-1911 (a), but are needed on the interstate system. Trouble is, local roads are the least equipped to be able to carry oversized and heavy vehicles. They are generally not designed to carry heavy loads.

The heavy weight of trucks and farm equipment not only puts stress on roads, but also on bridges. In 2004, the federal Bureau of Transportation Statistics reported that there were 26,620 bridges in Kansas. 23.5 percent of those bridges were considered structurally deficient or functionally obsolete as seen in Table 3.

The farm connection

In 1970, the average size of a Kansas farm was 574 acres. By 2005, it increased to 732 acres. Further, between 1990 and 2002, travel on rural roads by large commercial trucks increased by 32 percent across the nation. Part of this trend is due to an increased percentage of agricultural products being shipped by truck rather than rail or barge, as well as the majority of livestock and other live animals being shipped by truck.

The Iowa Department of Transportation did some research on...
Table 4.
Effect of different vehicles on roadway pavement

<table>
<thead>
<tr>
<th>Type</th>
<th>Type</th>
<th>Axles</th>
<th># Passes to Failure 6&quot; PCC</th>
<th># Passes to Failure 7&quot; PCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Axle Tractor-Semitrailer 80,000 lbs.</td>
<td>1 Single/2 Tandems</td>
<td>12,000</td>
<td>135,000</td>
<td></td>
</tr>
<tr>
<td>7-Axle Tractor-Semitrailer 96,000 lbs.</td>
<td>1 Single/2 Tridems</td>
<td>78,000</td>
<td>175,000</td>
<td></td>
</tr>
<tr>
<td>Grain Cart - 900 bu. 58,000 lbs. (20% on tow vehicle)</td>
<td>Tandem</td>
<td>200</td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td>Grain Cart - 875 bu. 57,000 lbs. (20% on tow vehicle)</td>
<td>Single</td>
<td>&lt;10</td>
<td>&lt;30</td>
<td></td>
</tr>
<tr>
<td>Grain Cart - 650 bu. 42,000 lbs. (20% on tow vehicle)</td>
<td>Single</td>
<td>&lt;30</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td>Grain Wagon - 775 bu. 49,000 lbs.</td>
<td>2 Singles</td>
<td>1,000</td>
<td>60,000</td>
<td></td>
</tr>
<tr>
<td>2 Grain Wagons - 450 bu. 31,000 lbs.</td>
<td>4 Singles</td>
<td>106,000</td>
<td>239,000</td>
<td></td>
</tr>
<tr>
<td>Combine - Empty 27,500 lbs. w/o corn head</td>
<td>2 Singles (1 tire on pavement)</td>
<td>18,000 front/9,500 rear</td>
<td>3,790,000</td>
<td>8,468,000</td>
</tr>
<tr>
<td>32,000 lbs. w/corn head</td>
<td>26,000 front/6,000 rear</td>
<td>887,000</td>
<td>1,980,000</td>
<td></td>
</tr>
<tr>
<td>Combine - w/240 bu. 41,000 lbs. w/o corn head</td>
<td>2 Singles (1 tire on pavement)</td>
<td>27,500 front/13,500 rear</td>
<td>712,000</td>
<td>1,591,000</td>
</tr>
<tr>
<td>48,000 lbs. w/corn head</td>
<td>36,000 front/10,000 rear</td>
<td>100,000</td>
<td>456,000</td>
<td></td>
</tr>
<tr>
<td>Large Row Crop Tractor 18,000 lbs.</td>
<td>2 Singles</td>
<td>11,000 front/7,000 rear</td>
<td>1,525,000</td>
<td>3,410,000</td>
</tr>
<tr>
<td>Liquid Manure Tanks 10,000 gallon - 96,000 lbs.</td>
<td>2 Tandems</td>
<td>&lt;10</td>
<td>&lt;30</td>
<td></td>
</tr>
<tr>
<td>7,500 gallon - 71,000 lbs.</td>
<td>26,000 front/70,000 rear</td>
<td>1 Tandem</td>
<td>&lt;10</td>
<td>&lt;30</td>
</tr>
</tbody>
</table>

*Source: Iowa Department of Transportation.

They're tearing up our roads, continued from page 5

road stress due to heavy loads. They looked at semi trailers and various pieces of farm equipment and determined the number of passes to failure on 6 inch and 7 inch Portland Cement Concrete (Table 4, above).

As the table shows, farm equipment such as grain carts and liquid manure tanks have a greater impact on roads than semi trailers. Semi trucks are designed to disperse weight across multiple axles to minimize pavement damage. Grain carts, liquid manure tanks, and other farm equipment have fewer axles, and carry loads that exceed the maximum axle loads permitted on commercial vehicles. The result of these higher loads on fewer axles is consumption of pavement life with fewer passes. This stress is compounded on bridges as many implements of husbandry are exempt from weight limits placed on bridges. Because of this, rural roads and bridges are subject to experience a quicker degradation.

Iowa’s research studied affects on concrete pavement. Structurally equivalent asphalt pavements would be expected to have similar impacts. However, most county and township roads in Kansas are not structurally equivalent to those in the study. The base and subgrade of the road are not designed to handle heavy loads. Heavy loads would have much higher impacts on the lower-volume roads in Kansas.

Agricultural equipment possesses the ability to have a much more damaging effect on roads that are not hard-surfaced. Factors include the season, load level, thickness of the crushed aggregate base (CAB), and soil type. The damage caused to a soft soil compared to a strong soil will be significantly higher during the wet season.

What to do?
Because varying conditions exist, it can be difficult to make generalized recommendations for improving road conditions. However, agencies can reduce the possibility for road damage at specific locations by designing a thicker CAB layer, improving the ability to keep water off the road, or by enforcing legal load limits.

Local officials that heavy loads on their roads can use the information above to argue for budgeting for sufficient road maintenance based on road use in their area. Sometimes business-
es that generate the heavy traffic will contribute part or all of the cost for upgrading key roads. In the case of gravel roads, proper grading to maintain a good crown will help keep water from forming puddles and causing soggy spots, and big headaches for the local government and its citizens.

Other ideas for accommodating heavy loads or addressing associated problems include:
— seal cracks in asphalt;
— maintain good drainage;
— budget for significant road improvements to carry heavy loads (asset management can help you determine how much is needed);
— work with the businesses that generate heavy loads to share cost of reconstructing critical stretches of road to a higher standard;
— discuss the problem with local law enforcement and judges and ask for better enforcement and steeper fines;
— set Spring weight limits if you have significant freeze/thaw problems;
— install geosynthetics on chronic problem areas on unpaved roads.

**Educate your commissioners with this brochure & video**

Kansas LTAP is producing a brochure that summarizes the main points contained in this article. This would be useful for sharing with your commissioners. To order a copy, turn to page 15.

Another resource on this topic, advertised previously, is the video “How Heavy is Too Heavy for the Roads of Kansas?” Produced by KDOT and FHWA, this shows how heavy vehicles damage roads. Order the video in VHS or DVD format from the Kansas LTAP lending library at www.ksltap.org.

3. Ibid.

**Ask the expert: What experience have you had paving gravel roads?**

Comments by Ken Skorseth, South Dakota LTAP . . . . . . . . . . . . . . .

A good gravel road is not necessarily a good base for asphalt. There are problems with excess fines, crown, and depth. While surface gravel needs a good percentage of fines to give it a binding characteristic, base material needs cleaner material with fewer fines.

Gravel roads have a greater crown than you want on an asphalt surface. Unless you reshape them you can have problems. For example, I’ve seen some sealcoated roads where after ice storms cars would slide off.

An average gravel road has about four inches of surface gravel. This is not adequate base for an asphalt surface. If you have any truck traffic at all, you need a minimum of six inches of base, and preferably eight. Otherwise you will have tremendous pavement breakup problems.

Excerpted from “Gravel Road Q&A,” Summer 1997 Crossroads, a publication of the Wisconsin Transportation Information Center.
Geosynthetics can help strengthen unpaved roads

There is an old saying about roads: “If you can drain it, you can maintain it.” Excessive water in a roadbed is the most common cause of rutting on rural roads. A poor or insufficient base compounds the problems caused by water. Common sources of water in the roadbed are underground springs in or near the roadbed, a high water table in areas having flat terrain, or low areas where surrounding fields are higher than the roadways and there is nowhere to divert the water. The problem may be a continual one such as ground seepage or an intermittent one due to rain or flooding. Improving drainage is desirable but cannot always be accomplished. To increase the stability of weak subgrades and to increase the load bearing capacity while reducing the cost of maintaining the road, geotextiles have been used successfully.

The function of geotextiles

The four primary functions of geotextiles when they are used on unpaved roads are as follows:

1. **Separation** is the main benefit in stabilization work with geotextiles. It has the ability to prevent the intermixing of two materials. With a geotextile in place, aggregate base materials under load are not forced into the subgrade. Subgrade soils cannot mix with the clean aggregate layer. Without geotextiles the aggregate and weak subsoil would mix. Load bearing capacity would be reduced and rutting accelerated. The fabric would allow water to pass through while preventing the layers from mixing.

2. While acting as a separator, the geotextile may also function in a **filtration** and drainage capacity in wet or saturated soils. Under load, high pressure creates a soil slurry that “pumps” upwards against the fabric. The fabric acts as a filter, screening out the fines from contaminating the aggregate layer while allowing water to drain freely through the aggregate. Filtration is the process of allowing water to pass through the fabric while preventing soil migration. Evaporation from underlying soil can proceed, preventing development of water pockets and hydrostatic excessive pressure due to rapid or repeated loads.

3. **Drainage** can be critical to the structural performance of a road. Water must be able to pass through the fabric. If the subgrade soil is subjected to persistent or even occasional wet conditions, the section must be permeable to allow rapid drainage of water from the loaded subgrade soils up into the free drainage aggregate base. Maintaining the drainage of the aggregate base and of the subgrade soils is very important in preventing failure of the support system.

Benefits of using geotextiles

- reduced maintenance costs;
- reduced depth of the structural section required to carry the load;
- reduced initial construction costs;
- possibility of reclaiming aggregate used in temporary roads;
- structural section life is prolonged and maintenance costs reduced because soil intermixing is restricted;
- cost effectiveness—approximately 33 percent reduction in aggregate required in the initial design of unpaved structural sections.

Woven vs. nonwoven textiles

Woven fabrics have a higher modulus (stress/strain) and develop maximum tensile strength with minimum elongation, but woven fabrics have lower abrasion resistance, less permeability, and poorer surface structure friction than nonwoven fabrics. Passage of water within the plane is defined as lateral permeability or transmissivity.
Woven fabrics do not pass within their plane, and because they do not, woven fabrics can be a problem on gravel bases. Woven fabrics should only be considered for locations that are fairly dry, where abrasive forces are minimized, and where soil/fabric/aggregate friction characteristics are not important.

Nonwoven fabrics offer superior resistance to abrasion damage and provide excellent characteristics for separation and filtration/drainage. Under the load they developed high tensile strength and have good friction properties, making them excellent for reinforcement.

Nonwoven fabrics have the capacity of passing water through both normally and within the plane. Nonwoven geotextiles are recommended for most unpaved road applications.

Installing geotextiles
For geotextiles to perform well in road stabilization, the fabric chosen must be of the proper type and it must be installed properly. Fabrics damaged during placement or installed in a highly wrinkled condition will not perform well. The aggregate overlay must be placed to its full depth and must be applied in a way that will not cause damage to the fabric from movement of construction equipment. The performance of geotextiles will be no better than selection and installation procedures.

Packaging and storing
Geotextiles come in rolls that are wrapped for protection from moisture and ultraviolet light. If these are stored outside, they should be elevated and covered with waterproof protection.

Site preparation
Clear and grade the area. Remove sharp objects. Cut trees and shrubs flush with the subgrade. Top soil and vegetation need not be removed. Excavate soft spots, backfill, and compact so filled area provides an equal stability with the adjacent areas. Grade the surface as much as possible to provide surface drainage and cross slope shaping. Tight blading will provide a smooth surface to support the fabric and will also provide a well-established crown. When roadbed material contains gravel, as the blade or grader drags the surface, sharp tips and edges on the gravel will be rolled over and become flush with the surface, reducing the possibility of punctures or tears in the fabric.

Unroll the geotextile in the direction of the construction traffic. Overlap in the direction of subbase replacement. Overlap is dependent on load bearing capacity of the subgrade, and it varies from 2 to 3 feet. Dump the aggregate on top of the geotextile. Overlap to avoid separation.

Aggregate depth is determined by subgrade strength and anticipated wheel loading; usually 4-6 inches is used. Compact the aggregate using conventional methods. Vibratory compaction is NOT recommended.

Damage repair
If the geotextile is damaged during the installation process, repairs can be made. Clear the damaged area plus three additional feet of all fill material. Cover area with a geotextile patch extending three feet beyond the perimeter of the damage. Replace subbase material and compact.

Adapted with permission from the Kentucky LTAP Center’s newsletter, The Link, Winter 2004/2005 edition, from material published by the South Dakota LTAP Center in their Special Bulletin #17, 2005.

Other resources on use of geotextiles on gravel roads:
- AASHTO M-288-00 Specification Geotextile Selection Guide. This can be found on the Web sites of most major vendors for geosynthetics.
- The following resources are available from our lending library at www.ksltap.org.

Geotextile Installation on Gravel Roads, 43 min. video, produced by Oklahoma LTAP, 1989.

Information on RoadSoft

... by Lisa Harris .................

I have been getting requests for more information about RoadSoft, the asset management software Terry McNinch mentioned at his keynote speech at the Spring Kansas County Highway Association meeting. For those of you who were not there, Terry showed how asset management software can help you plan, report, and explain how much you will spend throughout the life of your road network. You can easily determine the cost of maintaining a 100-mile road network for 20 years, or determine the best maintenance decisions if you have millions in special funding over a specified period. RoadSoft’s reports are easy to understand for the non-engineer and they explain in financial terms why you make the engineering decisions you make. More details are at www.roadsoft.org. Check out the Strategy Evaluation link under “Asset Management.”
A Leg Up

Road maintenance is a key component in bicycle safety

[Editor's note: While searching for some practical tips on maintaining streets for bicycle safety, I came across the excellent Web site of the American Trails Organization at http://www.americantrails.org. The organization is devoted to trail and roadway development and maintenance for a variety of day-to-day and recreational uses. Its “Resources and Library” link includes the following guidance from the Pima County, Arizona, Department of Transportation. This guidance covers specific issues and goals for maintaining bikeways and the roadway edge where the majority of bicycling takes place. —L.H.]

Maintenance of roadways and bikeways is important for user safety and for protection of public funds invested in these facilities. Well-maintained facilities lead to minimized road hazards and to increased usage of facilities.

Investment of public funds in maintenance of existing roadway and bicycle facilities is as essential as the development of new facilities. Most jurisdictions can readily point to a backlog of maintenance needs indicated by needs assessments performed by transportation agencies, pavement management systems maintained by the agencies, and public surveys and input.

The information below discusses bicyclists’ needs for well-maintained roadways and bikeways and provides goals for improved maintenance. Maintenance of the on-street bikeway system should be included directly as part of standard roadway maintenance.

To the degree feasible, maintenance of bikeways should be further emphasized based upon public requests and on routine inspection for cracks, pavement damage, and accumulated debris.

User needs

Roadways and bikeways should be maintained to accommodate all users of the facilities to a reasonable level of safety. As the American Association of State Highway and Transportation Officials (AASHTO) 1991 Guide for the Development of Bicycle Facilities states, “to varying extents, bicycles will be ridden on all highways where they are permitted.”

Maintenance of roadways and bikeways for bicycle use is based in part on an understanding of bicyclists’ needs, particularly concerning the roadway edge where the majority of bicycling takes place. Ridges and cracks, such as often develop between the roadway pavement and gutter pan or shoulder, can be hazardous to bicyclists. Existing drainage grates that have longitudinal slots or that are not flush with pavement can trap a bicycle wheel and contribute to accidents.

Common maintenance concerns such as potholes, cracks and debris in the roadway cause problems not only for bicyclists but for motorists as well. Wet leaves, rocks, gravel, sand, snow, ice, branches, and glass present difficulties for bicyclists, often causing bicyclists to use more of the travel lane or even swerve unpredictably in order to avoid these hazards. Responsive and appropriate levels of sweeping and maintenance will facilitate safe and responsible bicycle travel on roadways and bikeways.

Maintenance goals

Sweeping. Accumulated debris at the roadway edge or in the bicycle lane is one of the most common obstacles to safe use of facilities by bicyclists. A regular inspection and maintenance program is important to prioritize limited sweeping resources, and helps identify other problem conditions including potholes and cracks.

Goals:

1. Inspect arterials and collectors, once per year.

2. Respond to service requests within a week or sooner if possible to remove potentially hazardous debris.
3. Sweep arterials and collectors (including the bike lane area) once per month, or more frequently as needed based on inspections and service requests.
4. Sweep local roadways four times per year or more frequently based on inspections and service requests.
5. Remove debris from the curb and gutter pan area.
6. Sweep up debris as soon as possible after accidents to a level sufficient to accommodate bicycle travel.
7. Remove sand and cinder materials after the winter season ends or after major storms in high bicycle-use areas.

Surface Repairs. Maintenance of the roadway and bike lane pavement surface to acceptable standards is important to attract potential bicyclists to use facilities as well as to safely provide for existing users. Enhanced maintenance levels and preventative maintenance practices are desirable to provide rideable surface pavement, minimizing bumps, cracks, edges or drop-offs, ridges, and potholes. As mentioned previously, inspection and service response practices for roadway and bikeway sweeping can be combined with those for pavement surface maintenance for improved efficiency.

Goals:
1. Inspect arterials and collectors once per year for pavement surface problems and to rate pavement condition, or more frequently based on service requests.
2. Repair bikeway surface problems when identified or requested. Seal pavement cracks including between the asphalt pavement and gutter pan, and grind down surface bumps and ridges in the pavement which may develop in this area. Cut back on intrusive tree roots and repave or grind pavement to provide a rideable surface.
3. Respond to service requests based upon priority, and repair potentially hazardous conditions within 48 hours.
4. Prevent the edge of a roadway repair or utility cut from running through a bike lane if possible. If repairs are necessary in the bike lane, consider requiring contractors to repave it flush with the existing pavement surface free of bumps or depressions, and to maintain this surface for one year. Provide safe passage for bicyclists through or around barricade areas.
5. Repair pavement edge raveling on uncurbed roadways on a timely basis to help extend the life of the pavement and to maintain a rideable surface area.
6. Sweep project areas of debris after roadway pavement repairs, and remove any large, excess asphalt bumps left behind on the pavement surface.

Pavement Overlays. Pavement overlays improve conditions for motorists and bicyclists by eliminating cracks, bumps, potholes, and ridges in the pavement. Pavement overlays and roadway rehabilitation projects are also good opportunities to provide additional space for bicycling by widening the pavement surface area and/or by restriping the roadway to provide bike lanes or wide curb lanes.

Goals:
1. Coordinate the overlay schedule for opportunities to provide bike lanes or wide curb lanes as part of overlay projects.
2. Extend the pavement overlay over the entire surface area of the road and shoulder or at least 5 feet to the right of the painted edgeline if a bike lane or paved shoulder bikeway is provided. Ridges or edges should not be left in areas where bicyclists ride.
3. Overlay the pavement flush with the gutter pan to reduce problems for bicyclists with ridges and cracks.
4. Pave gravel driveway and side street approaches from the edge of the roadway to the county right-of-way line to help prevent loose gravel and rocks from being brought up onto the roadway or bike lane area. If the right-of-way line is close to the edge of roadway, coordinate with local property owners to the degree feasible to pave further along driveways from the roadway edge.
5. Sweep the project area and remove excess pavement after completion of the overlay.
6. Bring drainage grates, manholes and utility covers to grade after repairing.

Vegetation. Plantings along the side of the road or bikeway may encroach or cause sight distance problems for motorists or bicyclists at driveways or intersections. Encroachment causes bicyclists to ride further into the travel lane to avoid branches or to swerve unexpectedly. Plants blocking motorists’ views may cause them to extend their vehicles further into the travel lane or block the entrance to a sidewalk, bike lane, or multi-use trail in order to see. This may cause motorists to move into the path of oncoming vehicle, bicycle, and pedestrian traffic.

Goals:
1. Maintain trees and shrubs along roadways and bikeways to prevent encroachment from branches.

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Road maintenance / bicycle safety
continued from page 11

2. Respond to maintenance requests for trimming of branches within 48 hours or sooner if warranted.
3. Trim trees and shrubs to provide adequate sight distances at street intersections.
4. Require property owners to maintain vegetation satisfactorily to established standards, where applicable.
5. Cut back on intrusive tree roots and repave or grind pavement to provide a ridable surface. Utilize appropriate treatments to prevent pavement breakup caused by weeds or other plants growing through the pavement.

Signs, Stripes and Legends. Signs, stripes and legends fade over time as they are exposed to the elements and, for stripes and legends, to traffic traveling over their surface. Regular inspection and maintenance is important to support regulatory and advisory functions of signs, to increase the visibility of bikeway facilities, and to reduce liability of responsible agencies.

Goals:
1. Inspect signs, stripes and legends on bikeways on an annual basis or as part of service requests.
2. Replace defective or missing signs as soon as possible.
3. Repaint bike lane stripes and legends once per year, and in high bicycle-use areas potentially twice per year.

Drainage Facilities. Drainage facilities should be designed and maintained with consideration for bicycle traffic. Over time, drainage grates may shift or separate, longitudinal slots may develop, and grates may not have been brought to grade as part of periodic overlay projects. Also, curbs to divert surface drainage into catch basins may have been constructed in the bike lane or roadway shoulder area, thereby presenting hazards to bicycle traffic.

Goals:
1. Raise drainage grates flush with pavement.
2. Respond to service requests within 48 hours to modify or replace deficient drainage grates with bicycle-safe grates.
3. Address drainage problems where water puddles at roadside edge and remains for extended periods of time, affecting the ability of bicyclists to ride along the roadway or in the bike lane.
4. Remove existing drainage curbs that encroach into the roadway or bike lane.

Chip Sealing. Chip sealing can leave rough surfaces for bicycling. Chip seals that cover the roadway surface but only part of the shoulder area can cause difficulties for bicyclists due to a ragged edge or ridge. During chip sealing, small rocks can be kicked up from motor vehicles and can be hazardous to bicyclists as well as can crack vehicle windshields. When possible, other alternatives to chip sealing should be utilized [especially on bike routes].

Goals:
1. Cover only the travel lanes with chip seal and do not leave ridges at the bike lane stripe or painted edgeline on roadways with bike lanes or paved shoulders that are in good condition.
2. Use 1/4 inch chip seal material for bike lanes or shoulders which must be chip sealed as part of a roadway chip seal project, and chip seal the entire bike lane or shoulder rather than just a portion of it. The 1/4 inch chip seal may also be utilized on the travel lanes for improved efficiencies of application.
3. Use standard sweepers or vacuum sweepers on the roadway after chip sealing, with particular attention to the bike lane or roadway shoulder where greater amounts of loose chip seal material may accumulate.
4. Bring drainage grates, manholes, and utility covers to near grade after chip sealing.

Raised Pavement Markers. Raised pavement markers can be hazardous to bicyclists and can be problematic to maintain under traffic and snow removal conditions. The AASHTO 1991 Guide for the Development of Bicycle Facilities states that “Raised pavement markings and raised barriers can cause steering difficulties for bicyclists.” The Manual on Uniform Traffic Control Devices (MUTCD) also states that “Raised markers generally should not supplement right edge lines.”

Goals:
1. Remove existing raised pavement markers on edge line stripes and do not place on new edge line stripes.
2. If absolutely necessary for motorist safety, relocate markers to the motorists’ side of the stripe.
3. Uses pavement markers that are flush with the pavement surface that do not cause steering difficulties for bicyclists.

Source: www.americantrails.org/resources/trans/bikemaintpima.html
Revised environmental provisions in the works for KDOT contracts

... by Lisa Harris .................

KDOT has provisions in its Local Project contracts that identify environmental hazards on projects and how to address them. A new staff attorney for KDOT, Erika Bessey, is proposing changes to update and tighten the language to reflect current state and federal law.

What will the changes entail?
Bessey, who works for the Bureau of Construction and Maintenance, says that the language will be tweaked to cover more types of environmental contamination. Currently, the major emphasis is on underground storage tanks and hazardous waste which are both components of the Resource Conservation and Recovery Act; references to the Clean Water Act and Oil Pollution Act will added, among others. Definitions regarding liability and hazards will also be clarified and more federal and state statutes will be referenced directly in the contracts.

What will this mean for counties and cities?
When revised, some of the contracts may refer to the local government’s responsibility in exercising “proper due diligence”—essentially, being aware of potential hazards and making sure they are addressed by the contractor. Your city or county attorney can provide more information on steps to take in exercising (and documenting) due diligence. Bessey says that “due diligence has been a huge issue in environmental law in the last ten years.”

If you haven’t been exercising due diligence, it’s in your best interest to step up your project supervision and address any problems that exist.

Common sense advice on environmentally sensitive road maintenance

... by Lisa Harris .................

In the last year the Pennsylvania DOT published a manual entitled Environmentally Sensitive Maintenance for Dirt and Gravel Roads. You may have seen mention of this manual on the National Association of County Engineers Web site. It was written by two engineers who have experience as LTAP trainers in Pennsylvania, and was funded in part by the US EPA.

There are several things to recommend about this manual.
First, it is well-written, easy to understand, and contains illustrations and photographs to help convey the information.

Second, it is very comprehensive, with information on drainage, culvert design, erosion control, dust control, you name it.

Third, with the knowledge that “comprehensive” can often mean “lengthy,” the last part of the manual contains a series of technical sheets that condense the information in the manual into a few pages for each subject—each of them easy to carry in a clipboard or glovebox.

The manual is designed to provide common sense environmentally sensitive maintenance “tools” and practices, and it delivers.

The manual is available for free download at http://www.epa.gov/owow/nps/sensitive/sensitive.html
What’s New

... by Lisa Harris

Key Intersection Safety Resources
This is a list of publications, CDs and training courses offered by FHWA to assist transportation departments with understanding and addressing safety problems at intersections. Published by FHWA, 2008.

Best Practices
In 1999, the US DOT sponsored the Common Ground Study (CGS) to identify and validate existing best practices performed in connection with preventing damage to underground facilities. These excavation-related Best Practices are divided into eight chapters covering:
—planning & design best practices
—One Call Center best practices
—location & marking best practices
—excavation best practices
—mapping best practices
—compliance best practices
—public education best practices
—reporting/evaluation best practices

Download the 2008 version at www.commongroundalliance.com. Look for version “5.0” in the left hand column. Or you can order a hard copy from the same Web site.

At the Crossroads
This guidebook chronicles the long decline of road conditions, offers insights into the causes, and discusses the advantages and cost-savings of asset management and pavement preservation rather than short term, “worst first” policies. Published by the National Center for Pavement Preservation, 2007.

Kansas Road Scholar Program brochure, October 2007. This is the latest version of this brochure which shows the required courses for the three road scholar levels in Kansas—technical, supervisory and executive. Also describes how the program works and where to get more information.

Calendar

See our Web site for even more calendar listings. Go to www.ksltap.org and click on “Training Calendar.”

Coming this fall:

*Local/State Project Coordination Location and Dates TBD ▲M

*Overview of Engineering Functions in Public Works Location and Dates TBD ▲M

October 23
County Government/ City Government 101 Service Excellence in Local Government ▲T in Great Bend, KS Call Sarah Meyer, KAC 785-272-2585

*Bridge Maintenance
Nov 4 – Garden City
Nov 5 – Salina
Nov 6 – Topeka

*For information on calendar items indicated with an * or to suggest a topic for an LTAP workshop, contact: Kristin Kelly, LTAP Training Coordinator, 785/864-2594, kbkelly@ku.edu.

▲T = KS Road Scholar Program—Level 1 Technical skills required course
▲S = KS Road Scholar Program—Level 2 Supervisory skills required course
▲M = KS Road Scholar Program—Level 3 Master Road Scholar required course
Free Resources

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

Publications ..................
You are free to keep these unless otherwise noted.
See descriptions on pages 1 and 14.

❑ Road stress brochure for Kansas
  See description on page 7. Please indicate the number of copies you would like to receive. ________

❑ Key Intersection Safety Resources
  See description on page 14. Published by FHWA, 2008.

❑ At the Crossroads
  See description on page 14. Published by the National Center for Pavement Preservation, 2007.

❑ Kansas Road Scholar Program brochure
  October 2007. See description on page 14. Please indicate the number of copies you would like to receive. ________

Equipment .................
We offer turning movement counter boards for loan to local highway agencies. Call us at (785) 864-5658 to arrange a loan.
There could be a waiting list for these items.

❑ 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.

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*For requests outside the United States: After receiving your request, we will notify you of the postage cost and will send materials after receiving payment for postage.
Let us at the KUTC help you find the answers to your transportation-related questions.

KUTC, 1530 W. 15th St. #2160, Lawrence, KS, 66045
Call 785/864-5658 (fax 785/864-3199)
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The Kansas Local Technical Assistance Program (LTAP) is an educational, research and service program of the Kansas University Transportation Center (KUTC), located in the University of Kansas School of Engineering. Its purpose is to provide information to local and county highway agencies and transportation personnel by translating into understandable terms the latest technologies in the areas of roads, highways and bridges.

The KUTC Newsletter is one of the KUTC’s educational activities. Published quarterly, the newsletter is free to counties, cities, townships, tribal governments, road districts and others with transportation responsibilities. Editorial decisions are made by the KUTC. 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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